# Sum Froduct

# NEWSLETTER #116 - July 2022

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# Finally - a book update!! The third in our continuing series of Financial Modelling books is closer to

release! We have fielded MANY queries since we first revealed it was in the pipeline and after a multitude of delays, it is finally set to be issued (although you might not wish to hold your breath for a physical copy!).

This month, we also look at the updated Recommended PivotTables and provide greater detail on last month's announcements regarding the updated **TEXT** functions. Furthermore, Microsoft has started a new Excel Updates section which we have decided to pass on too!

Combined with another Beat the Boredom Challenge, plus our usual articles on Charts & Dashboards, Visual Basics, Power Pivot Principles, Power Query Pointers and Power BI Updates, this newsletter refuses to diminish in size. We continue with our imaginary Excel Functions (all too real as they tell us, *e.g.* **IMREAL**) this month, and we even have some more Keyboard Shortcuts if you **SHIFT** down to the end of the newsletter and promise to **CTRL** yourselves!

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

Liam Bastick, Managing Director, SumProduct



# Financial Modelling in Power BI: finally, coming soon!!

Originally announced in our 100th newsletter (!), pandemics, shipping issues, Power BI updates and other unforeseen technical delays saw this landmark book delayed and delayed further. Quite embarrassing, but not our fault!!

But no more: final editing checks have been made - and it is coming out soon !!



You may or may not be familiar with the first two books in this series, *Introduction to Financial Modelling and Continuing Financial Modelling*. These tomes covered how to model in Excel. But time moves on. And more and more of us are realising that whilst the humble spreadsheet is a powerful enabler, there's a young(er) upstart in town, gaining traction every day.

Power BI – Microsoft's self-service business intelligence and data visualisation tool – is becoming both more versatile and more popular each month. Today's analysts need to use the best, most powerful and flexible analytical software for their work. More and more of us are realising Power BI fits the bill. We'd be foolish to stand still.

This book addresses the way forward for financial modelling. Many working in banking and finance are creating their financial models in Excel and then importing them into Power BI for graphical interpretation and further analysis. We're not going to do that. This book seeks to build the model *in Power BI*.

Whilst not a "basic" book on Power BI, it is looking to lay the foundations of building a model in Power BI. It's not going to cover everything, but it will set the scene and construct the basics. To be released electronically within the next month or so, physical copies *should* be available before the end of the year.

### Improved Recommended PivotTables

Recommended PivotTables have been updated to become more intelligent by utilising the same technology as the Analyze Data feature, also in Excel. In addition, the dialog box interface has been replaced

with an all-new redesigned panel. This updated user experience makes it easier to view all of your options and simpler to change your data selection before inserting a recommended PivotTable.

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2015         Accessories         Pumps         S         3,00         10%           2015         Cothing         Tights         S         3,300         80%         Accessories         Accessories         S183,800         40%           2017         Accessories         Lights         S18,700         60%         Clothing         S108,400           2016         Accessories         Heimets         S         8,300         99%         Components         S113,800           2016         Glothing         S13,900         86%         Elikes         \$133,900				ategory'	ng' by 'Cat	s' and 'Rating	'Sale:							95%	\$34,000	mets	s H	Accessories	2017	
2015 clothing         Tights         \$ 3,00         30%         New Labels         Sum of sales         Average of           2017 Bikes         Road Bikes         \$ 16,900         65%         Accessories         S38,000         2012         Accessories         Lights         \$ 38,000         2012         Accessories         Lights         \$ 38,000         50%         Accessories         Clothing         \$ 200,400         2012         Accessories         \$ 200,400         Clothing         \$ 200,400         200,400	Deting	Annual of Date		and failer	£	l al al a	0						-	10%	\$ 700	nps	s P	Accessories	2015	
Z017 Bittes         Road Bittes         \$16,900         65%         Accessories         \$383,000           2017 Accessories         Lights         \$36,700         90%         Clothing         \$209,400           2015 Accessories         8,800         99%         Components         \$133,900           2016 Clothing         Bib-Shorts         \$ 2,900         36%         Biles         \$171,200	Kating	Average of Katin		um of Sales	Sur	Labers	Row							30%	5 3,300	hts	Т	Clothing	2015	
Z017 Accessories         Lights         S 36,700         S0%         Clothing         \$100,400           2015 Accessories         Heimets         \$ 8,300         99%         Components         \$133,900           2016 Clothing         Bib-Shorts         \$ 2,900         36%         Bikes         \$ 71,200	81%	,	\$383,800			sories	Acces							65%	\$16,900	d Bikes	R	Bikes	2017	
2015 Accessories         Heimets         \$ 8,300         99%         Components         \$133,000           2016 Clothing         Bib-Shorts         \$ 2,900         36%         Bikes         \$71,200	46%	1	\$209,400			ing	Clothi						-	90%	\$36,700	nts	s Li	Accessories	2017	
2016 Clotning Bio-Snorts \$ 2,900 36% Bikes \$71,200	47%	3	\$133,900			ponents	Comp						-	99%	\$ 8,300	mets	s H	Accessories	2015	
	41%	1	\$71,200				Bikes							36%	\$ 2,900	-snorts	B	Clothing	2016	
ZUIS Accessories Tires and Tubes \$ 8,700 90% Grand Total \$798,300	54%	5	\$798,300			d Total	Grand						-	90%	\$ 8,700	es and Tubes	s T	Accessories	2015	

To see how the new experience works, open an Excel workbook containing data and then select Insert -> Recommended PivotTables.

F	ile	Home	Insert	Draw	Page Layout
F	PivotTab v	le Recor Pivo Tal	mmended otTables	Table	Illustrations

In the Recommended PivotTables pane, review the suggested options:

able1				2				
'Sales' by 'Prod	uct' and 'Ye	ar'						
Sum of Sales	Column Lal	bels						
Row Labels	2015	2016	2017	0				
Tires and Tubes	\$8,700	\$13,800	\$63,700	\$				
Locks	\$10,000	\$29,800	\$35,000	4				
Tights	\$3,300	\$22,100	\$36,000	4				
Lights	\$1,300	\$21,600	\$36,700	4				
Helmets	\$8,300	\$17,000	\$34,000	4				
Insert on: + Ne	ew sheet +	- Existing sł	neet					
'Sales' and 'Rat	ing' by 'Cat	egory'						
Row Labels St	um of Sales	Average	of Rating					
Accessories	\$383,800	)	819	6				
Clothing	\$209,400	)	469	6				
Components	\$133,900	)	479	6				
Bikes	\$71,200	)	419	6				
Grand Total	\$798,300	)	549	6				
Insert on: + Ne	ew sheet +	- Existing sł	neet					

If desired, place your cursor in the Source box and choose a different data selection on the grid, and then finally select either **+New sheet** or **+Existing sheet** to insert the recommended PivotTable in your workbook.

lable1			
'Sales' by 'Prod	uct' and 'Ye	ar'	
Sum of Sales	Column Lal	bels	
Row Labels	2015	2016	201
Tires and Tubes	\$8,700	\$13,800	\$63,70
Locks	\$10,000	\$29,800	\$35,00
Tights	\$3,300	\$22,100	\$36,00
Lights	\$1,300	\$21,600	\$36,70
Helmets	\$8,300	\$17,000	\$34,000

This feature is currently available to Microsoft 365 subscribers in English, French, Spanish, German, Simplified Chinese and Japanese. Microsoft advises support for more languages is coming soon.

It should be noted that Recommended PivotTables currently does <u>not</u> support the analysis of datasets larger than 1.5 million cells. As an alternative, you can filter and reduce your data set to a supported number of cells, copy it to another location, and then run Recommended PivotTables on that smaller data set.

For best results:

- use clean, tabular data for best results
- format your data as an Excel table (click anywhere in your data and press CTRL + T or Insert -> Table)
- make sure all columns have headers, with a single row of unique, non-blank labels for each column
- · avoid double rows of headers or merged cells

• if you have complicated or nested data, use Power Query to transform it (for example, to unpivot your data) so it is organised in columns with a single header row.

To take advantage of this feature, you must have:

- a reliable internet connection
- 'Optional connected experiences' switched on.

The improved Recommended PivotTables experience analyses your data with intelligent services. For those so concerned, you may access the Microsoft Privacy Statement for additional details on data security. In particular, you should note that Microsoft advises that Recommended PivotTables uses material from third parties.

This updated feature will be rolled out to Office Insiders running Beta Channel Version 2204 (Build 15128.10000) or later.

### **Recent Text and Array Functions: an Update**

It all came in too late for last month's newsletter, but regular readers may recall I did mention that Microsoft has elected to "...enhance the signatures of the text functions..." as follows:

- added [match end] to TEXTBEFORE and TEXTAFTER. This will allow you to request a match against the end of the text
- renamed [ignore case] to [match mode] for TEXTBEFORE and TEXTAFTER
- added [match mode] to TEXTSPLIT to be more consistent with TEXTBEFORE and TEXTAFTER
- added [if not found] to TEXTBEFORE and TEXTAFTER. This expression is returned instead of #N/A when there is no delimiter match.

