

# SumProduct

NEWSLETTER #97 - December 2020

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## Our newsletter turns 8!!

'Twas December 2012, just before SumProduct's very own third birthday, when we unleashed our first newsletter – who would have thought we'd still be doing monthly newsletters of 500 pages or more (well, seems like it anyway!) eight years later?

It may be the end of the year, but there is no letting up as we say goodbye to 2020 (not many will be sad to see it go). This month we look at Excel Organization Data Types from Power BI, the fact after 900 years of Excel you may now unhide multiple sheets and even divulge that **LET** has been let loose.

The regulars are all in another jam packed newsletter too: we have another Beat the Boredom Challenge, Visual Basics, Power Pivot Principles, Power Query Pointers, Power BI updates, the A to Z of Excel Functions look at two very different FILTER functions, and there is even space for Keyboard Shortcuts (how would you function without them?).

Happy reading and remember: stay safe, stay happy, stay healthy.

Until next year. Season's greetings to you all / happy holidays.

*Liam Bastick*, Managing Director, SumProduct

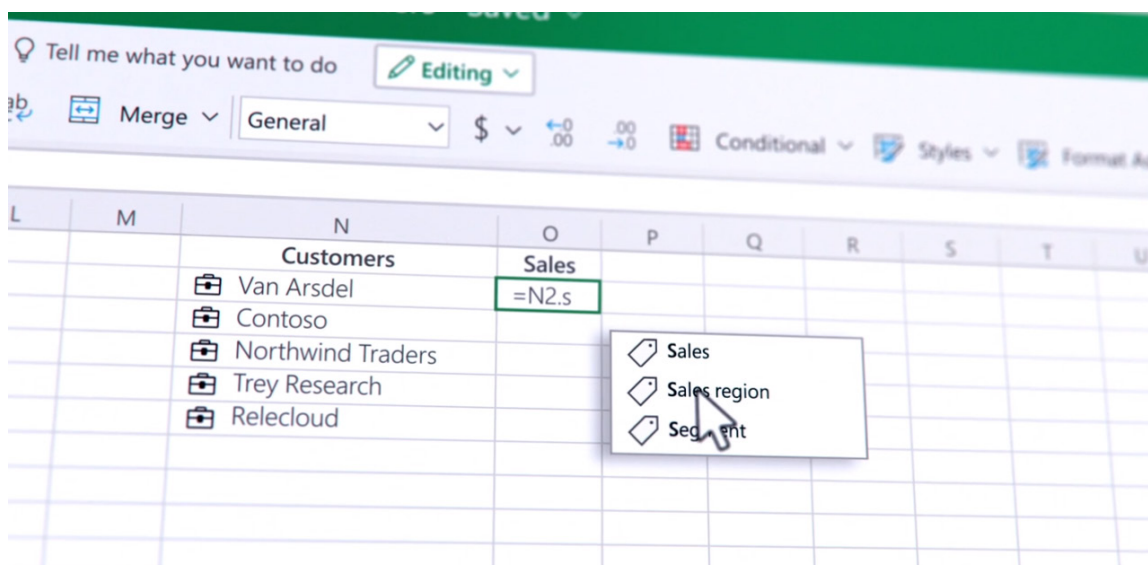


## Excel Organization Data Types from Power BI

You might be starting to get lost with all these new fangled features in Excel, but that's because the change of pace for the pace of change is getting very noticeable. We all work with data, day-in, day-out, and Excel already has powerful features to get and transform your data, using Get & Transform / Power Query and Power Pivot. Now, Power BI gets in on the act, as enterprise data discovery and analysis becomes more readily accessible in Excel. From late, late October, Organization data types from Power BI have become Generally Available, making it even easier to get information into your spreadsheets.

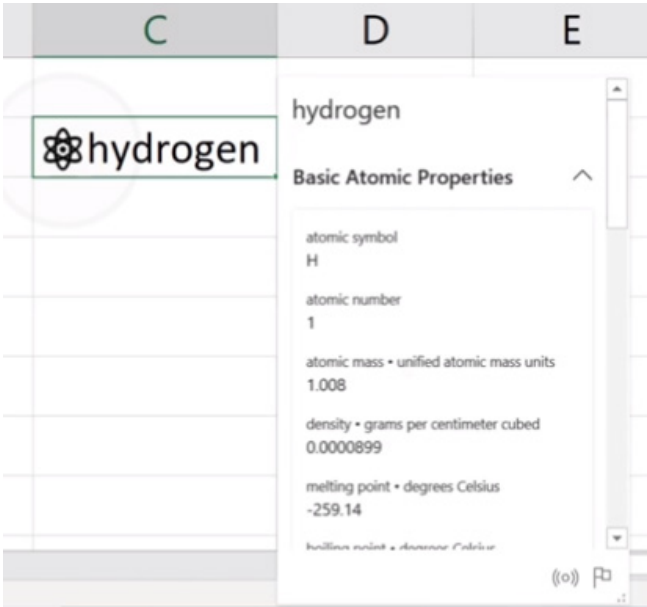
It's all to do with the evolution of Data Types.

For many years, Excel was seen as "just" a three-dimensional spreadsheet, merely data in rows and columns, across multiple sheets. Let's be honest: it was very good at that. But it had its limitations. This had limitations when you wished to analyse data in more dimensions. Now, Data Types adds more dimensions to your data, like the relational database countless users try to build in Excel every day. Any cell may now contain a rich set of structured data in just a single cell.




Data types are rich (hence, they are often referred to as “rich Data Types”), going well beyond numbers and text strings: just one cell value can contain a deep collection of hierarchical data, references to other data types, images, etc. They are also connected and can point to live services providing data that can be refreshed at any time, such as one of the first types, Stocks.

With Data Types, a single cell value can have a live connected set of information you can quickly pull into your decision-making process, without needing to constantly go back to the original source to find more information. You may leverage the card view



to see more information on that Data Type, and navigate through to related information. That additional information can be used in the formulae you write, charts you create, it can even be used to change how you sort and filter.

In addition to the flexibility, data types also give you more confidence in the data you are viewing. For example, if you were to import the data type for Seattle, you can now use a formula to reference the population =**A1.population**.

City	 Seattle
Population	729,601
Area	
State	
Country	

If the data type updates, the results of the formula will update too. Just seeing the static number 729,601, you also can see the formula and you now know exactly where that number came from, and even have the ability to ‘Refresh Data’.

create your own Data Types connecting directly to almost any data source you want. Excel has always supported a large set of data sources for direct import into the spreadsheet, and thanks to Power Query, you can also build powerful queries and transformations to get the data you’re looking for.

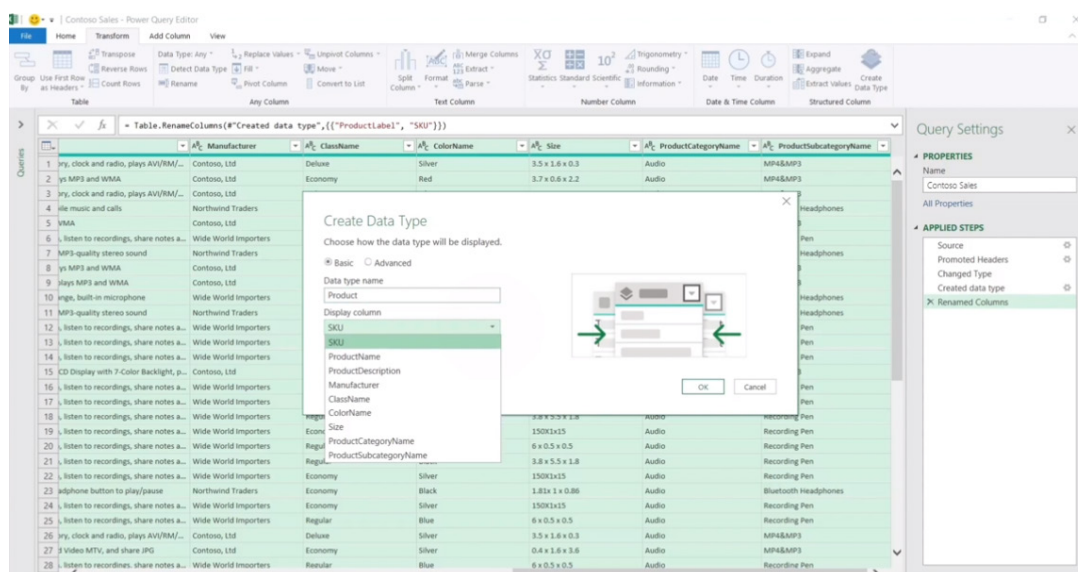
While publishing your data into Power BI gives you and your team an easy way to discover and import data types into Excel, you can also



This is the data you’re looking for...

Now, when you import data into your spreadsheet, you'll have the option to transform that data into a Data Type. In Power Query, you can create your very own custom data types using any source of Organization (*sic*) data available within the Get Data menu, e.g. files, databases, online services, other sources – the list is long. From here, you can pull in,

clean up and curate, and transform that data into custom Data Types according to your needs and preferences. These Data Types live within the workbook you're building, allowing you to simplify large volumes of data and make it easier for colleagues to consume.



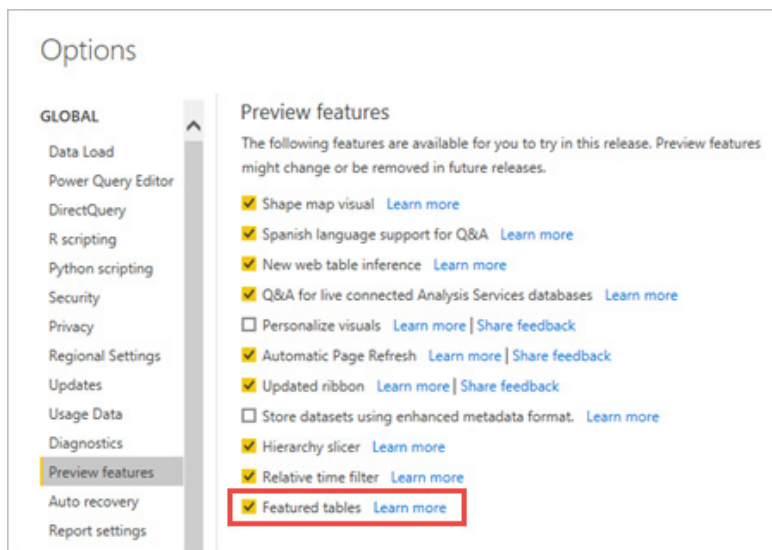
Power Query data types will automatically update from the connected data sources too.

But that's not all: with Wolfram Alpha data types, there are hundreds of additional Data Types coming to Excel, and we have previously discussed some of these in past newsletters.

Now that Data Types may use information from your company or organisation, leveraging Power BI as an ideal source of authoritative data as the next step makes sense. This adds centralised and controlled access, row-level security, and Microsoft Information Protection (MIP) sensitivity labels to the flexible and familiar environment of Excel.

The first step to using Organization Data Types is determining what information from Power BI you want, then simply enable them for Excel. To do this, you need to define tables as 'featured tables' in Power BI. To do this:

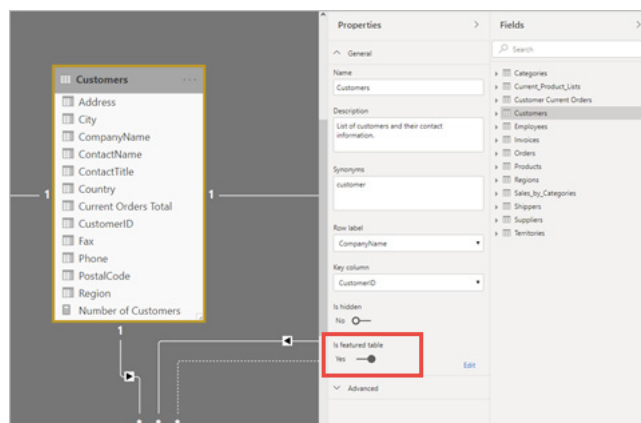
- Turn on the featured table Preview, by selecting **File -> Options and Settings -> Options -> Preview Features**
- Select the 'Featured tables' check box



- Restart Power BI Desktop
- Then, go to Model view



- Select a table, and set 'Is featured table' to Yes



- In Set up this featured table, provide the required fields:
  - o a description
  - o the 'Row label' field value is used in Excel so users can easily identify the row. It appears as the cell value for a linked cell, in the 'Data Selector' pane, and in the Information card
  - o the 'Key column' field value provides the unique ID for the row. This value enables Excel to link a cell to a specific row in the table

**Set up this featured table**

The data in featured tables is discoverable in connected products. [Learn more](#)

Description \*

List of customers and their contact information.

Row label \*

CompanyName

Key column \*

CustomerID

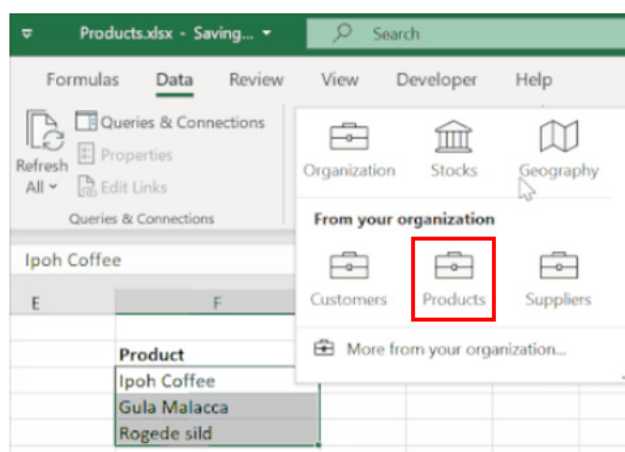
Save Cancel

- After you publish or import the dataset to the Power BI Service, the featured table is displayed in the Excel Data Types Gallery. You and other report creators can also create reports built on this dataset

Excel caches the list of Data Types so you need to restart Excel to see newly published featured tables. Some datasets aren't supported in the Preview; featured tables defined in those datasets won't appear in Excel. Limitations include:

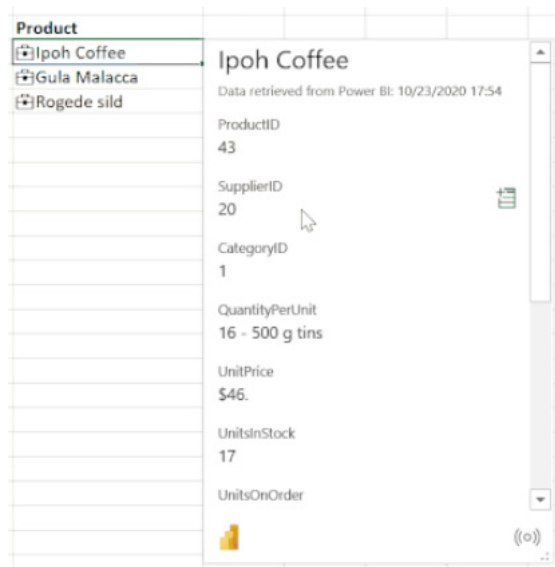
- Featured tables in Power BI datasets that use DirectQuery datasets or Datasets with a live connection
- Excel shows only data in columns and calculated columns in the featured table. Measures defined on related tables, and implicit measures calculated from relationships, aren't provided in the initial Preview
- Excel only displays featured tables that are stored in the new Power BI workspaces. Featured tables stored in the classic workspaces aren't shown as data types in Excel. You can upgrade classic workspaces to the new workspaces in Power BI.

As an example, if you wanted to work with Power BI data on products, you'd enter a list of product names, select them, and then convert using your organisation's 'Products' Data Type.

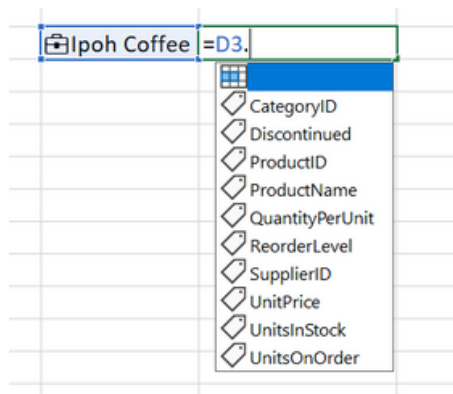




You can view the data type card by selecting the suitcase icon in the cell:



or you can add fields to the grid:

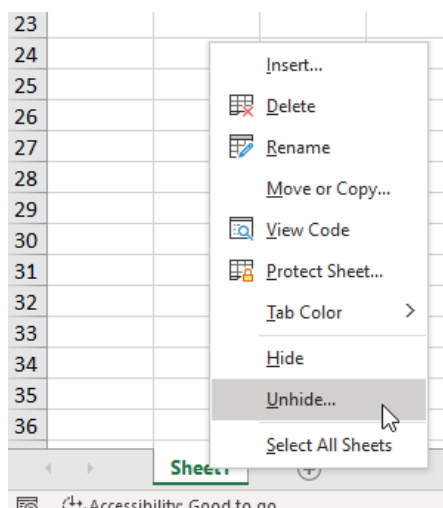


If your data is sensitive, you can use Microsoft Information Protection sensitivity labels in Power BI. These labels will be applied to your Excel workbooks when you convert or refresh your Organization data types. This requires MIP labels in Power BI (please ensure that you enable sensitivity labels in Power BI) and Office (subscription and licensing conditions must also be satisfied for sensitivity labels in Office).

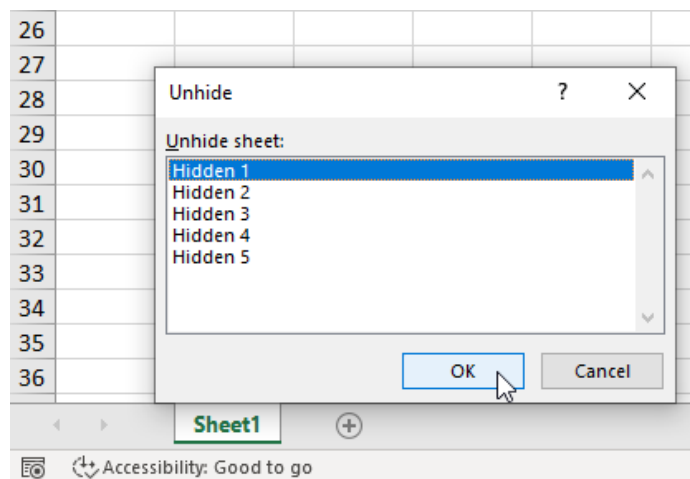
Data Types from Power BI are available to Excel subscribers in organisations with Office 365 or Microsoft 365 and the Power BI Pro Service plan with English added as an editing language (more languages will be coming soon, apparently). The feature is currently available on the Current Channel in Excel for Windows and coming soon to Excel for Mac and Excel for the web.

## Unhide Multiple Sheets

We have all been here. You have an Excel file and you need to unhide some hidden sheets. There are a few of them, and you know it's time to get Repetitive Strain Injury. You right-click to unhide sheets...



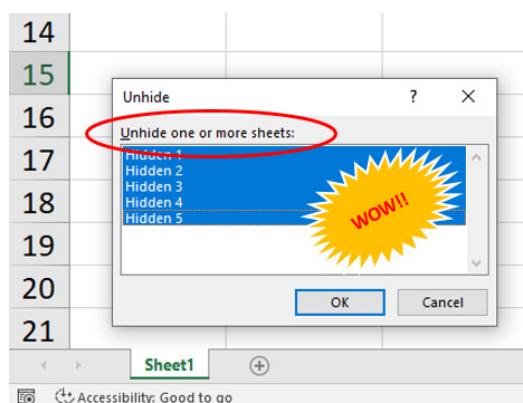
...and then you see it's time to unhide them one at a time:



(Sigh.)

**WELL, NOT ANY MORE!!**

Now, with Office 365 Insider / Beta / Nigel (whatever it's called this week...), there has been an update! Look what happens now:

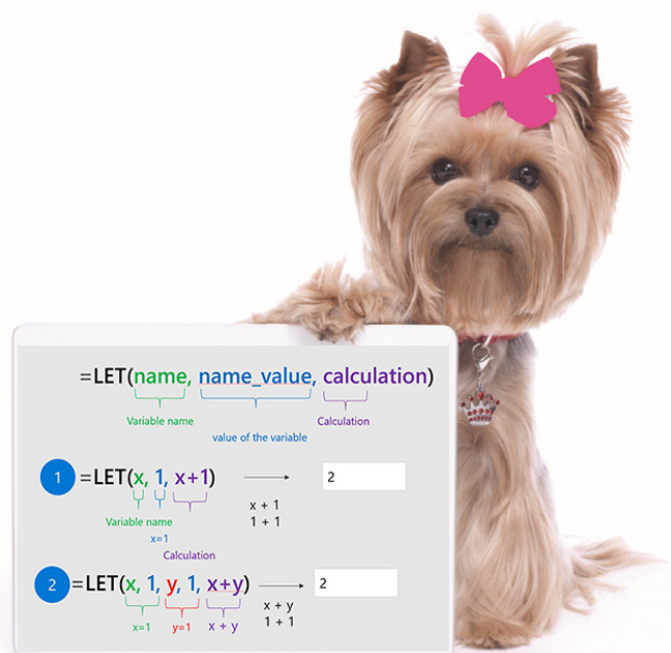


[No, it doesn't make your row size grow – it's a screenshot from a different PC!]

After 30,000 years of Excel (maybe a slight exaggeration), you can now unhide more than one sheet at a time using either **CTRL** or **SHIFT**! Ladies and gentlemen, I can confirm we have exited the Dark Ages: industrial revolution here we come.

As we say, this is an Office 365 Insider / Beta update, but you should see it in other variations of Office 365 soon. As always, it's less likely to come to the "perpetual" licences any time soon (if at all). Don't shoot me; I'm just the messenger...

## LET Off the Leash



March 2020 saw Microsoft announce a new Excel function, **LET**, for Office 365, albeit at the time of writing, only to the Insiders – now Beta – Channel. This allowed you to stop writing the same expressions time and time again in a formula or allowed portability of segments of a computation for different formulae. As Microsoft puts it, it's "...names on a formula level".

Now (November 2020), it's been made Generally Available to all users of Excel subscribers in the Office 365 or Microsoft 365 in the Production Current Channel.

