

Sum Product

NEWSLETTER #107 - October 2021

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It's almost time for Excel Virtually Global – The Sequel

Find out all the details about how you can view circa two days content from some of your favourite Excel, Power BI and PowerPoint presenters on the planet. Oh, and I will be doing it too! Don't forget to give to charity!

We say goodbye to User Voice, Silverlight and Power View, but no matter; we have time to look at notes on Excel for the web, as well as all the usual blarney, with another Beat the Boredom Challenge, plus Charts & Dashboards, Visual Basics, Power Pivot Principles, Power Query Pointers, Power BI updates, Keyboard Shortcuts and we strive for **GROWTH** in this month's A to Z of Excel Functions.

As always, happy reading and remember: stay safe, stay happy, stay healthy.

Liam Bastick, Managing Director, SumProduct



Excel Virtually Global This Month



EXCEL VIRTUALLY GLOBAL 2021

Not long to go now... Just a reminder, this almost-two-day virtual conference, for charity, presents **50** Excel, Data Platform and PowerPoint MVPs, together with other acknowledged experts from Microsoft and / or around the globe to present, answer questions and demonstrate the future of Excel and how it will make your life easier, personally and professionally.

Topics will include: Charts, Dashboards, Data Analysis, Data Types, Excel Tricks & Tips, Financial Modelling, Forecasting, Maps, Microsoft 365, New Functions and Features, Office Scripts, PivotTables, Power BI, Power Pivot, Power Query, Presenting Your Data and VBA. It's not all in English either, with some sessions in French, Portuguese and Spanish (albeit not many!).

Each session (including Q&A) will last no more than an hour and topics will cover all expertise levels, from novice to expert. Most presenters are well known in their spheres, and have written blogs, books and articles and / or present video sessions.

Most sessions will be recorded so you may watch them later with downloads aplenty – there are no medals for staying up to watch the entire event live! That's just as well, as it will run from 23:00 GMT / UTC on Monday 11 October to 20:59 GMT / UTC on Wednesday 13 October.

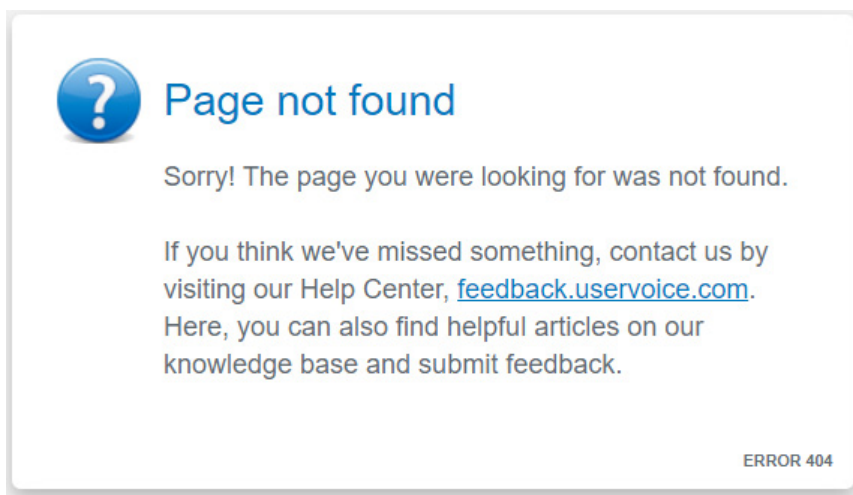
From your own favourite chair, bring a laptop, an inquisitive mind and your sense of humour. Be prepared to learn heaps. And remember, it's for charity – this year, there is no ticketing process: all we ask is an "honesty box" where you donate to your favourite charity.

For more details (e.g. times, speakers, sessions), please go to www.excelvirtuallyglobal.com.

Hopefully, we'll see you there!

Goodbye Excel User Voice

Regular readers will know we frequently extol the virtues of Excel UserVoice. Well, alas, 'tis no more:



Microsoft had partnered with UserVoice, a third-party service, to communicate with customers and collect feedback. However, the software giant had previously advised that they were moving away from all UserVoice feedback sites on a product-by-product basis throughout the 2021 calendar year. Sadly, it's now Excel's turn.

So what do you do now? Do they want feedback? Apparently, customers can continue to communicate with Microsoft and provide feedback through a number of different channels – what they refer to as “first party solutions” (a cost reduction program?). Examples include:

- in-product experiences (e.g. Send a Frown)
- Windows Feedback Hub
- Microsoft Tech Community
- Microsoft Store.

The official line is that Microsoft is “...evaluating enhancements and standardizations (*sic*) to improve and streamline how [they] communicate with customers and collect their feedback...”.

Alas, poor UserVoice, we knew you well.

Power View Goes into Retirement



Silverlight, a component used in Power View, will no longer be supported beginning on October 12th. Furthermore, Microsoft will be starting the process to retire Power View from Microsoft 365 too. As an alternative

to Power View, of course you should be using Power BI Desktop, which is where Microsoft continues to develop 20,000 updates a month (see later in this newsletter!).

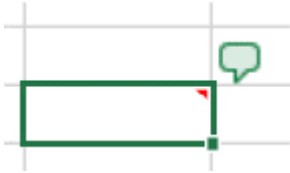
Comments and Notes Upgraded in Excel for the Web

There have been some recent updates to the threaded comments and notes experience in Excel. When what was known as “threaded comments” in Excel for Windows, Excel for Mac and Excel for the web was released back in January 2019, Microsoft originally decided to keep the legacy comments (the yellow sticky notes) in the Windows and Mac versions and rename them **notes**. However, it has become clear that notes and comments serve different purposes, and that Microsoft

needed to support both in order to address different user scenarios (e.g. conversations vs. annotations).

The problem was, when threaded comments were introduced, the ability to create notes in Excel for the web was removed. This meant that notes created in the desktop version looked and worked differently in Excel on the web, e.g.

- Notes on the web did not appear when hovering over the in-cell indicator. It required the user to hover and click an on-object user interface (UI), which would open the note in the Comments pane



- Notes on the web did not appear as yellow sticky notes. Instead, they took the form of threaded comments. When users attempted to edit or reply to a note, they would be required to first convert the note to a threaded comment
- You could create new threaded comments on the web, but not new notes.

For reference, here is how comments and notes appear presently in Excel for Windows:

Category	2009	2010
Rent and Utilities	<div><div>AW Alex Wilber (Contoso) B20 ***</div><div>threaded comments can be used to start conversations and @mention others to get their attention or to let them know when they need them to take action. When you @mention another user they will receive an email notification. @Joni Can you review the Rent and Utilities costs and let me know if they look correct?</div><div>July 28, 2021, 1:58 PM</div><div>JS Joni Sherman (Contoso)</div><div>Everything looks good!</div><div>July 28, 2021, 2:02 PM</div><div>@mention or reply</div></div>	
Equipment		
Marketing		
Freelancers		
Travel		
Taxes		
Other		
Total		

This is used for conversations.

Category	Jan	Feb	Mar	Apr
Rent and Utilities	\$ 1,570	\$ 1,469	\$ 1,364	\$ 1,500
Equipment	\$ 250	\$ 350	\$ 299	\$ 333
Marketing	\$ 463	\$ 452	\$ 482	\$ 492
Freelancers	\$ 467	\$ 463	\$ 475	\$ 464
Travel	\$ 123	\$ 92	\$ 60	\$ 131
Taxes	\$ 514	\$ 556	\$ 561	\$ 586
Other	\$ 205	\$ 227	\$ 310	\$ 192
Total	<div>Alex Wilber (Contoso):</div> <div>Note. The total monthly expenses should not exceed \$4,000</div>		3,551	\$ 3,698

This example is used make annotations or share instructions.

To counter this, Microsoft has instigated some important steps to address these inconsistencies and improve the overall user experience with notes and comments in Excel for the web. With this borne in mind:

- Threaded comments and notes may now display as floating objects. Excel for the web now supports floating notes on the grid, and notes have also been moved out of the Comments pane. Now, when you hover over the in-cell indicator, notes (and comments) will float on the grid, directly aligned to the cell they are related to
- The notes have been updated to look like notes (rather than threaded comments). Comments and notes each have their own familiar UI. The notes on the web have been revised to look and feel like those created in Windows and Mac. Now, when you create a note in either, it will render as a yellow sticky note on the web. When viewing notes on the web, there will no longer be confusion as to whether the object is a note or a comment
- The functionality to create both threaded comments and notes on the web is now fully supported. There is now the ability to

create yellow sticky notes in Excel on the web. This means you may choose the optimal solution for your specific scenario.

Working with comments and notes across Windows, Mac and the web is simple. On the Review tab, you can:

- select 'New Comment' to create a comment.
- select 'New Note' to create a note.

It should be noted that you may also right-click the cell you want to place a comment or note on, then use the shortcut menu to accomplish the task.

Other commands related to comments and notes are also found on the Review tab, allowing you to show or hide notes or comments, move to the next or previous item, convert notes to comments, etc.

To explore the improved functionality of notes and comments in Excel for the web, try the following:

- **View desktop notes on the web.** This may be achieved by creating a note in Excel for Windows or Excel for Mac. You should note that when you view the note in Excel for the web, it appears on hover and looks like the yellow sticky note you are familiar with

	2012	2013	2014	Total	Trend
\$	1,885	\$ 19,020	\$ 17,760	\$ 91,501	
\$	4,025	\$ 3,875	\$ 3,756	\$ 22,216	
\$	5,883	\$ 5,892	\$ 5,304	\$ 33,843	
\$	5,438	\$ 5,844	\$ 6,324	\$ 34,466	
\$	1,595	\$ 492	\$ 1,260	\$ 6,623	
\$	7,032	\$ 6,504	\$ 6,804	\$ 34,144	
\$	2,847			\$ 16,875	
\$	28,705			239,668	

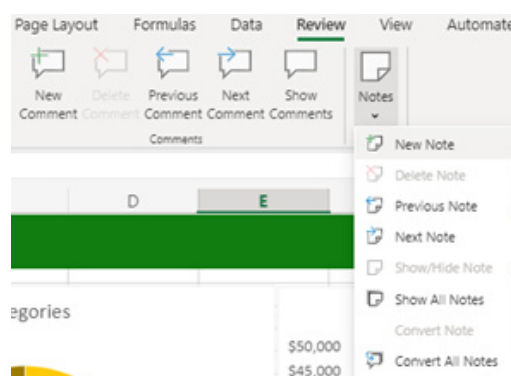
Alex Wilber (Contoso)
 Now notes created in Excel for Windows or Excel for Mac look like notes when viewed in Excel on the web. The classic yellow stickies

- **Create a note on the web.** Excel now supports the creation of both comments and notes on the web. To create a yellow sticky note, select **Review -> New Note**. (You may also right-click a cell and select 'New Note' in the shortcut menu)

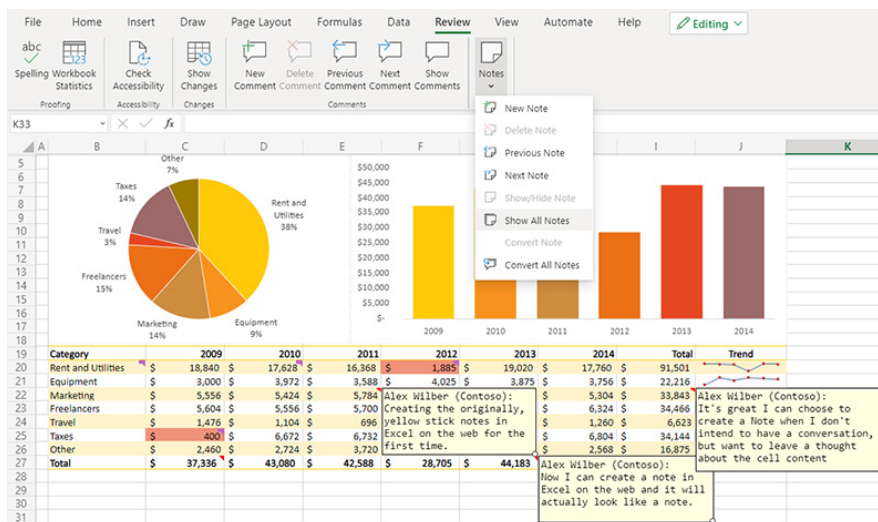
	2013	2014	Total	Trend
\$	19,020	\$ 17,760	\$ 91,501	
\$	3,875	\$ 3,756	\$ 22,216	
\$	5,892	\$ 5,304	\$ 33,843	
\$	5,844	\$ 6,324	\$ 34,466	
\$	492	\$ 1,260	\$ 6,623	
\$	6,504	\$ 6,804	\$ 34,144	
\$	2,556	\$ 2,568	\$ 16,875	
\$	44,183			

Alex Wilber (Contoso):
 Now I can create a note in Excel on the web and it will actually look like a note.

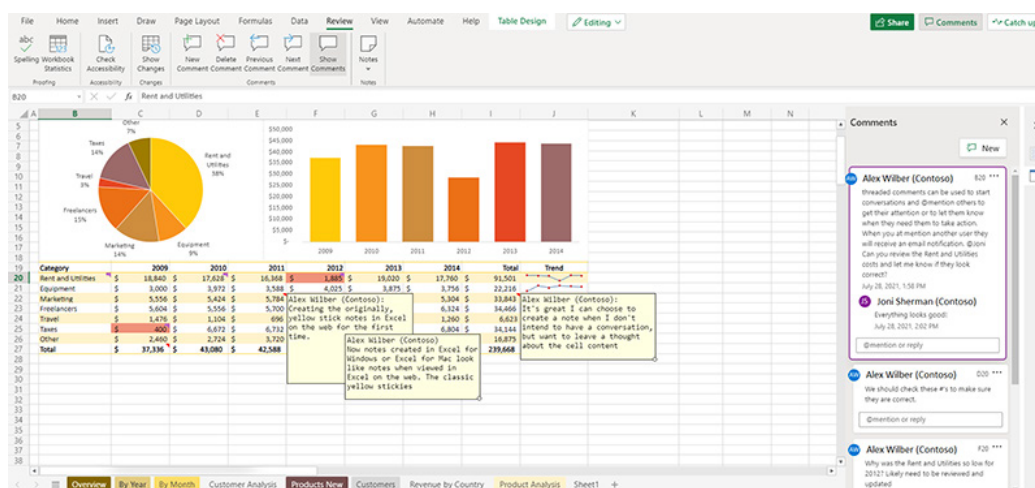
- **Manage notes on the web.** When you select a cell that contains a note, you can right-click it and choose a command to edit, show / hide, delete or convert the note to a threaded comment. Using the Notes button on the Review tab, you can create new notes, navigate through all notes with the next and previous commands and convert all notes to threaded comments



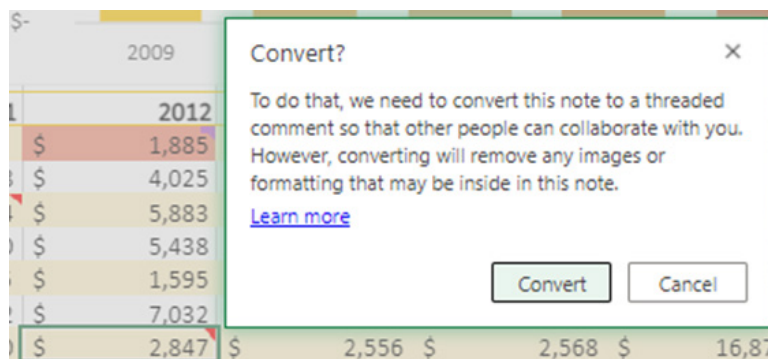
- **Show all notes on the grid.** To see all your notes on the grid, select **Review -> Notes -> Show All Notes**



- **See all notes and all threaded comments.** If you want to see all your notes and all your threaded comments at the same time, select **Review -> Notes -> Show All Notes**, and then select 'Show Comments' to open the Comments pane



- **Convert a note to a threaded comment.** If you have created a note in a cell and want to start a conversation or @mention someone, you need to convert the note to a threaded comment. Simply select and right-click the cell with the note you want to convert, choose 'Convert Note' in the shortcut menu, and then click the 'Convert' button confirm the action. The note becomes a threaded comment, and you can now start a conversation, @mention others and send notifications



When threaded comments were introduced with the legacy comments renamed as “notes,” it was noted that many would want to continue to use the notes with the usual keyboard shortcuts. Therefore, the legacy comment shortcut (**SHIFT + F2**) has been retained to create a note.

Further, Microsoft is also introducing a new keyboard shortcut to create a threaded comment: **CTRL + SHIFT + F2 (COMMAND + SHIFT + F2 on the Mac)**. However:

- on cells that already contain a note, pressing **SHIFT + F2** will put the note in Edit mode
- on cells that already contain a threaded comment, pressing **CTRL + SHIFT + F2 (COMMAND + SHIFT + F2 on the Mac)** will open the comment and put the focus in the Reply box.

Whilst notes in Excel on the web work much like notes have always worked in Excel for Windows and Excel for Mac, there are still a few differences and areas to be aware of. In particular, notes in Excel on the web:

- do not support rich text formatting, background colour or images
- cannot be repositioned on the grid
- may be shown, hidden and resized, but for a given user session only. Other co-authors will not see these formatting changes.

The above features are being released over some time to ensure things are working smoothly. If you don't have these features yet, don't worry, they're coming!!

Beat the Boredom Challenge

With many of us currently "working from home" / quarantined, there are only so Zoom / Teams calls and virtual parties you can make before you reach your (data) limit. Perhaps they should measure data allowance in blood pressure millimetres of mercury (mmHg). 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...*

Often, we receive data that isn't in the best of shape. It may have text and numbers intermingled and you wish to separate (i.e. space) them out. For example, you might want "Pelham123" to be "Pelham 123", or require "121Training" to be "121 Training".

Where there is just the one change of data type in the text string, it's possible to create a reasonably straightforward formula, but things get harder with multiple occurrences. And that's what this month's challenge is – *fix the issue in general*.

Using your favourite search engine will typically yield third party add-ins, VBA (e.g. User Defined Functions) and Power Query solutions – *all NOT allowed here!*

This month's challenge is to construct an Excel formula that will split out multiple occurrences of numbers and text, e.g.

Type Text Here

Liam123Tim Heng 4567 Hanh8JonAtHan90!

Result

Liam 123 Tim Heng 4567 Hanh 8 Jonathan 90 !