The updated text functions will become available to Beta channel users starting with build 15316.20000. The function documentation will be updated to reflect these changes in the coming weeks. Please note that you will need to update your **TEXTSPLIT** functions if you used the **[pad with]** argument, as this argument has moved from the fifth to the sixth argument. All of the other changes are backwards compatible.

Let's take a look at the three functions that have been updated.

### The TEXTBEFORE function



The **TEXTBEFORE** function returns the string of text that occurs before a given substring (*i.e.* a character or set of characters) in that string. It is the opposite of the **TEXTAFTER** function. **TEXTBEFORE** has the following syntax:

TEXTBEFORE(text, delimiter, [instance number], [match mode], [match end], [if not found])

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

- **text:** this is required and represents the text string you are searching within. Wildcard characters are not allowed
- **delimiter:** this is also required and represents the **text** in the text string that marks the point before which you wish to extract

- **instance number:** this is the first optional argument and denotes the nth instance of the delimiter before which you wish to extract. By default, this is equal to one [1]. If a negative number is used here, the function starts searching for the **delimiter** from the end rather than the beginning
- match mode: this is the second optional argument, and determines whether the text search is case-sensitive. The default is case-sensitive. If used, you should enter one of the following two [2] values:
  - o 0: case sensitive
  - o 1: case insensitive
- match end: also optional, this treats the end of the text as a delimiter. By default this is viewed as an exact match. If used, you should enter one of the following two [2] values:
  - o 0: do not match the delimiter against the end of the text
  - o 1: match the delimiter against the end of the text
- if not found: this too is an optional argument and provides the

value should no match be found. If not used and no match is found, *#N/A* will be returned.

It should be further noted that:

- when searching with an empty delimiter value, TEXTBEFORE matches immediately. It returns empty text when searching from the front (if instance number is positive) and the entire text when searching from the end (if instance number is negative)
- Excel returns an #VALUE! error if the instance number is zero (the default is one) or if the **instance number** is greater than the length of the **text**
- Excel returns an #N/A error if the **delimiter** does not occur within the **text**
- Excel returns an *#N/A* error if the **instance number** is greater than the number of occurrences of the **delimiter** within the **text**.

Please see the examples below:

	Α	В	C
1	Data		
2	Many many occurrences of "many" in this sentence.		
3		empty	
4	Liam Bastick		
5	SumProduct		
6			
7			
8	Formula	Description	Result
		Identifies there is no text before "Many" is used as the	
9	=TEXTBEFORE(A2, "Many")	delimiter (case sensitive is default).	
		Identifies there is text before "many" is used as the	
10	=TEXTBEFORE(A2, "many")	delimiter (case sensitive is default).	Many
		Identifies the text before "many" is used as the delimiter	
11	=TEXTBEFORE(AZ, "Many",, FALSE)	(case sensitive using FALSE).	Many
		Identifies there is no text before "many" is used as the	
12	=TEXTBEFORE(A2, "many",, TRUE)	delimiter (case insensitive using TRUE).	
		Identifies text before second occurrence of "many" (case	
13	=TEXTBEFORE(A2, "many", 2, FALSE)	sensitive).	Many many occurrences of "
		Identifies text before second occurrence of "many" (case	
14	=TEXTBEFORE(A2, "many", 2, TRUE)	insensitive).	Many
15	=TEXTBEFORE(A2, "Many", 2, FALSE)	No second occurrence of "Many" (case sensitive).	#N/A
16	=TEXTBEFORE(A2, "Many", 2)	No second occurrence of "Many" (case sensitive).	#N/A
	TEXTREFORE(A) II monthly ( EALCE)	Identifies there is text before the final occurrence of	
17	=TEXTBEFORE(AZ, MUNY, -1, FALSE)	"many" is used as the delimiter (case sensitive).	many many occurrences of
	-TEXTREEORE(A) "many" 2 EALSE)	Identifies there is text before the penultimate occurrence	Many
18	-TEXTBEFORE(AZ, MUNY, -Z, FALSE)	of "many" is used as the delimiter (case sensitive).	wany
19	=TEXTBEFORE(A2, "Many", -2, FALSE)	Insufficient occurrences of "Many" (case sensitive).	#N/A
20	=TEXTBEFORE(A2,)	The delimiter is not specified.	
21	=TEXTBEFORE(A2, "")	The delimiter is not specified.	
	-TEXTREEORE(A2 "Manu")	Insufficient occurrences of "Many" (case sensitive) (cell	#NI ( A
22	-TEXTBEFORE(AS, MULTY)	blank).	#N/A
	-TEXTREEORE(AA "")	Insufficient occurrences of "Many" (case sensitive) (cell	Liam
23	-IEAIDEFUNE(A4, )	blank).	Lialli
	-TEXTREFORE(AF "" "No space you idiot")	Insufficient occurrences of "Many" (case sensitive) (cell	No space you idiat
24	=1 $r$	blank).	No space you lotor
		Insufficient occurrences of "Many" (case sensitive) (cell	SumBroduct
25	-IEAIDEFUNE(A3, ,,,1)	blank).	Sumproduct

#### The TEXTAFTER function



The **TEXTAFTER** function returns the string of text that occurs after a given substring (*i.e.* a character or set of characters) in that string. It is the opposite of the **TEXTBEFORE** function. **TEXTAFTER** has the following syntax:

# TEXTAFTER(text, delimiter, [instance number], [match mode], [match end], [if not found])

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

- **text:** this is required and represents the **text** string you are searching within. Wildcard characters are not allowed
- **delimiter:** this is also required and represents the text in the text string that marks the point after which you wish to extract
- instance number: this is the first optional argument and denotes the nth instance of the delimiter after which you wish to extract. By default, this is equal to one [1]. If a negative number is used here, the function starts searching for the delimiter from the end rather than the beginning

- match mode: this is the second optional argument, and determines whether the text search is case-sensitive. The default is case-sensitive. If used, you should enter one of the following two [2] values:
  - o **0:** case sensitive
  - o 1: case insensitive
- match end: also optional, this treats the end of the text as a delimiter. By default this is viewed as an exact match. If used, you should enter one of the following two [2] values:
  - o ~~ 0: do not match the delimiter against the end of the text
  - o 1: match the **delimiter** against the end of the **text**
- **if not found:** this too is an optional argument and provides the value should no match be found. If not used and no match is found, *#N/A* will be returned.

Please see relevant examples below:

It should be further noted that:

- when searching with an empty delimiter value, TEXTAFTER matches immediately. It returns the entire text when searching from the front (if instance number is positive) and empty text when searching from the end (if instance number is negative)
- Excel returns an #VALUE! error if the **instance number** is zero (the default is one) or if the **instance number** is greater than the length of the **text**
- Excel returns an #N/A error if the **delimiter** does not occur within the **text**
- Excel returns an *#N/A* error if the **instance number** is greater than the number of occurrences of the **delimiter** within the **text**.

	A	В	C
1	Data		
2	Many many occurrences of "many" in this sentence.		
3		empty	
4	Liam Bastick		
5	SumProduct		
6			
7			
8	Formula	Description	Result
		Identifies there is text after "Many" is used as the	6 H H H H H H H
9	=TEXTAFTER(A2, "Many")	delimiter (case sensitive is default).	many occurrences of "many" in this sentence.
		Identifies there is text after "many" is used as the	
10	=TEXTAFTER(A2, "many")	delimiter (case sensitive is default).	occurrences of "many" in this sentence.
		Identifies the text after "many" is used as the delimiter	
11	=TEXTAFTER(A2, "many",, FALSE)	(case sensitive using FALSE).	occurrences of "many" in this sentence.
		Identifies there is text after "many" is used as the	
12	=TEXTAFTER(A2, "many",, TRUE)	delimiter (case insensitive using TRUE).	many occurrences of "many" in this sentence.
		Identifies text after second occurrence of "many" (case	
13	=TEXTAFTER(A2, "many", 2, FALSE)	sensitive).	" in this sentence.
		Identifies text after second occurrence of "many" (case	
14	=TEXTAFTER(A2, "many", 2, TRUE)	insensitive).	occurrences of "many" in this sentence.
15	=TEXTAFTER(A2, "Many", 2, FALSE)	No second occurrence of "Many" (case sensitive).	#N/A
16	=TEXTAFTER(A2, "Many", 2)	No second occurrence of "Many" (case sensitive).	#N/A
	TEXTACTED(A) "manu" 1 FALSE)	Identifies there is text after the final occurrence of "many"	" in this contonso
17	-TEXTAFTER(AZ, THUNY , -1, FALSE)	is used as the delimiter (case sensitive).	in this sentence.
	TEVTAFTER/A2 "manu" 2 FALSE	Identifies there is text after the penultimate occurrence of	occurrences of "many" in this contense
18	-TEXTAFTER(AZ, MUNY, -Z, FALSE)	"many" is used as the delimiter (case sensitive).	occurrences of many in this sentence.
19	=TEXTAFTER(A2, "Many", -2, FALSE)	Insufficient occurrences of "Many" (case sensitive).	#N/A
20	=TEXTAFTER(A2,)	The delimiter is not specified.	Many many occurrences of "many" in this sentence.
21	=TEXTAFTER(A2, "")	The delimiter is not specified.	Many many occurrences of "many" in this sentence.
	-TEXTAETER(A2 "Many")	Insufficient occurrences of "Many" (case sensitive) (cell	#N/A
22	-TEXTAI TEN(AS, MUNY )	blank).	#11/A
	-TEXTAETER/AA "")	Insufficient occurrences of "Many" (case sensitive) (cell	Bastick
23		blank).	DASTICA
	-TEXTAETER/A5 "" "No space you idiot")	Insufficient occurrences of "Many" (case sensitive) (cell	No space you idiot
24	-ick initiality, "", no space you lator y	blank).	No space you luiot
	-TEXTACTED/AC "" 1)	Insufficient occurrences of "Many" (case sensitive) (cell	
25	-ILATALIEN(A), ,,,1]	blank).	