In essence, this function assigned values or expressions to defined names and then passed these to calculation results. It may store intermediate calculations, values or defining names inside a formula. The defined

It has following syntax to operate:

**LET(name1, value1, [name2...], [value2...], calculation)**

where:

- **name1**: the name for the first value
- **value1**: the value to associate with the first name
- **name2** (optional): additional names for second and subsequent values
- **value2** (optional): additional values for the second and subsequent values
- **calculation**: this is the calculation to perform. This is always the final argument and it can refer to any of the defined names in the **LET**.

The main benefits of using **LET** function includes:

- **readability**: **LET** function tracks the changes in defined cells or expression in dynamic way, so there is no need to remember what a specific range / cell reference referred to. With the ability to define variables, it can provide more meaningful context to end users
- **performance**: **LET** allows named expression in the formula and calculated only once, even if it is referred to many times in the formula. This can significantly improve performance for complex expressions.

Let's return to our past example. If we are considering **LET**, how about we use the property rental market! Suppose we run a company where salespeople make commission based upon 1% of the average of the square of the weekly rent, e.g. if Annie makes two sales of \$400 and \$300, then the average of the amounts squared would be  $(300^2 + 400^2) / 2 =$

names only apply within the scope of the **LET** function in a similar way to variables in general programming scenarios.

If you reuse the same expression multiple times in a formula, Excel calculates that expression multiple times. That's *not* a good thing. **LET** allows you to name the expression and refer to it using that name, similar to **VAR** in a DAX expression, for those that know the language. Any named expression is calculated only once, even though it may be referred to many times in the formula. This can significantly improve performance considerably and speed up your spreadsheets.

Let's recap the **LET** function. We must define pairs of names and associated values, and a calculation that uses them all, as the final argument. At least one name / value pair must be defined.

125,000 and 1% of that would be \$1,250. Not much incentive to make lots of sales, is there? It's not my fault she negotiated her contract badly...

Anyway, it's convoluted, but we are trying to construct an example which we cannot simply solve using a standard Excel formula like **AVERAGEIFS**!

	A	B	C	D	E	F
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

Business Unit	Salesperson	Sales Amount
A	Annie	374
A	Brad	347
A	Charlie	159
A	Dee	393
B	Brad	478
B	Charlie	354
B	Charlie	159
C	Dee	203
C	Brad	371
C	Annie	300
C	Annie	400
D	Dee	187
D	Brad	140

Business Unit	C
Salesperson	Annie
Comm. Rate	1.00%

Commission	\$1,250.00	=LET(BusinessUnit,B3:B15=C17, SalesPerson,C3:C15=C18, Selection,BusinessUnit*SalesPerson, Commission,C19, SalesAmt,D3:D15, SUMPRODUCT(Selection*SalesAmt^2)*Commission/SUMPRODUCT(Selection))
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The formula in cell **C21** is given by

**=LET(BusinessUnit, B3:B15=C17,  
SalesPerson, C3:C15=C18,  
Selection, BusinessUnit\*SalesPerson,  
Commission, C19,  
SalesAmt, D3:D15,  
SUMPRODUCT(Selection\*SalesAmt^2)\*Commission/SUMPRODUCT(Selection))**

The final argument is the formula – but more on that shortly. Before that, there are pairs of expressions where the first element is the name and the second is an expression for a value. Let’s go through all of these arguments (mainly in pairs):

- **BusinessUnit, B3:B15=C17** define the array **BusinessUnit**, which is an array of TRUE and FALSE values depending on whether the Business Unit is equal to the value in cell **C17** (which is “C” in the illustration). Therefore, we have {FALSE, FALSE, FALSE, FALSE, FALSE, FALSE, FALSE, TRUE, TRUE, TRUE, TRUE, FALSE, FALSE}
- **SalesPerson, C3:C15=C18** generate a similar array (named **SalesPerson**), which provides TRUE and FALSE values depending on whether the salesperson was Annie. Therefore, we have {TRUE, FALSE, FALSE, FALSE, FALSE, FALSE, FALSE, FALSE, FALSE, TRUE, TRUE, FALSE, FALSE}
- **Selection, BusinessUnit\*SalesPerson** now shows the value of **LET**. This names the value of the product of the first two parameters **Selection** without having to write out the formula again and, more importantly, *without having to calculate them a second time unnecessarily*. This results in TRUE/FALSE expressions multiplied by other TRUE/FALSE expressions, which results in a one if both are TRUE and zero (0) otherwise. Therefore, we have {0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 0, 0}
- **Commission, C19** is relatively simple, naming the value in cell **C19** (1%) **Commission**
- Similarly, **SalesAmt, D3:D15** apply the name **SalesAmt** to the range **D3:D15** for the purposes of this formula. Therefore, we have {374, 347, 159, 393, 478, 354, 159, 203, 371, 300, 400, 187, 140}
- Finally, the formula **SUMPRODUCT(Selection\*SalesAmt^2)\*Commission/SUMPRODUCT(Selection)** calculates the commission similarly to the approach explained above. However, **Selection**, **SalesAmt** and **Commission** are merely referenced and neither need to be recalculated nor written out in full.

This may seem verbose, but it speeds up calculation time considerably, and makes formulae easier to read (once you get your head around this new approach). Further, **LET** only defines the range name within the formula. These are not general range names in the spreadsheet – Excel will not recognise them outside of this **LET** formula.

To be crystal clear, there are two key differences between defined range names and this now Generally Available **LET** function:


1. **LET** allows you to see the definition of the name there and then without jumping to the definition elsewhere. Yes, the formula may be longer in the cell, but the user can hopefully follow it without audit tools
2. When Excel sees a defined name in a formula, it pauses the current formula, evaluates the defined name's formula to get a result, and returns to the original formula. A variable defined using **LET** is only ever evaluated once.

An example that shows the difference is **=LET(x, RANDBETWEEN(1, 1000000), x – x)**. This formula will always return zero, since **RANDBETWEEN(1, 1000000)** gets evaluated and then assigned to **x**, which never changes, so **x – x = 0**.






If you instead use the name manager to define the name **x** as **=RANDBETWEEN(1, 1000000)**, then entering **=x – x** is almost never going to be zero, since each **x** in the formula causes **RANDBETWEEN** to be evaluated.

It should also be noted that you must be careful with your order of arguments and defining reference names. Name definitions can only make use of prior and not subsequent names. In the example above, **Selection** could only be defined once **BusinessUnit** and **SalesAmt** had both been defined.

Now that it has become Generally Available, there have been some changes made to **LET**:

1. **Autocompletion of names:** if you have defined the name earlier, Excel will now recognise it. There is now a special icon  indicating that you may autocomplete the formula with the name so identified

	A	B	C
1	=LET(count, 123, count		
2			
3			
4			

 count  
 COUNT  
 COUNTA  
 COUNTBLANK  
 COUNTIF

2. **Allowed names:** due to the rich Data Types also making use of the dot (“.”), this character is no longer legal in names bound by **LET**. If you have already created such naughty names in files created during the Insider phase, the name will be “silently upgraded”. Better than euthanised, we suppose
3. **Localisation changes:** localisation has now been removed from the **LET** function. **LET** is now the name of the function in all stockkeeping units (SKUs) of Excel and is no longer localised. **LET** it be.





## Beat the Boredom Challenge

With many of us currently “working from home” / quarantined, there are only so Zoom / Teams calls you can make before you reach your data limit. Perhaps they should measure data allowance in mugs of coffee. To try and keep our readers engaged, we will continue to reproduce some of our popular **Final Friday Fix** challenges from yesteryear in this and upcoming newsletters. One suggested solution may be found later in this newsletter. Here's this month's...

Near the end of the year, we usually find ourselves creating quarterly reports and sending them off to head office. And that may cause issues.

Have you ever been told by head office that they want all of the charts on a worksheet to have the same axis ranges, but you can't use a macro

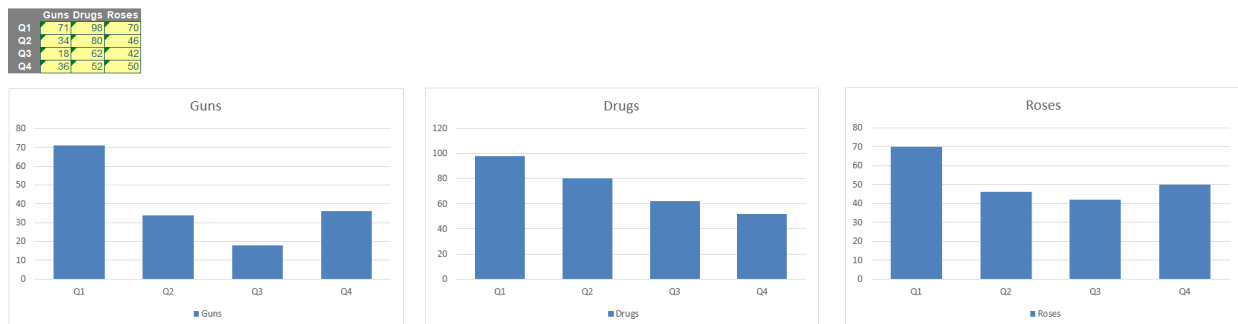
as it is against company policy? Hoping to find a solution, you navigate to trusty Google and only find answers that involves said prohibited automation?

### The Challenge

	Guns	Drugs	Roses
Q1	83	19	89
Q2	51	78	63
Q3	69	20	89
Q4	22	79	39

(data can change!)

Imagine you have the above chart data, and you need to generate the three charts (below) from the table. The trouble is, we want to have all three charts to have the same y-axis values.



There are two conditions:

1. the y-axis values have to be dynamic, *i.e.* they have to change based upon the range of data
2. this has to be done without the use of a macro.

Sound easy? Try it. One solution just might be found later in this newsletter – but no reading ahead!

## Visual Basics

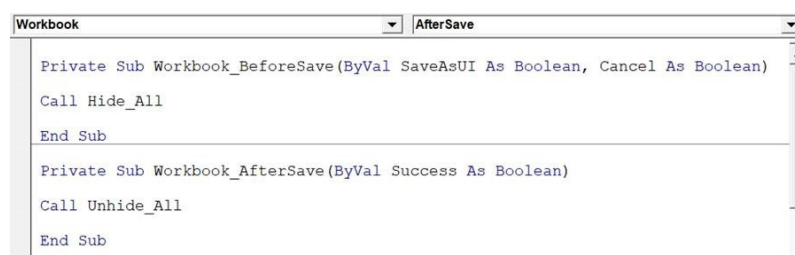
We thought we'd run an elementary series going through the rudiments of Visual Basic for Applications (VBA) as a springboard for newer users. This month, we consider how to set up events to trigger on saving a file.

We're going to start off by reusing some of the code that we used last month. Remember we created a Disclaimer macro that would run when the file is open? What happens if the person opening the file simply doesn't enable macros?

This is where **Workbook\_BeforeSave** comes in handy. Instead of running some sort of disclaimer that hides everything when the model is opened, why not run it instead just before we save the file? That way, when

we save the file, before it saves, it will run the Disclaimer, and when someone opens the file, sheets will be hidden already.

Of course, that begs the question, once it's saved, do we need to click “I agree” before we can move on? Well, if we use the **Workbook\_AfterSave** event, then we can have it unhide again once the file has been saved, meaning that we don't need to lift a finger to reset the file back to an ‘unlocked’ status.



There are actually some other tools that we can use as part of this function. If someone were to use 'Save As', this will transmit that fact to a variable called **SaveAsUI**, which can be used to create some additional rules, perhaps some new details that should be incorporated into the file to reflect the fact it will be a new file. You can also see that there is a **Cancel** variable that will check if someone cancels a 'Save As' operation, as you may not want the macro to run if the file isn't actually saved.

These are useful tools that can help you manage your files and automate

processes that you might not trust people to actively do when they save a file. Other useful things to run before saving might include resetting the viewable area of worksheets to the top left hand side, changing scenario values back to base case values, or other similar "file clean up" activities.

Next month, we'll take a look at some in-sheet events, such as selecting particular cells.

More next time.

## Power Pivot Principles

We continue our series on the Excel COM add-in, Power Pivot. This month, we get the introduction right and state we will be discussing managing multiple tables.

As we've been going through this series discussing Power Pivot, we've been creating measures predominantly in the 'Sales' table. If we look at this table in the Power Pivot window, we see that the measures are located at the bottom of each table in the 'Data View' mode.

	ProductKey	Order...	OrderDateKey	DueDateKey	Custome...	Promotio...
1	87	10-Aug-14 1...	20140810	20140822	103	1
2	98	17-Aug-14 1...	20140817	20140829	111	1
3	82	22-Aug-14 1...	20140822	20140903	112	1
4	89	15-Sep-14 1...	20140915	20140927	105	1
5	80	19-Sep-14 1...	20140919	20141001	110	1
6	81	10-Oct-14 12...	20141010	20141022	102	1
7	86	30-Oct-14 12...	20141030	20141111	107	1
8	86	01-Nov-14 1...	20141101	20141113	108	1
9	81	11-Nov-14 1...	20141111	20141123	109	1
10	95	08-Dec-14 1...	20141208	20141220	101	1
11	86	08-Dec-14 1...	20141208	20141220	104	1
12	98	19-Dec-14 1...	20141219	20141231	102	1
13	91	26-Dec-14 1...	20141226	20150107	101	1
14	82	10-Jan-15 12...	20150110	20150122	109	1
15	97	14-Jan-15 12...	20150114	20150126	112	1
16	97	15-Jan-15 12...	20150115	20150127	107	1
17	80	27-Jan-15 12...	20150127	20150208	108	1
Sales: \$1,820,598...						
Profit Margin: 63...						
Sales 2014: 6,838...						
Refunds: \$65,013...						

If this table is deleted, intentionally or unintentionally, all of the measures contained within the table will also be lost.

A countermeasure that one may take is to create a completely blank table in the data set, which will house all of the measures. This will allow the user to add or remove tables without losing any of the measures in the data set.

It's up to you which you do – just be consistent. At SumProduct, we acknowledge this approach, but we prefer to house measures in the tables they are most closely associated with.

More Power Pivot Principles next month.

## Power Query Pointers

Each month we'll reproduce one of our articles on Power Query (Excel 2010 and 2013) / Get & Transform (Office 365, Excel 2016 and 2019) from [www.sumproduct.com/blog](http://www.sumproduct.com/blog). If you wish to read more in the meantime, simply check out our Blog section each Wednesday. This month, we look at one way to remove blank rows and columns.

The scenario is familiar: a huge Excel table comes in with lots of columns and rows, but in some cases a column or row is completely empty, and the table needs to be condensed. This may be easy to do by hand for smaller tables, but for larger data sets it would be nice to be able to do this automatically, at the press of a button.

For this month's example, we have imported the **Items** table into Excel and this already has a few empty columns. There also a couple of blank rows: →

From the 'Data' tab, we may go to the 'Get and Transform' section and choose the option 'From Table'. We then get the following data in the Power Query Editor:

	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column
1	Side Connecting Porch	Tent	Approx (2m x 2.2m)	null	null	50		
2	3 x 3 metre marquee	Tent	Approx (10 x 10ft)	14	10	120		
3	4 x 4 metre marquee	Tent	Approx (13 x 13ft)	22	16	150		
4	6 x 3 metre marquee	Tent	Approx (10 x 20ft)	26	20	170		
5	8 x 3 metre marquee	Tent	Approx (10 x 26ft)	35	26	195		
6	6 x 4 metre marquee	Tent	Approx (13 x 20ft)	35	20	190		
7	8 x 4 metre marquee	Tent	Approx (26 x 13ft)	45	30	220		
8	10 x 4 metre marquee	Tent	Approx (32 x 13ft)	60	42	250		
9	6 x 6 metre marquee	Tent	Approx (20 x 20ft)	50	40	295		
10	8 x 6 metre marquee	Tent	Approx (26 x 20ft)	70	55	370		
11	10 x 6 metre marquee	Tent	Approx (32 x 20ft)	80	70	445		
12	12 x 6 metre marquee	Tent	Approx (40 x 20ft)	110	80	495		
13	4x6m/5x3m/6x4m Handstanding kit	Floor		null	null	32.5		
14	8x6m/10x6m/12x6m Handstanding kit	Floor		null	null	45		
15	10x6m/12x6m Handstanding kit	Floor		null	null	65		
16	3 X3 metre matting	Floor		null	null	40		
17	4 x 4 metre matting	Floor		null	null	40		
18	6 x 3 metre matting	Floor		null	null	50		
19	8 x 4 metre matting	Floor		null	null	50		
20	8 x 3 metre matting	Floor		null	null	65		
21	8 x 4 metre matting	Floor		null	null	65		
22	10 x 4 metre matting	Floor		null	null	80		
23	6 x 6 metre matting	Floor		null	null	90		
24	8 x 6 metre matting	Floor		null	null	105		

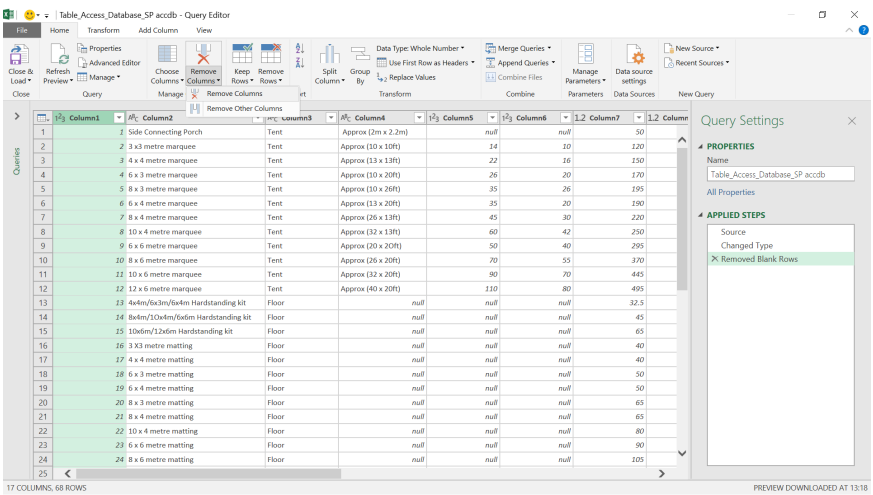
In the 'Home' tab, there is a section called 'Reduce Rows'. The 'Remove Rows' option drops down in this section gives us several choices:

	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column
1	Side Connecting Porch	Tent	Approx (2m x 2.2m)	null	null	50		
2	3 x 3 metre marquee	Tent	Approx (10 x 10ft)	14	10	120		
3	4 x 4 metre marquee	Tent	Approx (13 x 13ft)	22	16	150		
4	6 x 3 metre marquee	Tent	Approx (10 x 20ft)	26	20	170		
5	8 x 3 metre marquee	Tent	Approx (10 x 26ft)	35	26	195		
6	6 x 4 metre marquee	Tent	Approx (13 x 20ft)	35	20	190		
7	8 x 4 metre marquee	Tent	Approx (26 x 13ft)	45	30	220		
8	10 x 4 metre marquee	Tent	Approx (32 x 13ft)	60	42	250		
9	6 x 6 metre marquee	Tent	Approx (20 x 20ft)	50	40	295		
10	8 x 6 metre marquee	Tent	Approx (26 x 20ft)	70	55	370		
11	10 x 6 metre marquee	Tent	Approx (32 x 20ft)	80	70	445		
12	12 x 6 metre marquee	Tent	Approx (40 x 20ft)	110	80	495		
13	4x6m/5x3m/6x4m Handstanding kit	Floor		null	null	32.5		
14	8x6m/10x6m/12x6m Handstanding kit	Floor		null	null	45		
15	10x6m/12x6m Handstanding kit	Floor		null	null	65		
16	3 X3 metre matting	Floor		null	null	40		
17	4 x 4 metre matting	Floor		null	null	40		
18	6 x 3 metre matting	Floor		null	null	50		
19	8 x 4 metre matting	Floor		null	null	50		
20	8 x 3 metre matting	Floor		null	null	65		
21	8 x 4 metre matting	Floor		null	null	65		
22	10 x 4 metre matting	Floor		null	null	80		
23	6 x 6 metre matting	Floor		null	null	90		
24	8 x 6 metre matting	Floor		null	null	105		

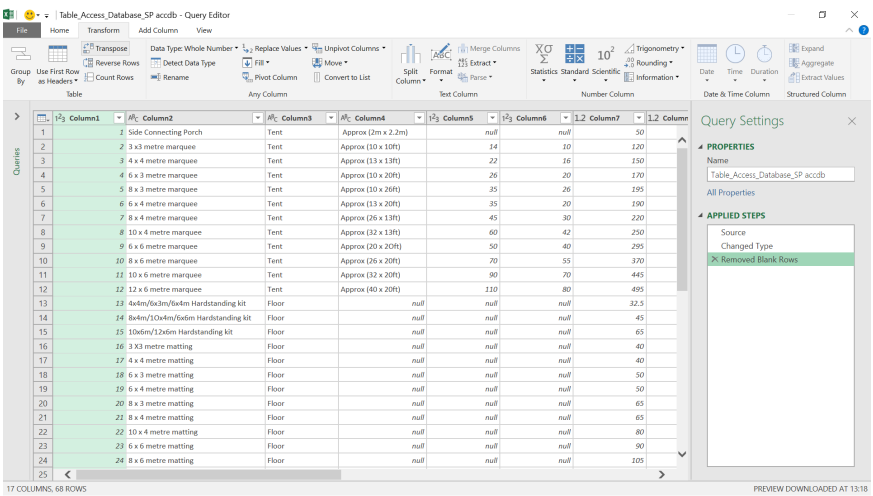
In this case, we want to remove the blank rows, so let's choose this.