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

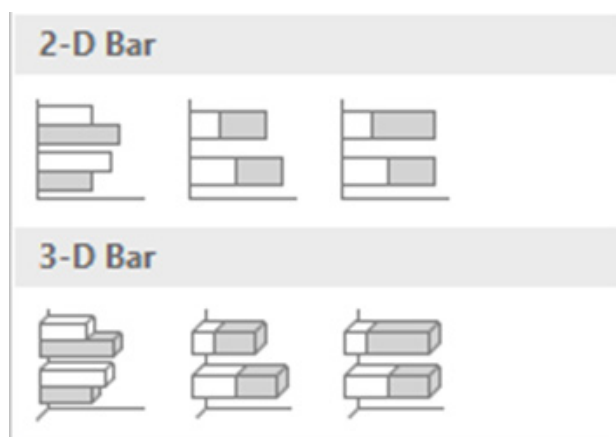
Charts and Dashboards

It's time to chart our progress with an introductory series into the world of creating charts and dashboards in Excel. This month, we look at Bar charts.

By definition, a Bar chart and a Column chart are both members of the bar chart family. Excel differentiates them by classifying a Bar chart as one where the bars are horizontal and therefore the categories are on

the vertical axis and the value range is specified on the horizontal axis. A Column chart, which was discussed in last month's newsletter, has vertical bars and the axes are obviously the other way around.

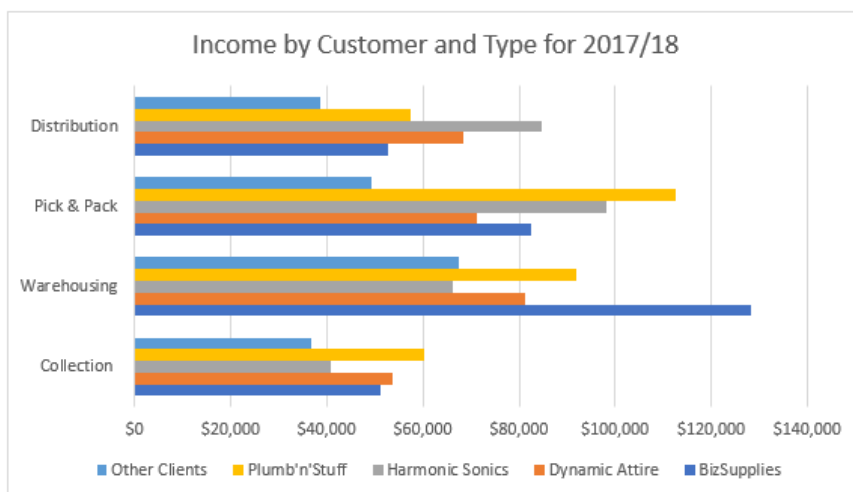
Just like for the Column chart, Excel provides a number of Bar chart variations, including Clustered and Stacked formats in 2-D and 3-D:



Reusing last time's sales data by customer group,

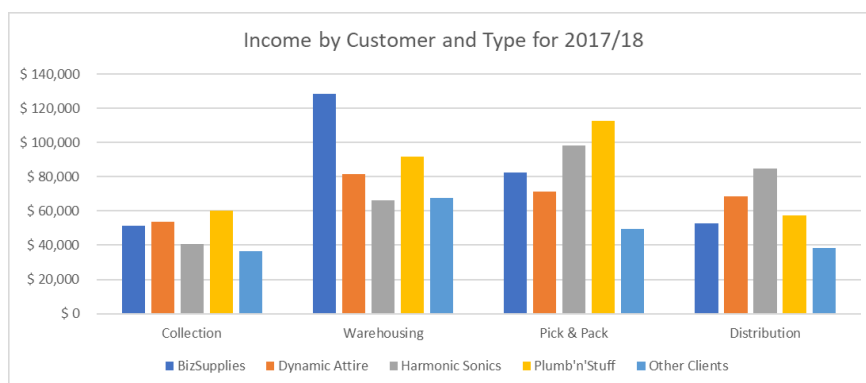
Income for 2017/18 by Type and Customer					
Income Type	BizSupplies	Dynamic Attire	Harmonic Sonics	Plumb'n' Stuff	Other Clients
Collection	\$ 51,273	\$ 53,709	\$ 40,677	\$ 60,250	\$ 36,616
Warehousing	\$ 128,194	\$ 81,318	\$ 66,315	\$ 91,765	\$ 67,401
Pick & Pack	\$ 82,399	\$ 71,216	\$ 98,094	\$ 112,581	\$ 49,320
Distribution	\$ 52,637	\$ 68,502	\$ 84,749	\$ 57,393	\$ 38,515

I can create a Bar chart such as the one below:



Initially, it looks the same as the Column chart, but upon further analysis, there are a few differences which might, and will in this example, require altering.

Below is the Column chart generated from the data (from last month):



First, notice the bars for each income type series are touching in the default settings, whereas there were gaps between them in the Column chart. Also, the income types on the vertical axis are in the wrong order. This is because Excel considers the bottom left corner of the chart to be the 'starting point' for the Line chart, Column chart, Bar chart and most others that have a single horizontal and vertical set of axes. As such, working from this corner, **Collection** is the first income type, so

it appears closest to the 'starting point' then working upwards, next is **Warehousing**, etc. Finally, note that the legend is also backwards compared to how it appeared for the Line chart and Column chart.

To change the order of the vertical axis, I select it, right click and choose 'Format Axis'. Under the 'Axis Option', tick the 'Categories in reverse order' checkbox.

Format Axis

Axis Options | Text Options

Axis Options

Axis Type

- ☒ Automatically select based on data
- ☐ Text axis
- ☐ Date axis

Horizontal axis crosses

- ☒ Automatic
- ☐ At category number
- ☐ At maximum category

Axis position

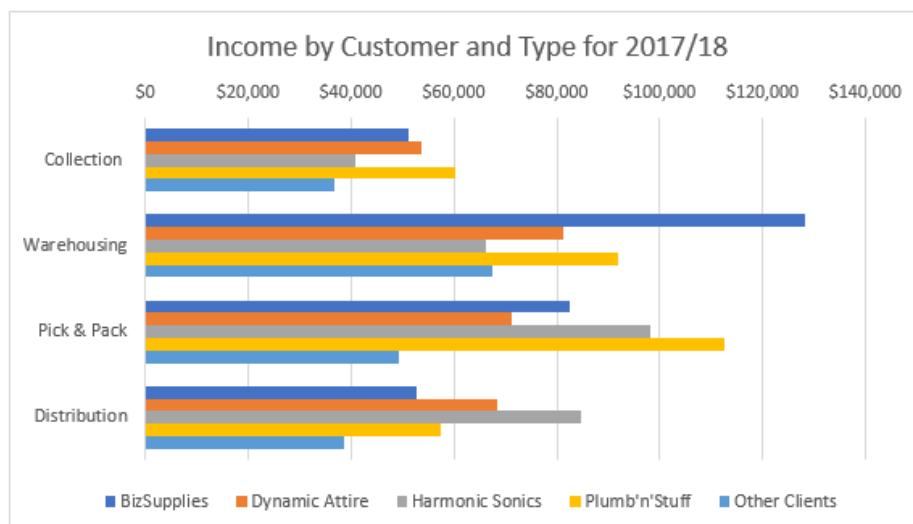
- ☐ On tick marks
- ☒ Between tick marks
- ☒ Categories in reverse order

▸ Tick Marks

▸ Labels

▸ Number

This will correct the order but now there is something weird: the horizontal axis is at the top, as this is where our first category is now located.



To fix this, I click on the axis and select 'Format Axis' once again. Under the 'Horizontal axis crosses', I tick 'At maximum category', which is **Distribution**.

Format Axis

Axis Options | Text Options

Axis Options

Axis Type

- ☒ Automatically select based on data
- ☐ Text axis
- ☐ Date axis

Horizontal axis crosses

- ☐ Automatic
- ☐ At category number
- ☒ At maximum category

Axis position

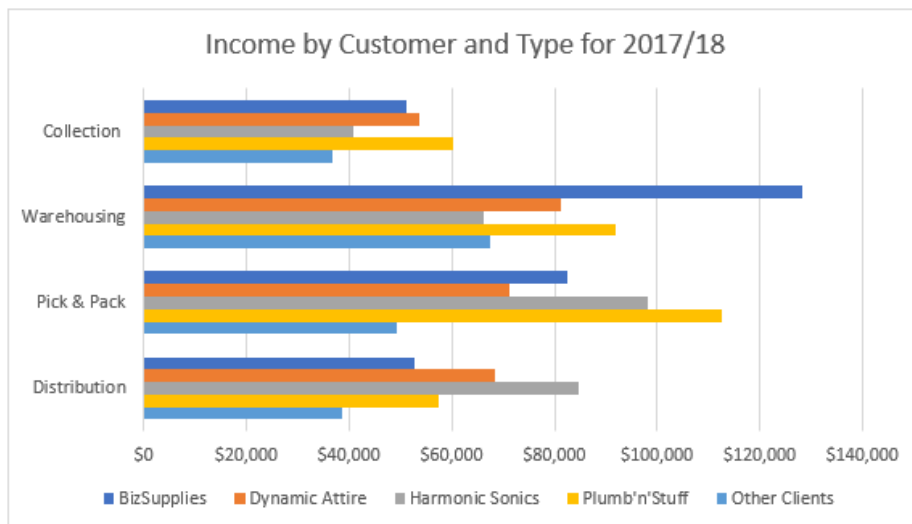
- ☐ On tick marks
- ☒ Between tick marks
- ☒ Categories in reverse order

▸ Tick Marks

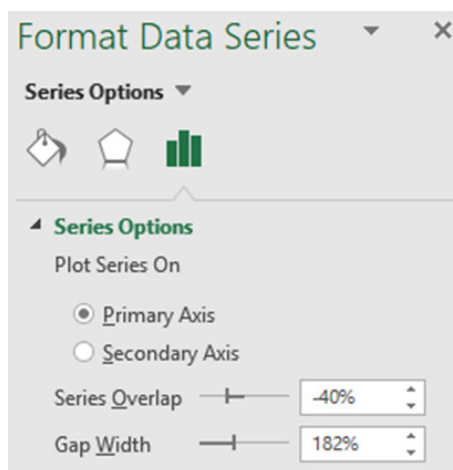
▸ Labels

▸ Number

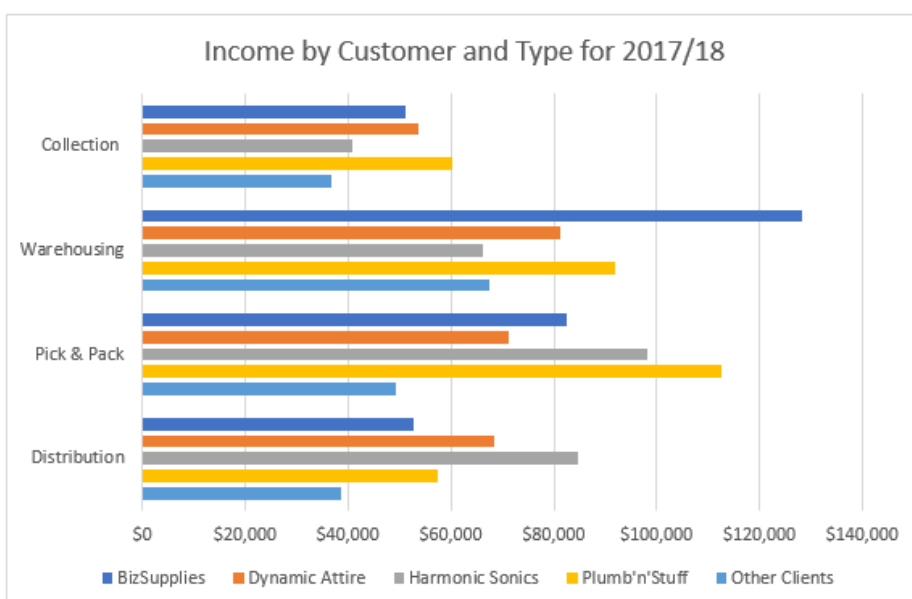
Also note that the above steps have also switched the legend around, putting **BizSupplies** first and **Other Clients** last, which is the order I happen to prefer.



To create the gap between the columns within each income type, I select any of the data series on the chart, right click and choose 'Format Data Series'. Under 'Series Options', there is 'Series Overlap'. By setting this to be a negative value, this will separate the individual columns from each other.



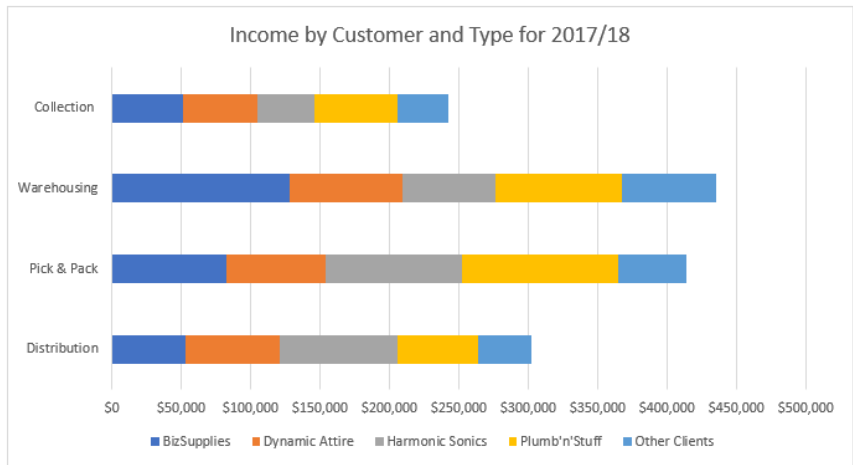
Now my chart looks fine:



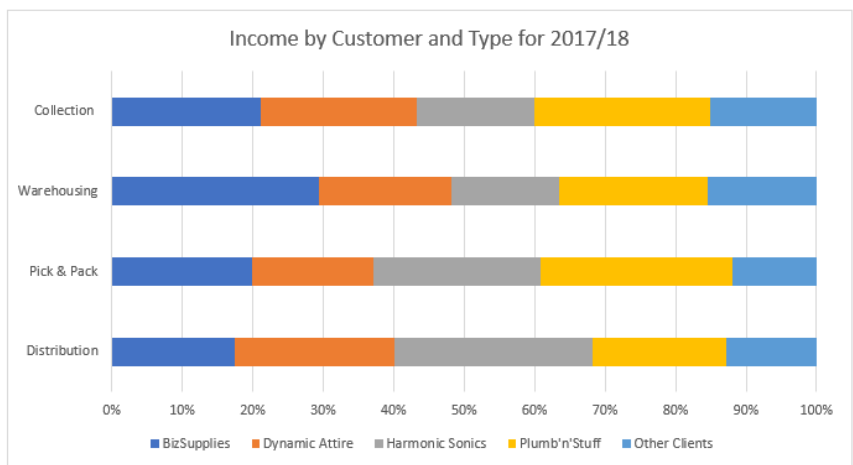
However, chart variations can sometimes communicate more information. For example, instead of using the Cluster type chart, I can change this into a Stacked chart, by clicking on the chart, then under the Design tab of 'Chart Tools' in the Ribbon, I choose 'Change Chart Type'. In the 'Change Chart Type' dialog, I choose 'Stacked Bar':



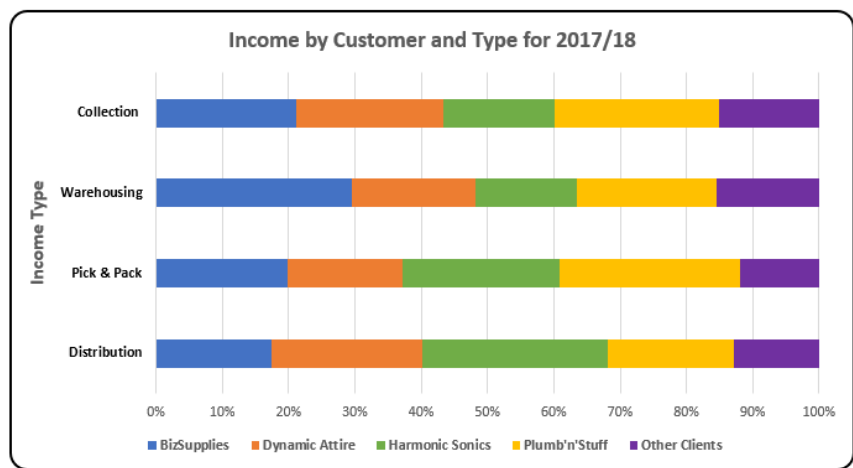
The chart now appears as follows, showing the total income from each activity as well as the client breakdown:



The other Bar chart variation is the 100% Stacked Bar, which shows the percentage of income from each client by activity type:



Finally, I do some further formatting similar to last time's Column chart, and then I have a more "vivid" Stacked Bar Chart, viz.



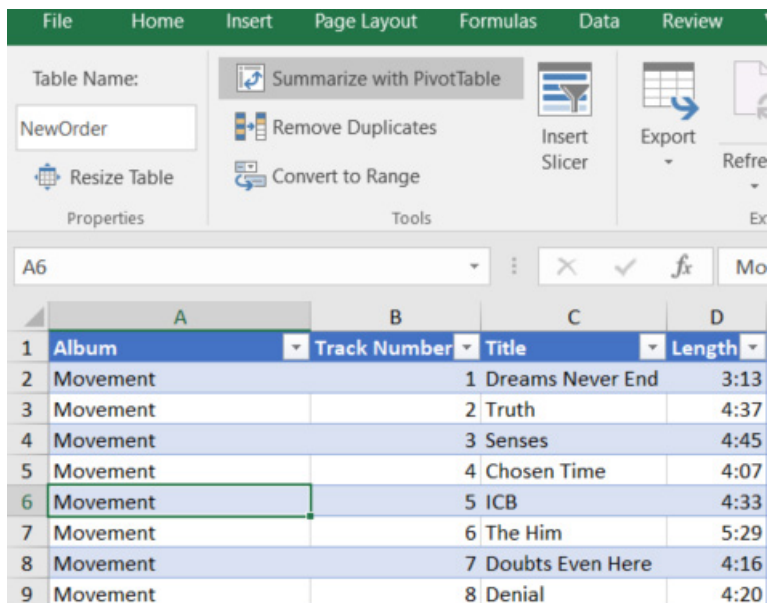
More next month...

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 continue looking at using ListObjects.

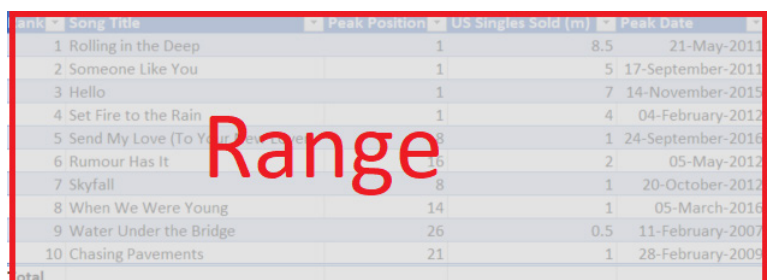
Warning! This was written whilst listening to a New Order playlist and Adele is making a comeback from last month's newsletter to show the various parts of a table.