### The TEXTSPLIT function



The **TEXTSPLIT** function is intended to work like the Text to Columns button on the Data tab of the Ribbon, almost like the "inverse" of the **TEXTJOIN** function. It allows you to split a given text across rows or down columns. TEXTSPLIT has the following syntax:

### TEXTSPLIT(text, [column delimiter], [row delimiter], [ignore empty], [match mode], [pad with])

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

- **text:** this is required and represents the text string you wish to split
- column delimiter: this is optional and denotes one or more characters that specify where to spill the text across columns
- row delimiter: this is optional and denotes one or more characters that specify where to spill the text down rows
- **ignore empty:** another optional argument, you should specify TRUE to create an empty cell when two delimiters are used. This argument defaults to FALSE, which means don't create an empty cell
- match mode: this is the second optional argument, and determines whether the text search is case-sensitive. The default is case-sensitive. If used, you should enter one of the following two [2] values:
  - o 0: case sensitive
  - o 1: case insensitive

• pad with: not to be confused with Pad Thai, this final optional argument "pads" the resulting text range where cells would otherwise be blank. The default is *N*/*A*.

Please note that you will need to update any **TEXTSPLIT** functions previously written if you used the **pad with** argument, as this argument has moved from the fifth to the sixth argument.

If there is more than one delimiter (row or column), then an array

constant must be used. For example, to split by both a comma (,) and a period (full stop, .), use **=TEXTSPLIT(text, {",", "."})**.

Just for a change, some more examples:

10





### **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...



We have gone through Dynamic Arrays and the value they provide to Excel in detail, including the solutions we can create with them. However, as we continue to try to tackle ever more perplexing challenges, we occasionally reach some awkward obstacles.

Which brings us to this month's challenge.

We have a list of months in a year in this case. We now use filters to see specific data daily. What would you do if you wanted to derive the first visible cell after applying the filter, which is commonly performed formulaically using dynamic arrays?

For example, if someone is looking at the sale of a company in a specific country while using the **FILTER** function, the Table's and reports' headings alter in line with the country name for which data is shown.

The use of macros and VBA could be a simple solution to this problem, but it is also a well-known reality that most Excel users are unfamiliar with VBA and macros, and that they will not run in all situations / environments. As a result, we must also look for a solution that does not require the use of such automated wizardry.

 This is a formula challenge, so no Power Query / Get & Transform or VBA!

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 Funnel charts.

The Funnel chart is effectively a form of Bar chart. The difference between the two is that the bars in a Funnel chart are centred across the width of the Plot Area instead of starting from the vertical axis.

A Funnel chart can be used to show values across stages or categories. Typically, the values are sorted from highest to lowest so that when they are graphed, the chart resembles a funnel. An example of when a Funnel chart could be used is to show the volumes at each stage in a sales process, commencing with the number of general enquiries, then those that become genuine prospects, those who respond to quotes provided, those that make contact to discuss / negotiate, and finally those who place orders. Such a scenario would naturally result in the numbers

being in descending order, but not all data that is used to create Funnel charts follows this rule.

The data table required for a Funnel chart is very straightforward. The stages or categories are entered into one column and the values are entered in a second column. For example, I have the following information about the six methods by which customers of a company place work orders / requests. Management is trying to ascertain which are the most popular methods that customers use to place work orders and, given recent issues with their online system and their web pages, whether they should consider investing more in upgrading their internetbased offerings.

Work Orders / Requests					
Source	Volume				
e-Mail	194				
Fax	39				
Online	1,057				
Onsite	120				
Telephone	366				
Web Site	792				

I highlight the data table and create a Funnel chart. The Funnel chart can be found under the Insert tab of the Ribbon, under the last small icon along the top of the Charts section. There is only one configuration option for the Funnel chart in Excel:



My initial chart looks like the one below:



The first obvious thing I notice is that this Funnel chart does not resemble a funnel. Clearly, this is due to the figures not being in descending order. The scenario used is one where the data is not reflecting stages in a process, but merely counts of occurrences, so my figures do not naturally reduce as I move from one category to the next. It would be more meaningful though if the figures were in descending order given management's

specific concerns. Therefore, I highlight the data table including the column headings but excluding the table header, then go to the Home tab on the Ribbon, select 'Sort & Filter', and finally, 'Custom Sort'. Within the Sort screen that appears, tick the 'My data has headers' option, then sort by the Volume column, from largest to smallest, and click OK.

Sort						?	×
* <u>A</u> ↓ <u>A</u> dd	Level XDelete Level	Copy Level	▲ ▼ <u>O</u> ption	ns	🛛 My dat	a has <u>h</u>	eaders
Column		Sort On		Order			
Sort by	Volume 🗸	Cell Values	$\sim$	Largest to S	Smallest		$\sim$
						-	
				L	)K	Car	ncel

The data and chart will reflect the change in the order of the information:

Source	Volume
Online	1057
Web Site	792
Telephone	366
e-Mail	194
Onsite	120
Fax	39



To further format this chart, I right-click on the bar and choose 'Format Data Series'. In here, I change the 'Gap Width' to 40% and then I change the colour of the bar to orange.

Format Data Series 🔹 🗙							
Series Options 🗸							
Series Options							
Gap <u>W</u> idth <del>- </del>	40%	* *					

The final product is shown below:



Do note that this differs from a Tornado chart insofar as the latter shows deviations from a given norm, both positive and negative, whereas corresponding bars are merely centred here.

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. Continuing our series about using **ListObjects** to manipulate Tables within an Excel workbook in VBA, this month we consider the unique properties of **ListColumn**. Whilst doing some research to eloquently explain the difference between rows and columns, we came across this quote:



There are a few things that may be done with **ListColumn** that are not possible with **ListRow** due to the nature of how you think to store data. Consider each row as a record in a database or an item. There may be an unlimited number of records as data is added. Columns are the fields of

data which are defined. They are attributes of the record storing a single piece of information in relation to that item. The column is the structure of your data whereas the row is the data itself.

The properties that are unique to ListColumn are as follows:

- DataBodyRange: remember that Range refers to the whole column including the header. This returns just the information in the column under the header, the data portion of the table
- Name: this returns the name stored in the header of the column
- Total: this returns the value in the Totals row. Note, the table must have a total otherwise it will return the following error as it is looking for an object that does not exist:

(General)	
Option Explicit	Microsoft Visual Basic for Applications 🛛 🗙 🗕
Sub Test2() Dim MyTable As ListObject Set MyTable = Range("MyTable").ListObject Debug Print MyTable ListColumns(2) Total	Run-time error '91': Object variable or With block variable not set
End Sub	OK Help
=[=_4]	]
imediate	

- TotalsCalculation: this gives the ability to change the type of calculation in the Totals row which we covered in an earlier newsletter
- XPath: XPath provides the ability to change the XPath information stored about the table. XPath uses path expressions to select nodes or node-sets in an XML document. XML is designed to manage and share structured data. Using XPath in VBA, you may manipulate the structure and tags in order to format in a certain way for importing / exporting between applications.

That wraps up all things ListColumns and ListRows and concludes the distinct ranges in a table!

More next time.

### **Power Pivot Principles**

We continue our series on the Excel COM add-in, Power Pivot. This month, we look at using concatenation with the **FILTER** function to combine filter criteria.