	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column
1	Side Connecting Porch	Tent	Approx (2m x 2.2m)	null	null	50		
2	3 x 3 metre marquee	Tent	Approx (10 x 10ft)	14	10	120		
3	4 x 4 metre marquee	Tent	Approx (13 x 13ft)	22	16	150		
4	6 x 3 metre marquee	Tent	Approx (10 x 20ft)	26	20	170		
5	8 x 3 metre marquee	Tent	Approx (10 x 26ft)	35	26	195		
6	6 x 4 metre marquee	Tent	Approx (13 x 20ft)	35	20	190		
7	8 x 4 metre marquee	Tent	Approx (26 x 13ft)	45	30	220		
8	10 x 4 metre marquee	Tent	Approx (32 x 13ft)	60	42	250		
9	6 x 6 metre marquee	Tent	Approx (20 x 20ft)	50	40	295		
10	8 x 6 metre marquee	Tent	Approx (26 x 20ft)	70	55	370		
11	10 x 6 metre marquee	Tent	Approx (32 x 20ft)	80	70	445		
12	12 x 6 metre marquee	Tent	Approx (40 x 20ft)	110	80	495		
13	4x6m/5x3m/6x4m Handstanding kit	Floor		null	null	32.5		
14	8x6m/10x6m/12x6m Handstanding kit	Floor		null	null	45		
15	10x6m/12x6m Handstanding kit	Floor		null	null	65		
16	3 X3 metre matting	Floor		null	null	40		
17	4 x 4 metre matting	Floor		null	null	40		
18	6 x 3 metre matting	Floor		null	null	50		
19	8 x 4 metre matting	Floor		null	null	50		
20	8 x 3 metre matting	Floor		null	null	65		
21	8 x 4 metre matting	Floor		null	null	65		
22	10 x 4 metre matting	Floor		null	null	80		
23	6 x 6 metre matting	Floor		null	null	90		
24	8 x 6 metre matting	Floor		null	null	105		

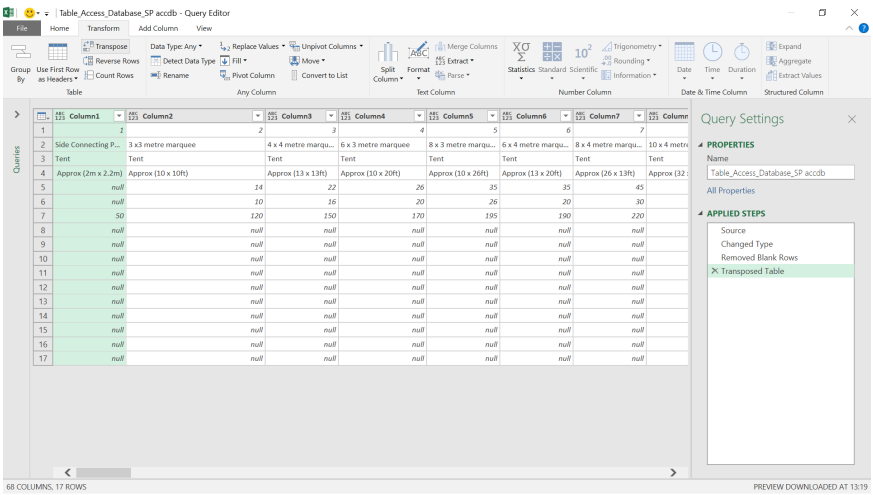
A step appears in the ‘APPLIED STEPS’ telling us that it has ‘Removed Blank Rows’ and our row number has reduced. Now, for the columns:



Even though there is a ‘Remove Columns’ option in the ‘Manage Columns’ section, there is no option to remove blank columns. Instead, we need to transform our data first.



In the Transform tab, we have the option to ‘Transpose’, which will treat columns as rows and vice versa. We’ll choose this.



Now we remove our blank rows again.



Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10
1	2	3	4	5	6	7	8	9	10
Side Connecting P...	3 x3 metre marquee	4 x 4 metre marquee	5 x 3 metre marquee	6 x 4 metre marquee	7 x 3 metre marquee	8 x 4 metre marquee	9 x 3 metre marquee	10 x 4 metre marquee	
Tent	Tent	Tent	Tent	Tent	Tent	Tent	Tent	Tent	
Approx (2m x 2.2m)	Approx (10 x 10ft)	Approx (13 x 13ft)	Approx (10 x 20ft)	Approx (10 x 26ft)	Approx (13 x 20ft)	Approx (26 x 13ft)	Approx (12 x 26ft)	Approx (12 x 26ft)	
24	22	26	35	35	25	45			
6	30	38	20	26	20	80			
7	150	170	185	140	220				
8	null	null	null	null	null	null			
9	null	null	null	null	null	null			
10	null	null	null	null	null	null			

The number of 'rows' have decreased from 17 to 10, so we may transpose again to reverse our columns and rows to their original configuration.

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10
1	2	3	4	5	6	7	8	9	10
Side Connecting Por...	Tent	Approx (2m x 2.2m)	null	null	50				
2	3 x3 metre marquee	Tent	Approx (10 x 10ft)	24	20	120			
3	4 x 4 metre marquee	Tent	Approx (13 x 13ft)	22	26	150			
4	5 x 3 metre marquee	Tent	Approx (10 x 20ft)	26	20	170			
5	6 x 3 metre marquee	Tent	Approx (10 x 26ft)	35	25	195			
6	6 x 4 metre marquee	Tent	Approx (13 x 20ft)	35	20	190			
7	8 x 4 metre marquee	Tent	Approx (26 x 13ft)	45	30	230			
8	10 x 4 metre marquee	Tent	Approx (32 x 13ft)	60	42	250			
9	6 x 6 metre marquee	Tent	Approx (20 x 20ft)	50	40	295			
10	8 x 6 metre marquee	Tent	Approx (26 x 20ft)	70	55	370			
11	10 x 6 metre marquee	Tent	Approx (32 x 20ft)	90	70	445			
12	12 x 6 metre marquee	Tent	Approx (40 x 20ft)	110	80	495			
13	4x6m/6x3m/6x6m Hardstanding kit	Floor	null	null	null	52.5			
14	4x6m/6x3m/6x6m Hardstanding kit	Floor	null	null	null	45			
15	10x6m/12x6m Hardstanding kit	Floor	null	null	null	65			
16	16 x 3 metre matting	Floor	null	null	null	40			
17	12 x 4 metre matting	Floor	null	null	null	40			
18	8 x 3 metre matting	Floor	null	null	null	50			
19	12 x 4 metre matting	Floor	null	null	null	50			
20	8 x 3 metre matting	Floor	null	null	null	65			
21	8 x 4 metre matting	Floor	null	null	null	65			
22	10 x 4 metre matting	Floor	null	null	null	80			
23	6 x 6 metre matting	Floor	null	null	null	90			
24	8 x 6 metre matting	Floor	null	null	null	105			

We can now close and load to the spreadsheet. One point to note: there is a reason why the column names are generic: transposing will lose the column names. Therefore, there is some work required to rename the columns, particularly as the blank ones will have disappeared (unless you demote the column headers first).

Next month, we will look at another way to remove blank rows and columns using the unpivot function. And this time we will keep the column names...

More next month!

## Power BI Updates

Here's an anomaly. Anomaly Detection is in Preview! That's not the only new feature in Preview with this update either: the new Field List and Model View are also making their debuts. Power BI Service's updates

add endorsements for datasets and dataflows are extended to reports and apps, enabling business users to be confident they are making decisions based on the right data.

Here is this month's list of updates, which seems smaller than usual (!):

### Reporting

- New Field List in Preview
- New Model View in Preview
- 'Apply all filters' is now Generally Available
- Visual Zoom Slider
- Data point rectangle select extended to Map visual
- Certificate revocation check for web connections
- Paginated reports updates

### • New connectors:

- o Action
- o Anaplan
- o Starburst Presto

### Developer

- Power BI Automation and APIs
- Fetch more data API 3.4
- Enhanced testing of your developed custom visual

### Analytics

- Anomaly Detection in Preview
- Q&A now supports partial matching data values

### Data Connectivity

- Hive LLAP connector Generally Available

### Visualisations

- New visuals
- Zebra BI 4.4
- New visual by ZoomCharts: Drill Down Map PRO
- xViz Scatter / Bubble chart.

Let's take a look at each in turn.

## New Field List in Preview

Microsoft is unifying the field lists across Data, Model and Report views in Power BI Desktop. This change will create consistency for functionality and User Interfaces across views (where applicable), to address end user feedback and anecdotal confusion.

Some of the consistency changes made include:

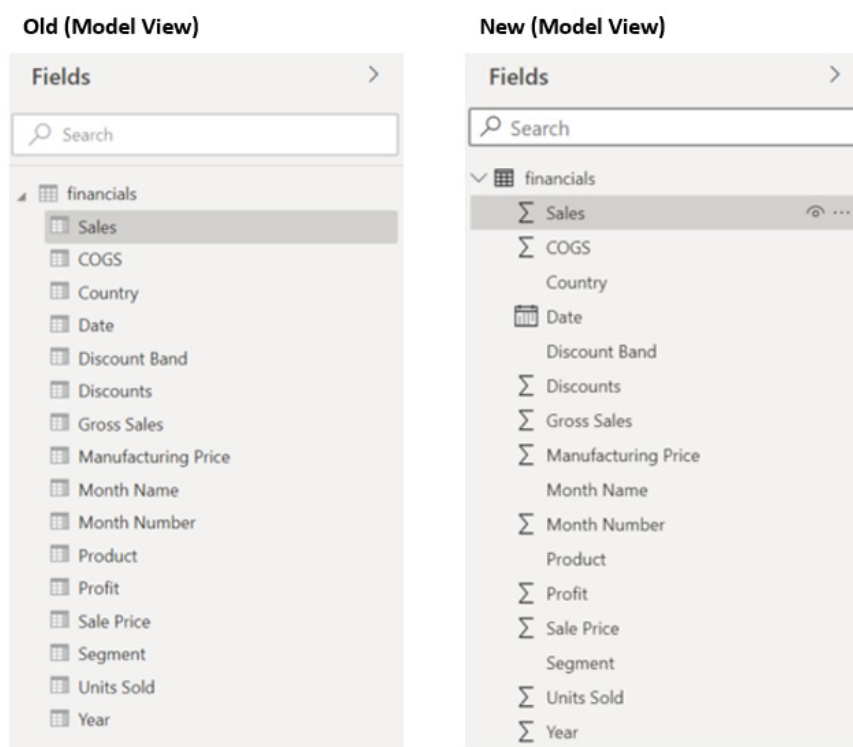
- Iconography
- Search functionality
- Context menu items
- Similar drag-drop behaviour
- ToolTips
- Accessibility improvements.

Apparently, the aim is to improve Power BI Desktop usability with this change and should have minimal impact on typical data workflows.

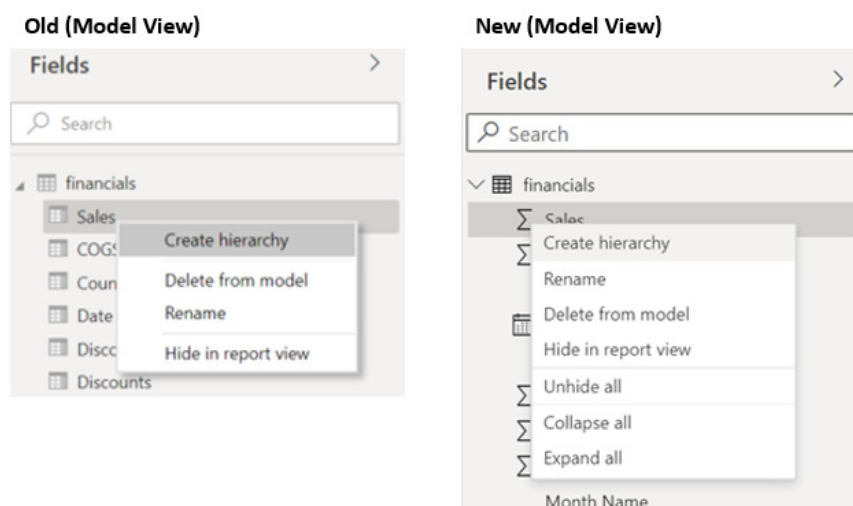
For this release, the new Field list will start rolling out to the Model view only. To activate this, find the Preview feature switch in the Preview options, *i.e.* **File -> Options and settings -> Options -> Preview features -> New Field list.**

Below is a 'before-and-after' comparison of the changes:

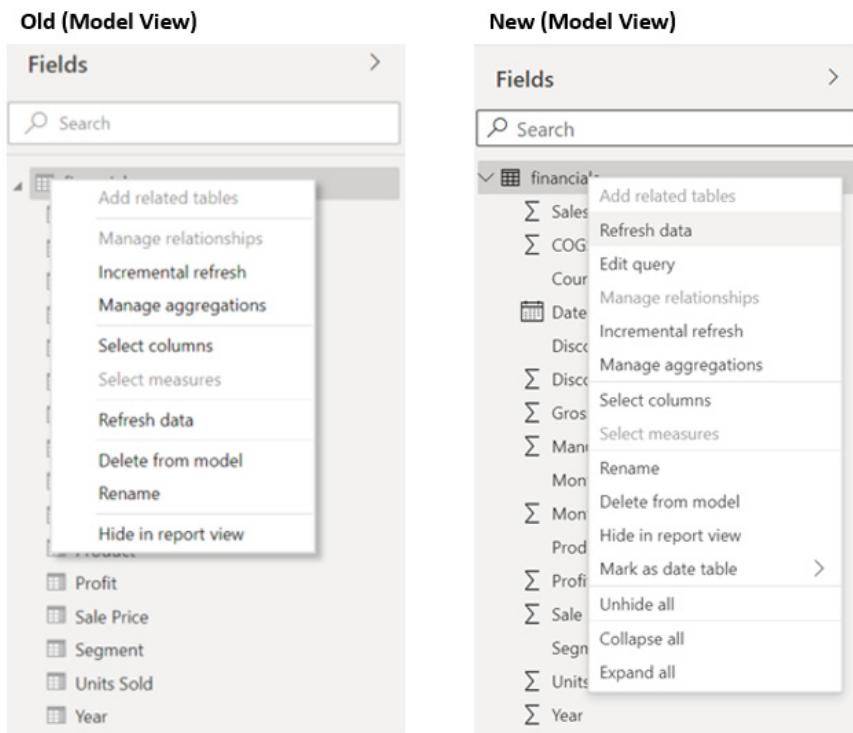
## ICONS AND USER INTERFACE



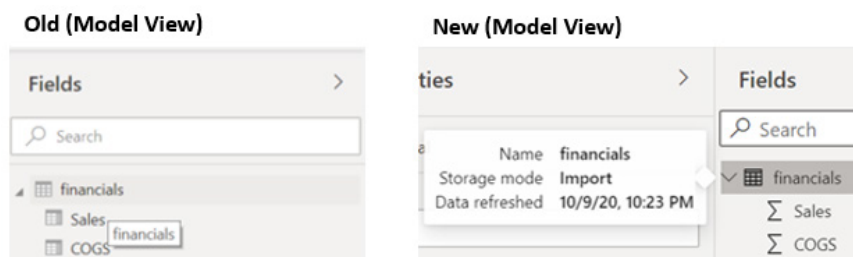
## CONTEXT MENU: FIELD



## CONTEXT MENU: TABLE



## TOOLTIPS



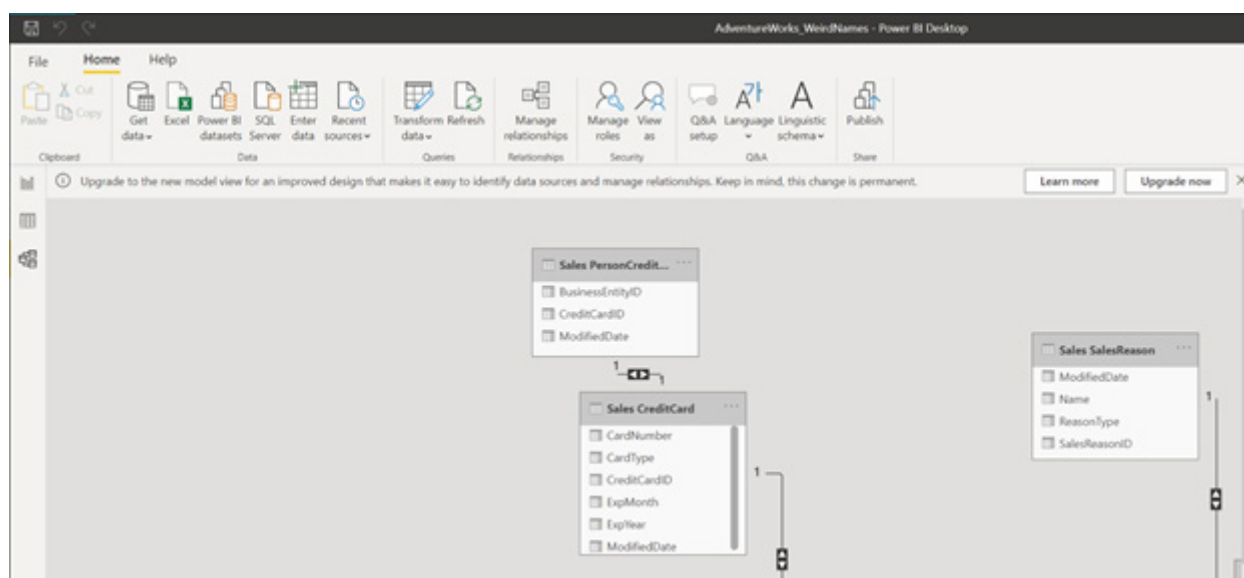
Also, the icons have been updated for the Field list:

Old Icon	New Icon	Meaning
		Folders in the Fields list.
		Numeric field: Numeric fields are aggregates that can be summed or averaged, for example. Aggregates are imported with the data and defined in the data model your report is based upon.
		Calculated column with a non-numeric data type: A new non-numeric column you create with a Data Analysis Expressions (DAX) formula that defines the column's values.
		Numeric calculated column: A new column you create with a Data Analysis Expressions (DAX) formula that defines the column's values.
		Measure: A measure has its own hard-coded formula. Report viewers cannot change the calculation, for example, if it is a sum, it can only be a sum. The values are not stored in a column. They are calculated on the fly, depending solely upon their location in a visual.
		Measure group.
		KPI: A visual cue that communicates the amount of progress made toward a measurable goal.

Old Icon	New Icon	Meaning
		Hierarchy of fields: Select the arrow to see the fields that make up the hierarchy.
		Geo data: These location fields can be used to create map visualisations.
		Identity field: Fields with this icon are unique fields, set to show all values, even if they have duplicates. For example, your data might have records for two different people named 'Robin Smith', and each will be treated as unique. They will not be summed.
		Parameter: Set parameters to make parts of your reports and data models (such as a query filter, a data source reference, a measure definition, etc.) depend upon one or more parameter values.
		Calendar date field with a built-in date table.
		Calculated table: A table created with a Data Analysis Expressions (DAX) formula based on data already loaded into the model. These are best used for intermediate calculations and you want to store as part of the model.
		Warning: A calculated field with an error. For example, the syntax of the DAX expression might be incorrect.
		Group: Values in this column are based on grouping values from another column, by using the groups and bins feature.
[None.]		Change detection measure: When you configure a page for automatic page refresh, you can configure a change detection measure that is queried to determine if the rest of a page's visuals should be updated.

### New Model View in Preview

You can use the Model view in Power BI Desktop to view and work with complex datasets that contain many tables. This month, that Model view has a new look. To use the new look, go to the model view and press 'Upgrade now' to use the new look.

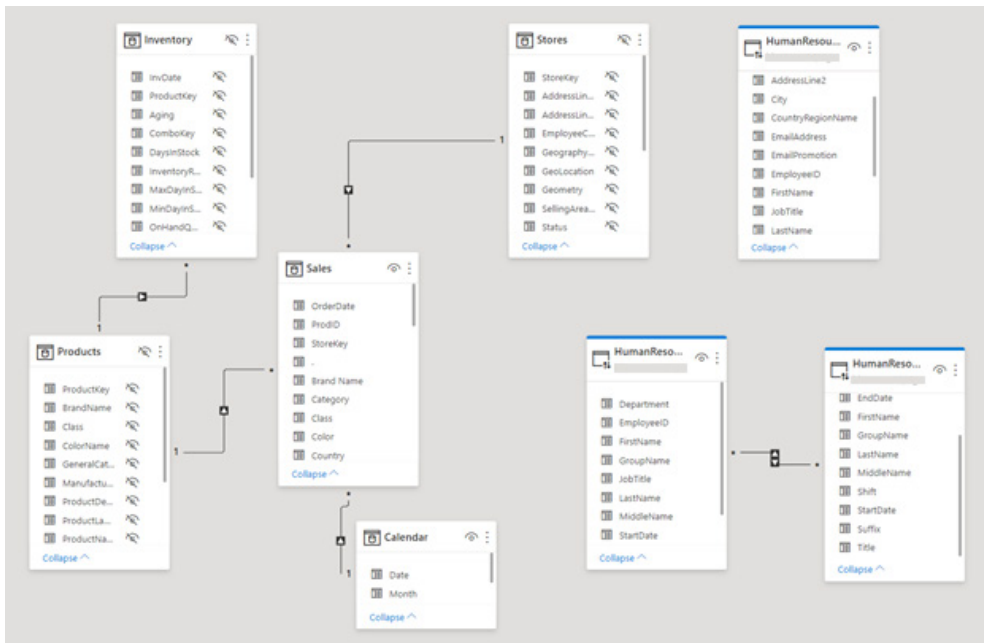


### TABLE CARD HEADERS: HEADER COLOUR

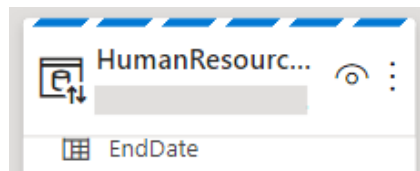
Table card headers show colours to help you quickly see which tables are from the same kind of source. All tables that are in import mode will not show a colour. Tables from the same DirectQuery source (blue in the

image below) will show a colour for tables from that same source. For colour-blind users, they may also learn which tables are from the same source by hovering over the table headers to see more details.





For tables in dual mode, the header will show a hashed colour to represent that the table is in both import and DirectQuery mode.