Last time out, we experienced the "Ecstasy" of being able to refer to a Table, but now it's time to play with its components "All Day Long".



Album	Track Number	Title	Length
Movement	1	Dreams Never End	3:13
Movement	2	Truth	4:37
Movement	3	Senses	4:45
Movement	4	Chosen Time	4:07
Movement	5	ICB	4:33
Movement	6	The Him	5:29
Movement	7	Doubts Even Here	4:16
Movement	8	Denial	4:20

Here, we will specifically explore the concept of the ranges. The **Range** property covers the entire Table and all the properties that apply to ranges apply to it.



Rank	Song Title	Peak Position	US Singles Sold (m)	Peak Date
1	Rolling in the Deep	1	8.5	21-May-2013
2	Someone Like You	1	5	17-September-2013
3	Hello	1	7	14-November-2015
4	Set Fire to the Rain	1	4	04-February-2012
5	Send My Love (To Your New Lover)	8	1	24-September-2019
6	Rumour Has It	16	2	05-May-2012
7	Skyfall	8	1	20-October-2013
8	When We Were Young	14	1	05-March-2018
9	Water Under the Bridge	26	0.5	11-February-2007
10	Chasing Pavements	21	1	28-February-2009
Total				

It's "Fine Time" that the whole table is considered. What is the "Vanishing Point" of a table?

By using the **Range.Delete** method, the whole table can be removed in one fell step.

```
(General)

Option Explicit

Sub DeleteRange ()

    Dim lo As ListObject
    Set lo = Range("NewOrder").ListObject

    lo.Range.Delete

End Sub
```

After a quick "Run" of that script, "Everyone Everywhere" would not be able to find trace of the table.

	A	B	C
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

However, there is a more direct way to completely remove a table. It might be “Academic” but works just as well and a lot less ambiguous – delete the **ListObject** directly!

```
(General)

Option Explicit

Sub DeleteRange()

    Dim lo As ListObject
    Set lo = Range("NewOrder").ListObject
    lo.Delete

End Sub
```

Before you can express any “Regret” over losing data and “Run Wild” deleting **ListObjects**, what if the table structure is to be removed but not the actual data itself? How do you convert from Table to a range, as if the ‘Convert to Range’ button were clicked on the Ribbon?

Table Name:

NewOrder

Resize Table

Properties

Summarize with PivotTable

Remove Duplicates

Convert to Range

Tools

Insert Slicer

Export

C74

Album

61	Get Ready		4:53
62	Get Ready	7. Rock the Shack (fe	4:12
63	Get Ready	8 Someone Like You	5:42
64	Get Ready	9 Classy	4:13

Convert to Range

Convert this table into a normal range of cells.

All of the data is preserved.

Take a “Turn” with the **Unlist** method of **ListObject**.

```
(General)

Option Explicit

Sub DeleteRange()

    Dim lo As ListObject
    Set lo = Range("NewOrder").ListObject
    lo.Unlist

End Sub
```


Before:

	A	B	C	D	E
1	Album	Track Number	Title	Length	
2	Movement	1	Dreams Never Enc	3:13	
3	Movement	2	Truth	4:37	
4	Movement	3	Senses	4:45	
5	Movement	4	Chosen Time	4:07	
6	Movement	5	ICB	4:33	
7	Movement	6	The Him	5:29	
8	Movement	7	Doubts Even Here	4:16	
9	Movement	8	Denial	4:20	
88	Total				
89					
90					

After:

	A	B	C	D	E	F	G
1	Album	Track Number	Title	Length			
2	Movement	1	Dreams Never Enc	3:13			
3	Movement	2	Truth	4:37			
4	Movement	3	Senses	4:45			
5	Movement	4	Chosen Time	4:07			

“Hey Now What You Doing?” The Table structure has been successfully converted and all filters have been removed *yet the formatting has remained the same.*

More next time.

Power Pivot Principles

We continue our series on the Excel COM add-in, Power Pivot. This month, we introduce the CLOSINGBALANCEMONTH function.

CLOSINGBALANCEMONTH is a time intelligence function similar to the **DATESYTD** (you can read about the DATESYTD function [here](#)). The **CLOSINGBALANCEMONTH** function, like all time series functions, requires contiguous dates to work properly.

The **CLOSINGBALANCEMONTH** has the following syntax:

CLOSINGBALANCEMONTH(expression, dates[, filter])

The **CLOSINGBALANCEMONTH** function can be used to generate balance sheet values, as we want to view the inventory balance at the *end* of a period.

We have the following inventory table containing T-Shirt data from the months of January 2017 to June 2017. Do note, for simplicity’s sake our example table already contains contiguous dates.

Restock	Date	Inventory	Product Type	Sale Number
	01-01-17	495	T-Shirts	5
	02-01-17	490	T-Shirts	9
	03-01-17	481	T-Shirts	8
	04-01-17	473	T-Shirts	10
	05-01-17	463	T-Shirts	7
	06-01-17	456	T-Shirts	16
	07-01-17	440	T-Shirts	15
	08-01-17	425	T-Shirts	11
	09-01-17	414	T-Shirts	6

After importing the table into Power Pivot let's create a measure using the **CLOSINGBALANCEMONTH** function:

Measure

Table name: Inventory

Measure name: Closing Balance

Description:

Formula: Σ Check formula

=CLOSINGBALANCEMONTH(SUM(Inventory[Inventory]),Inventory[Date])

Formatting Options

Category: General Number Currency Date TRUE/FALSE

Format: Decimal Number

Decimal places: 2

☒ Use 1000 separator (,)

OK Cancel

The next step is to create the following PivotTable:

	Closing Balance	Column Labels	
Row Labels	T-Shirts	Grand Total	
Jan	140	140	
Feb	214	214	
Mar	359	359	
Apr	8	8	
May	445	445	
Jun	69	69	
Grand Total	69	69	

PivotTable Fields

Active All

Choose fields to add to report:

Search

Table1

- ☒ Date
- ☒ Date (Month)
- ☐ Inventory
- ☒ Product Type
- ☐ Restock
- ☐ Sale Number
- ☒ Σ Closing Balance

Drag fields between areas below:

Filters

Columns

Product Type

Rows

Date (Month)

Date

Values

Closing Balance

The PivotTable now displays the inventory closing balance amount at the end of the month. From here we can use these values for our financial reports.

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. If you wish to read more in the meantime, simply check out our Blog section each Wednesday. This month, we take a look at how to reference a cell in an Excel workbook from Power Query.

Let's begin by creating a query from the item data below:

Book1 - Excel

Table Tools

kathryn newitt

File Home Insert Page Layout Formulas Data Review View Developer Power Pivot Design Tell me what you want to do

Get External Data New Query Recent Sources Refresh All Edit Links Connections Sort & Filter Filter Advanced Text to Columns Data Validation Manage Data Model What-If Analysis Forecast Subtotal Outline Analysis

From Table

Create a new query linked to the selected Excel table.

Item_Key	Item_Group	Dimensions	Standing_Capacity	Seated_Capacity	Price	Length	Width	Height	Length_UOM	Width_UOM
1	Tent	Approx (2m x 2.2m)		50						
2	Tent	Approx (10 x 10ft)	14	10	120					
3	Tent	Approx (13 x 13ft)	22	16	150					
4	Tent	Approx (10 x 20ft)	26	20	170					
5	Tent	Approx (10 x 26ft)	35	26	195					
6	Tent	Approx (13 x 20ft)	35	20	190					
7	Tent	Approx (26 x 13ft)	45	30	220					
8	Tent	Approx (32 x 13ft)	60	42	250					
9	Tent	Approx (20 x 20ft)	50	40	295					
10	Tent	Approx (26 x 20ft)	70	55	370					
11	Tent	Approx (32 x 20ft)	90	70	445					
12	Tent	Approx (40 x 20ft)	110	80	495					
13	Floor				32.5					
14	Floor				45					
15	Floor				65					
16	Floor				40					
17	Floor				40					
18	Floor				50					
19	Floor				50					
20	Floor				65					
21	Floor				65					
22	Floor				80					
23	Floor				80					
24	Floor				90					

Items Charges

On the Data tab, in the 'Get and Transform' section, we'll choose to create a new query 'From Table'.

Table: Access.Database.SP accdb5 - Query Editor

File Home Transform Add Column View

Close & Load Refresh Preview Advanced Editor Manage Choose Columns Remove Columns Keep Rows Remove Rows Sort Split Column Group By Replace Values Data Type: Whole Number Use First Row as Headers Merge Queries Append Queries Combine Files Parameters Data source settings Data Sources New Source Recent Sources New Query

Query

Table.TransformColumnTypes(Source,({"Item_Key", Int64.Type}, {"Item_Name", type text}, {"Item_Group", type text}),

Item_Key	Item_Name	Item_Group	Dimensions	Standing_Capacity	Seated_Capacity	Price
1	Side Connecting Porch	Tent	Approx (2m x 2.2m)	null	null	
2	3 x3 metre marquee	Tent	Approx (10 x 10ft)	14	10	
3	3 x 4 metre marquee	Tent	Approx (13 x 13ft)	22	16	
4	4 x 3 metre marquee	Tent	Approx (10 x 20ft)	26	20	
5	5 x 3 metre marquee	Tent	Approx (10 x 26ft)	35	26	
6	6 x 4 metre marquee	Tent	Approx (13 x 20ft)	35	20	
7	7 x 4 metre marquee	Tent	Approx (26 x 13ft)	45	30	
8	8 x 4 metre marquee	Tent	Approx (32 x 13ft)	60	42	
9	9 x 6 metre marquee	Tent	Approx (20 x 20ft)	50	40	
10	10 x 6 metre marquee	Tent	Approx (26 x 20ft)	70	55	
11	11 x 6 metre marquee	Tent	Approx (32 x 20ft)	90	70	
12	12 x 6 metre marquee	Tent	Approx (40 x 20ft)	110	80	
13	13 4x4m/6x3m/6x4m Hardstanding kit	Floor		null	null	
14	14 8x4m/10x4m/6x6m Hardstanding kit	Floor		null	null	
15	15 10x6m/12x6m Hardstanding kit	Floor		null	null	
16	16 3 X3 metre matting	Floor		null	null	
17	17 4 x 4 metre matting	Floor		null	null	
18	18 6 x 3 metre matting	Floor		null	null	
19	19 6 x 4 metre matting	Floor		null	null	
20	20 8 x 3 metre matting	Floor		null	null	
21	21 8 x 4 metre matting	Floor		null	null	
22	22 10 x 4 metre matting	Floor		null	null	
23	23 6 x 6 metre matting	Floor		null	null	

18 COLUMNS, 70 ROWS

PREVIEW DOWNLOADED AT 13:04

Query Settings

PROPERTIES

Name

Table: Access.Database.SP accdb5

APPLIED STEPS

Source

Changed Type

This all looks fine, but now let's add the 'Grand Total' from another sheet in this workbook.

Book1 - Excel

Table Tools

kathryn newitt

File Home Insert Page Layout Formulas Data Review View Developer Power Pivot Design Tell me what you want to do

Cut Copy Paste Format Painter Clipboard Font Font Size Font Color Bold Italic Underline Text Color Paragraph Alignment Merge & Center Conditional Formatting Table Styles Cell Styles Insert Delete Format Cells AutoSum Fill Sort & Find & Filter Select

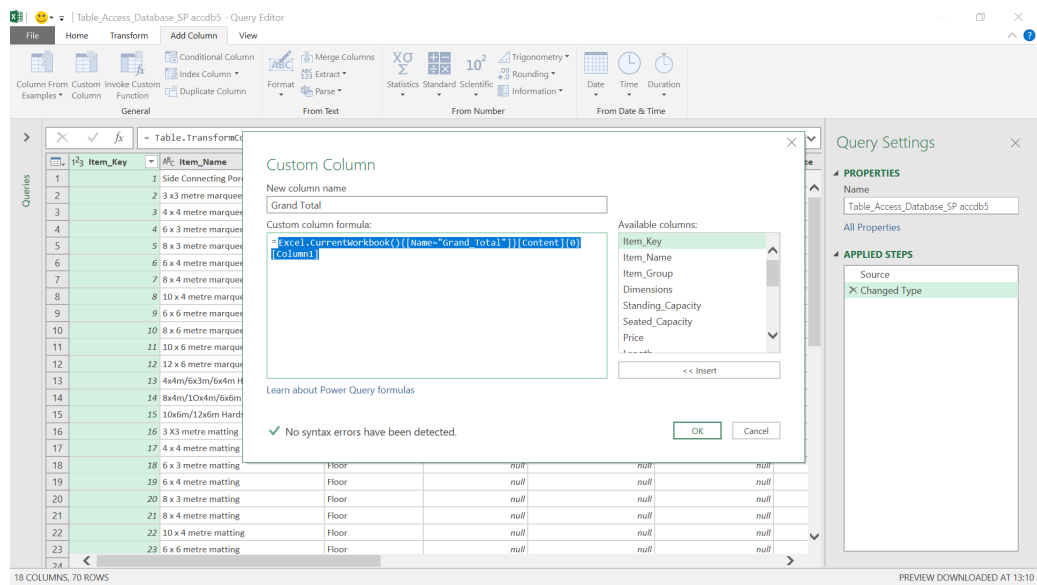
=SUM(D2:D30721)

Order_Line_Number	Charge_Line_Number	Amount	Discount	Item_Key	Order_Detail_Key	Description
2	1	50		1 2-1		Side Connecting Porch
3	1	50		1 2-2		Side Connecting Porch
4	1	50		1 2-3		Side Connecting Porch
5	1	50	0	1 2-31		Side Connecting Porch
6	1	50	0	1 2-32		Side Connecting Porch
7	1	50	0	1 2-33		Side Connecting Porch
8	1	120		2 1-2		3 x3 metre marquee
9	1	120		2 1-15		3 x3 metre marquee
10	1	120		2 1-17		3 x3 metre marquee
11	1	120		2 1-26		3 x3 metre marquee
12	1	120	0	2 1-32		3 x3 metre marquee
13	1	120	0	2 1-45		3 x3 metre marquee
14	1	120	0	2 1-47		3 x3 metre marquee
15	1	120	0	2 1-56		3 x3 metre marquee
16	1	150		3 1-4		4 x 4 metre marquee
17	1	150		3 1-11		4 x 4 metre marquee
18	1	150		3 1-12		4 x 4 metre marquee
19	1	150		3 1-20		4 x 4 metre marquee
20	1	150		3 1-25		4 x 4 metre marquee
21	1	150	0	3 1-34		4 x 4 metre marquee
22	1	150	0	3 1-41		4 x 4 metre marquee
23	1	150	0	3 1-42		4 x 4 metre marquee
24	1	150	0	3 1-50		4 x 4 metre marquee

Items Charges Sheet5

Grand Total £1,445,760.00

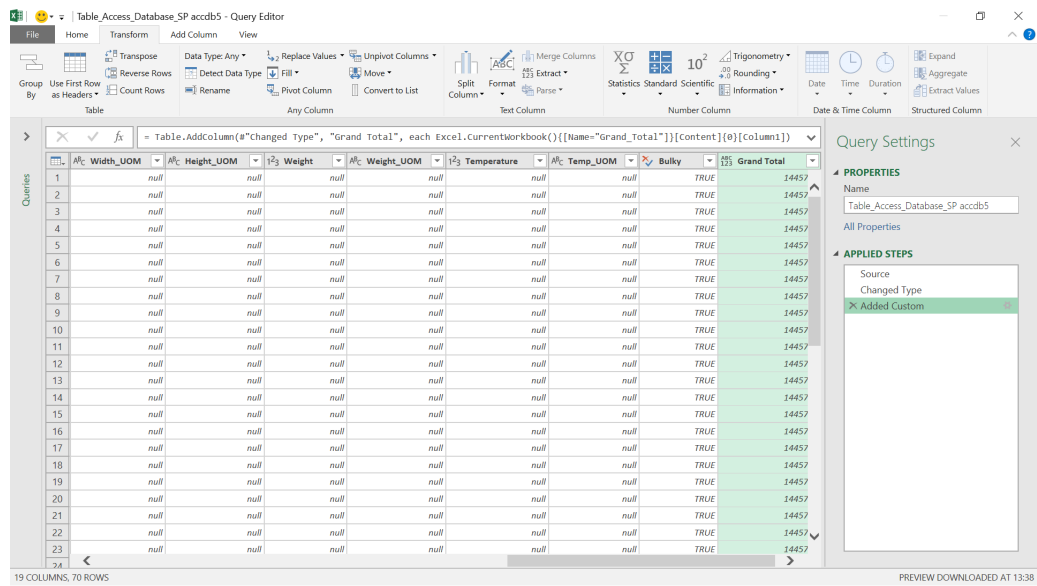
Our first step is to name this cell using the Name Box (highlighted above, currently displaying the cell K5). We'll call it 'Grand_Total'.
Now, go back to our query, and choose to create a 'Custom Column' from the 'Add Column' tab:



Here, enter the following formula:

```
Excel.CurrentWorkbook()[[Name="Grand_Total"]][Content][0][Column1]
```

When you click 'OK', a new column is added:



This method works for character and numeric cells (including dates).
More next month!

Power BI Updates

This month's updates see new improvements for buttons, line charts and DAX functions, amongst other updates. Also, Insights is new this month and Microsoft has added some new capabilities for Goals. The full list reads as follows:

Reporting

- New formatting options for buttons
- Toggle total columns in waterfall charts
- Line chart series labels
- Sensitivity label support for Power BI template files

Analytics

- Insights (Preview)

Modelling

- Shortcut expression for **CALCULATE** now supports aggregation functions
- New parameter for **XIRR** function
- Making it easier to format based on a user's locale

Data Connectivity and Preparation

- Power BI Connector in Power Automate is now Generally Available
- AssembleViews now Generally Available
- Azure Databricks (connector update)
- Bloomberg Enterprise Data and Analytics now Generally Available
- DataVirtuality (connector update)
- Exasol (connector update)
- Vena now Generally Available

Service

- Power BI Goals: automated status rules (Preview)
- Power BI Goals: improved filtering (Preview)
- APIs to determine who has access to what Power BI artifacts (Preview)
- Service Principal support for read-only Admin APIs now Generally Available

Mobile

- Goals now available in Power BI Mobile apps
- Explore content that's relevant to you (Android and iOS)
- Now you can request access to reports from your mobile app

Developers

- Microsoft moving Power BI visual offers to Commercial Marketplace within Partner Center (*sic*)

Visualisations

- PAFnow Process Mining flowchart visual by Process Analytics Factory GMBH
- Drill Down Network PRO by ZoomCharts
- Annotated Bar by Queryon
- Graphomate pictograms 2021.2 by Graphomate
- New visuals in AppSource

Paginated Reports

- New version of Power BI Report Builder.