Imagine we wanted to create a measure that calculates the total sales amount for April 2015 and May 2016 from our data set. How would we do that? One simple solution would combine two **CALCULATE** functions together:

Measure			?	×
Table name: Sales				~
Measure name: Sales Apr 20	15 & May 2016			
Description:				
Formula: $f_X$ Check form	ula			
=CALCULATE([Sales],	'Calendar'[Month Name	(Short)]="Apr",'Calendar'[Year]=2015)		
+ CALCULATE([Sales],'0	Calendar'[Month Name (	(Short)]="May",'Calendar'[Year]=2016)		
E				
Pormaturing Options				
Category: General	Symbol:	8		~
Number	Decimal places:	2 •		
Date TRUE/FALSE	Use 1000 separator ( )			
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	A B	С	D	PivotTable Fields	<del>-</del> x
1				Active All	
2				Choose fields to add to report	6 - A
3	Year 🗸	Sales Apr 2015 & May 2016		Search	م
4	2014	\$16,620.75			
5	2015	\$16,620.75		$\int_X IN Example 2$ $\int_X IN Example 1$	
6	2016	\$16,620.75		✓ f <sub>X</sub> Sales Apr 2015	& May 2016
7	2017	\$16,620.75		A The Sales Territony	<b>v</b>
8	2018	\$16,620.75		Drag fields between areas be	
9	<b>Grand Total</b>	\$16,620.75		▼ Filters	III Columns
10					
11					
12				Rows	Σ Values
13				Year 🔻	Sales Apr 2015 & May 💌
14					

A more delicate solution would involve a combination of the CALCULATE, FILTER, ALL and OR functions to create the measure.

Measure			?	×
Table name: Sales				~
Measure name: Sales in A	or 2015 & May 2016 2			
Description:				
Formula: $f_X$ Check for	rmula			
=CALCULATE <b>(</b> [Sales], FILTER(	ALL('Calendar'),			
	'Calendar'[Year]=2016	88 'Calendar' [Month Name (Short)] = "Apr", 88'Calendar' [Month Name (Short)] = "May"		
)	,			
Formatting Options				
Category:				
General	Symbol:	\$		~
Currency	Decimal places:	2 ≑		
TRUE/FALSE	Use 1000 separator (,)			
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Note that we can concatenate two criteria into one by using the '&&' syntax:

'Calendar'[Year]=2015&& 'Calendar'[Month Name (Short)] = "Apr",

'Calendar'[Year]=2016&&'Calendar'[Month Name (Short)]= "May"

This allows us to combine the two criteria into one CALCULATE function.

1	A B	C	D	-	PivotTable Field	ds 👻	×
2 3	Year 🗔 S	ales Apr 2015 & May 2016	Sales in Apr 2015 & May 2016 2		Choose fields to add to rep	port:	0 0
4	2014	\$16,620.75	\$16,620.75			_	
5	2015	\$16,620.75	\$16,620.75		$f_X$ IN Example 2 $f_X$ Sales in Apr	2015 & May 2016 2	
6	2016	\$16,620.75	\$16,620.75		✓ f <sub>X</sub> Sales Apr 20	015 & May 2016	
7	2017	\$16,620.75	\$16,620.75				
8	2018	\$16,620.75	\$16,620.75				
9	Grand Total	\$16,620.75	\$16,620.75		▼ Filters	III Columns	
10			-			Σ Values	-
11							
12					- Rows Year	<ul> <li>Values</li> <li>Sales Apr 2015 &amp; May .</li> </ul>	
13			4	το 📕		Sales in Apr 2015 & M.	

The type of criteria that can be used in this manner is not limited to dates. We can also use **Product Category Keys** and **Standard Costs** criteria in the same manner to build a similar measure.

Мазсиге	7	×
incours.		~
Table name: Sales		~
Measure name: Sales of Product Cat 1, Std Cost < 50 & Cat 2 Std Cost < 100		
Description:		
Formula: $f_X$ Check formula		
=CALCULATE( [Sales], FILTER( ALL('Product SubCategory'), Or('Product SubCategory/[ProductCategoryKey]=1&&'Product SubCategory'[Standard Cost]<50, 'Product SubCategory'[ProductCategoryKey]=2&&'Product SubCategory'[Standard Cost]<100 ) )		
Formatting Options		
Category: General Symbol: \$ Mumber Category: Decimal places: 2 TRUE/FALSE Use 1000 separator (.)		~
ОК	Cano	el

### This measure yields:

1 2	A B	C	PivotTable Fields
3	Year	Sales of Product Cat 1, Std Cost < 50 & Cat 2 Std Cost < 100	Search
4	2014	\$18,554.30	
5	2015	\$50,294.15	$\int_X \text{ IN Example 2}$ $\swarrow f_X$ Sales of Product Cat 1, Std Cost < 50 &
6	2016	\$458,309.80	☐ <i>f<sub>X</sub></i> Sales Apr 2015 & May 2016
7	2017	\$603,822.85	
8	Grand Total	\$1,130,981.10	Drag fields between areas below:
9			T Filters III Columns
10			
11			
12			Year Sales of Product Cat 1,
13			

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 look at the **M** function **Table.Join**.

Whilst there are often multiple ways to achieve the same objective in Power Query, the purpose of this month's example is to become familiar with the **M** function, **Table.Join**. The description in the Microsoft help pages is as follows:

#### Table.Join(table1 as table,

key1 as any,

table2 as table,

key2 as any,

optional joinKind as nullable number,

optional joinAlgorithm as nullable number,

optional keyEqualityComparers as nullable list) as table

This joins the rows of **table1** with the rows of **table2** based on the equality of the values of the key columns selected by **key1** (for **table1**) and **key2** (for **table2**).

By default, what is known as an "inner join" is performed, however an optional **joinKind** may be included to specify the type of join. Options include:

- JoinKind.Inner
- JoinKind.LeftOuter
- JoinKind.RightOuter
- JoinKind.FullOuter
- JoinKind.LeftAnti and
- JoinKind.RightAnti.

The different types of join work as follows:

- Inner: only matching rows
- Left Outer: all from first, matching from second table
- Right Outer: all from second, matching from first table
- Full Outer: all rows from both tables
- Left Anti: rows only in first table
- Right Anti: rows only in second table.

In order to understand how Table.Join works, let's consider an example of where it may be used.

Our fictional salespeople have been busy sending in their expenses, but the administration has not been ideal. We have a folder which contains all the expenses that we need to upload, but there have been inconsistencies that mean some of the expense files appear in more than one of the subfolders.



May is not one of our imaginary salespeople – 'May Expenses' holds expenses created in May. However, not all of the expense files are in here, so how can we see which files are duplicated? The example is simple, but this method will apply to much larger folders. In a new workbook, let's create a new query 'From Folder' on the 'From File' option in the 'Get and Transform' section of the 'Data Tab':

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Get External Data *	New year Contraction Contraction	ies Refre	Connections	⊉↓ <mark>∡ ⊉</mark> ∡↓ Sort	Filter	Clear Reapply Advances	Text to Column	Flash Fil Remove	Duplicates	Consolida	nte hips Data Model	What-If Analysis *	Forecast Sheet	* Group * * Ungroup Subtotal	•	Data Analysis		
	From File	+	From Wor	kbook	Sort & Fil	ter			Data Tool	ls		Forec	ast	Outline		Analysis		^
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6 7	From Other Se	urces >	From Fold	er 👘														-
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For the purposes of illustration, the folder here is located in '...PQ Blog\Expenses Duplicate Example'; this folder contains all the expense folders where we are looking for duplicates.

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When we click 'OK', we can see a list of all the files in the folders beneath the specified folder:

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Data -	Query - 🗟 Recen	t Sourc	Binary	Database1.accdb	.accdb	27/03/2018 12:45:44	09/02/2016 11:57:00	27/03/2018 12:45:44	Record	C:\Users\kathr\Or					
	Get & Transf	orm	Binary	power query course content.docx	.docx	27/03/2018 12:45:44	14/06/2016 10:47:15	27/03/2018 12:45:44	Record	C:\Users\kathr\Or		Ana	ilysis		^
41	×		Binary	Derek_expenses.xlsm	.xlsm	27/03/2018 12:45:44	25/04/2017 13:42:59	27/03/2018 12:45:44	Record	C:\Users\kathr\Or					
<b>N1</b>		~	Binary	Derek_NDL.txt	.txt	27/03/2018 12:45:44	02/05/2017 13:31:50	27/03/2018 12:45:44	Record	C:\Users\kathr\Or					
A	В	C	Binary	John_expenses.xlsm	.xlsm	27/03/2018 12:54:22	27/03/2018 12:54:22	27/03/2018 12:53:23	Record	C:\Users\kathr\Or	Q		R	S	
1			Binary	Mary_Expenses.xlsm	.xlsm	27/03/2018 12:45:44	25/04/2017 13:43:46	27/03/2018 12:45:44	Record	C:\Users\kathr\Or					
2			Binary	Derek_expenses.xlsm	.xlsm	27/03/2018 12:48:22	25/04/2017 13:42:59	27/03/2018 12:48:22	Record	C:\Users\kathr\Or					
3			Binary	Mary_Expenses.xlsm	.xlsm	27/03/2018 12:48:34	25/04/2017 13:43:46	27/03/2018 12:48:34	Record	C:\Users\kathr\Or					-
4			Binary	Paul_expenses.xlsm	.xlsm	27/03/2018 12:48:46	25/04/2017 13:44:33	27/03/2018 12:48:46	Record	C:\Users\kathr\Or					-
5		_	Binary	Paul_expenses.xlsm	.xlsm	27/03/2018 12:45:44	25/04/2017 13:44:33	27/03/2018 12:45:44	Record	C:\Users\kathr\Or					-
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For this task, we want to see the duplicates, not combine or load all the files, so we will choose to 'Edit'. In fact, you should always choose to edit first, to make sure you are getting the data that you expect.