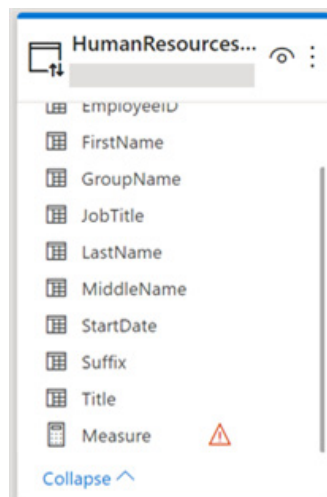
## TABLE CARD HEADERS: STORAGE MODE ICONS

Icons have been added to the table headers to help users identify the storage mode that a table is in:

Icon	Meaning
	Table is in import mode.
	Table is in DirectQuery mode.
	Table comes from a live connected source.
	Table is in dual (both import and DirectQuery) mode.

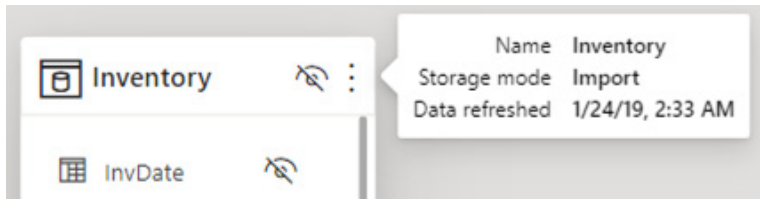
## TABLE CARD HEADERS: ERROR ICONS

If you have a field that has an error, now you will see an error icon show up next to that field.

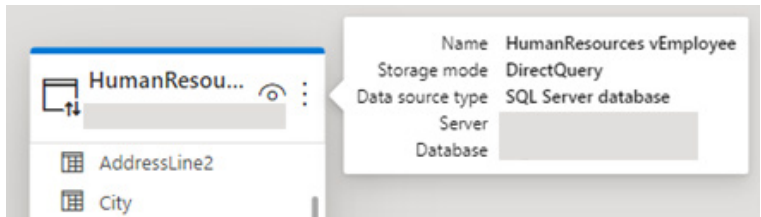


### TABLE CARD HEADERS: TABLE CARD TOOLTIPS

When you hover over the table card headers, you will see a ToolTip giving you more details about that table in your model. For a table that has been imported, you can see the name of the table, the storage mode it is in and when the data in that table was last refreshed.

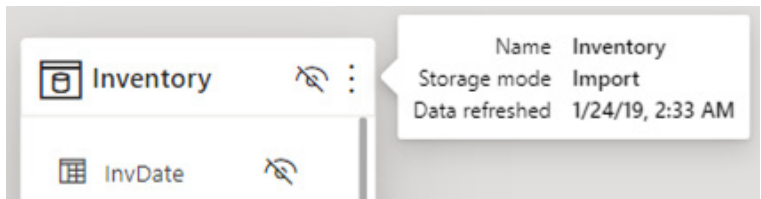


For a table in DirectQuery mode, you can see the name of the table, the storage mode, the type of data source being used, and the server and database names.

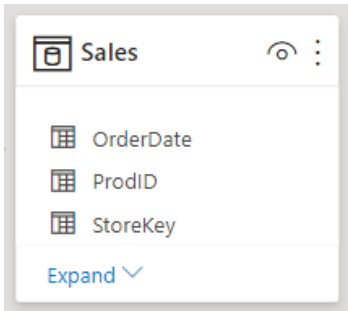


### TABLE CARD HEADERS: COLLAPSE CARD

To simplify the look of your model, you can collapse table cards to make them smaller.

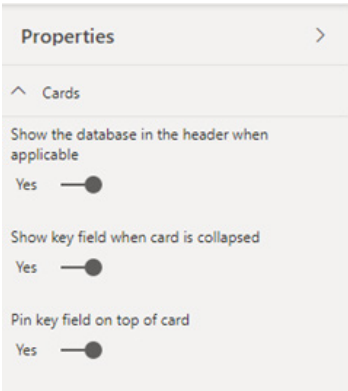


You can also collapse your table cards, but continue to show key fields:



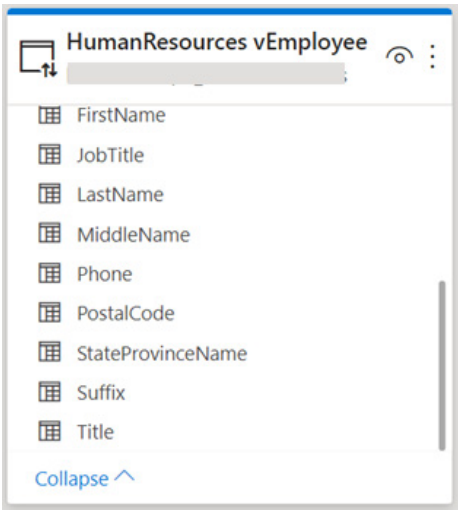
### TABLE CARD HEADERS: TABLE CARD PROPERTIES

You can change how table cards in the Model view display information with card properties. To see card properties, make sure you do not have a table or field selected.

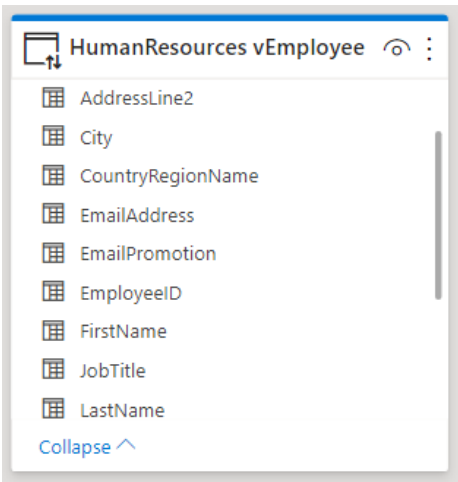


**TABLE CARD HEADERS: SHOW THE DATABASE IN THE HEADER WHEN APPLICABLE**

For tables that have associated database information, you can choose to show this information in the header of your table cards.

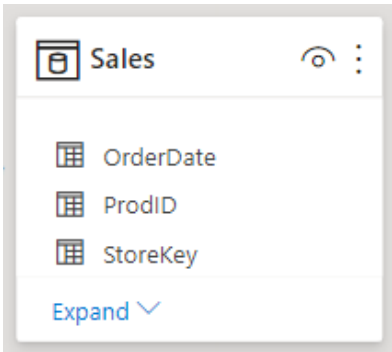


You can also choose to turn this off for a simplified, minimalistic look.



**TABLE CARD HEADERS: SHOW KEY FIELD WHEN CARD IS COLLAPSED**

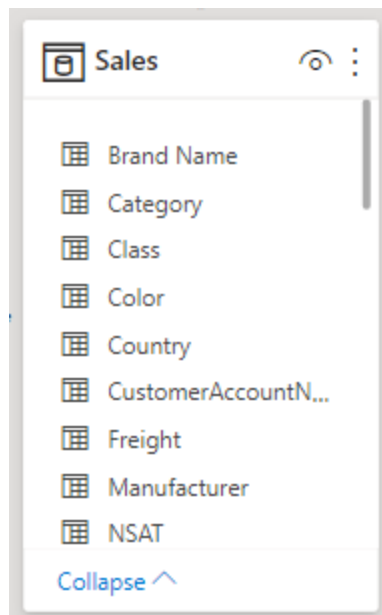
If you collapse a card, you can choose to continue to display the key fields for that table. Key fields are primary or foreign keys of relationships. In the following image, **OrderDate**, **ProdID** and **StoreKey** are key fields of the table **Sales**:



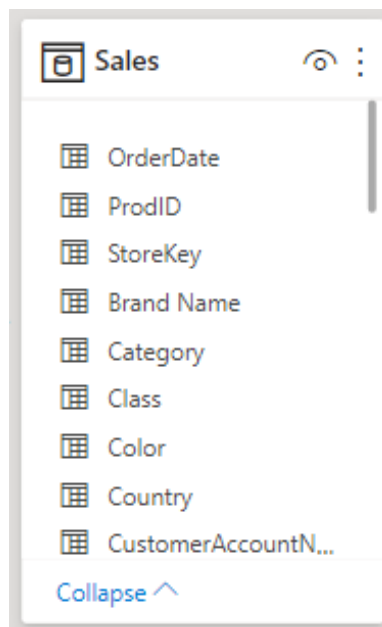
**TABLE CARD HEADERS: PIN KEY FIELD ON TOP OF CARD**

You can choose to pin key fields of a table to the top of its table card.

This image shows the fields in the **Sales** table in alphabetical order, which is the default order for tables and fields in Power BI:

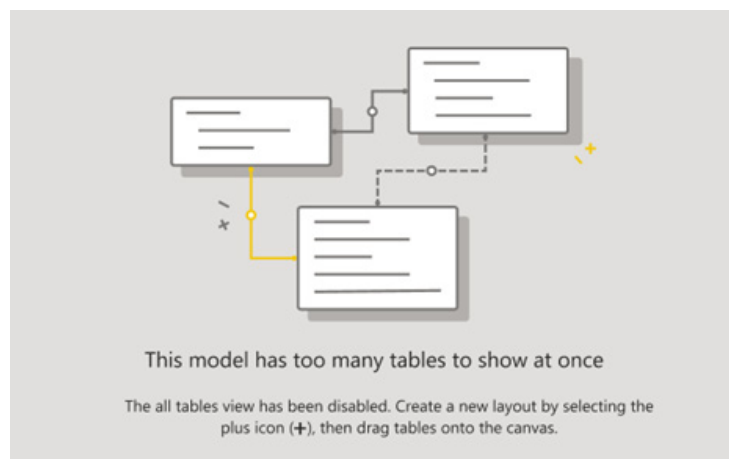


If you turn on 'Pin key field on top of card', the key fields for a table will show up at the top of your table cards. As you can see in the following image, the fields in the **Sales** table are no longer in alphabetical order because the key fields **OrderDate**, **ProdID** and **StoreKey** have been moved to the top of the card:



## PERFORMANCE VIEW

Microsoft has also made some performance improvements to the Model view. If you have a large model (more than 50 tables), instead of trying to show all your tables and hitting performance errors, Power BI will load and let you decide the layouts that you would like to work with.





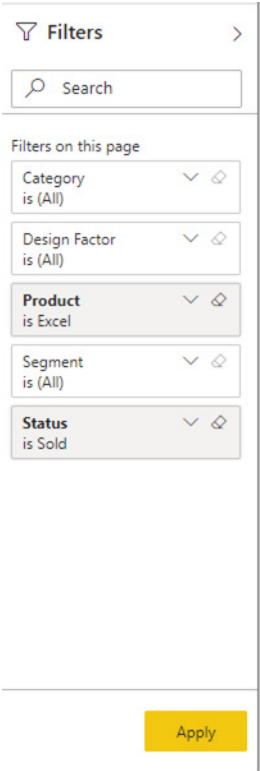
**‘Apply all filters’ is now Generally Available**

We finally get to the third feature!

The ‘Apply all filters’ feature is now Generally Available. As a reminder, this feature was introduced to help optimise the Filter pane for query reduction by applying all filter changes at once. Previously, you had two options for filter queries: apply basic filters instantly (the default option) or add an ‘Apply’ button to each basic filter. The first option to apply the basic filter instantly is ideal for those who prefer instant interactivity over query reduction. The second option, which added an ‘Apply’ button to each Filter card, optimised for query reduction instead. However, it

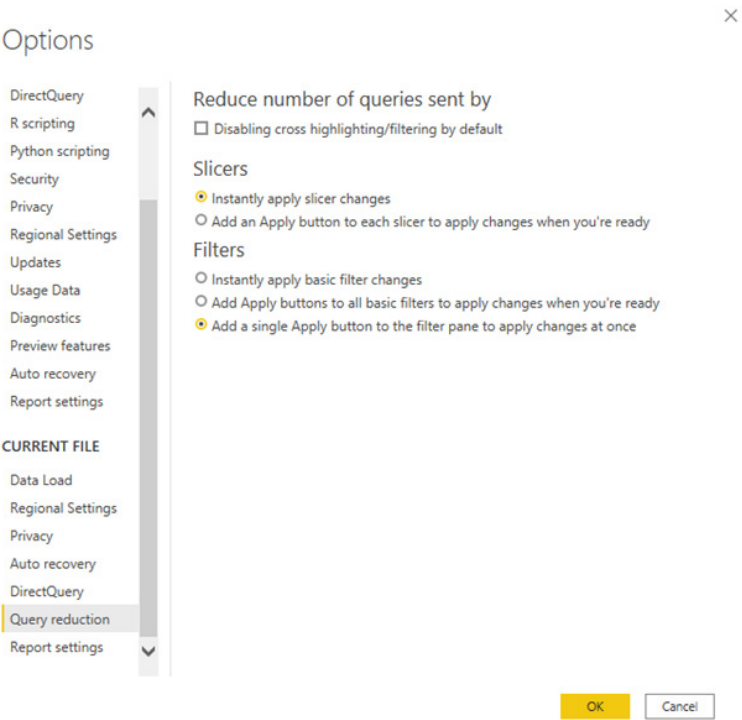
required an additional click every time you needed to apply a filter.

In May, Microsoft released a Preview of an ‘Apply all filters’ option to add a single ‘Apply’ button to the Filter pane, essentially allowing you and your end-users to apply all filter modifications at once. This capability is useful if you want to defer when to apply filter changes, so that you only have to wait once after you are ready to apply any filter changes to the report or visuals.



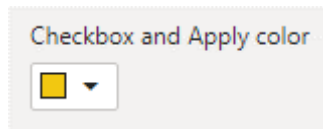
You may now set this feature at a report-level; however, the feature will be off by default.

You can turn on this option in Power BI Desktop by going to **File -> Options and settings -> Options -> Query reduction -> Filters** and selecting the option to ‘Add a single Apply button to the filter pane to apply changes at once’.

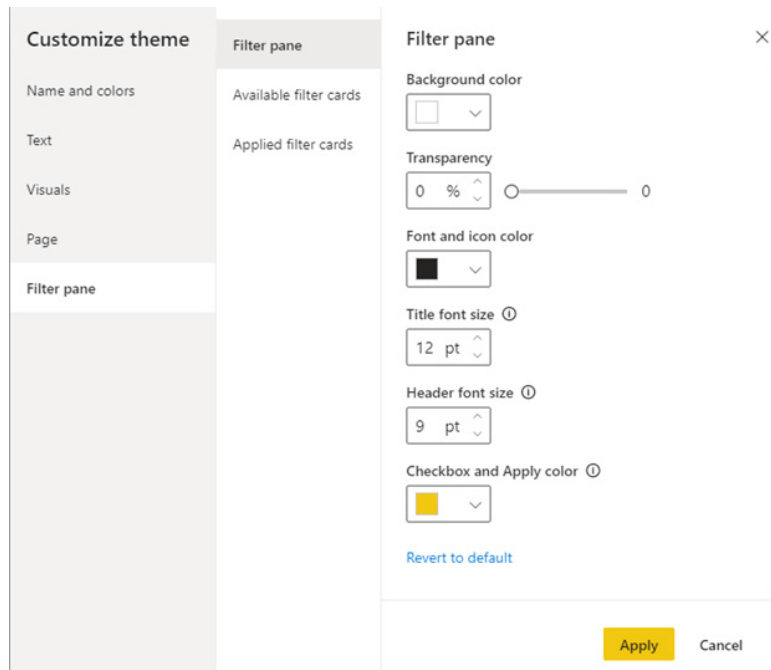


As part of this General Availability release, a few usability improvements have been made too:

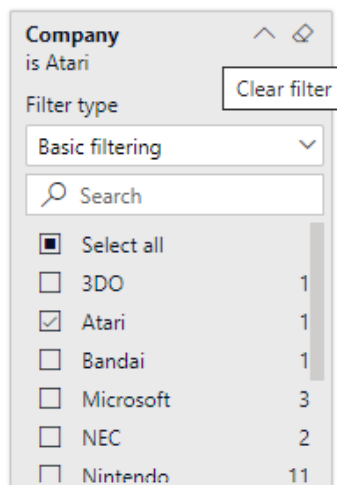
- You can now change the fill colour for the 'Apply' button in the Filter pane tab of the Format pane:



- You can also specify the colour in the theme itself:



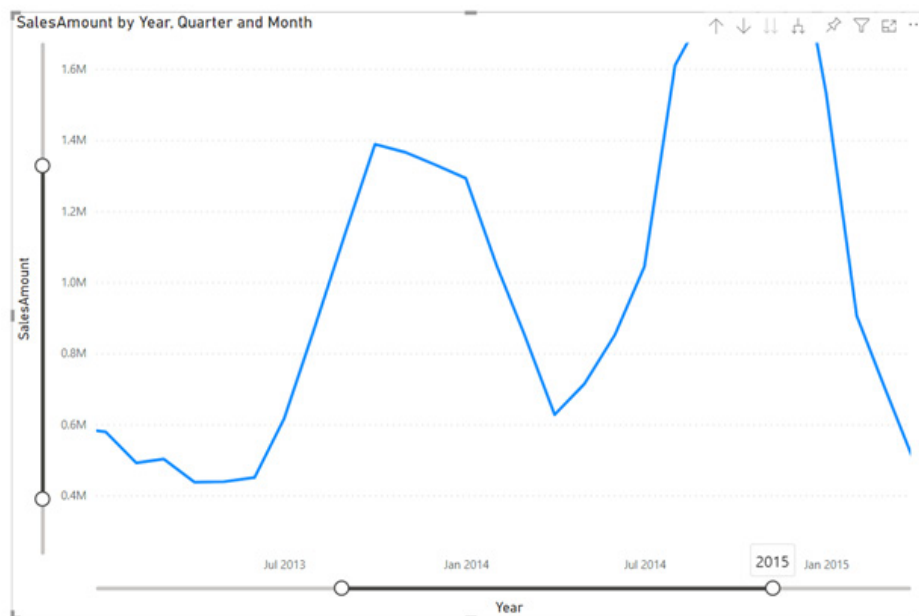
- The behaviour for the Clear filter has been modified. Previously, if you hit 'Clear filter', the action would be instant instead of deferred, like other filter modifications. Now, when you hit the 'Clear filter' icon, Power BI will only clear the filter when you hit the 'Apply' button on the Filter pane.



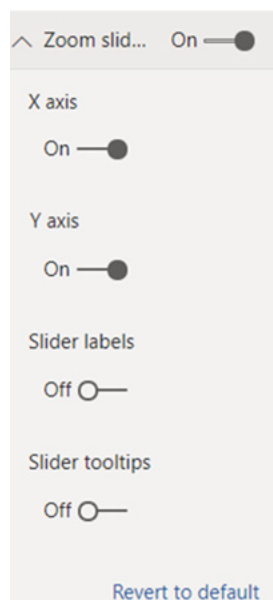
### Visual Zoom Slider

Zoom sliders have now been added to Cartesian charts. These sliders give report creators and users a simple way to examine a smaller range of the data in a chart without having to use a filter. Further, using zoom sliders will not affect contextual information, such as calculated trendlines.

To use a zoom slider, simply click and drag endpoints to adjust the dimensions of the view window. Then, click and drag the bar between them to pan that window around.



You can enable zoom sliders in their card in the Formatting pane of the supported visuals. There are also a few other options:



The **X** and **Y** axis toggles enable or disable the zoom slider for each axis. The slider labels toggle enables a new row of labels next to the slider indicating the full range of the data, and the slider ToolTips toggle makes ToolTips appear as you click and drag each endpoint, showing you the value of your selection as you work with the slider.

The zoom state of your visual will also be saved when you save and

publish your report. When end users open the report, the endpoints of the zoom slider will default to whatever you have saved, allowing you to highlight a specific window of data while keeping its context immediately accessible.

Zoom sliders are to be enabled for bar / column, line, line and bar / column combination, and scatter charts.

### **Data point rectangle select extended to Map visual**

This update sees the data point rectangle select Preview feature extended to the Map visual. Now, users may click and drag across maps to create a selection rectangle, allowing them to easily select multiple points at once.

### **Certificate revocation check for web connections**

The security of web connections has been strengthened to protect your data. However, this means that certain scenarios, like capturing web requests with Fiddler, will no longer work by default (bang goes our trick for referencing multi-page data from a website with a single URL – please see <https://www.sumproduct.com/thought/referencing-multi->


[page-data-from-a-web-site-with-a-single-url](https://www.sumproduct.com/thought/referencing-multi-page-data-from-a-web-site-with-a-single-url)). To enable those scenarios, uncheck the 'Enable certificate revocation check' in the Security pane in the Options dialog and then restart Power BI Desktop. Obviously, unchecking that box will make web connections less secure.

## Paginated reports updates

### PAGINATED REPORT SAMPLE REPORTS

Microsoft has now provided paginated report samples for you to download and try out in the Power BI Service. Details may be found at <https://docs.microsoft.com/en-us/power-bi/paginated-reports/paginated-reports-samples#download-the-reports>. They reflect several typical scenarios you might use paginated reports in, including:

- an operational report around sales performance
- an invoice generated for a customer
- a course transcript
- mailing labels
- a formal receipt mailed to a customer.



**Contoso Suites**  
123 Coffee Street  
Buffalo, NY 98052  
USA  
Telephone 012345678  
<http://www.contososuites.com>

Owl Wholesales  
123 Violet Road, Phoenix, CO 85003 USA

**Invoice CIV-000676 000007-1**  
**30 November 2019**  
Payment terms: Net 45 days  
Payment due 1/14/2020  
**\$321,113.52**

ITEM	DESCRIPTION	QUANTITY	SALES PRICE	DISCOUNT	AMOUNT
D011	Lens	2 Each	2	0	4.00
L0001	Mid-Range Speaker	35 Each	500	0	17,500.00
P0001	Acoustic Foam Panel	117 Each	37	0	4,329.00
D0003	Standard Speaker	23 Each	220	0	5,060.00
T0001	Speaker cable 10	65 Each	500	0	32,500.00
D0004	High End Speaker	12 Each	2000	0	24,000.00
T0004	Television M120 37" Silver	53 Each	350	0	18,550.00
T00002	Projector Television	23 Each	3750	0	86,250.00
T0005	Television HDTV X590 52" White	33 Each	2890	0	95,370.00
T0003	Surround Sound Receiver	56 Each	450	0	25,200.00
SALES SUBTOTAL AMOUNT					4.00
SALES TAX					12,350.52
<b>USD TOTAL</b>					<b>321,113.52</b>

Sales invoice notes

**METHODS OF PAYMENT**

Electronic payment      Check  
Payment reference **US-009**      Make check payable to **Contoso Suites**  
Sort code      **34567**      Write reference **US-009** on the check.