Let's go through each in turn.

New formatting options for buttons

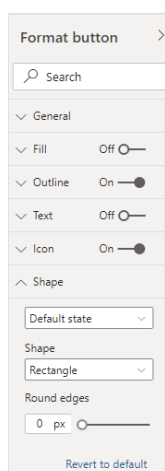
Buttons in Power BI have now been updated to include a lot more formatting options, including new shapes and custom icons.



Previously, buttons were only available in the rectangular form. Now with this release, you have a lot more shapes to choose from:

- | | | | |
|------------------|----------------------|---------------------|------------------------------|
| • Arrow | • Isosceles Triangle | • Pill | • Tab: Single Corner Rounded |
| • Chevron Arrow | • Octagon | • Rectangle | • Tab: Single Corner Snipped |
| • Pentagon Arrow | • Oval | • Right Triangle | • Tab: Top Corners Rounded |
| • Heart | • Parallelogram | • Rounded Rectangle | • Tab: Top Corners Snipped |
| • Hexagon | • Pentagon | • Speech bubble | • Trapezoid. |

While 'Rectangle' is still the default shape for buttons, you can change to shape by navigating to the Shape tab of the Format button pane, viz.



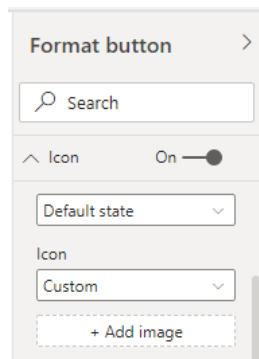
In addition to new shapes available for buttons, this release also includes new formatting options such as:

- Custom image or icon for your button

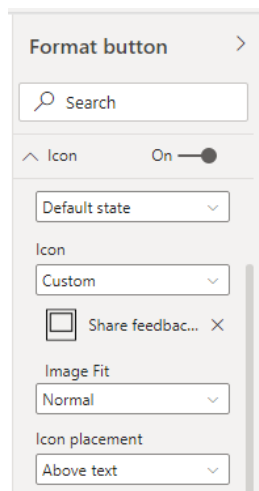


Share feedback

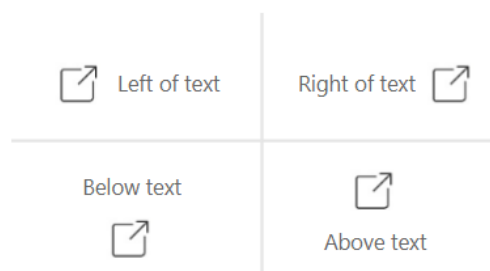
You can find this option by navigating to the Icon tab of the Format button pane and selecting the Custom option for Icon:



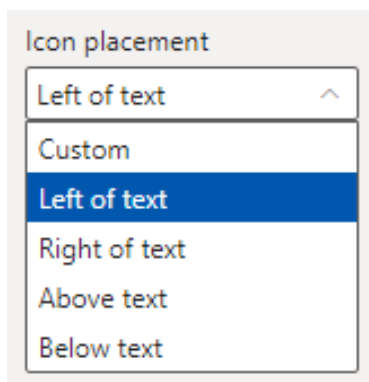
Once you add your image you can also customise the Image fit:



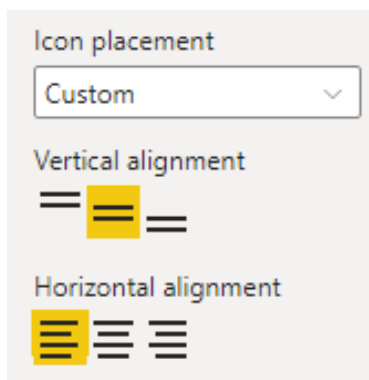
- Easy icon placement options



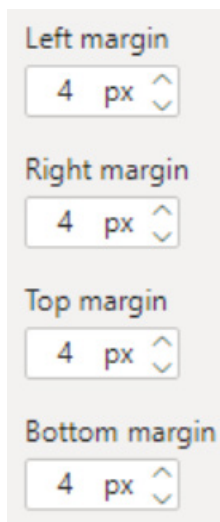
You can find these options in the Icon placement dropdown of the Icon tab:



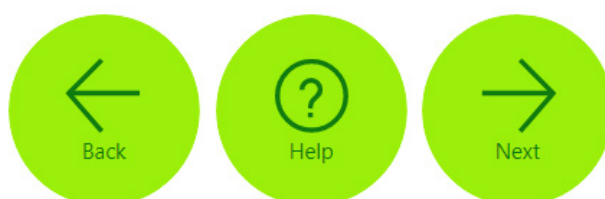
If you select the Custom option, you can control icon's vertical and horizontal alignment:



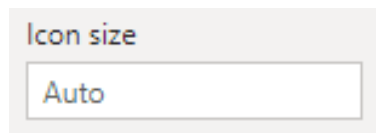
- Control Icon margin (alternatively known as padding)



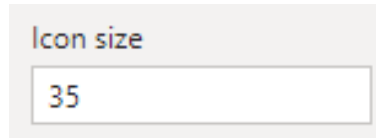
- Customise and fix the Icon size



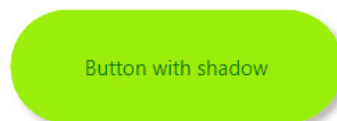
By default the Icon size is set to Auto, meaning that as you resize the button, the icon size will automatically change in size.



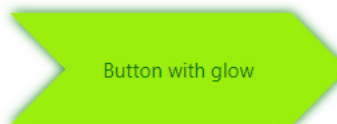
However, now you have the option to set a fixed Icon size (in pixels):



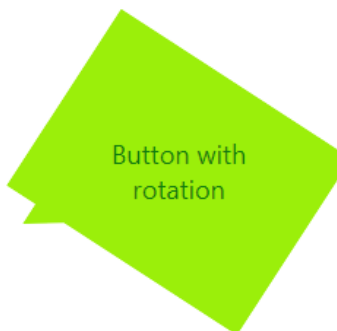
- Drop Shadow effects



- Glow effects



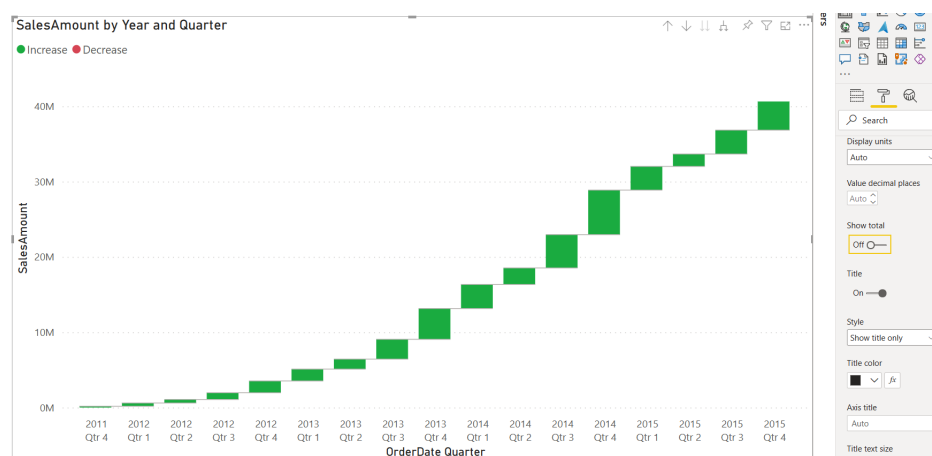
- Button Shape rotation and Text rotation



Toggle total columns in waterfall charts

You may now turn off total columns in your waterfall charts. You will find this new toggle in the y-axis card in the formatting pane. If you turn it on, the totals of your waterfall charts will be removed (which seems the

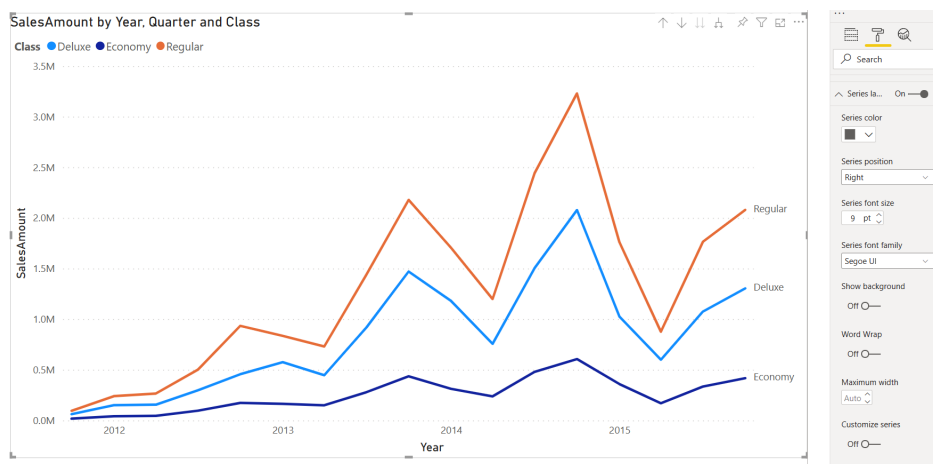
wrong way round to my little brain). Note that if you have a breakdown field, your visual will have subtotal columns but not a total column, so you will not see this option in the Formatting pane.



Line chart series labels

This month also sees a new option to create and format series labels in your line charts. Using the series labels option in the Formatting pane, you can turn on and format labels that appear on the left or right sides

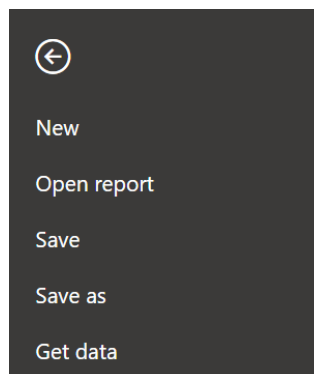
of your series categories in line charts. These supplement the legend in providing clarity on which lines are associated with which categories.



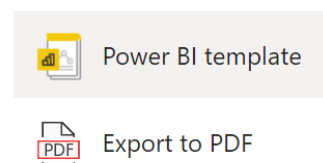
Sensitivity label support for Power BI template files

In Power BI Desktop, you can create and use templates to create new reports. MIP sensitivity labels enable you to properly classify Power BI files. Now, you can also apply a MIP label to Power BI template files (.pbix). Upon export to Power BI template, a MIP label and protection

set on a Power BI file (.pbix) will be applied on the new template file. When a new report is created from the template file, the label will be applied too.



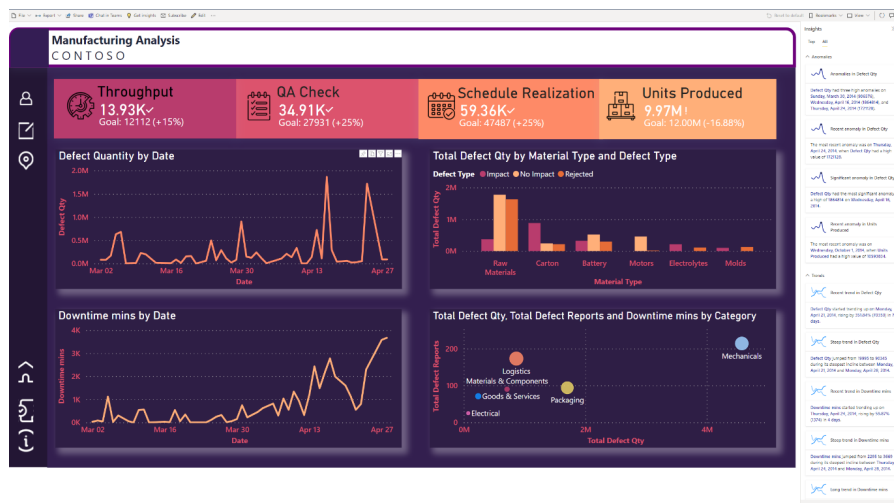
Export



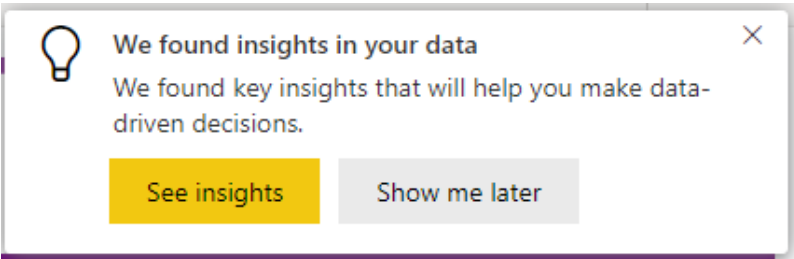
Insights (Preview)

The Insights feature helps users easily find and explore insights such as anomalies, trends and KPI analysis in their data, as they interact with and consume their reports. It proactively notifies a user if there are interesting insights in their reports and provides explanations for the insights. It works out of the box on any report so consumers can

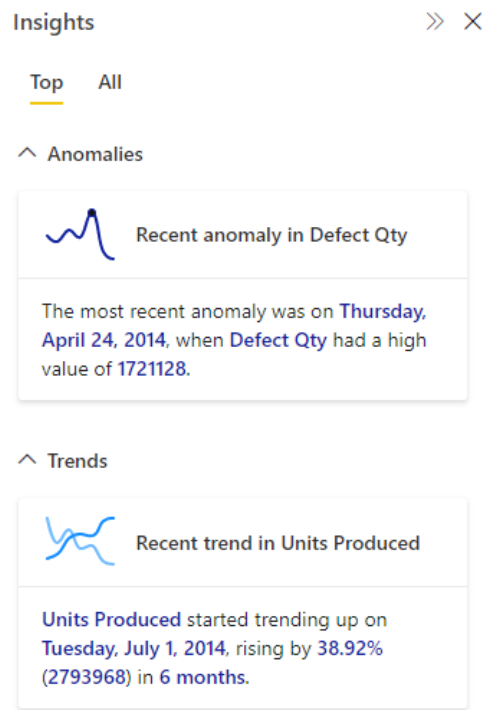
automatically get insights without any setup or configuration by the creators. Insights is supported for reports in Premium and Premium Per User (PPU) workspaces. You can also use this capability in non-premium workspaces if you have a PPU license.



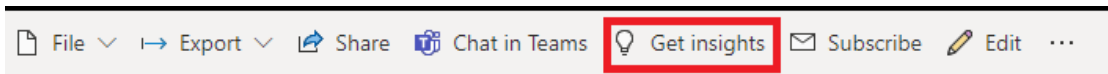
When you open a report, Power BI automatically runs insights analysis and shows you notifications if there are Top insights in your data. Top insights are those that are noteworthy based u[on factors like recency and significance, e.g. a huge anomaly in the previous day or a steep trend in the last week.



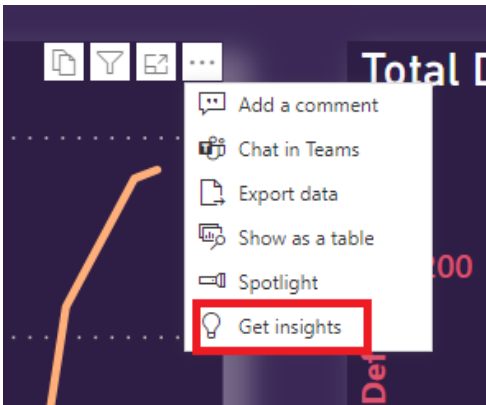
Clicking on 'See Insights' on this dialog (Microsoft refers to it as a 'toast'), opens up the Insights pane:



You can also click on 'Get insights' in the Action bar at any time to see Insights about the current report page.



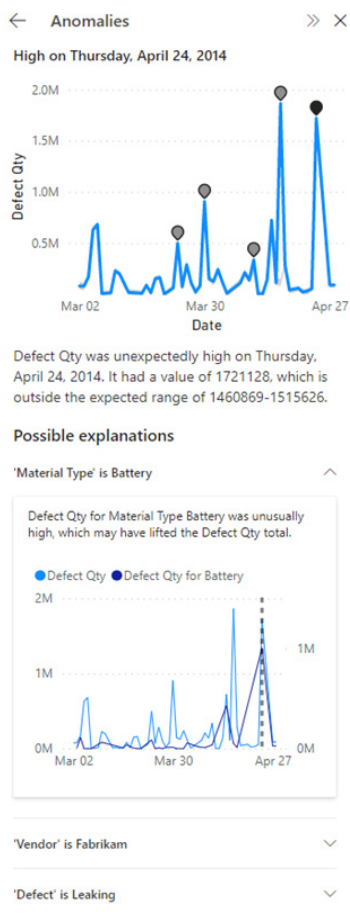
Selecting 'More options' (...) in the upper-right corner of a visual and then 'Get insights' shows you insights about just that visual:



The Insights pane currently shows you three types of insights:

1. Anomalies
2. Trends
3. KPI analysis.

Clicking on the card shows you more details about the insight and possible explanations:



Shortcut expression for CALCULATE now supports aggregation functions

Power BI has now made it easier to write filters for the **CALCULATE** and **CALCULATETABLE** functions. You may now use aggregation functions in the filters when they are used in Boolean (True / False) expressions. You

should note that the newly supported syntax improve the readability of the **DAX** expressions but don't impact performance when compared to their more verbose equivalent expressions.

As an example of the newly supported syntax:

CALCULATE([Total Sales], DimProduct[UnitPrice] > MEDIAN(DimProduct[UnitPrice]))

New parameter for XIRR function

In certain situations, the **XIRR** function (a financial function that can be used to calculate the internal rate of return, *i.e.* the discount rate that will make the present value of the given free cash flow zero) is unable to find a solution and returns an error. Starting with this release, Microsoft

has added a fifth and optional parameter that enables you to specify an alternate result which will be returned instead of an error whenever the **XIRR** function cannot find a solution.

Making it easier to format based on a user's locale

The **FORMAT** function enables you to convert a value to text according to a specified format. This month sees Power BI add the ability to specify a locale. For example, if you wanted to show a date in the English / Great Britain locale you could write:

FORMAT(dt"2010-12-03T12:30:59", "General date", "en-GB")

This returns 03/12/2010 12:30:59, where the day precedes the month, and the time is written in 24-hour format.

If you wanted to show a date in the English / United States locale instead you could write:

FORMAT(dt"2010-12-03T12:30:59", BLANK(), "en-US")

This returns 12/3/2010 12:30:59 PM, where the month precedes the day, and the time is written in 12-hour format. You should note that this second example does not specify a format string altogether.