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>		$\times$	√ fx =	Folder.Files("C:\Users)	kathr\	OneDrive\D	ocuments	\PQ_Stand	ardExpenses	\PQ Blog\Ex	penses Dup	licate Ex	ample")		~	Ouerv	Settinas		×
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For this exercise, we only need the **Name** and **Folder Path** columns, so we will select those columns and choose to 'Remove Other Columns' from the 'Remove Columns' dropdown on the 'Manage Columns' section of the 'Home' tab.

File File Close & Load * Close	F Ri Pre	Expenses Duplicate Exam tome Transform Add Properties Advanced Editor tresh Query	d Column View Choose Remo Columns Column	r ve Keep Remove 15 * Rows * Rows * s Reduce Rows	Ž↓ Ž↓ Split Column ♥	Data Type: Text • Use First Row as Heade Use First Row as Heade Use First Row as Heade Transform	rs • The Combine Files	Manage I Parameters * Parameters D	Data source settings Data Sources	New Source Recent Source New Que	e • Irces • Y	٥	× ^ 0
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Arguably, we should also upshift the **Name** column for comparison. This really depends whether a file with uppercase text is really the same file as one with the same name, but using lowercase text. This will depend

upon the practices of the users concerned. If required, we would then select the **Name** column and use the 'UPPERCASE' option in the 'Format' dropdown on the 'Transform' menu as shown below.

File File Group By	Use F as He	Expenses Duplicate Example - Query Edito Home Transform Add Column View Caranspose Data Type: Text * Exercise Rows Readers* Count Rows Research	r l <sub>g-2</sub> Replace Values * 🐃 Unpivot Columns * le 🛃 Fill * 🐺 Move * 🖓 Pivot Column 📋 Convert to List	Split Column	[Add	Merge Columns	X O Statisti	s Standard Scientific	Trigonometry *	Date	Time Duration	- C	× ^ (2
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>	×	√ fx = Table.SelectColumns	(Source,{"Name", "Folder Path"})			UPPERCASE				~	Outony Satt	linac	~
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	7	Derek expenses.xlsn	C:\Users\kathr\OneDrive\Documen	ts\PO St	anda	ardExpenses\PO B	log\Ext	enses Duplicat	e Example\Mav	Expe	Source		4
	8	Mary_Expenses.xlsm	C:\Users\kathr\OneDrive\Documen	ts\PQ_St	anda	ardExpenses\PQ B	og\Exp	enses Duplicat	e Example\May	Expe	× Removed €	Other Columns	4
	9	Paul_expenses.xlsm	C:\Users\kathr\OneDrive\Documen	ts\PQ_St	anda	ardExpenses\PQ B	log\Exp	enses Duplicat	e Example\May	Expe			
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3.000		<								>			CD 47 12-1

We will not be upshifting the text, so our final step for this part of the process is 'Removed Other Columns'. We need to remember this step, as will be shown later.

The next step is to group by name and to do this, we use the 'Group By' option in the 'Table' section of the 'Transform' tab. It should be added at this point that there are other ways to do this grouping, but we are doing it this way to allow us to user **Table.Join** later!

File	<b>)</b> • <del>-</del>	Expenses Duplicate Exam Home Transform A	mple - Query Ed dd Column V Data Type: Text *	itor New	• 🐜 Unpivot Columns •	Merge Columns	Χσ 🗮 10 <sup>2</sup> 4	Trigonometry *		(L) (L)	Expand	× ^ (2
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We will call our new column Occurrences, which will count the number of rows for each name.

File Group By	Use F as H	Home Transform Add Column Transpose Data Typ Enders Count Rows Table	View e: Decimal Number ct Data Type ime	<ul> <li>I<sub>+2</sub> Replace Values</li> <li>Fill </li> <li>Fill </li> <li>Pivot Column</li> <li>Any Column</li> </ul>	• • • Unpivet Columns •     • • • • • • • • • • • • • • • •	Split Format Split Parse *	XO ∑ XIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		ate & Time Column	Expand Aggregate Extract Value Structured Colum	^ (
>	×	√ fx = Table.Group	#"Removed Oth	er Columns", {"	Name"}, {{"Occurrenc	es", each Table.RowCount(_), ty	rpe number}}) 🗸 🗸	c	uery Settings		×
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Due	2	power query course conten	t.docx	2					Name		
Ŭ	3	Derek_expenses.xlsm		2					Expenses Duplicate Exa	.mpie	
	4	Derek_NDL.txt		2				1.1	All Properties		
	5	John_expenses.xlsm		1				4	APPLIED STEPS		
	6	Mary_Expenses.xlsm		2					Source		
	7	Paul_expenses.xlsm		2					Removed Other Cr	shumne d	ŝ
									X Grouned Rows	iumo i	a l

We may filter out those names that only appear once by applying a filter to **Occurrences**.

File Home Group Use First Row By as Headers * Table	Transform Ac	Id Column View Data Type: Decimal Number Data Type: Decimal Number Detect Data Type Rename	• 1 <sub>92</sub> Replace Values ↓ Fill • ♥ Pivot Column Any Column	Wind Columns     Wind Columns     Convert to List	Split Format Parse * Text Column * Text Column	XO ∑ XIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	Date & Time Column Date & Time Column
Control (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	fx     - Tablf       ne     Sort Ascending       Sort Descending     Clear Sort       Clear Filter     Remove Empty       Number Filters     Societ. All)       1     1       √2     2		r coluens", ("%	ame"), (("Occurrence	n*, esch Table.RosComt(), t	pe number]]) v	Query Settings ×  • PROPERTIES Name Experses Doulcate Example All Properties  • APPLE Starge * Coupled Rows • *

### This then leaves us with the duplicates.

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Thus, we have the names of the files that are duplicated, but now we want to go back and look at the folder path. We want to merge the data we had in step 'Removed Other Columns' (see now why we had to remember this step?) with the data we have in step 'Filtered Rows'. This is where we may use **Table.Join**.

Our first table is at the step 'Removed Other Columns' and our second table is at 'Filtered Rows'.

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Wenow have the file name, folder path and the number of occurrences – so we can see where every duplicate file is. The syntax we used is:

= Table.Join( #"Removed Other Columns", "Name", #"Filtered Rows", "Name")

The reason for the **#**'s is because we have names with gaps, and the **#** simply tells **M** to ignore the spaces in the names. We could also rename our steps, but I prefer to do it this way, so I can see exactly where we are combining our data. **"Name**" tells Power Query how to join the two tables – if the name matches, then join the rows. We are using the default join here: the inner join.

Now we know where the duplicate files are, we may sort out the administration.

More next month!

### **Power BI Updates**

The latest set of updates finally sees the General Availability of the new Format Pane, plus error bars and information protection updates, table navigation improvements, Connect to datamarts and Power BI Data Storytelling features. But, as always (and of course!), there's more. The full list is as follows:

### Reporting

- New Format Pane now Generally Available
- Updates to error bars in Preview
- Information protection updates
- Table navigation improvements
- Canvas Zoom in Teams and Quick create

### Modelling

Composite models on SQL Server Analysis Services

### Data connectivity and preparation

- Connect to Datamarts in Preview
- Anaplan (Connector Update)
- Azure Databricks (Connector Update)
- Databricks (New Connector)
- Dremio Cloud (Connector Update)
- FactSet Analytics (Connector Update)
- Hexagon PPM Smart API (Connector Update)
- SingleStore (New Connector)
- Snowflake (Connector Update)
- Vessel Insight (Connector Update)
- Workplace Analytics / Viva Insights (Connector Update)

### Service

- Power BI Data Storytelling
- Announcing the Data Hub
- Power BI Metrics updates

Let's now go through each in turn.

### New Format Pane now Generally Available

The new Format pane is finally Generally Available. This has also been shipped to the Power BI Service. The improvements have continued though:

- a blocking bug has been fixed to ensure the Analytics pane works for custom visuals (where applicable)
- another bug has been fixed that removed log scale applied to the horizontal axis. This affected line, area, stacked area, combo, or scatter charts set prior to April 2022 reports. The issue has now been resolved
- when changing a blank page to ToolTip size, Power BI now automatically flips the "allow use as ToolTip" toggle on.

### Updates to error bars in Preview

This update also revamps the Error bars card in the Analytics pane to simplify the structure of the formatting options. With fewer sub-cards to have to scroll through, you can more easily find and customise the

various elements you want to see on your error bars. The major changes are that line options have now been moved into the Error band sub card, and marker options have also now moved into the bar and band cards.

### Embedded Analytics

- Hierarchy slicers support in JS APIs
- Support embedding Paginated Report with data sources containing single sign on (SSO)
- Support passing report parameters for Paginated Reports in JS SDK
- DirectQuery for Power BI datasets is now supported in Power BI Embedded
- Service principal profile

### Developers

- Define the privileged permissions your visual is requesting in the capabilities.json
- Improving the custom visual load time

### Visualisations

- New visuals in AppSource
- Milestone Trend Analysis Chart by Nova Silva
- Inforiver Premium Edition now certified
- Zebra BI Cards 1.2

### Other

- Coming soon: Dataverse Display Name Support
- Power BI Desktop infrastructure update (WebView2)
- Improved support for single sign-on (SSO) for all users.