**OTHER INFORMATION**

Tax registration no.      **1234123400**  
Our reference      **Karl Bystrom**

Disclaimer: This is a sample and is provided 'as is' without warranty of any kind. Sample data included are for illustration only and are fictitious. No real association is intended or inferred.

Page 1 of 1

### DOWNLOAD CONNECTED PAGINATED REPORT FROM A POWER BI DATASET

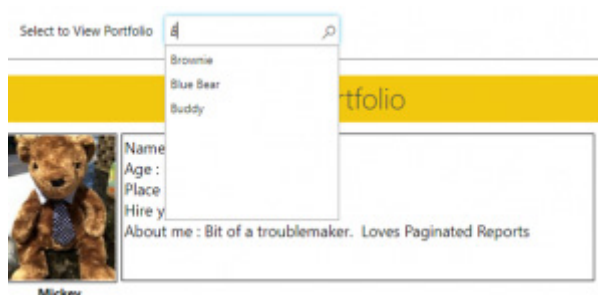
To help get started building a paginated report against a Power BI dataset, the Power BI team has added the ability to download the RDL file from the Power BI service with the connection information

already defined for the selected Power BI dataset. Simply choose any Power BI dataset in the Service you have access to and right-click on the dataset. You will see the option to 'Download the .rdl'.

### SEARCH IN PARAMETER DROPDOWNS IN POWER BI

This update has also addressed one of the top usability issues related to parameter dropdowns in the Power BI Service. You may now use a fuzzy

text search to better filter the value you are looking for, so you do not have to scroll through a long list to get the selected item.



## PAGE VIEW MODE URL PARAMETER

You can pass 'rdl:reportView=pageView' as part of a URL to configure the look and feel of your paginated reports in Power BI and render the report in page view mode instead of interactive.

## POWER AUTOMATE ACTIONS FOR EXPORTING POWER BI AND PAGINATED REPORTS

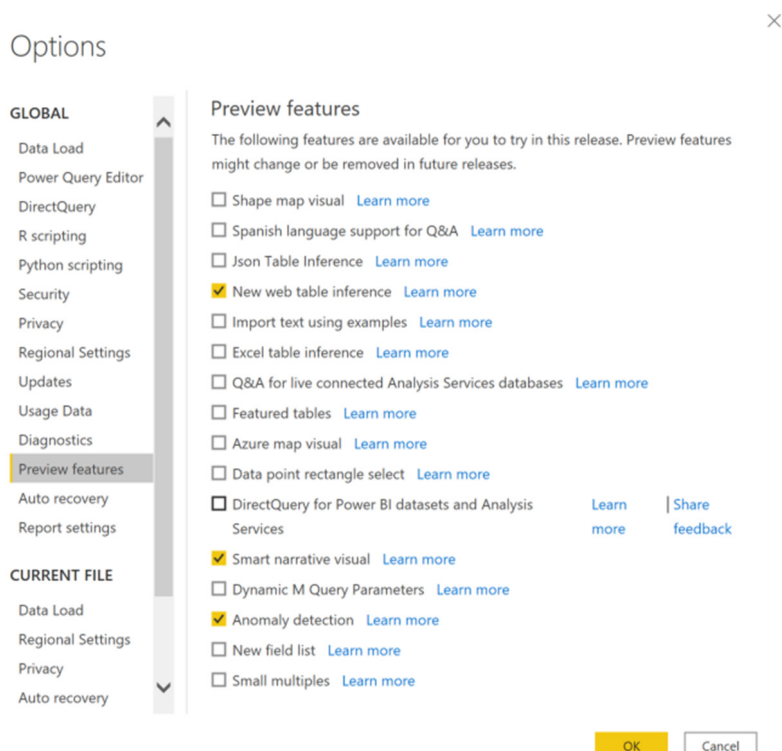
You may easily leverage the Power BI export API for either Power BI reports or paginated reports in your Power Automate workflows. These new actions make it easy for anyone to quickly export their Power BI content in a variety of supported formats and scenarios. Want to have a Power BI report saved to OneDrive every day at noon as a PDF, or have

different reports mailed to everyone on your team in different formats? No problem. Have a Power App using the Common Data Service and want to print an invoice from it using paginated reports? You can do that now too...

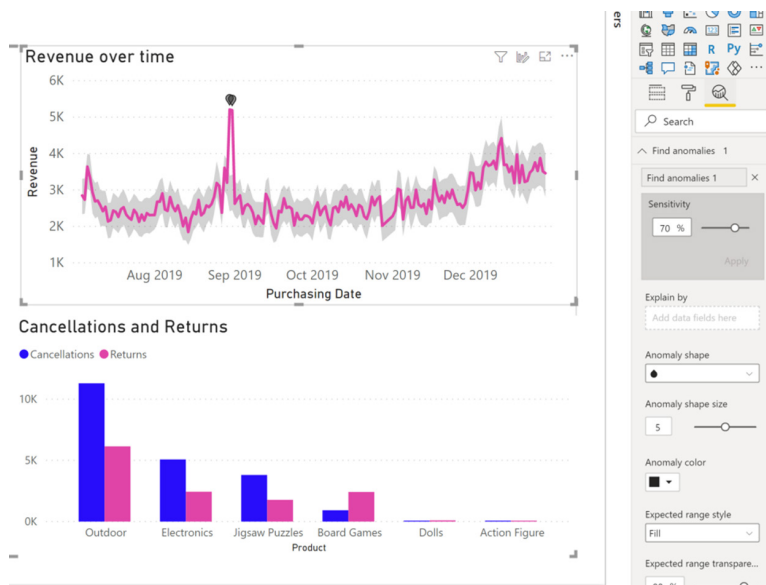
## Anomaly Detection in Preview

Anomaly detection helps you enhance line charts by automatically detecting anomalies in your time series data. It also provides explanations for the anomalies to help with root cause analysis. With just a couple of clicks you can easily find insights without slicing and dicing the data.

Since this feature is in Preview, you will first need to turn on the feature switch by going to **File -> Options and Settings -> Options -> Preview features** and make sure 'Anomaly detection' is turned on:

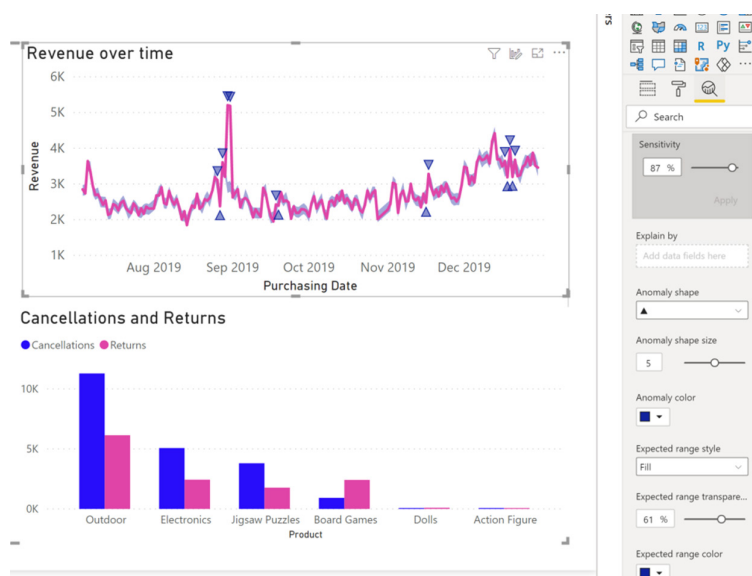


Once you enable 'Anomaly detection on a chart' by adding 'Find Anomalies' from the 'Analytics' pane, it gets automatically enriched with the anomalies and expected range of values.

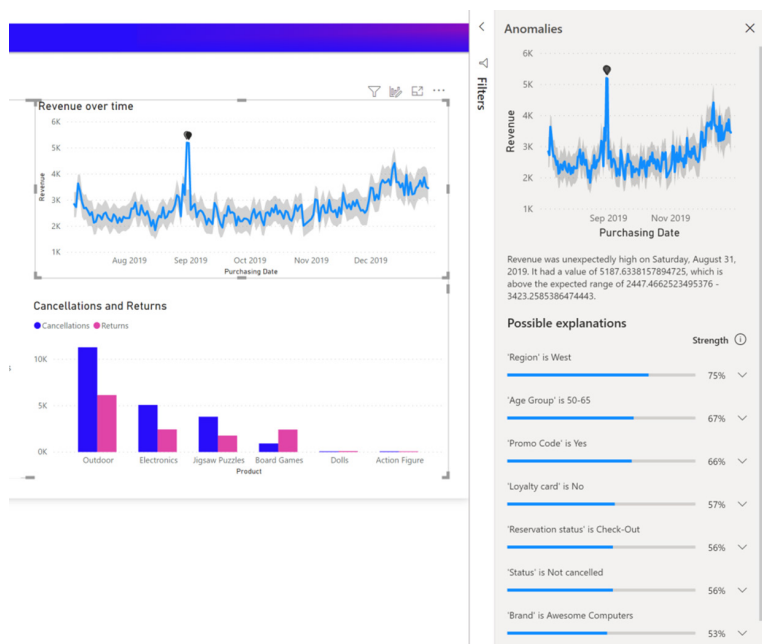




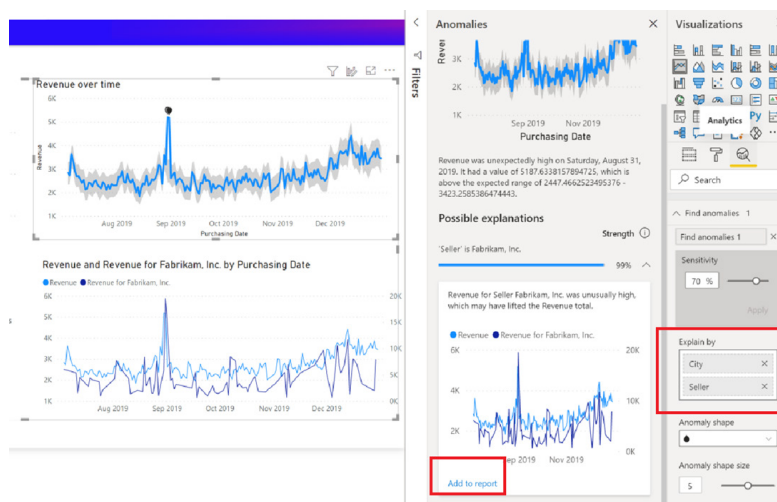
This experience is highly customisable, whereby you may configure the sensitivity of the algorithm, shape, size, colour of the anomaly, and the colour, style and / or transparency of the expected range.



Once you select the anomaly, Power BI runs an analysis across the fields in your data model to figure out possible explanations. The Anomalies pane provides a natural language explanation of the anomaly and associated factors sorted by their explanatory strength.



You can control the fields that are used for analysis by dragging fields into the 'Explain by' field well. Clicking on an explanation opens the card where you can see more details of the explanation. You can also add the explanation visual to the report.



Report consumers can view anomalies and explanations after the creator publishes the report to the Power BI Service.

### ***Q&A now supports partial matching data values***

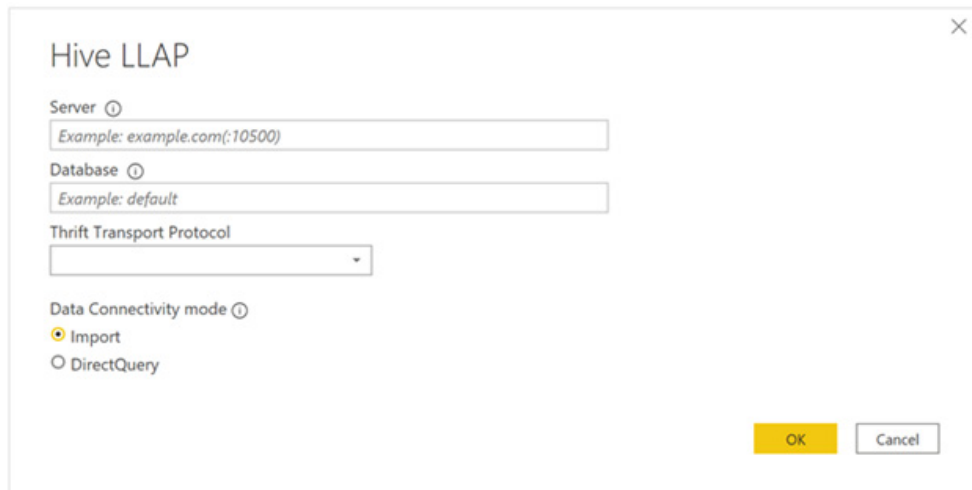
Q&A now supports a much-requested feature: 'partial matching for data values'. Prior to this update if you typed in 'show me sales for Azure', the question would fail because the actual value is 'Microsoft Azure'.

With this new update, we will now return you intelligent matches by searching the data for more than just exact matches. You can feel Fuzzy all day long!

### ***Hive LLAP connector Generally Available***

The Hive LLAP connector is now Generally Available. It has also been added to the On-Premises Data Gateway.

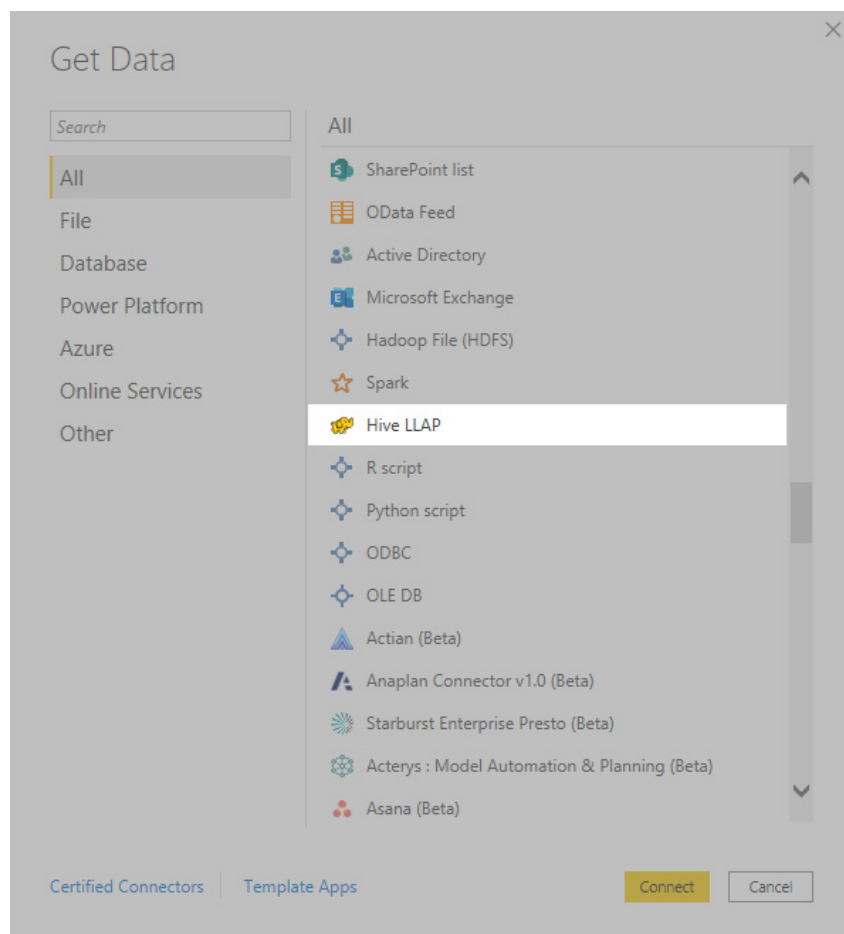
This connector provides both Import and Direct Query capabilities and the ability to specify 'Thrift Transport Protocol' as 'Standard' or 'HTTP'.



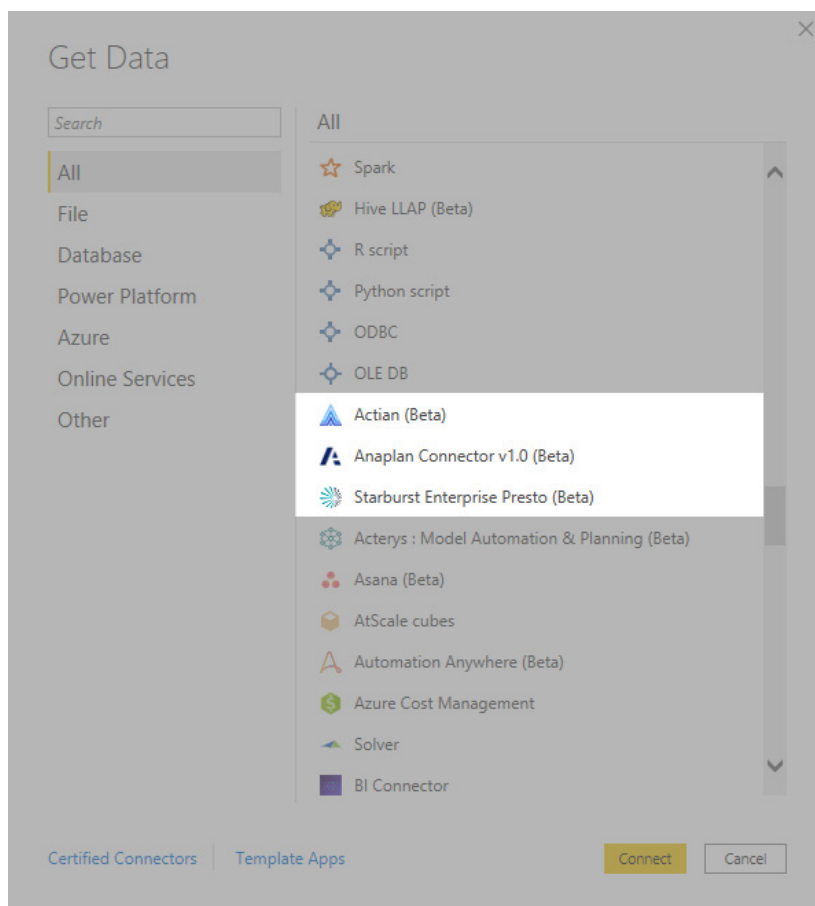
The screenshot shows a 'Hive LLAP' configuration window. It contains the following fields and options:

- Server**: A text input field with a placeholder 'Example: example.com(:10500)'.
- Database**: A text input field with a placeholder 'Example: default'.
- Thrift Transport Protocol**: A dropdown menu.
- Data Connectivity mode**: Two radio buttons, 'Import' (selected) and 'DirectQuery'.
- Buttons**: 'OK' and 'Cancel' buttons at the bottom right.

This connector can be found in the 'Other' category of the 'Get Data' dialog:



The screenshot shows the 'Get Data' dialog box. On the left is a sidebar with categories: 'All', 'File', 'Database', 'Power Platform', 'Azure', 'Online Services', and 'Other'. The 'Other' category is selected. The main area displays a list of connectors under the 'All' heading. The 'Hive LLAP' connector is highlighted. Other connectors listed include SharePoint list, OData Feed, Active Directory, Microsoft Exchange, Hadoop File (HDFS), Spark, R script, Python script, ODBC, OLE DB, Action (Beta), Anaplan Connector v1.0 (Beta), Starburst Enterprise Presto (Beta), Acterys : Model Automation & Planning (Beta), and Asana (Beta). At the bottom, there are tabs for 'Certified Connectors' and 'Template Apps', and 'Connect' and 'Cancel' buttons.



### ACTION



Action Avalanche is a fully managed platform with a hybrid cloud data warehouse. The cloud data warehouse was designed to deliver performance and scale, powered by a vectorised database engine (whatever that means!). Using ODBC and / or JDBC connectivity, users of Avalanche can easily connect Power BI to an Avalanche cloud data

warehouse. You will be able to find this connector in the 'Database' category.

To download the Avalanche client drivers, please use the following link: <https://esd.action.com/>.

### ANAPLAN



The Anaplan Connector for Power BI is a user-friendly native connector for Power BI. It allows you to easily connect Anaplan data and models to Power BI. The connector lets you load export actions saved within Anaplan models directly into Power BI. Find this connector in the 'Other' category.

### STARBURST PRESTO (Beta)



Starburst Data provides accelerated data analytics at scale with Power BI. The Power BI DirectQuery driver can be used to connect Microsoft Power BI Desktop and Microsoft Power BI Service to Starburst Enterprise.

It allows users to connect Power BI with Starburst's distribution of Presto. This combination enables the query processing to be performed in Presto, instead of moving data to Power BI for processing.

The ANSI SQL MPP query engine offers quick access to massive volumes of complex data at source (consolidated or federated). Power BI leverages that single point of access to data anywhere and enables users to analyse the data to make informed business decisions in real time. Starburst

### ***Certified and Promoted reports and apps***

Organisations are increasingly seeking to build a data culture so they can leverage insights every day, at all levels of their company, across users with a variety of analytical skillsets.

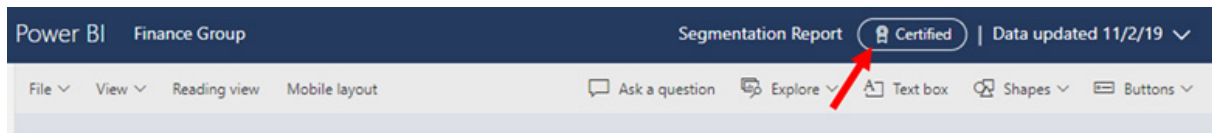
To encourage the use of standardised data, Microsoft had previously released endorsement for datasets and dataflows. This capability was designed to help report creators who need to find authorised data to build their reports on.

This update now extends this capability to provide similar endorsement

Enterprise includes numerous high-performance parallel connectors with global security, caching, autoscaling, cost-based query optimiser, and 24x7 support from Presto experts. This connector is again in the 'Other' category.

capabilities for reports and applications. This will enable business users to be confident they are making business decisions based on the right data.

With certification, Power BI is providing organisations with a mechanism they can use to distinguish their most valued and trusted content. Content certification can be tightly controlled and documented via an administrative control, ensuring that certification is a selective process that results in the establishment of truly reliable and authoritative body of content designed for use across the entity.