If you specify a format string that is not locale-dependent such as "mm/dd/yyyy" that format string will be used, and any locale specified will not be used. Hence, the following will return 12/3/2010 even though "en-GB" is specified as the locale:

FORMAT(dt"2010-12-03T12:30:59", "mm/dd/yyyy", "en-GB")

As another example, consider the following:

FORMAT(123456.78, "###,###.##", "nl-NL")

This returns 123.456,78 as in the Netherlands (nl-NL locale) the comma is used as the decimal separator and the thousand separator is a dot, whereas switching the locale to "en-US" returns 123,456.78, i.e. it's the other way around.

You should note that these examples leverage the new way of expressing datetime values in **DAX** introduced last month. Of course, you can pass in a column reference or use the date functions to provide the date and time.

Power BI Connector in Power Automate is now Generally Available

The Power BI Connector in Power Automate is now Generally Available. This connector allows Power BI users to use Power Automate to perform actions within Power BI, including refreshing a dataset, performing

exports on Power BI reports or performing an action when a data driven alert is fired. Microsoft has commented that they will be developing additional actions for this connector soon.

AssembleViews now Generally Available

This connector is now Generally Available.

Azure Databricks (connector update)

This update adds support for export and import of PBIDS files.

Bloomberg Enterprise Data and Analytics now Generally Available

This connector has now been made Generally Available. According to the Bloomberg team, "...this connector is no longer considered in 'Beta'. In addition, [their] recent update changed the entry field from a single-line to a multiple-line entry so users can see their full BQL query".

DataVirtuality (connector update)

This connector update adds a mapping for string data type with large size to allow usage of that data type in Direct Query Report Visuals. It further improves comfort for handling of unencrypted connections in create connection process.

Exasol (connector update)

This update contains the following changes:

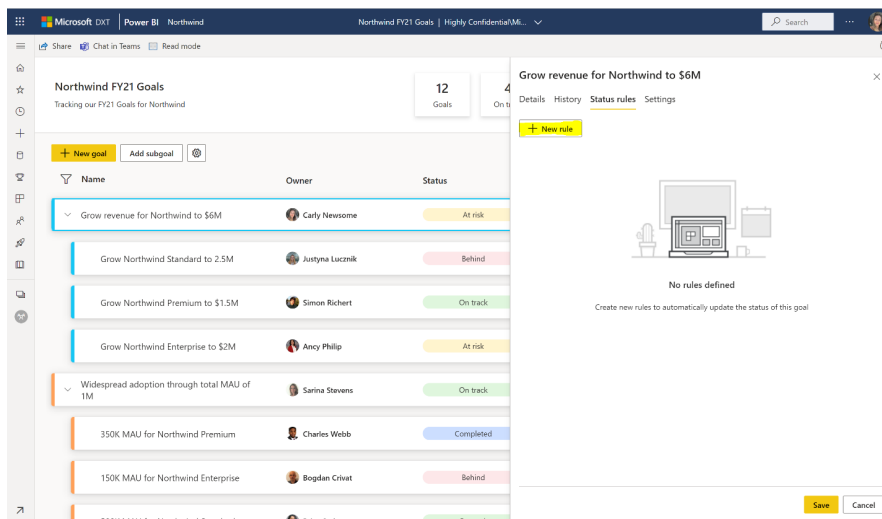
- DSN support
- limited Kerberos authentication support
- implicit authentication is now also possible.

Vena now Generally Available

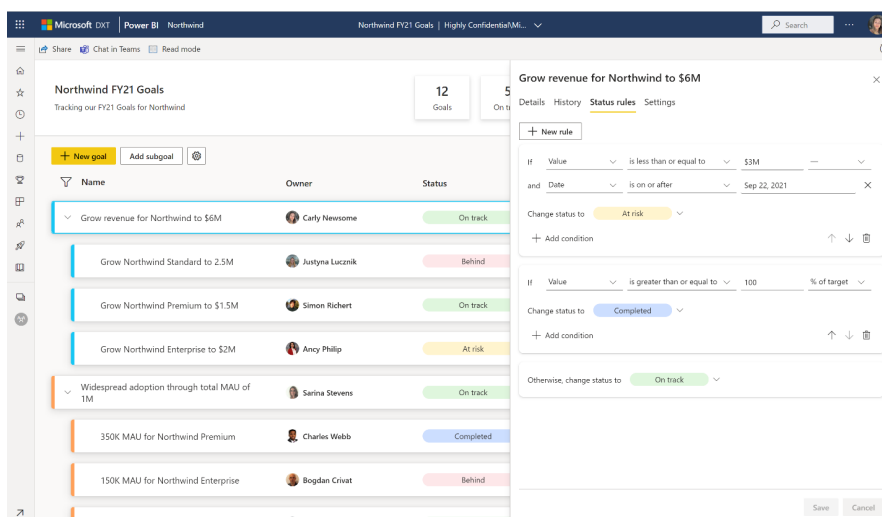
This connector is now Generally Available and has made error handling improvements.

Power BI Goals: automated status rules (Preview)

One of the important attributes of a goal defined within Power BI scorecards is its status. With this new release, scorecard authors will be able to automate status updates based on rules that govern that goal or subgoal.



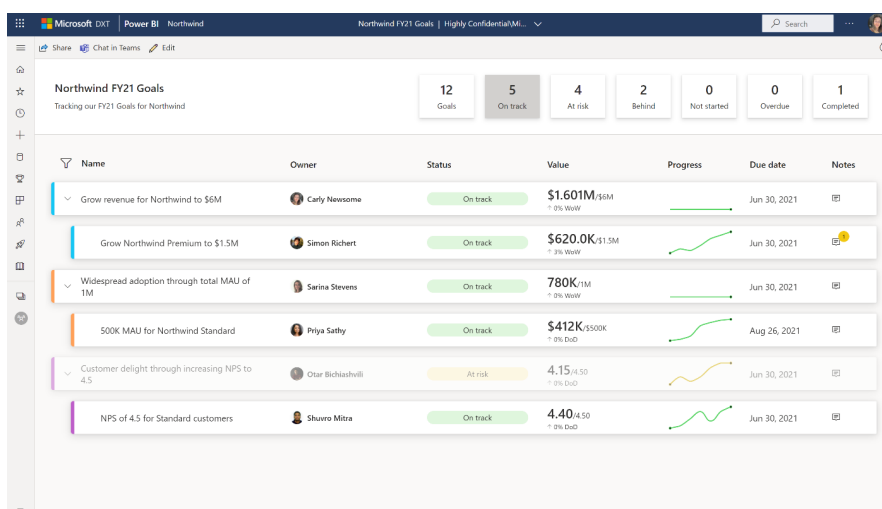
Users will be able to precisely set when goals are on track or falling behind. Scorecard authors will be able to set up rules that automate statuses based upon the value, percentage of target met, date conditions or a combination of the three.

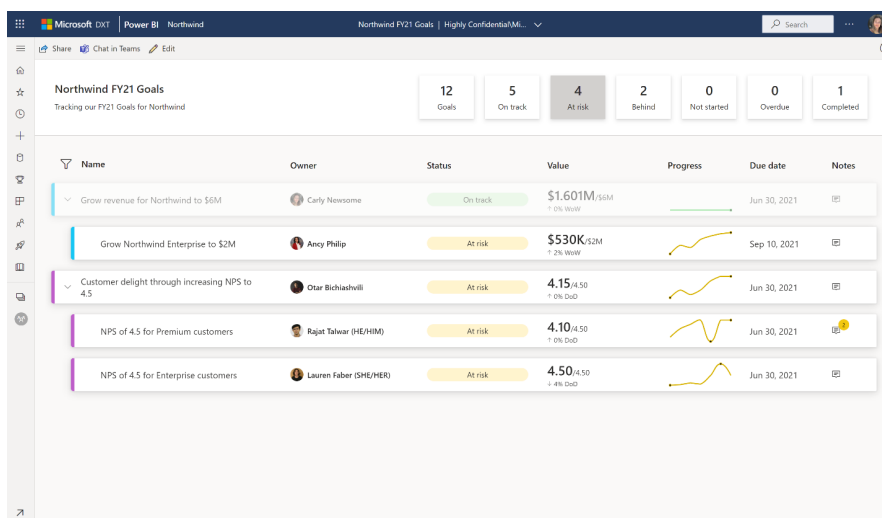


Once those rules are set, you can assign the priority by simply dragging them into place.

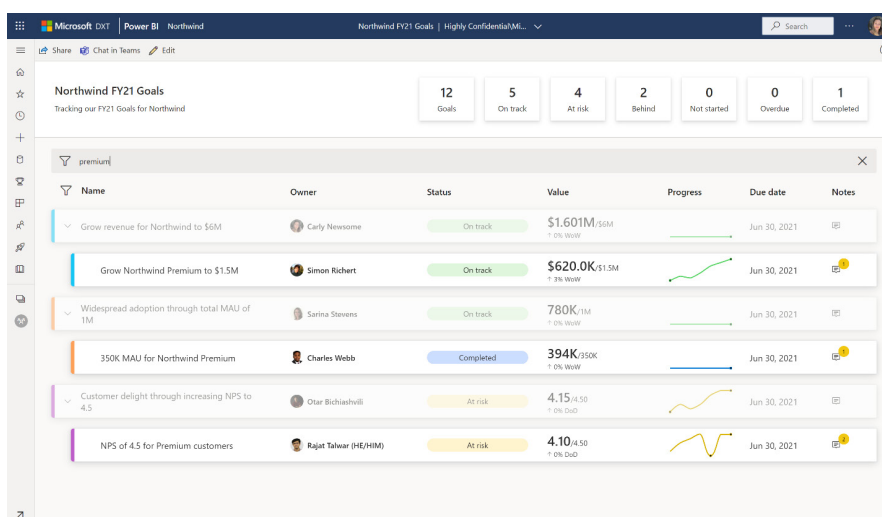
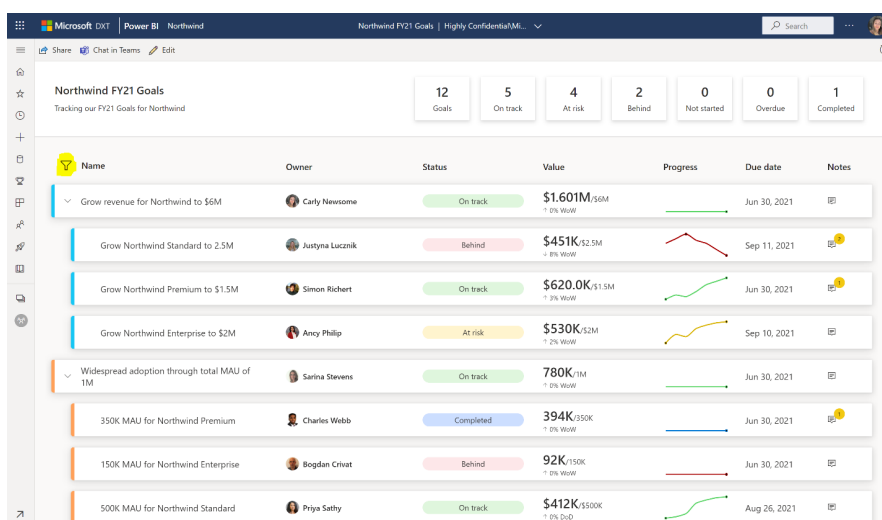
Power BI Goals: improved filtering (Preview)

With this new release, we have incorporated improved filtering capabilities. Now, you can easily view all the goals labelled as a particular status by clicking on the summary cards, making it easier than ever to see at a glance what's at risk and what's on track.





This update also includes a keyword search, making it easier to search for specific goals and see how they're doing at a glance, without losing context of the parent / child relationships.



APIs to determine who has access to what Power BI artifacts (Preview)

Microsoft has a new set of APIs that allow you to programmatically retrieve user and permission information for most Power BI assets (reports, dashboards, datasets, dataflows, workspaces and capacities).

They can help Power BI administrators support access review audits, understand oversharing risks and see who has access to Power BI assets. For this Public Preview, this update releases two types of APIs:

1. The first one requires you to supply an asset identifier and will output the users and groups that have been granted access to the asset
2. The second one is an extension to the Scanner Admin API to that adds users or security groups with their access levels for one or more workspaces.

When you need to spot check access rights for a particular asset, such as a report, a dashboard or dataset, to assess potential data leakage risk, you want to leverage the Who has Access to an Asset API, such as the GetReportUsersAsAdmin API. When your information security team asks you perform an access review audit across the entire tenant or multiple workspaces, the scanner API with user permission extension will come in handy. It provides you with user access information for various Power BI assets across all your workspaces.

Service Principal support for read-only Admin APIs now Generally Available

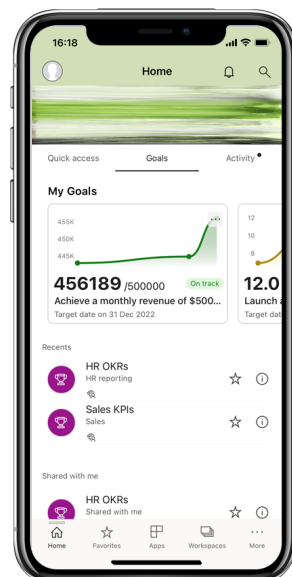
To better support the security constraints of some organisations, this update has added service principal support for the scanner Admin APIs. Service principal is an authentication method that can be used to let an Azure AD application access Power BI APIs. This gets rid of the need to maintain a service account with an administrator role. To allow your application to use the Admin APIs, you only need to give your approval

once as part of the tenant settings configuration. This was made a Public Preview feature last December and has now become Generally Available. There is a difference: the Generally Available version has added support for new administrator APIs to determine who has access to what Power BI artifacts.

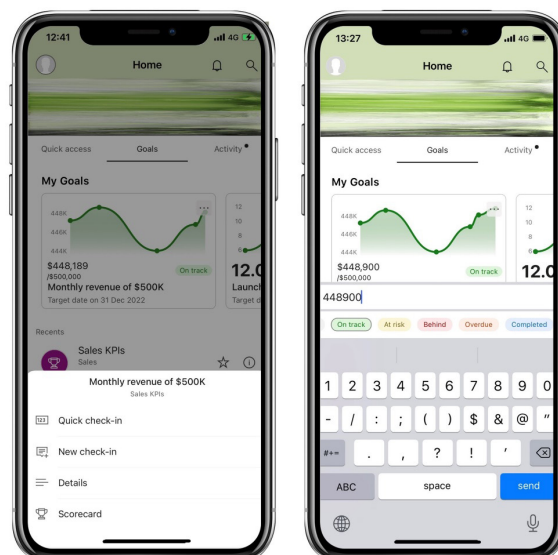
Goals now available in Power BI Mobile apps

Now while you're on the go, you can monitor your goals and scorecards and even check in progress, directly from the mobile app. This is because a new Goals hub has been added to the app, making it possible for you

to view your scorecards and closely monitor your assigned goals. With the mobile app's new Goals hub, you can stay on top of your targets from anywhere at any time.



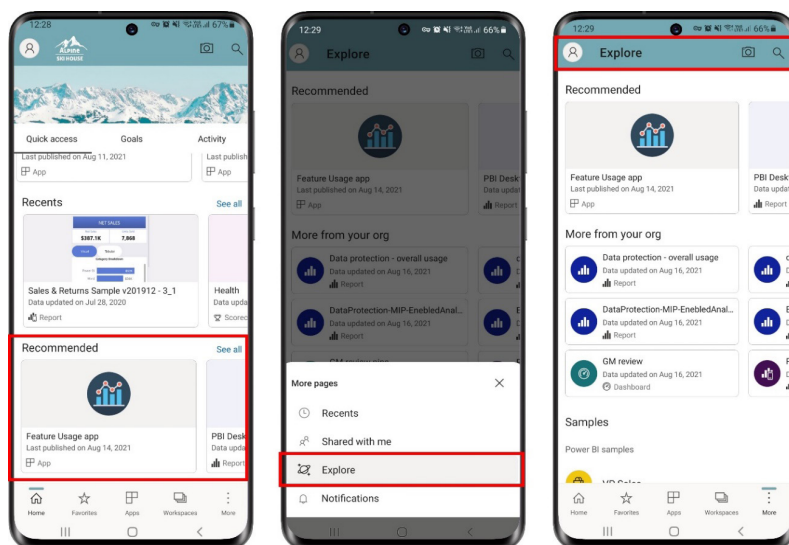
To keep your goals up to date, you can update values using either 'Quick check-in' or 'New check-in'.



Explore content that's relevant to you (Android and iOS)

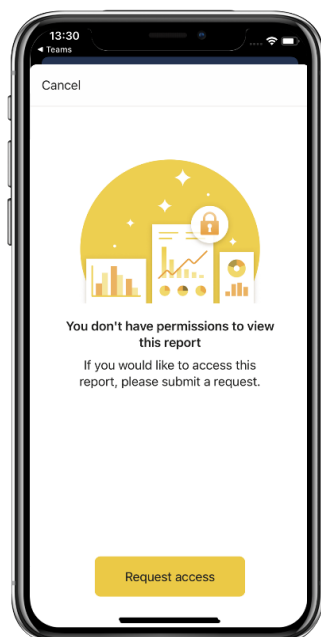
Furthermore, you may now enhance your Power BI mobile experience and productivity by exploring content from your organisation that has

been picked especially for you. It's there for you on the Home page in the new Recommended strip or on the new Explore page.



Now you can request access to reports from your mobile app

If ever someone has sent you a link to a report, but it's not shared with you, and you find you don't have access, you can now request access directly from the application. About time too!



Microsoft moving Power BI visual offers to Commercial Marketplace within Partner Center

If you have one or more Power BI visual offers, either published or as a draft, then you need to be aware of this move. Microsoft has decided to move in order to streamline the offer management experience. Apparently, multiple improvements are coming with this migration and "...many more are to come in future".

This will be happening shortly. During the migration, your customers will still be able to find and acquire your offers. You can continue accessing your offers in Office Store until the move. Then, you will be required to enrol into the Commercial Marketplace (CMP) to continue managing your Power BI visual offers in Partner Center. When the offer migration is complete, your Power BI visual offers will not be accessible in Office Store and can only be accessed from CMP for those who are enrolled.