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### Information protection updates

In Power BI Desktop, you can establish a live connection to a shared dataset in the Power BI Service and create many different reports from the same dataset. If the dataset has a sensitivity label, Power BI will

automatically apply the live dataset's sensitivity label to the PBIX file in order to maintain the data's classification and protection as it leaves the Power BI Service.



#### Table navigation improvements

There are also several enhancements to the Table visual for existing and new reports to improve performance, usability and accessibility for all users. These updates include:

- overall performance improvements for scrolling and rendering, as well as the look and feel of grid lines and selection styles
- new keyboard shortcuts for easier navigation, including SHIFT + Up / Down Arrow to select multiple contiguous rows, Page Up / Down for scrolling, and HOME / END to move focus to the first / last cell in the current row
- enhanced row selection experience that includes a left indicator and improved contrast to help distinguish selected rows from non-selected rows

- a new two-toned focus outline so on any colour background, the focus will always be visible even on darker themes meeting colour contrast requirements
- updated conditional formatting icons that are conformant with colour contrast requirements and now announces alternative text with screen readers
- the ability to associate images with alternative (alt) text in the Formatting pane to describe images to blind and low vision users.

Sales by Region								10
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Sub-Saharan Africa	Kenya	Cosmetics	9 7,130,976.40	7 4,708,399.60	11,839,376.00	1,053.32	27080	1,748.80
Europe	Ireland	Household	8 13,645,971.16	7 4,500,232.42	18,146,203.58	2,010.16	27154	2,673.08
Europe	Spain	Household	8 13,236,903.60	7 4,365,328.20	17,602,231.80	1,507.62	26340	2,004.81
Europe	Malta	Cosmetics	6,338,616.43	7 4,185,224.77	10,523,841.20	789.99	24071	1,311.60
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### Canvas Zoom in Teams and Quick create

Last month's update shipped the canvas zoom feature to both Power BI Desktop and Service. This feature is now also available for Power BI in Teams and Quick create. For report readers, this is especially important for improving readability. For report creators, this helps magnify the canvas to make pixel perfect tweaks. You may drag the slider to set the zoom level or click on the zoom % to launch the zoom level dialog and type in a custom input. Furthermore, you may use the new quick 'fit to page' button to get back to the default view.

One thing to note though: the zoom level is not saved with the report.



#### **Composite models on SQL Server Analysis Services**

This update also allows you to create composite Power BI models by connecting to SQL Server 2022 Analysis Services tabular models. SQL Server 2022 is available now for public Preview. When you upgrade or deploy tabular models to SQL Server 2022 Analysis Services, this DirectQuery connection becomes available in Power BI Desktop beginning with the May 2022 release. Existing or new tabular models hosted on SQL Server 2022 Analysis Services can be joined with other data in Power BI Desktop to create a composite model.

### **Connect to Datamarts in Preview**

As a reminder, Datamarts in Power BI was officially announced in May 2022 as a new Power BI Premium self-service capability that enables you to perform relational database analytics and uncover actionable insights from their data.

You can now easily discover and connect to Datamarts from the 'Data hub' within the Power BI Desktop Ribbon. This feature allows users to discover datamarts that have already been created and reuse them to easily build reports.



You will be able to see datamarts that you have created or were shared with you by others in the organisation. This will connect you to the datamart's underlying auto-generated dataset (using live connect) so that you can easily create reports.

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To create datasets on top of the datamart, you can use the Azure SQL database connector and specify the Datamart's SQL connection string for Server name. If you created the datamart, you can get the SQL Connection string from datamart settings (context menu action from the datamart in your workspace):

### **Settings for Customer360**

- Datamart Description
- Server settings

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If this datamart was shared with you, you can get the SQL connection string from the Datamart info page below from the Data Hub (in Power BI Service) (see more on the Data Hub below).

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Description 🖉 Add a description		share business insights. Learn more
		Create from scratch

Apparently, Microsoft has state that the plan is to next simplify the experience to connect to the datamart's SQL endpoint so that advanced use cases may be served easily without the hassle of having to find the connection string.

### Anaplan (Connector Update)

The Anaplan connector has been updated. This version of Anaplan connector for Power BI now supports Anaplan OAuth APIs for authenticating with Anaplan. Users will be able to use either Basic Authentication (User ID, Password) or the Anaplan configured IDP for

Azure Databricks (Connector Update)

The Azure Databricks connector has been updated:

- fast evaluation option is removed from the User Interface (UI) and is used by default now
- various performance improvements have also been made.

#### Databricks (New Connector)

A new Databricks connector has also been released. This update contains a Preview generic datasource 'Databricks (Beta)', which supports OAuth authentication on AWS. The OAuth on AWS Preview will support users managed by Databricks directly.

#### Dremio Cloud (Connector Update)

The Dremio Cloud connector has been updated:

- users may now connect Power BI Service to Dremio without needing Power BI Gateway
- some customers may experience a back compatibility issue with their existing connections and reports. They may need to re-enter their credentials and possibly recreate existing reports once they have upgraded to this new connector.

### FactSet Analytics (Connector Update)

Minor internal fixes for table representation have been made.

#### Hexagon PPM Smart API (Connector Update)

This update contains a fix resolving an issue where Okta authentication no longer worked with the WebView2 browser control.

### SingleStore (New Connector)

There is a new SingleStore Power BI connector. SingleStore is a fast database for all data-intensive applications. It provides a single unified database for analytical and transactional workloads with multi-model support for text, geospatial, time-series and more. The SingleStore Power BI connector provides a live connection to the database with support for DirectQuery as well as the ability to import data into Power BI with standard and Custom SQL Import modes.

logging into Anaplan from the connector, accessing and running Export

actions. With this new connector option, customers do not need to be

an Anaplan exception user to use Power BI.

### Snowflake (Connector Update)

This update contains a minor bug fix around mixed case database names and quotations causing compilation errors.

### Vessel Insight (Connector Update)

The new update in the connector enables a user to navigate through fleets with different asset trees when applicable and only sensors with data will be visible. Vessel Insight has a new version of the asset tree where the hierarchy structure has been updated. It is now possible to navigate through the old and the new asset tree or more, while

### Workplace Analytics / Viva Insights (Connector Update)

The Workplace Analytics connector has been updated and is now rebranded as Viva Insights. The updated connector is now Generally

the previous version of the connector only allows the user to navigate through one asset structure. Sensors without data will be hidden and ensure the user when selecting sensors for import that there will be no empty sensors.

Available. The connector includes a new optional parameter, which lets you import raw query output from certain data sources.

### Power BI Data Storytelling

Back in May, Microsoft announced the public Preview of Power BI Data Storytelling, which represents a new integration between Power BI and PowerPoint.

Power BI Data storytelling is a PowerPoint add-in developed by the Power BI team, which lets you add Power BI reports into PowerPoint slides and utilise the interactive experience of Power BI inside your presentations. With data storytelling, data will always be up to date in your slides, whether you're building a presentation or presenting it live to others.

This update enables Storytelling starting points inside the Power BI report experience, making it easier and simpler for you to get started with storytelling directly from the report you want to use in your presentation.

First, open the report you wish to add to your presentation, navigate to the desired page, and make any data selection that reflects the view you want to use. Then, click **Share -> PowerPoint or Export -> PowerPoint** -> **Embed live data**.

Check the 'Embed report with data filters you selected' box if you want to make sure that the same report state will be added to the presentation. This will open a new window, with two options:

- 1. copy the link and paste into a Power BI add-in you added to an existing presentation
- 2. open a new presentation with the report automatically added to it and continue to build your presentation.



### Announcing the Data Hub

The Data Hub is the evolution of the Datasets Hub that was announced in December 2020. In the Data Hub, in addition to Power BI datasets, you can now find the newly released Datamarts.

The Data Hub is a central location for data owners, report creators and report consumers to manage, discover and reuse data items across all workspaces:

- data item owners can see usage metrics, refresh status, related reports, lineage and impact analysis to help monitor and manage their data items
- report creators can use the Hub to find suitable items to build their reports on and use links to easily create the reports
- report consumers can use the Hub to find reports based on trustworthy data items.

This was in response to feedback Microsoft received from many customers that users often build similar data repeatedly, resulting in resource overload, governance complexity, and difficulty in identifying sources of truth.

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龟	AdventureWorks	-				-
0	AdventureWorks	-			6/3/22, 2:18:00 PM	-
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The Data Hub addresses these challenges by making it easier for users to discover existing, quality data and reuse it to answer business questions and gain insights. Once you discover a data item that seems to have the right data, a click on the item opens the data details page. On the details page you can see the following:

- metadata about the data item, including description, endorsement and sensitivity label
- actions such as share, refresh, create new, etc.
- related reports, which are reports that were built on top of the dataset.