As Power BI becomes widely adopted across your organisation, you can see that many reports are available. Often, multiple similar reports exist, with major overlap between them, making it difficult to find the right report one can use and be sure of. Any content owner (a user with an admin /

member / contributor role in the workspace) can promote their content, thereby marking it as trusted and ready to be shared. This promoted content will get better visibility in a variety of Power BI experiences, making it easier for business users to find and identify.

### ***'New look' of the Power BI Service is now live***

All the improvements of the 'new look', from navigation updates to the simplified action bar for reports and dashboards, have been fully released to all tenants and users. Microsoft has stated that they have "...made

incremental updates to modernize (sic) and simplify the Power BI [S] service..." from feedback gleaned during the Preview phase.

For those of you that has missed the key 'new look' improvements, here's a quick recap:

- **Simplified action bar:** The action bar has been made simpler and been better organised so it is easier to find related actions and putting most common actions front and centre
- **Page navigation settings:** Report authors can choose where report page navigation sits, on the left as a pane or across the bottom as tabs
- **Minimise global navigation and collapse left page navigation:** To give you more room to view and interact with your reports, Power BI has updated interactions to minimise the global navigation and collapse the left pages navigation
- **New workspaces:** Easier to scan, find what you need, get data, search, take quick actions, etc.
- **Updated personal bookmarks:** Previously, selecting a personal bookmark would update the bread crumb in the top bar with the name of the bookmark. Moving forward, the bookmark name will be updated inline within the context of your report action bar
- **View report details:** See details such as last refresh date and contact information quickly, right in the top banner
- **Vertical list of pages:** Report page names are now in a list in a vertical pane. They are prominent, hard to miss, and like navigation in Word and PowerPoint
- **Improved filter experience:** Updates such as viewing applied filters and the new Filters pane are available by default with the 'new look'
- **Dashboard experience:** Dashboards also have a simplified action bar, just like reports and apps, for a consistent experience, while retaining the functional differences.

With 'new look' released to all tenants and users, the user-facing 'New look on' toggle has now been removed from the header.

### ***Power BI Automation and APIs***

The new Power BI API for Reports allow report creators to transfer the ownership of paginated report data sources to authorised users who call the API. For instance, to update the details of a data source, you must be the owner of the data source. The 'Take over API for paginated reports'

will help users take ownership of the source to allow access to update it.

The new API will be the equivalent of the existing API, 'Datasets – Take over in group', which allows users to transfer ownership of a dataset for Power BI reports.

### ***Fetch more data API 3.4***

The 'Fetch more data API' enables custom visuals to bypass the hard limit of a 30,000 rows data view when additional data is needed. With the new 3.4 API release, Power BI has extended the 'Fetch more data' API's functionality to support a new approach of loading data chunks.

In addition to the existing approach which aggregates all the chunks requested, the API now supports loading only incremental data chunks. The new approach allows more flexibility in the way additional data chunks are loaded to the visual.

## Enhanced testing of your developed custom visual

This update adds a new feature that enables developers to override the AppSource published visual version with a local file version in both Power BI Desktop and Service. This is used when developers want to test or debug a local version of a visual that is already published in AppSource.

## New visuals

There are various new visualisations to check out this month:

- Forecast visual by Predmac
- Global Launch Estimated by TheraTraq
- Lollipop Column Chart by Nova Silva
- Dynamic KPI Card by Sereviso
- Shielded HTML Viewer by Nova Silva
- TheraTraq Timeline Circle by TheraTraq
- Workforce by TheraTraq.

We look at three (*not mentioned above*) in more detail below.

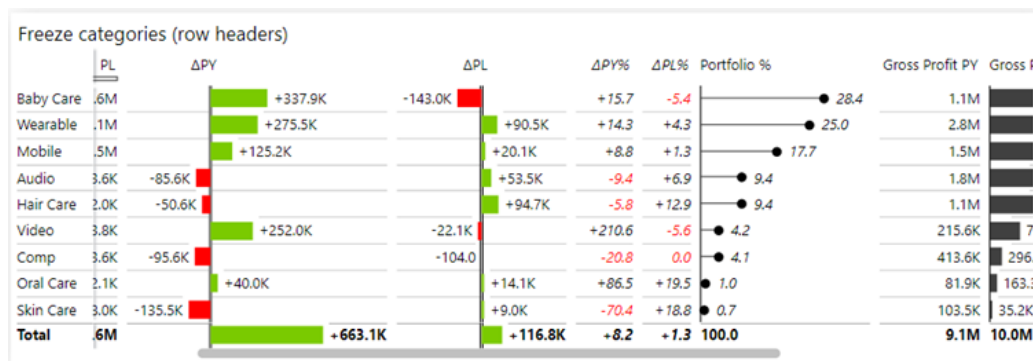
## Zebra BI 4.4

The latest update of Zebra BI visuals for Power BI (version 4.4) introduces a few new ideas and addresses frequently requested features. Major changes such as multi-level hierarchical charts and custom fonts, as well as the ability to freeze row headers in tables, 1-click experience of Top N + Others, support for Analytics pane, additional fields for ToolTips and new design options for a sleeker look.

The key improvements in Zebra BI Tables are detailed below.

### FREEZE OR UNFREEZE CATEGORIES (ROW HEADERS)

If you freeze the row headers (first column), it locks them into place. This is very practical for use with data-heavy table or matrix displays:

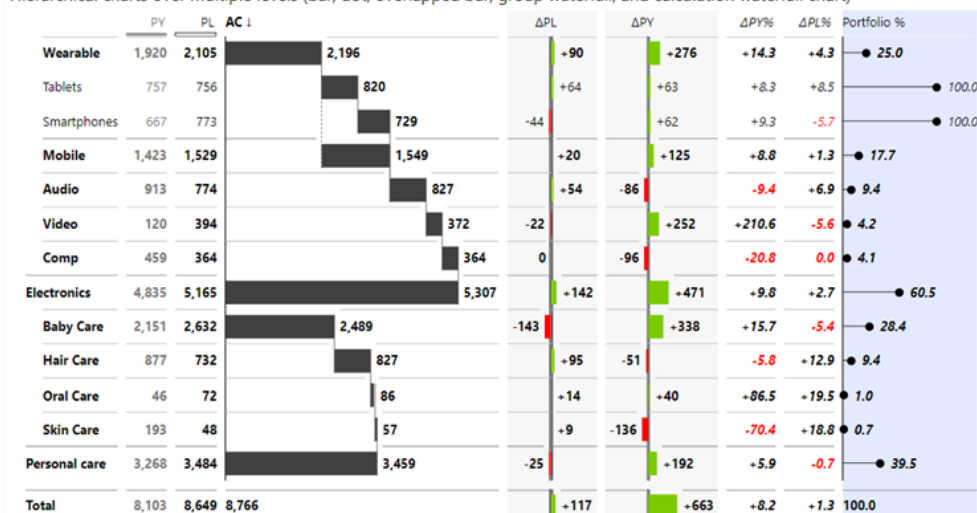


### MULTI-LEVEL HIERARCHICAL CHARTS

Hierarchical charts are quite a challenge in data visualisation because of the scaling issue with higher levels on the hierarchy being much larger than all other levels below that. But now, Zebra has found a more natural way to display the contribution of each level lower on your hierarchy.

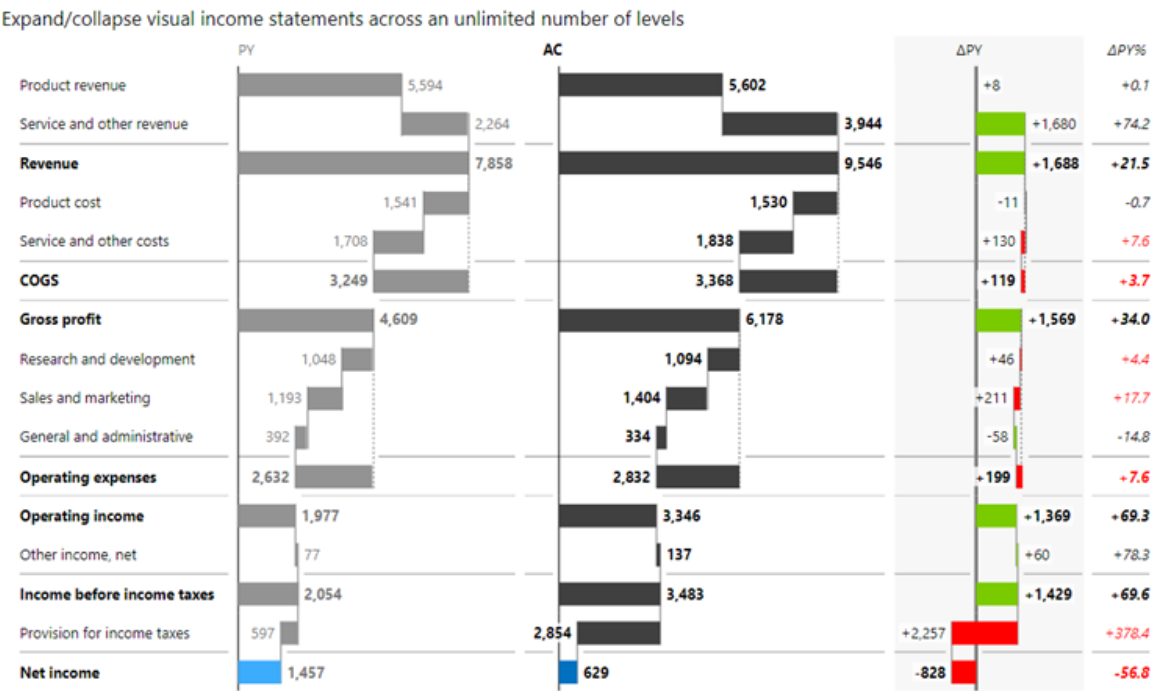
Here is an example with a vertical waterfall chart. As you can see, it makes it clearer to understand how each business unit contributes to the total bottom line of each division:

Hierarchical charts over multiple levels (bar, dot, overlapped bar, group waterfall, and calculation waterfall chart)



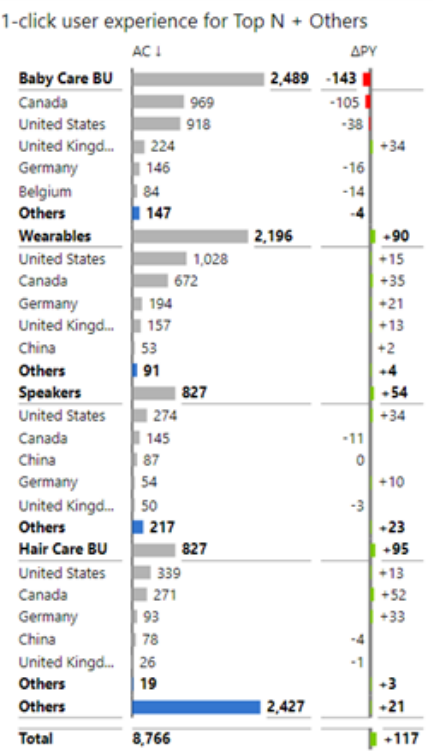


This solution works especially well in P&Ls (income statements). In a hierarchical P&L, you can dynamically expand / collapse certain subtotals as needed, e.g. revenue, COGS or Opex:



1-CLICK TOP / BOTTOM N

Filtering tables with the Top N feature has now been improved. It is now easier to change the number of Top N elements you wish to see.

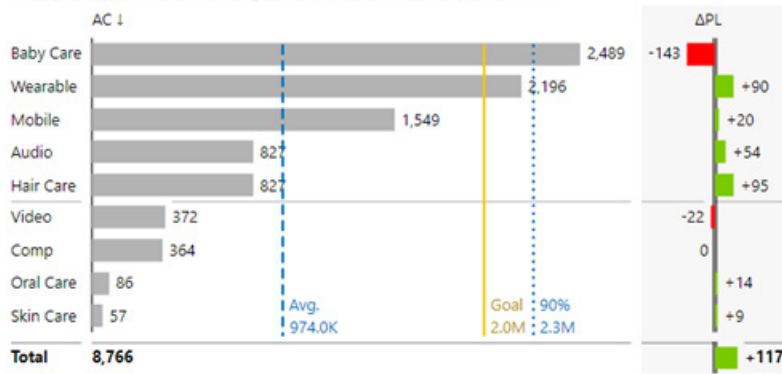


This feature is rolled out across hierarchies. You can turn the Top N on or off separately for any level in your hierarchy.

ANALYTICS PANE

The Analytics pane is one of those Power BI features that too often gets overlooked but is hiding some useful powers. It enables you to simply add certain calculated elements, e.g. average, median, constant and percentile to your tables. You can for example set the benchmark and it will be displayed on the table (see the yellow line below):

Analytics pane: add average, median, constant, percentile



## PERFORMANCE IMPROVEMENTS

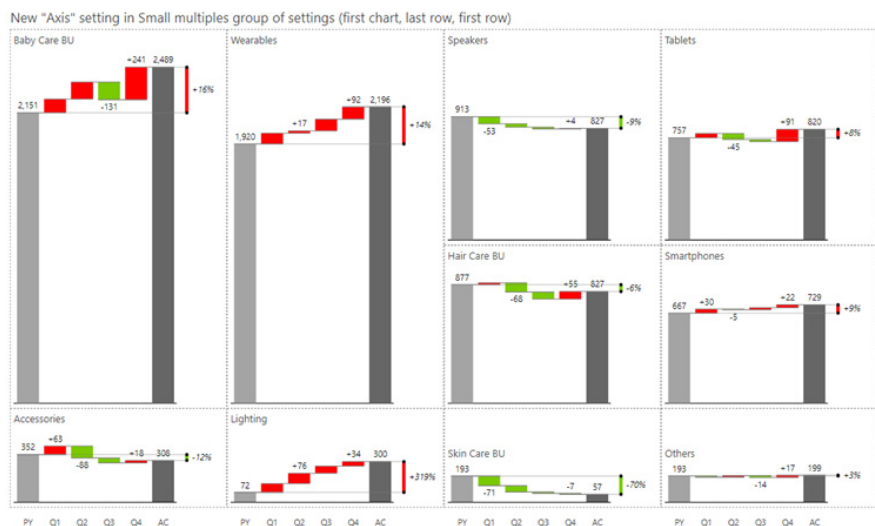
There are reportedly other features and improvements in the Zebra BI Tables visual that will improve the design and usability of your Power BI reports and dashboards, with speed improvements reported of 15 – 25% (albeit measured by Zebra BI).

Zebra BI Charts (version 4.4) has been updated too...

## SLEEKER AXIS LABELS IN SMALL MULTIPLES

Zebra BI's small multiples follow a minimalistic concept. However, this version improves legibility. You can now control the density and the number of axis labels.

This is important because in a typical small multiple there can be a lot of redundancy in data labels. Now there are more options, e.g. to display only labels in the first chart, only on the first row, or on the last row only. See the example below:



Even if the charts are larger and users need to scroll up and down, your labels on the bottom will stay frozen and help users understand which categories they are looking at.

## 1-CLICK TOP N + OTHERS

From now, you can change the number of charts displayed with one simple click. Even users may increase or decrease the number of charts: →

When you change the number of charts, everything else is still automatically calculated in the 'Other' chart.

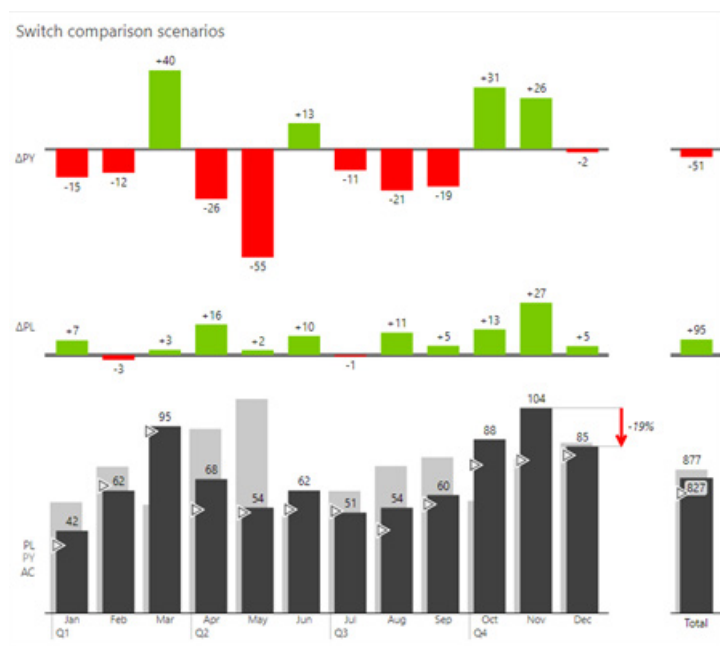


## ADDITIONAL FIELDS FOR TOOLTIPS

ToolTips make reports more understandable for people who read them. From this update, there are now additional data fields in your data ToolTips. When users hover over certain values, they will be able to see additional information for each data point, including text comments.

## SWITCH COMPARISON SCENARIOS

If you have multiple comparisons in your Zebra BI Charts visual, you can now choose the order in which they are displayed:



## New visual by ZoomCharts: Drill Down Map PRO

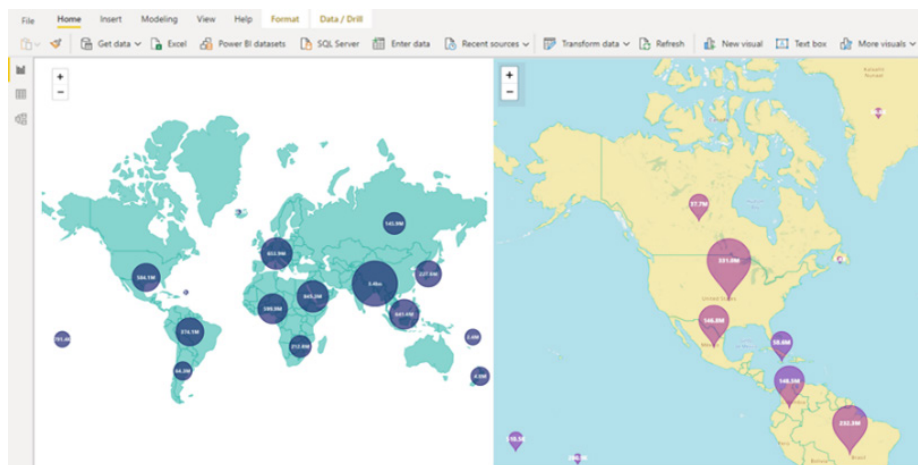
Drill Down Map PRO by ZoomCharts may be used to create maps with built-in filters (such as countries and states) or create and store your own filters for custom regions. Features include data clusters as do(ugh)

nut charts and multi-page Tooltip enables you to show more data per location in a structured, user-friendly way.

The main features are:

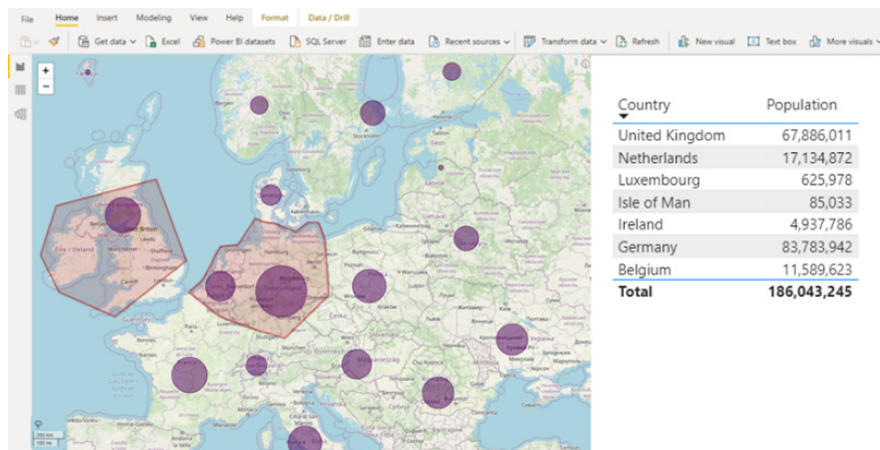
## UP-TO 11 LAYERS

Use Microsoft Azure Maps or a custom tile server of your choice (e.g. OpenStreetMap) as the base layer. Add additional shape layers on top of that using either built-in shapes or add your own by specifying KML / GeoJSON sources. Each layer can be bound to specific zoom levels to enable dynamic drill down experience.



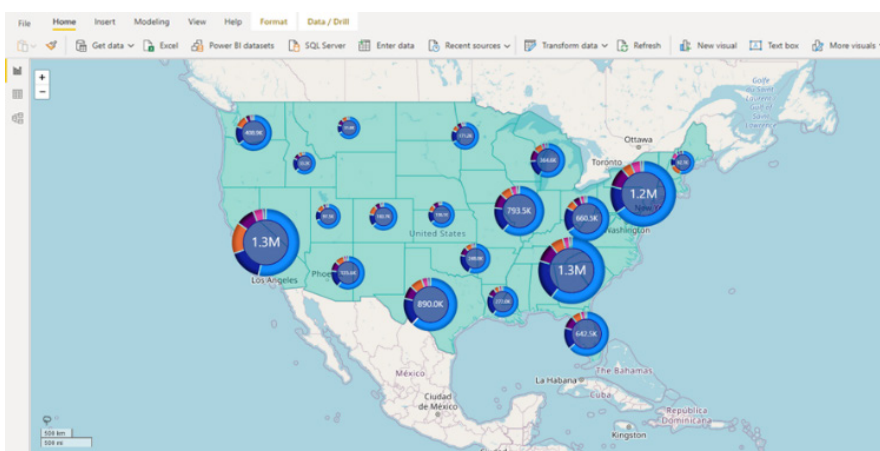
## FILTERING USING CUSTOM SHAPES

Use built-in shape layers (e.g. countries, states), create your own custom shapes (the lasso tool) or import shapes from KML / GeoJSON files and use the shapes to aggregate and filter your data. Custom shapes can be saved in the visual within the report to enable your end users to use them for data exploration purposes.