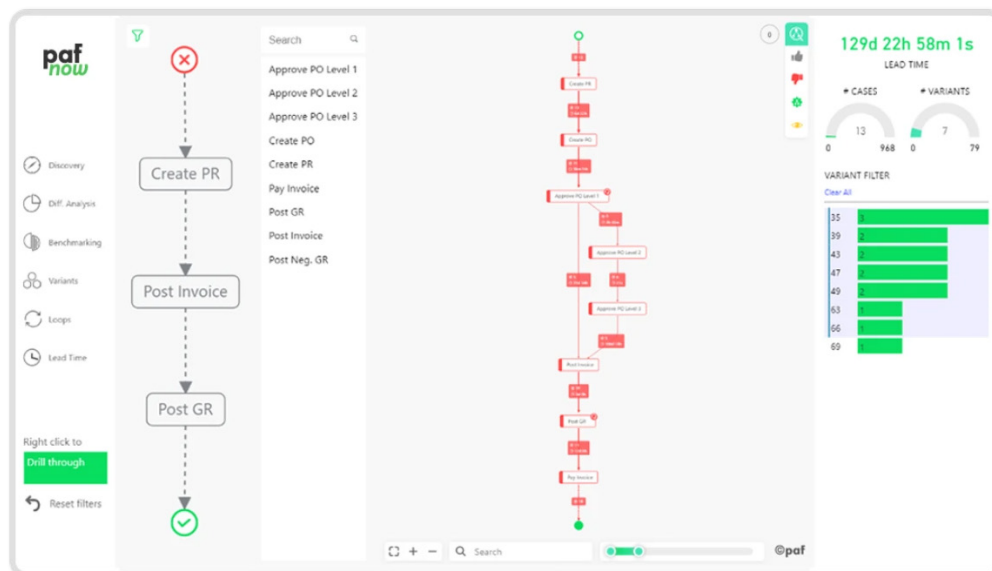
Therefore, if this applies to you, you should complete the enrolment to CMP as soon as possible. Additionally, you may follow the in-portal instructions in Office Store within Microsoft Partner Center (microsoft.com) to complete the enrolment.

With this migration, publishers must submit their files (PBIX and PBIVIZ) directly to Partner Center. You don't need to email the support team to get the XML. This should be a significant benefit that simplifies the submission process.

With the new process, you may use the "compare" feature to see changes from previously submitted versions before publishing your offer, enhanced informative messages to provide you with more details on the visual submission status, and an enhanced review and publish page to provide more details about the offer setup.

PAFnow Process Mining flowchart visual by Process Analytics Factory GMBH

PAFnow Process Mining Visual is a powerful tool for the analysis of your business processes based upon event data. You may use this visual to explore process variants, identify bottlenecks, reveal root causes, etc.



With PAFnow, you can obtain a facts-based, data-driven process visualisation that will allow you to realize the following business benefits:

- reduce operational costs
- improve operating margin
- improve efficiency
- accelerate automation with RPA.

There are some newly added features too:

- Filter preview to see how filters will change the visual
- Breadcrumbs for filter history to discard and add filters easily
- more flexibility in display options of edge and node labels and ToolTip.

You can test the new PAFnow Process Mining visual to accelerate your projects. The in-app purchase of this visual, enables an upgrade to PAFnow Enterprise for advanced analysis features, additional visuals and unlimited events. There are no purchases required to use the visual itself.

You can check this visual out on AppSource.

Drill Down Network PRO by ZoomCharts

Drill Down Visuals
FOR POWER BI

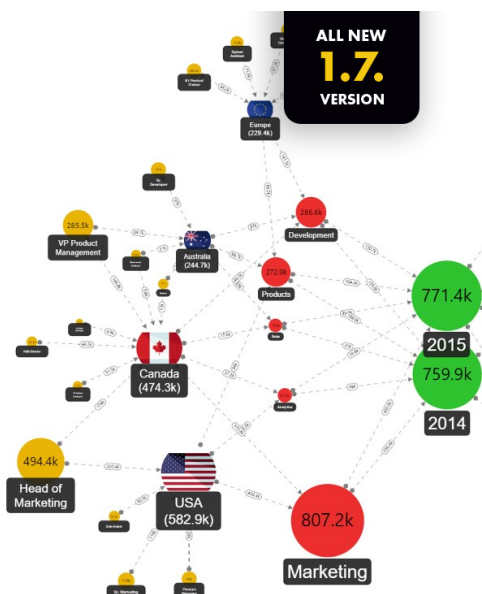


Drill Down Network PRO

Rich customization options

- set color, radius, labels, size and shape for nodes
- change color, type, thickness, decorations and labels for links
- customize node labels and their location, add legends

zoomcharts.com/powerbi



Drill Down Network PRO by ZoomCharts is a new visual that may be used to explore networks of category-based data. This visual allows you to transform your multi-level pie chart into a network chart that allows you to view relations and spot outliers.

Among the main features of Drill Down Network PRO you will find:

- full customisation: you may choose from multiple node shapes, customise vertices, edges, *etc.*
- cross-chart filtering: instead of using slicers, you may select data points on multiple charts
- image support: modify your reports with images to emphasise vertices
- drill through support: examine data in more detail when selecting the last drill through level
- multi-touch device friendly: experience consistent data exploration on any device.

You can download a free 30-day trial of Drill Down Network PRO from the AppSource.

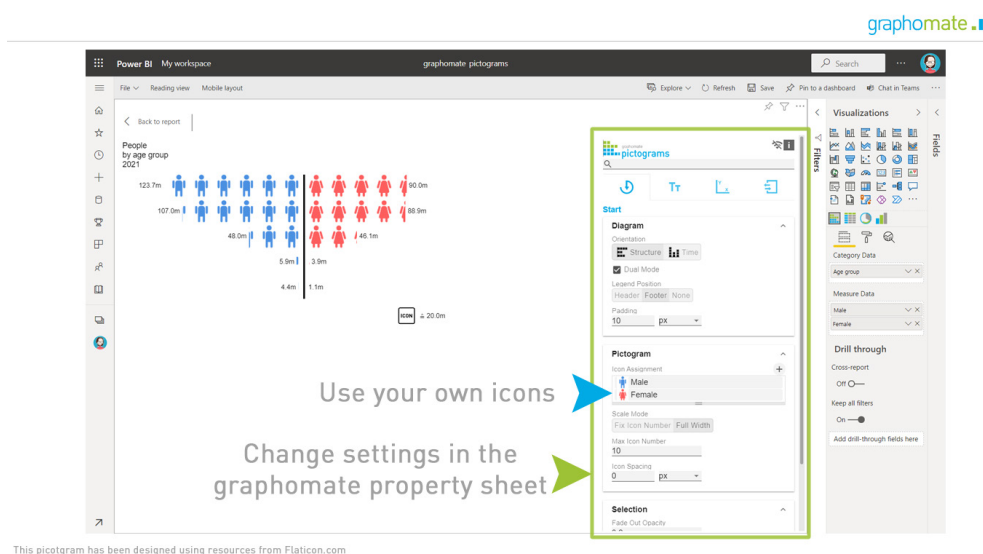
Annotated Bar by Queryon

This custom visual combines bar chart functionality with customisable labels so that your users will focus on key data in a bar chart. Users may customise your label colour, font, size and position of the bar, and can drill down by clicking on labels or the bar itself.

Multiple Bar styles like Stacked, Side-by-Side (Clustered), and Overlapping (also known as “Bar in a Bar”) are available. Overlapping bars help display the comparison between two items when one is inherently a part of the other, such as a project budget versus expenditures to date.



Graphomate pictograms 2021.2 by Graphomate



It’s well known that it’s easier for viewers to recall certain data if it is shown as a pictogram or icon. With this visualisation, you may select icons from an existing palette or insert your own symbols (e.g. product icons) as you like. The Graphomate pictograms allow the scaling of a single icon as a fixed unit.

Advantages of using Graphomate pictograms include:

- freely selectable icons per data series and data point
- horizontal or vertical alignment
- alternatives are possible from a central axis, from where a data series may begin to the left or to the right
- any image (jpeg, gif, png, svg) may be used
- DataURL is supported.

You can make use of the integration of Graphomate’s custom visuals and use filters and slicers side by side with the standard visuals.

As usual, it may be downloaded from the AppSource.

New visuals in AppSource

Other new visuals not mentioned above include:

- Laconic Card PRO
- Lipstick Bar Chart
- process.science Process Mining
- SPC G Chart
- SPC U 'Prime' Chart
- Sunburst by MAQ Software
- Timeline Box
- TRUECHART for Power BI
- valQ – Collaborate.

New version of Power BI Report Builder

A new version of Power BI Report Builder is also available now. With this update of Power BI Report Builder, the 64-bit version is now available from the Microsoft Download Center, in addition to the Microsoft Store, for enhanced memory limits and other performance gains. Enhanced

support for Date/Time parameters is now provided. This update also includes a number of accessibility fixes related to keyboard shortcuts and screen reading tools. You should note that previously installed third-party data providers may need to be updated to their 64-bit versions.

More next month, we're sure!

The A to Z of Excel Functions: GESTEP



It may sound like some sort of military walk, but the **GESTEP** function was used to assist filtering out data. Imagine you wanted to identify data that exceeded or was equal to some hurdle (target value). If you are familiar with the IF function, you might create a calculation such as

=IF(value >= hurdle, 1, 0)

In this case, if the variable **value** is greater than or equal to the **hurdle**, then a value of one (1) is returned, else zero (0). Well, guess what? There is a seemingly pointless Excel function out there that already does this for you. As a model auditor for more than 30 years, I can honestly say I have never seen the following function used in practice!

However, for completeness, the Excel function **GESTEP** returns one (1) if a compared number is greater than or equal to a "step" (the given hurdle), otherwise it returns zero (0). This function may be used to filter a set of values. For example, by summing several **GESTEP** functions you can calculate the count of values that exceed a threshold.

GESTEP has the following syntax:

GESTEP(number, [step])

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

- **number**: this is required, and represents the value to test against the hurdle, **step**
- **step**: this argument is optional. This is the threshold value; if this value is omitted, it is assumed to be zero (0).

It should be further noted that:

- if any argument is nonnumeric, **GESTEP** returns the **#VALUE!** error value.

Please see our example below:

	A	B	C
1	Formula	Description	Result
2	=GESTEP(2,1)	Checks whether 2 is greater than or equal to 1	1
3	=GESTEP(1,2)	Checks whether 1 is greater than or equal to 2	0
4	=GESTEP(1)	Checks whether 1 is greater than or equal to zero (0) [unspecified]	1
5	=GESTEP(-1,-2)	Checks whether -1 is greater than or equal to -2 (it is!)	1
6	=GESTEP(-1)	Checks whether 2 is greater than or equal to zero (0) [unspecified]	0
7			

The A to Z of Excel Functions: GETPIVOTDATA

To understand the **GETPIVOTDATA** function, we first need to understand PivotTables.

Many analysts use Excel to summarise cleaned-up data and convert it into information, with structured (sorted and / or ordered) referencing, so that users may understand their numbers, identify trends and produce various reports.

To understand what I mean, as an example, we may receive data like this:

Month	Business Unit	Amount	Month	Business Unit	Amount	Month	Business Unit	Amount	Month	Business Unit	Amount
Q1	East	108.68	Q4	North	122.26	Q3	West	178.63	Q4	West	135.06
Q2	South	103.84	Q1	North	162.85	Q3	West	197.42	Q4	East	114.34
Q3	West	109.75	Q4	North	127.61	Q3	North	109.74	Q1	North	142.24
Q2	North	147.52	Q3	East	173.11	Q3	South	105.75	Q1	North	174.07
Q1	North	140.94	Q4	East	144.52	Q3	East	146.55	Q3	East	174
Q3	East	180.53	Q4	South	153.62	Q4	East	155.89	Q1	North	169.23
Q1	South	160.91	Q4	North	156.35	Q4	West	154.87	Q3	West	159.28
Q3	West	144.8	Q4	North	111.5	Q4	East	188.68	Q4	West	149.65
Q4	North	102.64	Q2	South	159.33	Q4	East	108.58	Q1	South	168.45
Q2	West	111.91	Q1	West	122.27	Q2	North	136.68	Q2	South	105.41
Q3	North	139.83	Q3	North	174.8	Q2	West	121.86	Q4	East	111.5
Q2	East	121.07	Q3	South	188.57	Q2	West	107.79	Q1	North	120.71
Q2	North	110.63	Q3	North	188.81	Q4	West	100.29	Q2	South	126.21
Q4	North	103.44	Q1	West	130.3	Q1	East	171.19	Q2	East	101.12
Q1	East	128.15	Q2	South	156.26	Q1	North	154.07	Q1	North	155.7
Q3	North	163.52	Q1	East	132.8	Q2	West	160.54	Q2	West	191.55
Q2	North	105.7	Q4	North	109.5	Q3	North	133.36	Q3	South	135.73
Q2	North	197.92	Q1	North	119.51	Q1	West	152.08	Q3	West	172.24
Q1	East	176.3	Q3	West	127.16	Q3	West	152.9	Q2	East	154.79
Q4	East	142.83	Q2	East	191.57	Q3	West	132.41	Q2	West	104.37
Q4	East	133.31	Q1	North	183.14	Q1	North	166.26	Q3	West	167.79
Q3	East	170.55	Q4	West	188.43	Q1	East	124.16	Q1	West	171.4
Q1	West	183.04	Q3	North	100.17	Q1	East	111.04	Q3	North	176.46
Q2	West	153.5	Q1	East	125.33	Q1	West	145.13	Q1	West	120.81
Q3	East	196.76	Q3	East	148.75	Q2	North	133.59	Q4	East	138.06
Q2	East	138.14	Q3	South	153.09	Q2	West	109.96	Q2	East	161.2
Q3	South	191.34	Q4	North	115.7	Q1	South	157.59	Q3	East	176.21
Q3	East	138.2	Q1	East	193.69	Q4	East	137.18	Q4	North	154.38
Q1	East	185.13	Q2	West	196.38	Q3	South	197.28	Q3	South	102.7
Q4	East	120.12	Q4	North	162.13	Q4	West	198.84	Q3	North	119.78
Q4	West	126.64	Q2	East	177.88	Q1	West	107.86	Q1	South	143.85
Q1	West	123.78	Q4	West	198.77	Q2	South	130.64	Q4	North	136.86
Q2	West	183.44	Q2	West	132.03	Q1	East	107.03	Q1	North	121.37
Q1	South	164.43	Q1	East	126.94	Q4	North	199.97	Q1	West	102.22

and we may turn it into something more informative, such as this:

	North	East	South	West	Total
Q1	\$ 1,810.09	\$ 1,690.44	\$ 795.23	\$ 1,358.89	\$ 5,654.65
Q2	\$ 832.04	\$ 1,045.77	\$ 781.69	\$ 1,573.33	\$ 4,232.83
Q3	\$ 1,306.47	\$ 1,504.66	\$ 1,074.46	\$ 1,542.38	\$ 5,427.97
Q4	\$ 1,602.34	\$ 1,495.01	\$ 153.62	\$ 1,252.55	\$ 4,503.52
Total	\$ 5,550.94	\$ 5,735.88	\$ 2,805.00	\$ 5,727.15	\$19,818.97

Each attribute (known as a **field**) in a table typically contains a category of data. A **crosstab query** (similar to the one pictured, above) summarizes the data from one or more of these fields that are separated into groups based on one or more fields. Essentially, a crosstab query summarizes data in more than one dimension to provide insight that may not be immediately forthcoming otherwise. For example, given the source data, how could you possibly notice that Sales for Quarter 4 in the South are very low relative to other quarters and regions?

Excel has many useful tools that will assist, centred around its version of an enhanced crosstab query, known as a **PivotTable**.

Crosstabs let you quickly compare, contrast and otherwise assess sales activity based on the variables you chose. However, if you sought to deeply analyse the data, you would need to re-design your crosstab query. No such limitation exists with **PivotTables**.

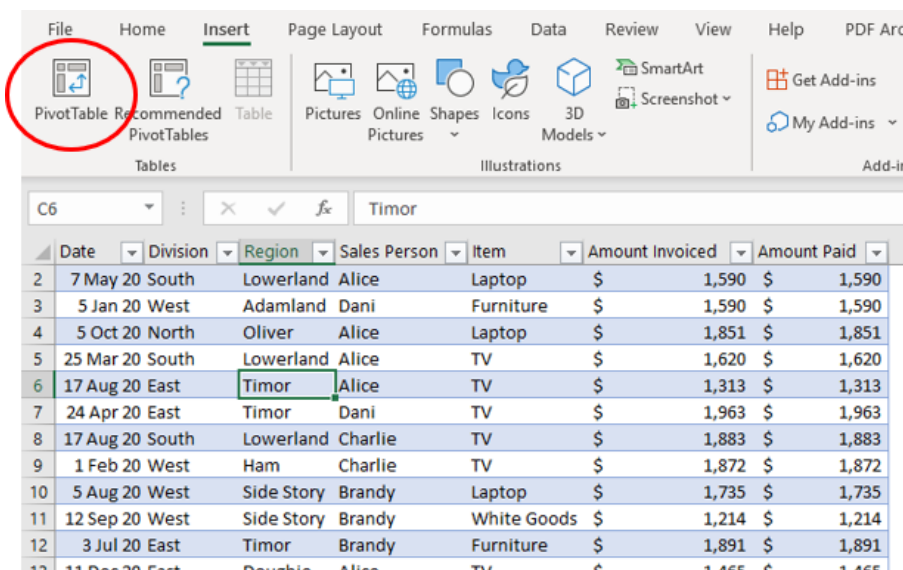
PivotTables allow you to analyse in two dimensions (row and column), and filter on many parameters. They let you filter, drag, drop, rearrange and drill down on data to create additional reports right on the spot.

Due to their similar appearance, crosstabs and PivotTables are often referred to as the same thing. They are not. While they do have obvious differences, both can be powerful tools for providing deeper insights into your existing data. Here, we will concentrate on PivotTables.

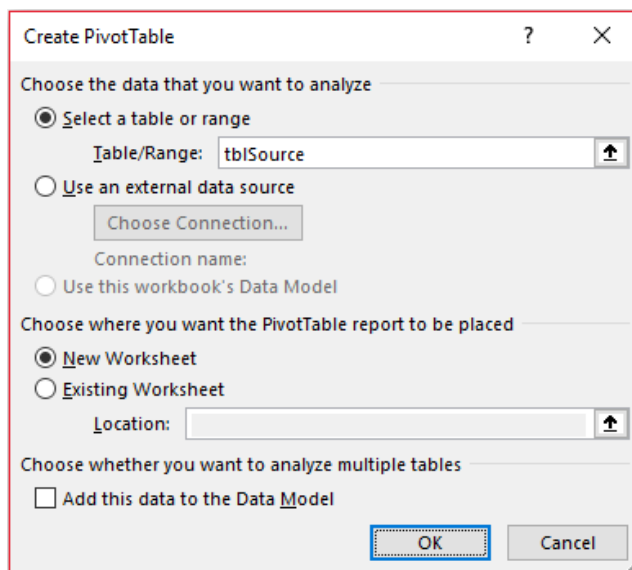
A PivotTable is a semi-dynamic, tabular summary of data. It is one of Excel's most flexible tools and can provide results that would take some time to reconstruct with sophisticated uses of functions such as **SUMIF**, **SUMPRODUCT**, and so on.