Considering data discovery best practices, before creating new reports, you should look at the existing related reports. If there are no such reports that are suitable, there are multiple ways to create a new report:

 create a report from a template, if a template has been defined (a template is defined by adding the suffix '(template)' to a report built on top of the dataset / datamart)

- create a report from scratch, to open a blank canvas and start creating your report
- auto-create a report. It should be noted that this is currently supported only for single-table datasets; moving forward, support for datasets with multiple tables will be added in due course
- create a formatted table.

Power BI report creators primarily use Power BI Desktop to build new content and then publish it to the Power BI Service. When building new reports, instead of connecting to external data sources, the best practice is to connect to curated data available to them in Power BI.

In Power BI Desktop, just as in the Power BI Service, Microsoft would like to bring all Power BI data items into a single experience. For this reason, they have brought the Data Hub into Power BI Desktop.

With the Data Hub, users may find datasets and datamarts side by side, filter and search to find the data they need, and then connect to create a report.



### **Power BI Metrics updates**

There are several Power BI Metrics (the feature formerly known as 'Goals') updates this month. There are now additions of multiple milestones that allow you to add date associated milestones within a

given metric, categorical metrics that help you track non-numerical items, and enrichment of the bulk updating feature. Further, Power BI Metrics now supports customer managed keys.

### Milestones

Now, date associated milestones can be added to a metric to help track incremental progress toward an overall end goal. With this new feature, scorecards support more nuanced tracking scenarios such as cumulative monthly targets, stepped revenue goals, and more.

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7	<ul> <li>Customer delight through increasing NPS to 4.5</li> </ul>		e <mark>n</mark>	Otar Bichiashvili		4.30/5		On trac	k.		Aug 16,	2023

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<ul> <li>Customer delight t</li> </ul>	hrough increasing NPS to	4.5	<b>9</b>	Otar Bichiashvili	4.30/5	On track	Aug 16, 2023

Each milestone you set is associated with a date so that you can accurately track your progress in your scorecard the way you do in the rest of your organisation. In the setup process, you will have the flexibility to select whether you want to display the next milestone or the final target for your metric on the scorecard. This may be customised per metric.

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•	Grow Northwind Enterprise to \$2M		<b>.</b> •	Ancy Philip	\$530K/s2M + 1.92% WeW	At risk	~	Jun 8, 2022
	<ul> <li>Widespread adoption through total MAU of 1M</li> </ul>			🕥 Sarina Stevens	780K/1M	At risk		Apr 1, 2022
	350K MAU for Northwind Premium		2	Charles Webb	394K/100K ↑ 0% WeW	On track		Apr 1, 2022
	150K MAU for Northwind Enterprise			🌒 Bogdan Crivat	92K/155K + 2.64% DoD	On track	$\checkmark$	Apr 1, 2023
	500K MAU for Northwind Standard		ی	Priya Sathy	\$40K/5600K ~ 0% wew	Behind Schedule		Apr 1, 2023
			<b>"</b>	Otar Bichiashvili	4.30/5 ↑ 0% WeW	On track		Aug 16, 2023
	NPS of 4.5 for Standard customers		÷	Shuvro Mitra	3/4.50 ⇒ 25% MoM	Behind Schedule	$\overline{}$	Aug 16, 2023
R	NPC of 4.5 for Premium distances		"Э	Daise Talaas Diff Allan	4.20/5	Rahind Scharlida	<u> </u>	Aug 16 2022

You can see the milestones as well as the final target visualised in the Details pane alongside your current progress, so that it's easier than ever to get a snapshot of how you're performing against your metrics.

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	150K MAU for Northwind Enterprise			Bogdan Crivat	+ 0% W 92K + 2.64%	New check-in  Check-in for May 11, 2022 On track
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	NPS of 4.5 for Standard customers		2	Shuvro Mitra	3/4.50 + 25% #	5 months ago
Я	NPS of 4.5 for Premium customers		<b>*</b>	👮 Rajat Talwar (HE/HIM)	4.20	Carly Newsome Check-in for Sep 7, 2021 Completed

### **Categorical Metrics**

Now you may begin to track metrics that are not numerical. With categorical metrics, scorecards support scenarios like accessibility, NPS category scores (detractor, promotor, *etc.*). To get started, select categorical from the floating formatting bar when choosing the current and target values.

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	<ul> <li>Widespread adoption through total MAU of 1M</li> </ul>		Sarina Stevens	780K/1M	At risk	<b>_</b>	Apr 1, 2022
	350K MAU for Northwind Premium	e <sup>9</sup>	Charles Webb	394K/500K	On track		Apr 1, 2022
	150K MAU for Northwind Enterprise		🔮 Bogdan Crivat	92K/155K	On track		Apr 1, 2023
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You will be able to select from existing lists of categories or create new categories with accessibility scores. After creating my categories, you may then fill out my current and target values with the appropriate selections.

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	350K MAU for Northwind Premium	e <mark>9</mark>	Charles Webb		394K/500K + 0% WeW		On track	-		Apr 1, 2022
	150K MAU for Northwind Enterprise		🌒 Bogdan Crivat		92K/155K		On track			Apr 1, 2023

#### Here, you can see a group of metrics with accessibility scores B-D, with final targets of A.

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	<ul> <li>Customer delight through increasing NPS to 4.5</li> </ul>		e.	Otar Bichiashvil	i	4.30/5 + 0% WeW		On	track		Aug 1	6, 2023
	<ul> <li>Grow revenue for Northwind to \$6M</li> </ul>			00		\$1.61M/52		On	track		Jun 19	, 2023
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я	<ul> <li>Widespread adoption through total MAU of 1M</li> </ul>			🚯 Sarina Stevens		780K/1M 1 0% WoW		At	risk		Apr 1,	2022

#### **Bulk Updating**



With new additions to bulk updating, you will be able to:

- assign owners
- update statuses (if no rules exist)
- create new or replace existing status rules
- update start dates
- update due dates.

### Hierarchy slicers support in JS APIs

Slicers in Power BI are a type of on canvas visual filters. The slicers enable a user to sort and filter a packed report and view only the information they want. Independent software vendors (ISVs) and developers may now interact with hierarchy slicers using slicer APIs in JS APIs. Using the slicer APIs, you can get and set the state of a Power BI slicer. In addition, you can use load configuration to change the slicer state when loading a report.

### Support embedding Paginated Report with data sources containing single sign on (SSO)

Partners and customers may now automate Power BI Embedded paginated reports with data sources containing SSO support when the data source has the SSO option enabled and your users access reports built atop the data source. Power BI will send the related identity blob, which was received through the GenerateTokenV2 request in the queries, to the data source.

This option enables Power BI to respect the security settings that are configured at the data source level.

### Support passing report parameters for Paginated Reports in JS SDK

Developers may now set up parameters to paginated reports in Power BI by passing them in the Payload settings through JS SDK. They can further customise how Power BI processes the paginated report by embedding parameters for filtering data that meets the parameters criteria.

#### DirectQuery for Power BI datasets is now supported in Power BI Embedded

ISVs may now enable their customers to create their own specific dataset that can be combined with a central dataset that ISV uses for all their customers. The customers can combine their own data coming from any datasource connected to PBI in any fashion (including with SSO enabled for supported data sources) and create their own measures and calculations.

For example, ISVs can let their tenant customers create tenant specific measures via their code, using TOM over XMLA to the customer tenant specific dataset.

### Service principal profile

Until now, ISVs and other Power BI Embedded application owners were able to deploy the embedded solution to production by using one of the following two [2] options:

- create one service principal for all their customers, where they have a Power BI limit of 1,000 workspaces per each service principal
- 2. create one service principal per each customer, where they have the burden of managing thousands of service principals.

Now, this update has added a new method that allows a much larger number of customers per one service principal by introducing a new

### Define the privileged permissions your visual is requesting in the capabilities.json

Starting from API 4.6 and above, developers must declare any privileged API calls their visual requires access to operate. These currently include **web access** and **downloading to a file** from the custom visual.

These privileges are granted in the *capabilities.json* file and will be displayed in the 'About' dialog in the Desktop and web when in Edit

### Improving the custom visual load time

With API 4.6, Microsoft has improved the load time for custom visuals.

#### New visuals in AppSource

The following are new visuals in this update:

- Mapbox Custom visual
- SCvation-Flow-Basic
- 2WriteBack
- Easy SPC.

### Milestone Trend Analysis Chart by Nova Silva

Milestones in project management are points in time when important deliverables are due, such as beginning and end dates of project phases, formal approvals, etc. The Milestone Trend Analysis Chart for Power BI allows you to monitor these milestones.

Key signals in the Milestone Trend Analysis Chart include:

- horizontal line: no change in the (expected) completion date
- · increasing line: delay in the (expected) completion date
- decreasing line: (expected) completion date brought forward.