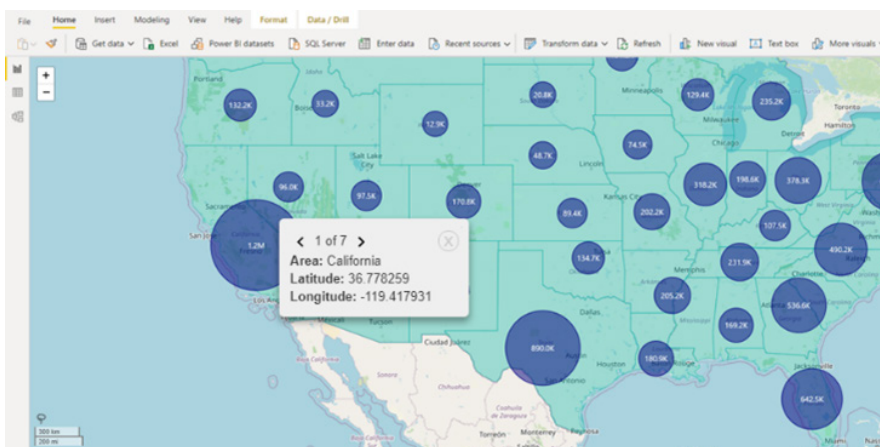
## CLUSTER THE DATA USING THE BUILT-IN DRILL DOWN DONUT PRO VISUALS

When grouping data in clusters based upon their location and proximity, you can turn them into donut charts to visualise the content of the cluster; data will be automatically grouped by the category field. Slices act as category filters.



## MULTI-PAGE TOOLTIPS FOR CLUSTERED NODES

Multi-page ToolTips solve the problem of showing additional information for each data point within the cluster. You can browse information for all related nodes within one ToolTip, using navigation arrows.



## RICH CUSTOMISATION OPTIONS

As all ZoomCharts custom visuals, Drill Down Map PRO comes with plenty of formatting options. There are multiple node shapes to choose from as well as image support for nodes. You can add auras, assign a different

color for each node category, adjust node sizes, fonts and labels. Visual also fully supports measures, drill-through and report page Tooltip.





Drill Down Map PRO is useful for visualising environmental, sociodemographic and health data, mapping sales and marketing data or monitoring production and equipment data by site location (e.g. drilling or mining sites).

### xViz Scatter / Bubble chart

The xViz Scatter/ Bubble chart provides nine (9) quick-start templates, including Scatter, Bubble and an International Business Communication Standards (IBCS) variation for both. A Scatterplot chart displays the relationship between two numerical values (X and Y coordinate), and ideal for correlation analysis and outlier detection. The Bubble chart further enhances the Scatterplot's information density by adding a size variable as a third dimension. You can also pack more information

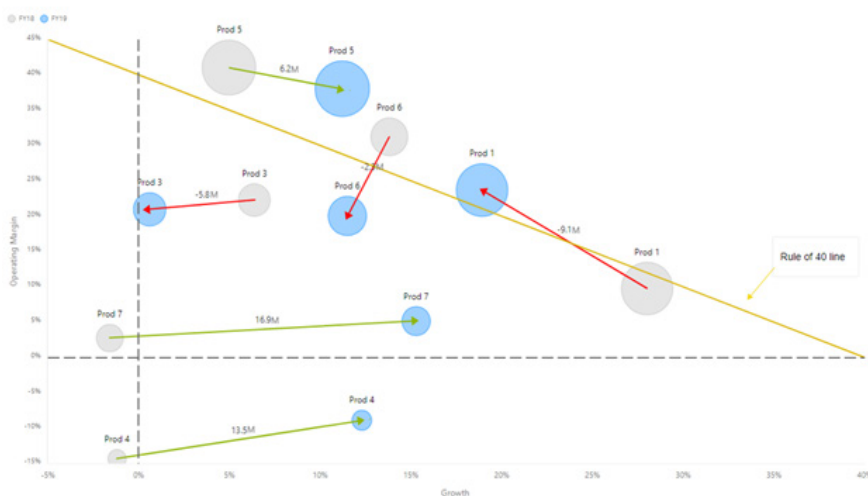
by using color as the fourth variable, either value or category, with conditional formatting.

The category fields are used for labelling the bubbles and activate drill down mode when more than one. The legend field further splits the bubbles into different groups, which can be styled with specific colours, shapes, patterns and custom images under the Appearance tab.

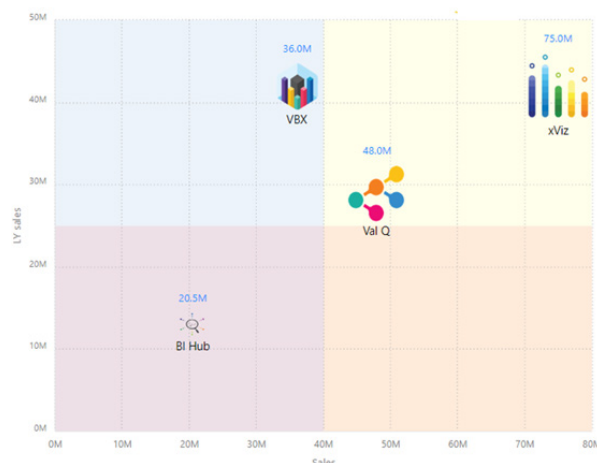
Several key features have been addressed as below:

- robust conditional formatting for outlier detection
- IBCS standard templates for Bubble and Scatter
- variance bar for strategic use cases
- data label customisation: display category and value for each data point
- analytics section: custom lines, trend lines, reference lines and bands
- runtime options: ranking with 'Others', zoom in / out, lasso and reverse lasso
- annotations for enhanced storytelling
- Bubble customisation: shape, size, pattern and custom images (Data URI)
- axis ranges for grouping the axes into different bands.

xViz Scatter/Bubble - Strategic Analysis using Variance bar



xViz Scatter/ Bubble chart with Custom Images



More next month we're sure!

## The A to Z of Excel Functions: FILTER

No longer in Preview mode, *i.e.* it's now Generally Available to Office 365 users, **FILTER** is one of seven functions heralding the new dawn of arrays – the Dynamic Array.

Before explaining **FILTER**, let's first consider what a Dynamic Array is. Consider the following data:

	C	D	E	F	G	H
9						
10				<b>Original Data</b>		
11						
12						
13				Shape	Colour	Sides
14				Triangle	Red	3
15				Rectangle	Amber	4
16				Circle	Green	1
17				Triangle	Red	3
18				Square	Blue	4
19				Rectangle	Blue	4
20				Rectangle	Amber	4
21				Circle	Amber	1
22				Triangle	Red	3
23				Square	Green	4
24				Circle	Blue	1
25				Square	Amber	4
26				Triangle	Blue	3
27				Circle	Green	1
28				Rectangle	Blue	4

If I were to type **=F12:H27** into another cell, Excel in the past would have thought I had gone mad. I'd need to wrap it in an aggregation function such as **SUM**, **COUNT** or **MAX**, to name but a few. Otherwise, I would have to wrap it in braces using **CTRL + SHIFT + ENTER** and use it as an array formula.

But no more.

Look at what happens when I type **=F12:H27** into cell **F33**:

F33						
	C	D	E	F	G	H
30						
31				<b>Dynamic Array Result</b>		
32						
33				Shape	Colour	Sides
34				Triangle	Red	3
35				Rectangle	Amber	4
36				Circle	Green	1
37				Triangle	Red	3
38				Square	Blue	4
39				Rectangle	Blue	4
40				Rectangle	Amber	4
41				Circle	Amber	1
42				Triangle	Red	3
43				Square	Green	4
44				Circle	Blue	1
45				Square	Amber	4
46				Triangle	Blue	3
47				Circle	Green	1
48				Rectangle	Blue	4
49						

The formula *automatically extends* to three columns by 16 rows! It has *spilled*. Get used to the vernacular. There's a reason this article got the name it did!

Any formula that has the potential to return multiple results can be referred to as a **Dynamic Array** formula. Formulae that are currently returning multiple results, and are successfully spilling, can be referred to as **Spilled Array Formulae**.

Notice I did not have to highlight all of the cells **F33:H48**. It *spilled*. Also take note I formatted cell **F33** – er, that didn't spill, because presently

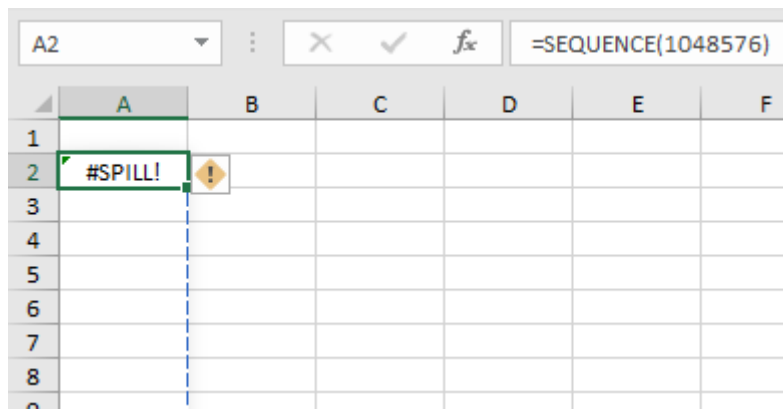
formatting isn't propagated. This is why this is not yet Generally Available. Microsoft is still trying to work out what should and shouldn't be allowed to happen in this first release. But don't let that put you off.

And don't let this basic example put you off either. If you feel a general sense of underwhelm coming over you, it's because I haven't yet communicated how powerful this all is as my example was too basic.

However, before I carry on there is a question I do need to cover with my far too simple example: what happens if something gets in the way?







- **Table formula:** as I will explain shortly, Tables and Dynamic Arrays are not yet best friends. Spilled array formulae aren't supported in Excel Tables (generated by **CTRL + T**). Try moving your formula out of the Table, or go to **Table Tools -> Convert to range**

fx		=SORT([Units])	
	D	E	
	Units	Sort	
	22	#SPILL!	
	961	#SPILL!	
	691	#SPILL!	
	445	#SPILL!	
	378	#SPILL!	
	483	#SPILL!	
	445	#SPILL!	
	650	#SPILL!	
	544	#SPILL!	
	865	#SPILL!	

- **out of memory:** I have forgotten what this one means. Sorry, I couldn't resist that. The spilled array formula you are attempting to enter has caused Excel to run out of memory. You should try referencing a smaller array or range
- **spill into merged cells:** spilled array formulae cannot spill into merged cells. You will need to un-merge the cells in question or else move the formula to another range that doesn't intersect with merged cells.

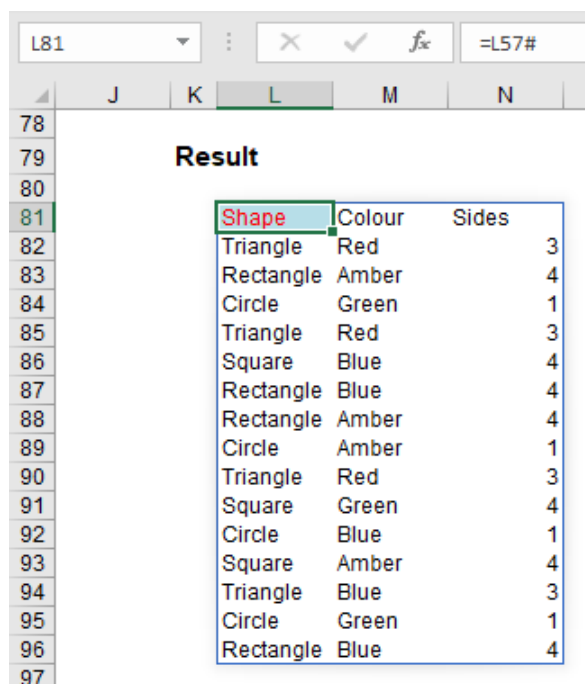
fx		=SORT(D2:D11)	
	D	E	F
	Units		Units
	62		#SPILL!
	961		
	691		
	445		
	378		
	483		
	650		
	783		
	142		
	404		

When the formula is selected, a dashed border will indicate the intended spill range. You can again select that wonderfully named error floatie and choose the 'Select Obstructing Cell' option to immediately go the obstructing cell. As soon as the merged cells are cleared, the array formula will spill as intended

- **unrecognised / fallback error:** the “catch all” variant. Excel doesn't recognise, or cannot reconcile, the cause of this error. Here, you should make sure your formula contains all of the required arguments for your scenario.

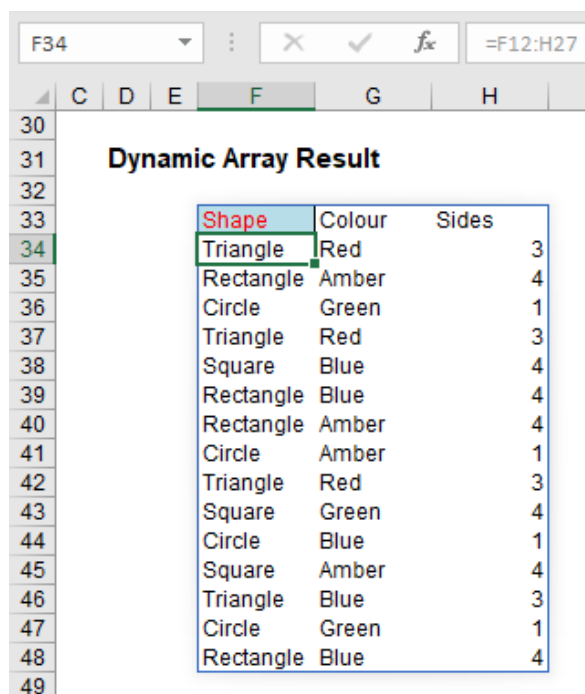
### Returning to Dynamic Arrays

Now that we have considered what happens if you block a Dynamic Array, let me now turn my attention to what happens if you *don't*. You get the following:



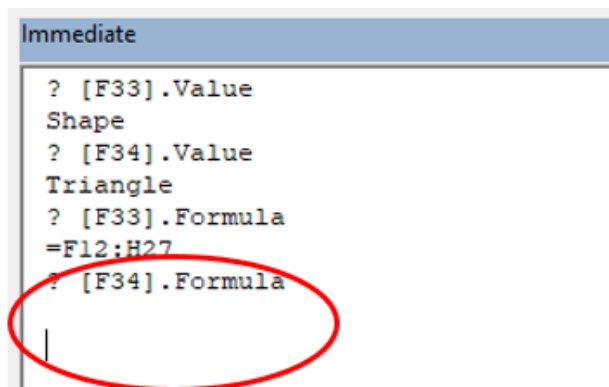
Shape	Colour	Sides
Triangle	Red	3
Rectangle	Amber	4
Circle	Green	1
Triangle	Red	3
Square	Blue	4
Rectangle	Blue	4
Rectangle	Amber	4
Circle	Amber	1
Triangle	Red	3
Square	Green	4
Circle	Blue	1
Square	Amber	4
Triangle	Blue	3
Circle	Green	1
Rectangle	Blue	4

Do you see I am not having to anchor cells (*i.e.* use dollar [\$] signs)? The formula just *spills*. Let me be clear. If I select cell **F34**, I get the following:



Shape	Colour	Sides
Triangle	Red	3
Rectangle	Amber	4
Circle	Green	1
Triangle	Red	3
Square	Blue	4
Rectangle	Blue	4
Rectangle	Amber	4
Circle	Amber	1
Triangle	Red	3
Square	Green	4
Circle	Blue	1
Square	Amber	4
Triangle	Blue	3
Circle	Green	1
Rectangle	Blue	4

Here's a first. Check out the formula in the formula bar. It's *greyed out*. Ever seen that before? Effectively, cell **F34** contains the value 'Triangle' but it does not actually contain an “Excel” formula in the usual sense. To demonstrate this, let me show you the VBA Immediate Window:



If you select cells **F33:H48** and use 'Go To Special' (**F5 -> Special**), and then select 'Formulas', cells **F33:H48** are shown as formula cells. You can even copy and paste them as values. Ladies and gentlemen, welcome to this brave new world.

Once you have a Dynamic Array, referring to it is simple using what is known as the **Spilled Range Operator**. For example, if I want to refer

to the Dynamic Array in the previous examples, it initially had a range of **L57:N72**. However, once I had added a row and column to the Table, this resized to **L57:O73**. I can easily refer to this array, whatever its size as follows. In its initial state:

L81					
	J	K	L	M	N
78					
79					
80					
81					
82					
83					
84					
85					
86					
87					
88					
89					
90					
91					
92					
93					
94					
95					
96					
97					

### Result

Shape	Colour	Sides
Triangle	Red	3
Rectangle	Amber	4
Circle	Green	1
Triangle	Red	3
Square	Blue	4
Rectangle	Blue	4
Rectangle	Amber	4
Circle	Amber	1
Triangle	Red	3
Square	Green	4
Circle	Blue	1
Square	Amber	4
Triangle	Blue	3
Circle	Green	1
Rectangle	Blue	4

The formula **=L57#** allows for variations – you simply type in the top left-hand cell reference (*i.e.* the cell with the non-greyed out formula) and add **#**, known as the Spilled Range Operator. Simple!

### ***FILTER*** Function

With the above borne in mind, the **FILTER** function will accept an array, allow you to filter a range of data based upon criteria you define and return the results to a spill range.

The syntax of **FILTER** is as follows:

**=FILTER(array, include, [if\_empty]).**

It has three arguments:

- **array**: this is required and represents the range that is to be filtered
- **include**: this is also required. This specifies the condition(s) that must be met
- **if\_empty**: this argument is optional. This is what will be returned if no data meets the criterion / criteria specified in the **include** argument. It's generally a good idea to at least use **""** here.

For example, consider the following source data:

	C	D	E	F	G	H	I
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							

Original Data			
Item	Shape	Colour	Sides
1	Triangle	Red	3
2	Rectangle	Amber	4
3	Circle	Green	1
4	Triangle	Red	3
5	Square	Blue	4
6	Rectangle	Blue	4
7	Rectangle	Amber	4
8	Circle	Amber	1
9	Triangle	Red	3
10	Square	Green	4
11	Circle	Blue	1
12	Square	Amber	4
13	Triangle	Blue	3
14	Circle	Green	1
15	Rectangle	Blue	4

To begin with, I will perform a simple **FILTER**:

F36

:

✖

✓

*f<sub>x</sub>*

=FILTER(F12:I27,G12:G27=G33,"Not Located.")

▲

C

D

E

F

G

H

I

J

K

L

30

31

32

33

34

35

36

37

38

39

40

Filter Results

Shape

Triangle

Item	Shape	Colour	Sides
1	Triangle	Red	3
4	Triangle	Red	3
9	Triangle	Red	3
13	Triangle	Blue	3

Here, in cell **F36**, I have created the formula

**=FILTER(F12:I27,G12:G27=G33,"Not Located.")**

**F12:I27** is my source **array** and I wish only to **include** shapes (column **G12:G27**) that are 'Triangles' (specified by cell **G33**). If there are no such shapes, then **"Not Located."** is returned instead. To show this, I will change the shape as follows:

F36

<

That is about as basic as it gets. I can get cleverer. Consider the following example:

F73    X    ✓    f<sub>x</sub>    =FILTER(F48:I63,(G48:G63=G69)\*(H48:H63=G70),{"-", "None", "N/A", "N/A"})

Item	Shape	Colour	Sides
1	Triangle	Red	3
2	Rectangle	Amber	4
3	Circle	Green	1
4	Triangle	Red	3
5	Square	Blue	4
6	Rectangle	Blue	4
7	Rectangle	Amber	4
8	Circle	Amber	1
9	Triangle	Red	3
10	Square	Green	4
11	Circle	Blue	1
12	Square	Amber	4
13	Triangle	Blue	3
14	Circle	Green	1
15	Rectangle	Blue	4

**Filter Results**

Shape: Triangle  
Colour: Red

Item	Shape	Colour	Sides
1	Triangle	Red	3
4	Triangle	Red	3
9	Triangle	Red	3

I have repeated the source **array** (cells F48:I63) for clarity. The formula

=FILTER(F48:I63,(G48:G63=G69)\*(H48:H63=G70),{"-", "None", "N/A", "N/A"})

looks horrible to begin with, but it's not quite as bad as it appears upon further scrutiny. The **include** argument,

(G48:G63=G69)\*(H48:H63=G70)

contains two conditions. Firstly, **G48:G63=G69** means that the 'Shape' (column **G48:G63**) has to be a 'Triangle' (cell **G69**) and that the 'Colour' (column **H48:H63**) has to be 'Red' (cell **G70**). The multiplication operator (\*) is used to denote **AND**. The Excel function **AND** cannot be used with arrays – this is nothing special to Dynamic Arrays; **AND** does not work with **CTRL + SHIFT + ENTER** formulae either. This syntax is similar to how you would create **AND** criteria with the **SUMPRODUCT** function, for example.

Consider the final argument: {"-", "None", "N/A", "N/A"}. The braces (typed in!) are used to create an array argument that specifies what should be written in each column should there be no record that meets both criteria, e.g.

F73    X    ✓    f<sub>x</sub>    =FILTER(F48:I63,(G48:G63=G69)\*(H48:H63=G70),{"-", "None", "N/A", "N/A"})

Item	Shape	Colour	Sides
-	None	N/A	N/A

See? Not as bad as you might first think.



My final example is very similar:

F109          =FILTER(F84:I99,(G84:G99=G105)+(H84:H99=G106),{"-", "None", "N/A", "N/A"})

	C	D	E	F	G	H	I	J	K	L	M	N	O
81													
82													
83													
84													
85													
86													
87													
88													
89													
90													
91													
92													
93													
94													
95													
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102													
103													
104													
105													
106													
107													
108													
109													
110													
111													
112													
113													
114													
115													
116													

**Original Data**

Item	Shape	Colour	Sides
1	Triangle	Red	3
2	Rectangle	Amber	4
3	Circle	Green	1
4	Triangle	Red	3
5	Square	Blue	4
6	Rectangle	Blue	4
7	Rectangle	Amber	4
8	Circle	Amber	1
9	Triangle	Red	3
10	Square	Green	4
11	Circle	Blue	1
12	Square	Amber	4
13	Triangle	Blue	3
14	Circle	Green	1
15	Rectangle	Blue	4

**Filter Results**

Shape

Colour

Item	Shape	Colour	Sides
1	Triangle	Red	3
2	Rectangle	Amber	4
4	Triangle	Red	3
6	Rectangle	Blue	4
7	Rectangle	Amber	4
9	Triangle	Red	3
15	Rectangle	Blue	4

Once you realise I have simply repeated referencing for clarity, the formula

**=FILTER(F84:I99,(G84:G99=G105)+(H84:H99=G106),{"-", "None", "N/A", "N/A"})**

is nothing more than the **OR** equivalent of the previous example, with '+' replacing '\*' to switch from ensuring both conditions are met to only one condition being met. As at the time of writing, **XOR** is not catered for, but I am sure some clever person will create an equivalent in due course (if Microsoft doesn't beat them to it), necessity being the mother of invention and all that jazz.