Imagine we are a Head Office Analyst reviewing the sales of four divisions: imaginatively called North, South, East, and West. For reasons known only to me, that's the order I wish to report – neither alphabetically nor reverse alphabetically.

Creating a PivotTable is straightforward. Assuming the dataset is in one block (a 'contiguous' range) and has been converted to a Table (Ctrl + T) so that the range may be extended automatically, simply select any cell within the dataset and then click on **Insert -> PivotTable (Alt + N + V [+ T])**:



This gives rise to the 'Create PivotTable' dialog box:



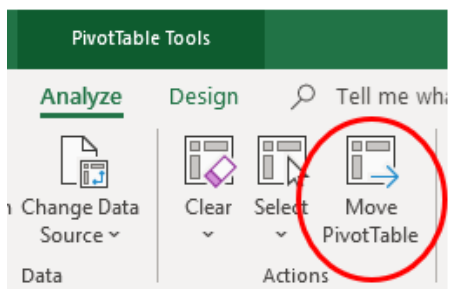
You have the choice of where to place the PivotTable report – either on an existing worksheet (not necessarily the worksheet you are on presently) or else insert a new worksheet.

I have a "rule of thumb" regarding PivotTables. If you are using them for analysis and the fields may be switched to assess trends / understand the data, then the PivotTable may vary in size considerably. Therefore, it is best to have the PivotTable on a separate worksheet, with very little else on it, so that it cannot clash with other spreadsheet elements, such as charts, datasets, formulas, and so on.

However, if the PivotTable is more "mature" and is being used to summarise data on an output sheet, then you may put more than one PivotTable on the sheet, as long as you ensure they cannot collide when changing filters. These sheets tend to be output sheets known as **dashboards**. It's a good idea to place PivotTables at the foot of any such sheet so that if a filter reduces the PivotTable's footprint significantly, the white space created will not look conspicuous.

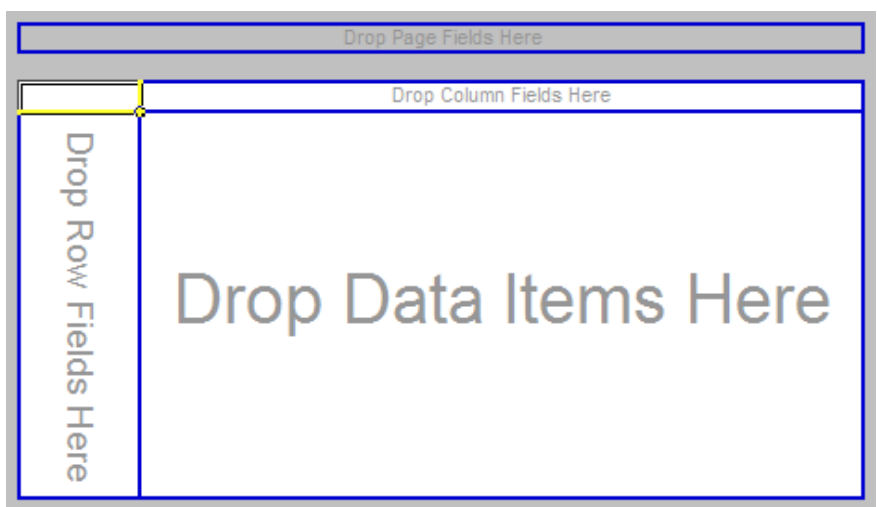
Also, remember when selecting where to place a PivotTable, always remember the main PivotTable will be positioned two rows further down. Do remember if you make a mistake, it's not the end of the world! You have two options available to you:

1. **Move the PivotTable:** This is very easy to do. Simply click a cell within the PivotTable. This triggers the context specific 'PivotTable Tools' tabs 'Analyze' and 'Design'. On the 'Analyze' tab, in the 'Actions' grouping, select 'Move PivotTable' (**Alt + JT + V**) and then follow the instructions



2. **Delete the PivotTable:** This is even easier to achieve! Simply highlight the entire PivotTable range and select 'Delete' on the keyboard.

The PivotTable has four areas where data fields may be placed (a data field is simply any one of the columns of the database, for example, Date, Division, Sales Person, Amount Invoiced, in this illustration):



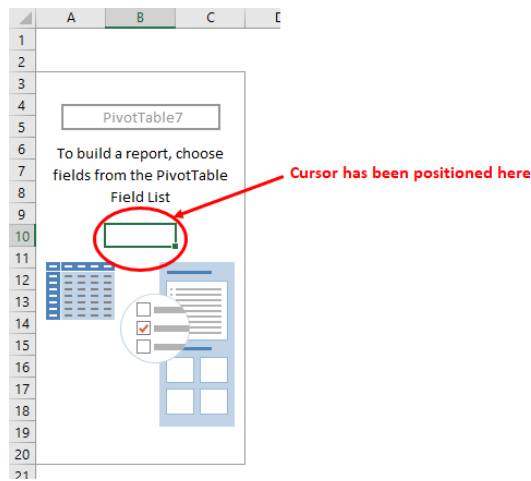
- **Page:** Values in this field appear as page items in the PivotTable
- **Row:** Values in this field appear as row items in the PivotTable
- **Column:** Values in this field appear as column items in the PivotTable
- **Data:** The field to be summarized – if this data is numerical in nature, **SUM** (how much) will be the default operation, otherwise **COUNT** (how many) is used. They are easily changed, if necessary.

PAGE	COLUMN
ROW	DATA

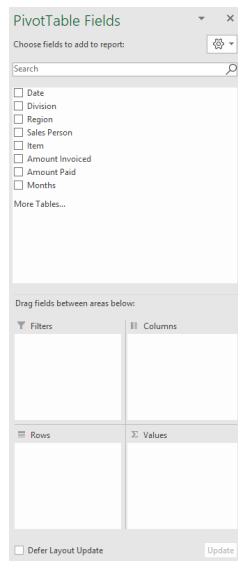
More than one field can be placed in any of these locations – the effect is a hierarchical grouping depending upon the order of placement.

In essence, a PivotTable is a three-dimensional summary of a database. Consider it as a book: each page has a summary table of a selection of the data (for instance, in our example, each page could show the sales of each electrical item for each region and division on a particular date, so Page 1 is 1 1 Jan 20, Page 2 is 2 Jan 20, and so on).

To populate the layout, it is simply a case of dragging and dropping, provided you have the PivotTable Fields pane visible (previously known as the **Field List**). If it does not appear, right-click anywhere in the PivotTable region and on the shortcut menu select the last item 'Show Field List'. The PivotTable Fields pane appears when you click inside the PivotTable region:



The PivotTable Fields pane will look similar to this (it can be resized if necessary):

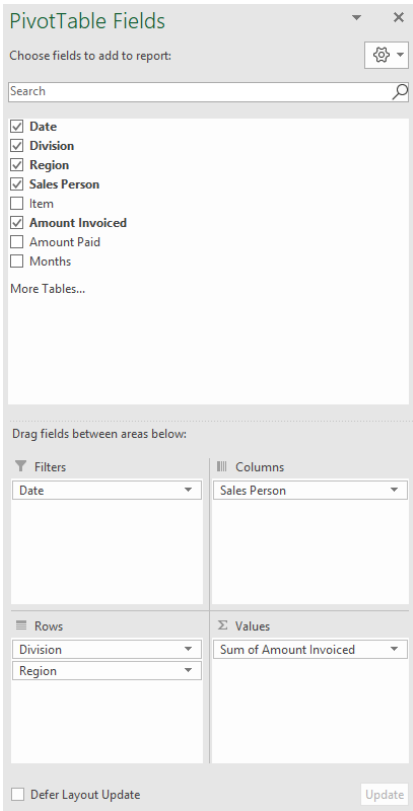


The fields may be dragged into the bottom section, dragging it into one of the four windows below ('Filter' is the 'Page' equivalent). If I just dragged 'Region' in for instance (into 'Rows') I would get a sorted, unique list of the regions:

	A
1	
2	
3	Row Labels
4	Adamland
5	Border
6	Doughie
7	Eiger
8	Eregg
9	Goh
10	Ham
11	Hampton
12	Joe
13	Lowerland
14	Oliver
15	Pole
16	Side Story
17	Timor
18	Trevor
19	Upperland
20	Grand Total
21	

That’s fine, although with the dynamic array functions **SORT** and **UNIQUE** now available in some versions of Excel (with no need to refresh data as it changes), this may not be as useful a trick as it once was.

As a more comprehensive example, let’s consider I had dragged fields around as follows:



Depending upon your current PivotTable settings, your PivotTable might look something like the following:

	A	B	C	D	E	F
1	Date	(All)				
2						
3	Sum of Amount Invoiced	Column Labels				
4	Row Labels	Alice	Brandy	Charlie	Dani	Grand Total
5	North	279721	264636	292275	290828	1127460
6	Eiger	77696	67554	97836	78816	321902
7	Oliver	78390	44125	58180	79791	260486
8	Pole	66899	64277	74130	62953	268259
9	Upperland	56736	88680	62129	69268	276813
10	South	315471	294652	274040	298157	1182320
11	Border	70579	76406	64492	76090	287567
12	Hampton	91236	81911	77952	74120	325219
13	Joe	66301	58865	69180	74356	268702
14	Lowerland	87355	77470	62416	73591	300832
15	East	270905	261761	284070	267684	1084420
16	Doughie	72569	47906	89532	80748	290755
17	Eregg	64786	87501	65701	64308	282296
18	Timor	66192	63486	52534	65313	247525
19	Trevor	67358	62868	76303	57315	263844
20	West	252166	303598	275945	277681	1109390
21	Adamland	67065	51495	53750	66930	239240
22	Goh	68697	76267	63181	66583	274728
23	Ham	57101	88729	82944	69947	298721
24	Side Story	59303	87107	76070	74221	296701
25	Grand Total	1118263	1124647	1126330	1134350	4503590
26						

How easy is this? I feel like I am writing under false pretences. The number formatting could be better, the three text fields “Sum of Amount Invoiced”, “Column Labels” and “Row Labels” look a little clunky, but it’s not a bad start.

One great thing about PivotTables is how easy they are to manipulate. Subtotals may be added from the Design tab:

	A	B	C	D	E	F	G
1	Date	(All)					
2							
3	Amount Invoiced		Sales Person				
4	Division	Region	Alice	Brandy	Charlie	Dani	Grand Total
5	North	Eiger	\$77,696	\$67,554	\$97,836	\$78,816	\$321,902
6		Oliver	\$78,390	\$44,125	\$58,180	\$79,791	\$260,486
7		Pole	\$66,899	\$64,277	\$74,130	\$62,953	\$268,259
8		Upperland	\$56,736	\$88,680	\$62,129	\$69,268	\$276,813
9	North Total		\$279,721	\$264,636	\$292,275	\$290,828	\$1,127,460
10	South	Border	\$70,579	\$76,406	\$64,492	\$76,090	\$287,567
11		Hampton	\$91,236	\$81,911	\$77,952	\$74,120	\$325,219
12		Joe	\$66,301	\$58,865	\$69,180	\$74,356	\$268,702
13		Lowerland	\$87,355	\$77,470	\$62,416	\$73,591	\$300,832
14	South Total		\$315,471	\$294,652	\$274,040	\$298,157	\$1,182,320
15	East	Doughie	\$72,569	\$47,906	\$89,532	\$80,748	\$290,755
16		Eregg	\$64,786	\$87,501	\$65,701	\$64,308	\$282,296
17		Timor	\$66,192	\$63,486	\$52,534	\$65,313	\$247,525
18		Trevor	\$67,358	\$62,868	\$76,303	\$57,315	\$263,844
19	East Total		\$270,905	\$261,761	\$284,070	\$267,684	\$1,084,420
20	West	Adamland	\$67,065	\$51,495	\$53,750	\$66,930	\$239,240
21		Goh	\$68,697	\$76,267	\$63,181	\$66,583	\$274,728
22		Ham	\$57,101	\$88,729	\$82,944	\$69,947	\$298,721
23		Side Story	\$59,303	\$87,107	\$76,070	\$74,221	\$296,701
24	West Total		\$252,166	\$303,598	\$275,945	\$277,681	\$1,109,390
25	Grand Total		\$1,118,263	\$1,124,647	\$1,126,330	\$1,134,350	\$4,503,590

It's important to realise that your data may move as you modify your PivotTable. Imagine you wished to link a formula to Brandy's sales in Eregg (circled). Here, the cell reference would be **D16**. However, after filtering on Date, Division and Sales Person, the PivotTable is restated as

	A	B	C	D	E
1	Date	(Multiple Items)			
2					
3	Amount Invoiced		Sales Person		
4	Division	Region	Brandy	Charlie	Grand Total
5	North	Eiger	\$3,239	\$7,852	\$11,091
6		Oliver	\$1,810		\$1,810
7		Pole	\$2,823	\$2,686	\$5,509
8		Upperland	\$2,735		\$2,735
9	North Total		\$10,607	\$10,538	\$21,145
10	East	Doughie	\$1,059		\$1,059
11		Eregg	\$1,720	\$1,639	\$3,359
12		Timor		\$3,681	\$3,681
13		Trevor		\$4,187	\$4,187
14	East Total		\$2,779	\$9,507	\$12,286
15	Grand Total		\$13,386	\$20,045	\$33,431

Not only is the value different (due to the Date filter), now the cell reference is **C11**. The Excel formula would not move because no rows / columns have been inserted / removed. This is where the function **GETPIVOTDATA** comes in.

Check **File -> Options** and then go to **Formulas**:

Excel Options

General

Formulas

Data

Proofing

Save

Language

Ease of Access

Advanced

Customize Ribbon

Quick Access Toolbar

Add-ins

Trust Center

Change options related to formula calculation, performance, and error handling.

Calculation options

Workbook Calculation

Automatic

Automatic except for data tables

Manual

Enable iterative calculation

Maximum Iterations: 100

Maximum Change: 0.001

Recalculate workbook before saving

Working with formulas

R1C1 reference style

Formula AutoComplete

Use table names in formulas

Use GetPivotData functions for PivotTable references

Error Checking

Enable background error checking

Indicate errors using this color:

Reset Ignored Errors

Error checking rules

Cells containing formulas that result in an error

Formulas which omit cells in a region

Inconsistent calculated column formula in tables

Unlocked cells containing formulas

Cells containing years represented as 2 digits

Formulas referring to empty cells

Numbers formatted as text or preceded by an apostrophe

Data entered in a table is invalid

Formulas inconsistent with other formulas in the region

Misleading number formats

OK

Cancel

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If 'Use GetPivotData functions for PivotTable references' is checked, then clicking on the cell containing Brandy's sales for Eregg would not have provided a typical Excel reference. Instead, it would generate the formula

=GETPIVOTDATA("Amount Invoiced",\$A\$3,"Division","East","Region","Eregg","Sales Person","Brandy")

This should be read as “for the PivotTable with ‘Amount Invoiced’ in its top left-hand corner in cell **A3**, report back the sales where the Division is East, the Region is Eregg and the Sales Person is Brandy – it’s essentially the PivotTable equivalent of the **SUMIFS** function.

On a side note, you should also see that our trick from earlier – putting ‘Amount Invoiced ’ (with a trailing space) has fooled **GETPIVOTDATA**.

Using **GETPIVOTDATA** allows you to reference data in the PivotTable as *long as it is in the PivotTable!*

You can use **GETPIVOTDATA** to retrieve summary data from a PivotTable, provided the summary data is visible in the report.

Note: You can quickly enter a simple **GETPIVOTDATA** formula by typing = (the equal sign) in the cell you want to return the value to and then clicking the cell in the PivotTable that contains the data you want to return.

Its syntax is as follows:

GETPIVOTDATA(data_field, PivotTable, [field1, item1, field2, item2], ...)

It has the following arguments:

- data_field:** this is required and represents the name, enclosed in quotation marks, for the data field that contains the data that you want to retrieve
- PivotTable:** this is also required. This is a reference to any cell, range of cells, or named range of cells in a PivotTable. This information is used to determine which PivotTable contains the data that you want to retrieve

- field1, item1, field2, item2:** these pairs of arguments are optional. If used, you may have from 1 to 126 pairs of field names and item names that describe the data that you want to retrieve. The pairs may be in any order. Field names and names for items other than dates and numbers are enclosed in quotation marks. For OLAP PivotTables, items can contain the source name of the dimension and also the source name of the item. A field and item pair for an OLAP PivotTable might look like this:
"[Product]" , "[Product].[All Products].[Foods].[Baked Goods]".

It should further be noted that:

- calculated fields or items and custom calculations are included in **GETPIVOTDATA** calculations
- if **PivotTable** is a range that includes two or more PivotTables, data will be retrieved from whichever report was created most recently in the range
- if the **field** and **item** arguments describe a single cell, the value of that cell is returned regardless of whether it is a string, number, error, and so on
- if an **item** contains a date, the value must be expressed as a serial number or populated by using the **DATE** function so that the value will be retained if the worksheet is opened in a different locale. For example, an item referring to the date March 5, 1999 could be entered as 36224 or **DATE(1999,3,5)**
- times may be entered as decimal values or by using the **TIME** function.
- if PivotTable is not a range in which a PivotTable is found, **GETPIVOTDATA** returns an **#REF!** error
- if the arguments do not describe a visible field, or if they include a report filter in which the filtered data is not displayed, **GETPIVOTDATA** returns the **#REF!** error value.

Please see our example below:

	A	B	C	D	E	F	G	
1	Date	(All)						
2								
3	Sum of Amount Invoiced	Item						
4	Division	Store	Computer	MP3 Player	Stereo	TV	Grand Total	
5	North East Division	North	2,791.11	1,107.59	1,709.65	6,592.85	12,201.20	
6		East	1,450.01	2,653.28	1,891.63	1,851.62	7,846.54	
7	North East Division Total		4,241.12	3,760.87	3,601.28	8,444.47	20,047.74	
8	South West Division	South	2,447.79	533.59		2,005.03	4,986.41	
9		West	2,598.99	257.43		2,471.55	5,327.97	
10	South West Division Total		5,046.78	791.02		4,476.58	10,314.38	
11	Grand Total		9,287.90	4,551.89	3,601.28	12,921.05	30,362.12	
12								
13								
14	Formula	Description					Result	
15	=GETPIVOTDATA("Amount Invoiced",A3)	Returns the grand total of the Amount Invoiced field					30,362.12	
16	=GETPIVOTDATA("Sum of Amount Invoiced",A3)	Also returns the grand total of the Amount Invoiced field; the field name can be entered exactly as it looks on the sheet, or as its root (without "Sum of," "Count of," and so on)					30,362.12	
17	=GETPIVOTDATA("Amount Invoiced",A3,"Item","TV")	Returns the grand total for TVs					12,921.05	
18	=GETPIVOTDATA("Amount Invoiced",A3,"Item","TV","Division","North East Division")	Grouped items may be totalled					8,444.47	
19	=GETPIVOTDATA(A3,A3,C3,F4,A4,A5)	Whilst you may replace some hard coded items with cell references (this is dangerous if the PivotTable changes), it does cause problems with the calculation engine. Best avoided					#REF!	
20	=GETPIVOTDATA("Amount Invoiced",A3,"Item","Bacon Sandwich")	Sadly, there are no bacon sandwiches in the PivotTable					#REF!	
21								

The A to Z of Excel Functions: GROWTH



A window function (also known as an apodization or tapering function) is a mathematical function that has a zero value outside of a chosen interval. Uniform distributions and the bell curve are two such window functions commonly used in statistics.

Exponential smoothing is what's known as a rule of thumb technique (*i.e.* not strictly accurate) for smoothing time series data using the exponential window function. The aim is to smooth out historical data to predict trends, *etc.*

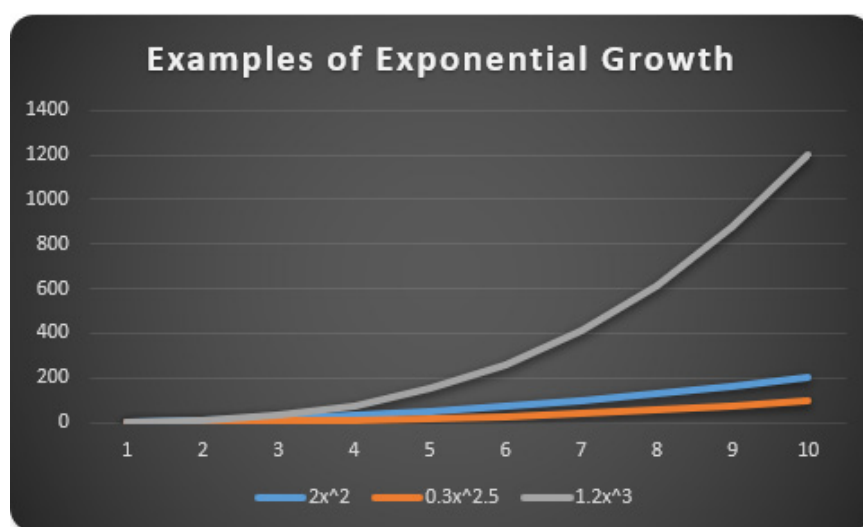
The aim is to develop a technique to identify what would be next in a series, *i.e.* forecast the future. There are various approaches used:

- **Naïve method:** this really does live up to its billing – you simply use the last number in the sequence, *e.g.* the continuation of the series 8, 17, 13, 15, 19, 14, ... would be 14, 14, 14, 14, ... Hmm, great
- **Simple average:** only a slightly better idea: here, you use the average of the historical series, *e.g.* for the continuation of the series 8, 17, 13, 15, 19, 14, ... would be 14.3, 14.3, 14.3, 14.3, ...
- **Moving average:** now we start to look at smoothing out the trends by taking the average of the last *n* items. For example, if *n* were 3, then the sequence continuation of 8, 17, 13, 15, 19, 14, ... would be 16, 16.3, 15.4, 15.9, 15.9, ...

- **Weighted moving average:** the criticism of the moving average is that older periods carry as much weighting as more recent periods, which is often not the case. Therefore, a weighted moving average is a moving average where within the sliding window values are given different weights, typically so that more recent points matter more. For example, instead of selecting a window size, it requires a list of weights (which should add up to 1). As an illustration, if we picked four periods and [0.1, 0.2, 0.3, 0.4] as weights, we would be giving 10%, 20%, 30% and 40% to the last 4 points respectively which would add up to 1 (which is what it would need to do to compute the average).

Therefore the continuation of the series 8, 17, 13, 15, 19, 14, ... would be 15.6, 15.7, 15.7, 15.5, 15.6, ...

These only go so far. Sometimes, you want to spot non-linear, trends, *e.g.* sales are based on an exponential growth curve. The **GROWTH** function calculates the predicted exponential growth by using existing data. It returns the **y**-values (dependent values) for a series of new **x**-values (independent values) that you specify by using existing **x**-values and **y**-values. Therefore, you may use the **GROWTH** worksheet function to fit an exponential curve to existing **x**-values and **y**-values too.



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

GROWTH(known_y's, [known_x's], [new_x's], [constant])

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

- **known_y's**: this is required and represents the set of **y**-values you already know in the relationship $y = b \cdot m^x$
 - o if the array **known_y's** is in a single column, then each column of **known_x's** is interpreted as a separate variable
 - o if the array **known_y's** is in a single row, then each row of **known_x's** is interpreted as a separate variable
 - o if any of the numbers in **known_y's** is zero or negative, **GROWTH** returns the #NUM! error value
- **known_x's**: this argument is optional and denotes an optional set of **x**-values that you may already know in the relationship $y = b \cdot m^x$
 - o the array **known_x's** can include one or more sets of variables. If only one variable is used, **known_y's** and **known_x's** can be ranges of any shape, as long as they have equal dimensions. If more than one variable is used, **known_y's** must be a vector (that is, a range with a height of one row or a width of one column)
 - o if **known_x's** is omitted, it is assumed to be the array {1,2,3,...} that is the same size as **known_y's**
- **new_x's**: this is optional. These are new x-values for which you want GROWTH to return corresponding y-values
 - o **new_x's** must include a column (or row) for each independent variable, just as **known_x's** does. Therefore, if **known_y's** is in a single column, **known_x's** and **new_x's** must have the same number of columns. If **known_y's** is in a single row, **known_x's** and **new_x's** must have the same number of rows
 - o if **new_x's** is omitted, it is assumed to be the same as **known_x's**
 - o if both **known_x's** and **new_x's** are omitted, they are assumed to be the array {1,2,3,...} that is the same size as **known_y's**
- **constant**: this is also optional. This represents a logical value specifying whether to force the constant **b** to equal 1
 - o if **constant** is TRUE or omitted, **b** is calculated normally
 - o if **constant** is FALSE, **b** is set equal to 1 and the **m**-values are adjusted so that $y = m^x$.

Further, it should be noted:

- formulae that return arrays must be entered as array formulae after selecting the correct number of cells
- when entering an array constant for an argument such as **known_x's**, use commas to separate values in the same row and semicolons to separate rows.

Please see my example below:

	A	B	C	D
1	Month	Actual Sales	Formulaic Sales	Formula
2	11	33,100	32,618	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7)
3	12	47,300	47,729	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7)
4	13	69,000	69,841	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7)
5	14	102,000	102,197	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7)
6	15	150,000	149,542	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7)
7	16	220,000	218,822	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7)
8	17		320,197	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7,\$A8)
9	18		468,536	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7,\$A9)
10				
11				
12	Month	Actual Sales	Formulaic Sales	Formula
13	11	33,100	9,546	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7,,FALSE)
14	12	47,300	21,960	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7,,FALSE)
15	13	69,000	50,516	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7,,FALSE)
16	14	102,000	116,206	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7,,FALSE)
17	15	150,000	267,319	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7,,FALSE)
18	16	220,000	614,939	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7,,FALSE)
19	17		1,414,601	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7,\$A19,FALSE)
20	18		3,254,137	=GROWTH(\$B\$2:\$B\$7,\$A\$2:\$A\$7,\$A20,FALSE)
21				

More Excel Functions next month.

Beat the Boredom Suggested Solution

This month, we looked at a common “clean up” problem in Excel – how to separate text and numbers.

As we stated earlier, often, we receive data that isn’t in the best of shape. It may have text and numbers intermingled and you wish to separate (i.e. space) them out. For example, you might want “Pelham123” to be “Pelham 123”, or require “121Training” to be “121 Training”.

Where there is just the one change of data type in the text string, it’s

possible to create a reasonably straightforward formula, but things get harder with multiple occurrences. And that’s what this month’s challenge was – *fix the issue in general*.

This month’s challenge was to construct an Excel formula that will split out multiple occurrences of numbers and text without using third party add-ins, VBA (e.g. User Defined Functions) and Power Query solutions, e.g.

Type Text Here

Liam123Tim Heng 4567 Hanh8JonAtHan90!

Result

Liam 123 Tim Heng 4567 Hanh 8 Jonathan 90 !

Same as longhand?



Suggested Solution

This problem has been a regular challenge for Excel users since the dawn of time. Well, 1985 anyway. **Dynamic arrays** have made the task easier because you can now undertake repetitive checks. Dynamic arrays have made the task easier because you can now undertake repetitive checks...

OK, the joke's over. The joke's over. The joke's over...

As you can see, our suggested solution is extremely simple:

	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			

Type Text Here

Liam123Tim Heng 4567 Hanh8JonAtHan90!

Result

Liam 123 Tim Heng 4567 Hanh 8 Jonathan 90 !

Same as longhand?



=PROPER(TRIM(CONCAT(IF(INDEX(IF(ISNUMBER(VALUE(MID(F12,SEQUENCE(1,LEN(F12)),1))),1),SEQUENCE(1,LEN(F12)))=INDEX(IF(ISNUMBER(VALUE(MID(F12,SEQUENCE(1,LEN(F12)),1))),1),SEQUENCE(1,LEN(F12))),1),SEQUENCE(1,LEN(F12)),0),MID(F12,SEQUENCE(1,LEN(F12)),1),""&MID(F12,SEQUENCE(1,LEN(F12)),1))))

=PROPER(TRIM(CONCAT(IF(INDEX(IF(ISNUMBER(VALUE(MID(F12,SEQUENCE(1,LEN(F12)),1))),1),SEQUENCE(1,LEN(F12)))=INDEX(IF(ISNUMBER(VALUE(MID(F12,SEQUENCE(1,LEN(F12)),1))),1),SEQUENCE(1,LEN(F12))),1),SEQUENCE(1,LEN(F12)),0),MID(F12,SEQUENCE(1,LEN(F12)),1),""&MID(F12,SEQUENCE(1,LEN(F12)),1))))

Any questions?

Perhaps we need to step through this monster.

Let's step through the mechanics of this calculation by breaking it down component by component. The first element is (hopefully) straightforward!

	D	E	F	G	H	P	Q	R	S	T
27										
28										
29										

Original Value

=F12

Liam123Tim

Heng 4567 Hanh8JonAtHan90!

=F12

If you need help with this calculation, then the rest of this explanation is not looking good. This simply links the original input into cell **P28**, so all the formulae are close together. That's not so exciting.

The next formula is a tad more interesting:

	D	E	F	G	H	I	J	P	Q	R	S	T
29												
30												
31												

Separate Characters

=MID(P28,SEQUENCE(1,LEN(P28)),1)

L

i

a

m

1

2

=MID(P28,SEQUENCE(1,LEN(P28)),1)

Even in this stepped out approach, I have managed to include three functions in one formula!

1. **LEN(P28)** is a text function that counts the number of characters (its "volume") in the text string in cell P28. In the example (above), there are 58 characters, so **LEN(P28)** equals 58
2. The **SEQUENCE(rows, [columns], [start], [step])** function has one required (**rows**) and three optional arguments. This is one of the new **dynamic array functions** and fills rows number of **rows**, columns number of **columns** (1 if not specified), starting at start (1 if not specified) in increments of **step** (1 if not specified). Hence, **=SEQUENCE(4,3,2,1)** would be

B2					
	A	B	C	D	E
1					
2		2	3	4	
3		5	6	7	
4		8	9	10	
5		11	12	13	
6					

It would consist of 12 cells (4 rows by 3 columns), starting with the number 2 and increasing in increments of 1 (*as pictured*).

Therefore, **=SEQUENCE(1,LEN(P28))** would be the numbers 1 to 58, all in one row, across 58 columns

- Finally, **=MID(P28,SEQUENCE(1,LEN(P28)),1)** uses the **MID(text, start_number, length)** function. Here, it takes a sub-text string from the **text** reference, starting at position **start_number** of length. So, **=MID("abcdefg",2,3)** would be **"bcd"** being three characters starting from the second position.

Therefore, **=MID(P28,SEQUENCE(1,LEN(P28)),1)** simply splits the text string out into 58 cells across a row, each cell consisting of just one of the 58 characters in the text string. It should be noted that **MID** converts every element to a text string, *i.e.* all characters are text – *even numbers*.

You can read more about the text functions **LEN** and **MID** [here](#).

Let's look at the next two formulae together:

	D	E	F	G	H	I	J	P	Q	R	S	T	U
31													
32		Identify Numbers			=VALUE(P30#)			#VALUE!	#VALUE!	#VALUE!	#VALUE!	1	2
33													
34		Classify			=IF(ISNUMBER(P32#),1,)			0	0	0	0	1	1

=VALUE(P30#)

=IF(ISNUMBER(P32#),1,)

I want to identify which characters are numbers in the range starting in cell **P30** (**P30#** simply means the spilled dynamic array, so all 58 cells – but this will change if the text length changes). **ISNUMBER** will do this – but not straight away. Remember, **MID** has converted everything to text, so first I need to convert numbers back to numbers.

Interestingly, the **N** function won't work here (it will "coerce" the range back to one cell), but **VALUE** will. Values of text characters are **#VALUE!** by definition.

Then, with this new range in **P32#**, we can see what is a number and what isn't. The formula

=IF(ISNUMBER(P32#),1,)

Simply provides a 1 for every numerical value and zero (0) for everything else (including **#VALUE!** errors).

The next three steps may be considered together:

	D	E	F	G	H	I	J	K	P	Q	R	S	T	U
35														
36		Nth Character			=INDEX(P34#,SEQUENCE(1,LEN(P28)))				0	0	0	0	1	
37														
38		(N-1)th Character			=INDEX(P34#,SEQUENCE(1,LEN(P28),0))				0	0	0	0	0	
39														
40		Consistent Class?			=P36#-P38#				TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
41														

=INDEX(P34#,SEQUENCE(1,LEN(P28)))

=INDEX(P34#,SEQUENCE(1,LEN(P28),0))

=P36#-P38#

The expression **=SEQUENCE(1,LEN(P28))** has already been explained: this generates the numbers 1 to 58 in 58 cells across the row. Since **P34#** contains 58 cells across one row,

=INDEX(P34#,SEQUENCE(1,LEN(P28)))

is a seemingly rather longwinded way of replicating **P34#** - the first cell provides the first value in the vector **P34#**, the second cell provides the second value in the vector **P34#** and so on. It seems convoluted. It's *subtle* though: this formula is giving us a way of referencing a particular position in the range **P34#**. That's important when we consider the second formula:

=INDEX(P34#,SEQUENCE(1,LEN(P28),0))

Almost the same formula, the **start** of zero (0) is specified in the **SEQUENCE** function. When it is not specified (as in the first formula considered in this section), it is assumed to start at one (1). This has the effect of producing the same result as the first formula, albeit displaced one cell to the right, *e.g.* the first cell provides the “noughth” value in the vector **P34#**, the second cell provides the first value in the vector **P34#**, and so on. In other words, it displays the previous cell result.

The formula

=P36#-P38#

simply checks that the current cell and the previous cell in the range are both text or both numerical values (TRUE). If they differ, the result is FALSE. This is what we want to find. Wherever we have a FALSE value, we need to add a space to separate text and numbers (or vice versa). This is precisely what the next formula does:

	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
41																	
42																	
43																	

=IF(INDEX(P34#,SEQUENCE(1,LEN(P28)))=INDEX(P34#,SEQUENCE(1,LEN(P28),0)),P30#," "&P30#)

This formula takes the logic of the above. The formula **=P36#-P38#** cannot be referred to per se (it has been provided for illustration) as this is not how dynamic arrays work. However, this formula checks for inconsistent data types between the cell and the prior and adds a preceding space if the two data types differ (*i.e.* the equality is FALSE). For example, the value in cell **T42** is not 1, but “ 1” (*i.e.* it has a preceding space to delineate between text and number).

The final three formulae simply tidy things up:

	D	E	F	G	H	I	P	Q	R	S	T
43											
44											
45											
46											
47											
48											
49											

=CONCAT(P42#)

=TRIM(P44)

=PROPER(P46)

The formula in cell **P44** simply combines all the cell values back into one cell using the **CONCAT** (concatenate) function; the formula on cell P46 removes excess spaces using **TRIM**; the final formula in cell P48 just puts all text into “Proper” case, *i.e.* each word starts with a capital letter, with all other letters using lower case.

That’s it.

To get the monster formula, you just build each formula into its dependent calculation so the last formula could be expressed as

=PROPER(TRIM(P44))

and the formula before that could be written as

=PROPER(TRIM(CONCAT(P42#)))

If you carry on this approach, this will eventually result in our monster formula, *viz.*

=PROPER(TRIM(CONCAT(IF(INDEX(IF(ISNUMBER(VALUE(MID(F12,SEQUENCE(1,LEN(F12))),1))),1),SEQUENCE(1,LEN(F12)))=INDEX(IF(ISNUMBER(VALUE(MID(F12,SEQUENCE(1,LEN(F12))),1))),1),SEQUENCE(1,LEN(F12),0)),MID(F12,SEQUENCE(1,LEN(F12)),1)," "&MID(F12,SEQUENCE(1,LEN(F12)),1))))

	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			

Word to the Wise

Dynamic arrays are only supported in Microsoft 365 and Excel on the Web presently. If you have an earlier version of Excel, the suggested solution here will neither display correctly nor calculate appropriately. In this case, you will have to revert to VBA (*e.g.* as User Defined Function), a

third party add-in or Power Query. You can’t use **LAMBDA** either!

For the time being!

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 and we'll be happy to walk you through the process.

Location	Course	Date	Date	Duration	Duration
Online (Australia)	Excel Tips and Tricks	6 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 year, we thought we'd revisit each function key in depth (there are 12 – one for each month of the year!). Given it's now October, let's look at the **F10** tips.

Keystroke	What it does
F10	Activate menus
CTRL + F10	Toggle maximised / restored
SHIFT + F10	Activate context menus (right-click)
ALT + SHIFT + F10	Show On-Object User Interface (OOUI)

Hey, it's not our fault so many do the same thing this month!

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

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 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.

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 for a copy of the brochure or download it directly from www.sumproduct.com/training.

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