### Dynamic Arrays vs. Legacy Array Formulae

Finally, prior to this new functionality, if you wanted to work with ranges in Excel, you used to have to build array formulae, where references would refer to ranges and be entered as **CTRL + SHIFT + ENTER** formulae. The main differences are as follows:

- Dynamic Array formulae may spill outside the cell bounds where the formula is entered. The Dynamic Array formula technically only exists in the cell in the top left-hand corner of the spilled range (*as shown earlier*), whereas with a legacy **CTRL + SHIFT + ENTER** formula, the formula would need to be entered in the entire range
- Dynamic arrays will automatically resize as data is added or removed from the source range. **CTRL + SHIFT + ENTER** array formulae will truncate the return area if it's too small, or return #N/A errors if too large
- Dynamic array formulae will calculate in a 1 x 1 context
- Any new formulae that return more than one result will automatically spill. There's simply no need to press **CTRL + SHIFT + ENTER**
- According to Microsoft, **CTRL + SHIFT + ENTER** array formulae are only retained for backwards compatibility reasons. Going forward, you should use Dynamic Array formulae instead
- Dynamic array formulae may be easily modified by changing the source cell, whereas **CTRL + SHIFT + ENTER** array formulae require that the entire range be edited simultaneously
- Column and row insertion / deletion is prohibited in an active **CTRL + SHIFT + ENTER** array formula range. You first need to delete any existing array formulas that are in the way
- But remember, this function is only available to Office 365 subscribers still. Even if you have access to Excel 2019, you cannot use **FILTER**.

# The A to Z of Excel Functions: FILTERXML



This function should not be confused with **FILTER**!

Until Excel 2013, Excel was mostly an offline application, although you could use VBA, Power Query / Get & Transform or Power Pivot in Excel to gain access to internet and online datasets. However, Excel 2013 changed all that and introduced two new functions to the world:

1. **WEBSERVICE**, which provides immediate and easy access to any REST WebAPI assuming you have an internet connection by downloading the HTTP response of the provided URL; and
2. **FILTERXML**, which parses an XML string (*i.e.* a text string that contains an XML document) and returns a single element (known as a node or attribute) provided by an XPath. In case you are wondering, XPath is a query language for selecting XML elements such as nodes and attributes and works with both XML and HTML.

Therefore, **FILTERXML** tends to work in tandem with **WEBSERVICE** insofar that it makes sense of the long text string delivered by the former function and finds what you are looking for in that text string.

The **FILTERXML** function employs the following syntax to operate:

**FILTERXML(xml, xpath)**

The **FILTERXML** function has the following arguments:

- **xml**: this is required and represents a string in a valid XML format
- **xpath**: this is also required. This represents a string in a standard XPath format.

It should be noted that:

- if **xml** is not valid, **FILTERXML** returns the **#VALUE!** error value
- if **xml** contains a namespace with a prefix that is not valid, **FILTERXML** returns the **#VALUE!** error
- the **FILTERXML** function is not available in Excel Online
- the **FILTERXML** function is not available in Excel (2016) for Mac
- Further, this function may appear in the function gallery in Excel for Mac, but it relies on features of the Windows operating system, so it will not return results on a Mac.

Please see our example below:

A	B	C
1	Address	
2	<a href="https://themes.trac.wordpress.org/log/i-design?limit=100&amp;mode=stop_on_copy&amp;format=rss">https://themes.trac.wordpress.org/log/i-design?limit=100&amp;mode=stop_on_copy&amp;format=rss</a>	
3		
4		
5	Formula	Description
6	=WEBSERVICE(A2)	Downloads the HTTP response of the provided URL (truncated).
7	=FILTERXML(\$C6,\$B7)	//item//link
8	=FILTERXML(\$C6,\$B8)	//item//title
9	=FILTERXML(\$C6,\$B9)	//item//pubDate
10		
11	This example uses the <b>FILTERXML</b> function on XML data returned in cell C6, which is provided by the results of the <b>WEBSERVICE</b> function on the web query in cell A2. The information summarises the link, the title and publishing date in this instance.	
12		
13		

More Excel Functions next month...

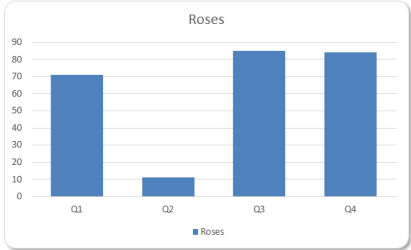
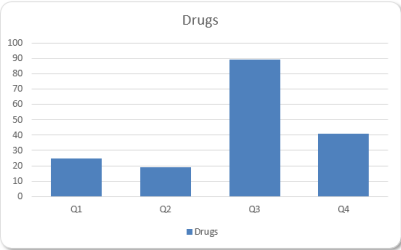
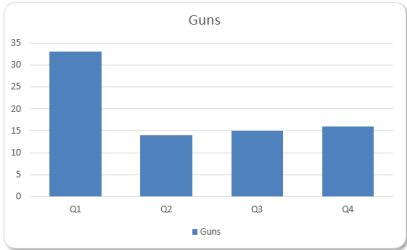
# Beat the Boredom Suggested Solution

Earlier in the newsletter, we looked at three charts that pulled data from the same table. However, there was no easy way to format the y-axis on all three charts so that they all share the same range, without using a macro.

Chart Data

	Guns	Drugs	Roses
Q1	33	25	71
Q2	14	19	15
Q3	15	89	85
Q4	16	41	84

Example Charts



The Guns and Roses charts have a maximum y-axis range of 80, but the Drugs chart has a maximum of 120. We want all three charts to have the same range. How do we do this?

## A Suggested Solution

The first step is to create a new column in the table that retrieves the maximum value:

### Chart Data

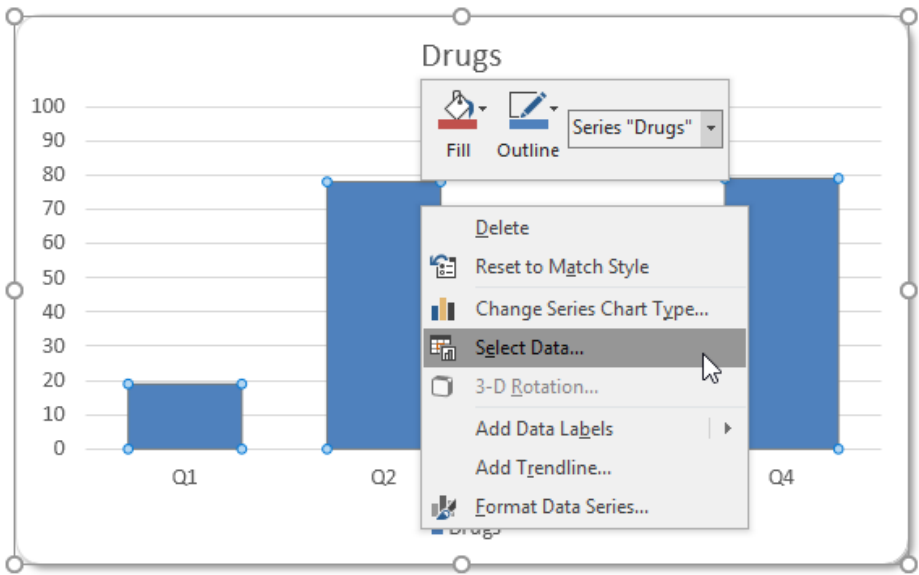
	Guns	Drugs	Roses	Max
Q1	83	19	89	89
Q2	51	78	63	89
Q3	69	20	89	89
Q4	22	79	39	89

The new column has the following formula:

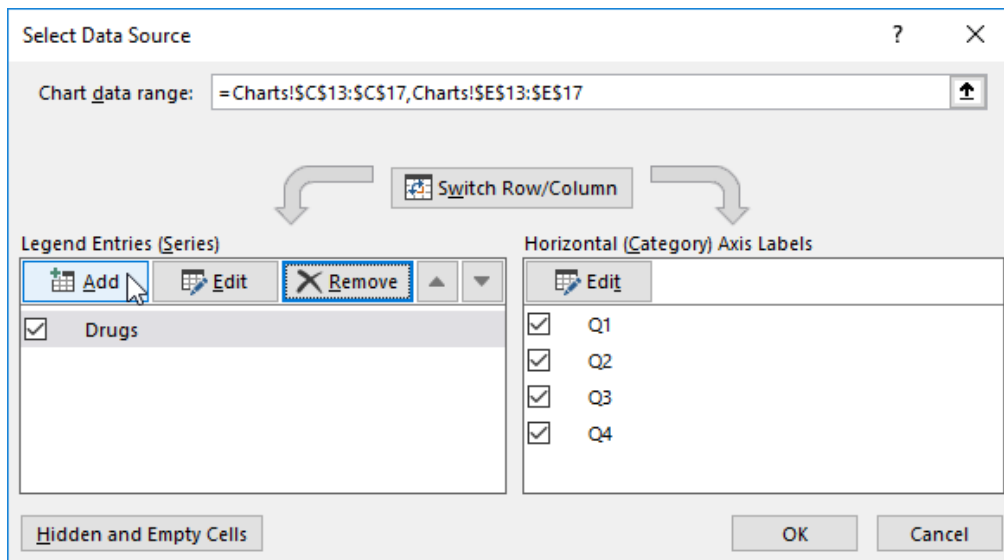
**=MAX(\$D\$14:\$F\$17)**

This will allow us to update the range of the graphs dynamically based upon changing quarterly numbers.

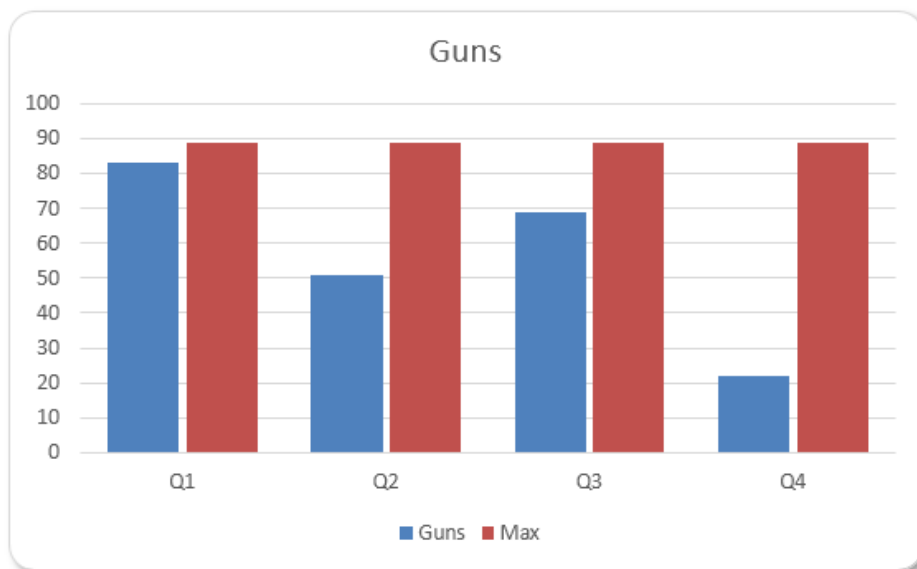
The next step is to include the 'Max' column in each of the charts, we do this by right-clicking the charts and then selecting the 'Select Data...' option.



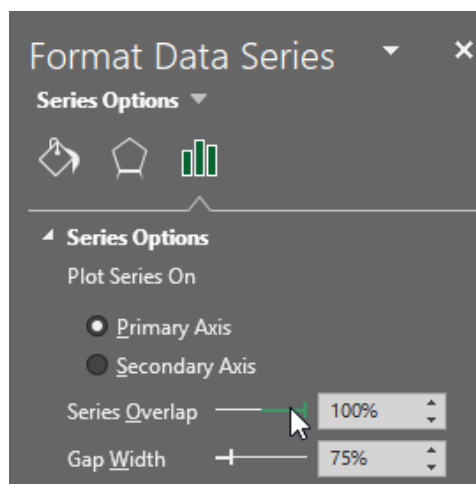
The 'Select Data Source' dialog box will appear:



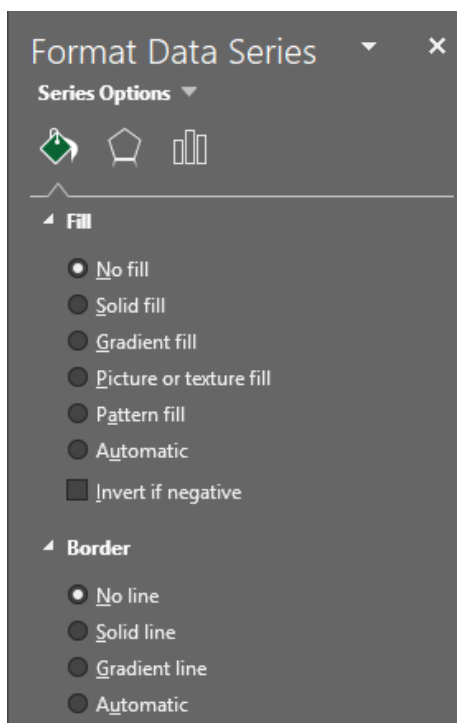
Click on the 'Add' button, to add the Max column into the chart. Once you have included the Max column into each chart, they will have two columns for each quarter, similar to the 'Guns' chart featured below.



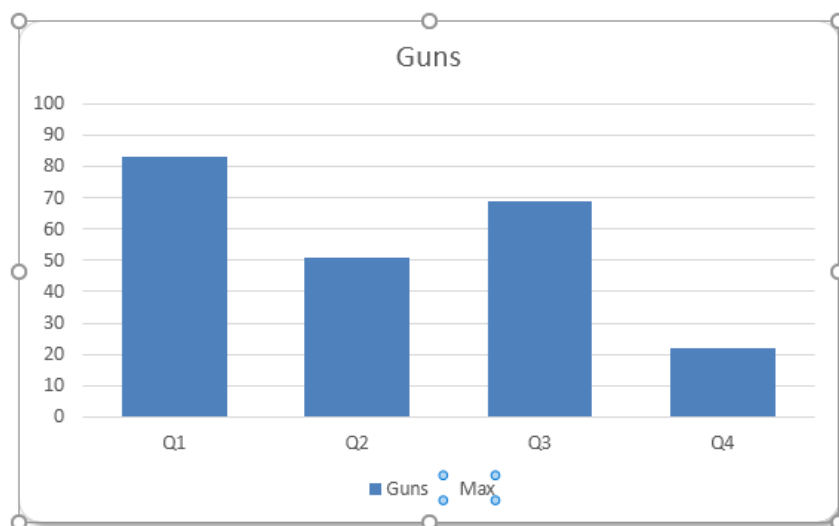
The trick here is to select the Max (red) data series and choose the 'Format Data Series...' option, and adjust the 'Series Overlap' option to 100%.



Now to get rid of the columns, adjust the 'Fill' and 'Border' settings to 'No fill' and 'No line' respectively.



The final step is to remove 'Max' from the legend. Double click it then hit 'Delete' on your keyboard!



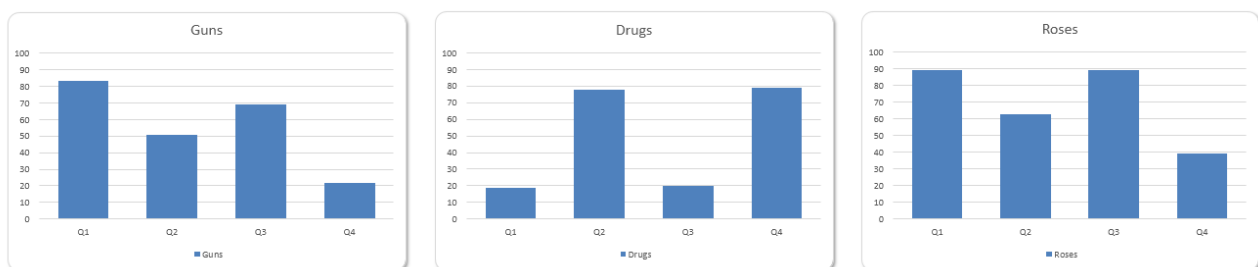
Another trick to incorporate, in case those pesky headquarters staff continuously suggest changing chart titles, is to use a formula to decide the chart titles. Click on each chart title and typing in the formula in the formula bar accordingly, for instance the 'Guns' chart should be linked to:

**=Charts!\$E\$10**

This works for simple formula references on the same sheet only. Now, all three charts will not only have consistent but dynamic axes ranges, but also have self-updating chart titles.

So there you have it, charts that will dynamically update based on table data, all with the same y-axis ranges!

#### Example



Until next time.

## Upcoming SumProduct Training Courses - COVID-19 update

Due to the COVID-19 pandemic that is currently spreading around the globe, we are suspending our in-person courses until further notice. However, to accommodate the new working-from-home dynamic, we are switching our public and in-house courses to an online delivery stream, presented via Microsoft Teams, with a live presenter running through the same course material, downloadable workbooks to complete the hands-on exercises during the training session, and a recording of the sessions for

your use within 1 month for you to refer back to in the event of technical difficulties. To assist with the pacing and flow of the course, we will also have a moderator who will help answer questions during the course.

If you're still not sure how this will work, please contact us at [training@sumproduct.com](mailto:training@sumproduct.com) and we'll be happy to walk you through the process.

Location	Course	Date	Date	Duration	Duration
Online (Australia)	Power Pivot, Power Query and Power BI	9 - 11 Nov 2020	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	16 Nov 2020	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	17 - 18 Nov 2020	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	14 - 16 Dec 2020	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	3 Days
Online (Australia)	Power Pivot, Power Query and Power BI	4 - 6 Jan 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	11 Jan 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	12 - 13 Jan 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	15 - 17 Feb 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	22 Feb 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	23 - 24 Feb 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	7 - 9 Apr 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	14 Apr 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	15 - 16 Apr 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	10 - 12 May 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	17 May 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	18 - 19 May 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	15 - 17 Jun 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	22 Jun 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	23 - 24 Jun 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	19 - 21 Jul 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	26 Jul 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	27 - 28 Jul 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	23 - 25 Aug 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	30 Aug 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	31 Aug - 1 Sep 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	29 Sep - 1 Oct 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	06 Oct 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	7 - 8 Oct 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	3 - 5 Nov 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	10 Nov 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	11 - 12 Nov 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	8 - 10 Dec 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	15 Dec 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	16 - 17 Dec 2021	09:00-17:00 AEDT	(-1 day) 22:00-07:00 GMT	2 Days



## Key Strokes

Each newsletter, we'd like to introduce you to useful keystrokes you may or may not be aware of. This month, we thought we look at an even more combinations of those pesky **FUNCTION** keys...

Keystroke	What it does
ALT + SHIFT + F1	Insert new sheet
ALT + SHIFT + F2	Save
ALT + SHIFT + F4	Close application
ALT + SHIFT + F10	Show On-Object User Interface (OOUI)
ALT + SHIFT + F11	Show Script Editor
CTRL + ALT + F1	New macro sheet
CTRL + ALT + F2	Open
CTRL + ALT + F3	New Name
CTRL + ALT + F4	Close application
CTRL + ALT + F5	Refresh all
CTRL + ALT + F8	Disconnect display (Windows Key + P restores)
CTRL + ALT + F9	Full recalculation
CTRL + ALT + F12	Thai dictionary
CTRL + SHIFT + F1	Show / hide Ribbon and Quick Access Toolbar together
CTRL + SHIFT + F3	Create Names
CTRL + SHIFT + F4	Find previous (from most recent search)
CTRL + SHIFT + F6	Previous window / workbook
CTRL + SHIFT + F12	Print
CTRL + ALT + SHIFT + F2	Print
CTRL + ALT + SHIFT + F4	Close application
CTRL + ALT + SHIFT + F9	Full recalculation rebuild

There are c.550 keyboard shortcuts in Excel. For a comprehensive list, please download our Excel file at [www.sumproduct.com/thought/keyboard-shortcuts](http://www.sumproduct.com/thought/keyboard-shortcuts). Also, check out our new daily **Excel Tip of the Day** feature on the [www.sumproduct.com](http://www.sumproduct.com) homepage.

## Our Services

We have undertaken a vast array of assignments over the years, including:

- **Business planning**
- **Building three-way integrated financial statement projections**
- **Independent expert reviews**
- **Key driver analysis**
- **Model reviews / audits for internal and external purposes**
- **M&A work**
- **Model scoping**
- **Power BI, Power Query & Power Pivot**
- **Project finance**
- **Real options analysis**
- **Refinancing / restructuring**
- **Strategic modelling**
- **Valuations**
- **Working capital management**

If you require modelling assistance of any kind, please do not hesitate to contact us at [contact@sumproduct.com](mailto:contact@sumproduct.com).

## Link to Others

These newsletters are not intended to be closely guarded secrets. Please feel free to forward this newsletter to anyone you think might be interested in converting to "the SumProduct way".

If you have received a forwarded newsletter and would like to receive future editions automatically, please subscribe by completing our newsletter registration process found at the foot of any [www.sumproduct.com](http://www.sumproduct.com) web page.

## Any Questions?

If you have any tips, comments or queries for future newsletters, we'd be delighted to hear from you. Please drop us a line at [newsletter@sumproduct.com](mailto:newsletter@sumproduct.com).

## Training

SumProduct offers a wide range of training courses, aimed at finance professionals and budding Excel experts. Courses include Excel Tricks & Tips, Financial Modelling 101, Introduction to Forecasting and M&A Modelling.

Check out our more popular courses in our training brochure:



Drop us a line at [training@sumproduct.com](mailto:training@sumproduct.com) for a copy of the brochure or download it directly from [www.sumproduct.com/training](http://www.sumproduct.com/training).

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