To embed Power BI report with a dataset which has a Direct Query connection to another Power BI dataset two separate things must be done:

- in Power BI portal, set the 'XMLA endpoint' to 'Read Only' or 'Read Write' in the dataset's capacity: this only needs to be done once per capacity
- 2. generate a Multi-Resource Embed Token with all relevant dataset IDs specified in the request and the XmlaPermissions set to ReadOnly.

entity named service principal profile. Each service principal profile can administer a customer, and the number of profiles per service principal can reach hundreds of thousands.

The service principal profile allows the ISV to build a scalable application that enables better customer data isolation and establishes tighter security boundaries between customers. Using the service principal profile enables the ISV application to host multiple customers on a single Power BI tenant. Each profile represents one customer in Power BI. In other words, each profile creates and manages datasets, reports, dashboards and other artifacts that are connected only to one specific customer's data.

mode. The visual will be permitted to access any special privileges only if it was predefined in the *capabilities.json*. Administrators may enable custom visuals downloading files through a tenant setting.

New APIs are introduced to allow visuals to query the host at runtime to determine which of the privileges is enabled.

Milestone Trend Analysis (MTA) is a simple method of early identifying deadline trends. It allows you to react in time with corrective actions. It will also raise the deadline awareness of all project participants and stakeholders.

### **Milestone Trend Analysis Chart: identify milestone trends**



### **Combined as tooltip with the PowerGantt Chart**



All features of the Milestone Trend Analysis Chart are available in the familiar standard Power BI user interface. Themes, interactive selection and ToolTips are all supported.

All features are available for free to evaluate this visual within Power BI Desktop from within AppSource.

### Inforiver Premium Edition now certified

Inforiver Premium Edition, which delivers a quick way to build Power BI reports, has now been Microsoft Power BI Certified. The latest release incorporates several new features and enhancements and is available for download at Microsoft AppSource.

The Premium Edition leverages a no-code / low-code architecture to deliver a wide variety of use cases such as:

- paginated reports
- management, financial and IBCS variance reports
- graphical tables (in-cell visualisations)
- pivot analysis with expand and collapse available for both row and columns
- Excel-like formulae at row, column and cell level for visual-level calculations
- manual data entry for plan, forecast or comments / cell level annotations
- what-if? simulations with popular distributions and spread methods
- formatted export to Excel / PDF.

Additional use cases such as writeback, paginated report subscription scheduling, and collaborative cell level commenting are available (but only in the enterprise edition).

Inforiver Premium Edition is completely free for Power BI Desktop, with no feature restrictions. Apparently, Inforiver pricing has also been simplified for wider adoption.

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Key enhancements in this 1.5 release include:

- KPI explorer / slicer for data exploration
- new chart types
- column pinning and freezing
- column filtering
- show measure on rows
- User Experience (UX) enhancements
- display and formatting enhancements.

### Zebra BI Cards 1.2

The 1.2 version of the Zebra BI Cards visual brings some new features, such as the ability to display the year-to-date (YTD) value for the KPIs, more flexibility with different font settings for elements on the cards, and new interaction settings.

### Year-to-date value

With Zebra BI Cards 1.2 you may now choose to display the YTD value for the KPIs. In practice, this brings several benefits:

- seamlessly switch between different stages for each KPI: YTD total, total and last data point
- compare data with the same period last year
- put your data in perspective by having all information about KPI performance on one page.

#### Font settings

To create even more flexible reports, you may now apply your preferred font settings, such as font style, size, and colour. Card elements like KPI title, value, variances and chart labels may be customised separately.

### Interaction settings

By adding the Interaction group of settings, report designers now have more control over which interaction is allowed to the end-user once the report is published.



#### Coming Soon: Dataverse Display Name Support

With next month's release, Microsoft has announced that they are planning to support display names through the Dataverse connector. Once released, you will see display names automatically applied to all columns in the model when creating reports using the Dataverse connector, in either Import or Direct Query mode.

This should save Dataverse users a lot of time, as you won't need to manually name every column to match the friendly names end users are accustomed to seeing in their applications, like Dynamics. However, Microsoft did want to give everyone advanced warning of this change, as there will be some impact on existing reports once the change rolls out. For all existing reports, you'll need to open the report up in Power BI Desktop and refresh the model for display names to show up. On the first schema refresh, the display names will override any existing renames you've made in the report, so if you want to retain those unique names, you'll need to manually reapply your name changes in the model. This will only happen when the display names are first applied, so future schema refreshes should not require any rework.

Overall, this change should reduce the amount of manual work you have to do to make your reports based on Dataverse data easily readable and familiar for your report consumers.

### Power BI Desktop infrastructure update (WebView2)

The switch to WebView2 as part of the infrastructure update continues. As Microsoft is getting closer to General Availability, they are hoping to have solved as many issues as possible. Starting with this release, you will see the following warning every time you launch Power BI Desktop if you don't have WebView2 installed yet:



If you see this, you should install WebView2 and enable it.

### Improved support for single sign-on (SSO) for all users

Power BI Desktop will now prompt users to sign in and use SSO where applicable to better align with Microsoft Office. This is the first of many small tweaks the start-up experience. In future updates, Microsoft will use signed in users to deliver more tailored experiences and allow users to consume files from the Service.

That's it for this month. See you in August!

### **New Features for Excel**

Similar to the Power BI Updates, the Excel gang has commenced summarising recent updates in everyone's favourite spreadsheeting software. We've no idea whether this will continue, but we thought we'd make hay whilst the sun shines and provide an overview of the features divulged across Excel for the web, Windows, Mac and mobile.

In this first update (of this kind anyway!), Microsoft has shared the General Availability of Power Query refresh for selected data sources

and the ability to change the source file for workbook links in Excel for the web and performance improvements across Excel for Windows and Excel for Mac making AutoFilter noticeably faster, for example. For Insiders, updates see an improved Recommended PivotTable experience (already noted earlier in this newsletter) in Excel for Windows and the ability to get and shape data with the Power Query Editor in Excel for Mac.

### Excel for the web

- Power Query refresh for selected data sources
- Changing source file for workbook links

### **Excel for Windows**

- Improved recommended PivotTable experience (Insider Beta)
- Faster recalculation on resource constrained devices (Current Channel)
- Faster AutoFilter (Monthly Enterprise Channel)
- Dataflow and Dataverse connectors (Monthly Enterprise Channel and Current Channel)
- Running Office Scripts from a workbook button (Current Channel)

### Excel for Mac

- Shaping data with Power Query Editor (Insider Beta)
- Faster AutoFilter
- Improved Find dialog and Find All.

Let's plough through.

### Power Query refresh for selected data sources

In Excel for the web, Power Query refresh is now available for queries sourcing data from the current workbook and anonymous OData feeds. Furthermore, it should be noted that Queries may refresh:

- in the background, so you may continue working on the spreadsheet
- asynchronously, instead of one-by-one, enabling a faster refresh.



As stated above, to refresh the Power Query queries in your workbook situated in Excel for the web, the source data must either emanate from the current workbook (*i.e.* 'From Table / Range') or else anonymous OData feeds. In addition, you may also start with a Blank Query, write your own **M** code and then refresh it.

The refresh happens behind the scenes so you may keep editing the workbook while refreshing. It is done in a usual way, *e.g.* 

Select the Data tab -> Refresh All

Obviously, Microsoft is continuing to work on enabling refresh for additional data sources as well as with other features. Future plans include Power Query Refresh for additional data sources, automation support, and eventually, releasing the full Power Query Editor experience to Excel for the web.

### Changing source file for workbook links

In addition to opening, refreshing and breaking links, you may also now change the source file in workbook links in Excel for the web.



### Improved recommended PivotTable experience (Insider Beta)

As mentioned earlier in this newsletter, Recommended PivotTables in Excel for Windows are now more intelligent, utilising the same technology as the Analyze Data feature. A redesigned panel should make it simpler to view all of your options, and easier to change your data selection before inserting a recommended PivotTable.

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### Faster recalculation on resource constrained devices (Current Channel)

On resource constrained devices, Excel for Windows has now made recalculation more optimal by default, by running calculations on a single thread. In most cases, users should see noticeably faster calculation on these devices. It should be noted that in some cases that require computationally intensive calculations, users may want to consider overriding this default by setting the 'Number of calculation threads' to two [2] in **File -> Options -> Advanced -> Formulas**, *viz*.

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### Faster AutoFilter (Monthly Enterprise Channel)

Users should now find AutoFilter noticeably faster in Excel for Windows too. Improvements have been made to reduce memory usage and optimise calls made by the filter's comparison algorithm. The

optimisations should be especially noticeable on low-end devices that have less memory or slower CPU-memory throughput.

### Dataflow and Dataverse connectors (Monthly Enterprise Channel and Current Channel)

Dataflows are a self-service, cloud-based, data preparation technology. They enable customers to ingest, transform and load data, and are featured in multiple Microsoft products. With the new 'From Dataflows' connector in Excel for Windows, you can now connect and import data from Dataflows directly into Excel. Users are able to immediately load data into Excel or use Power Query to transform the data prior to loading it into Excel.

Don't fear the 'verse. Dataverse is a secure and cloud-based storage for your data. It allows you store a business-focused definition of your organisation's data for use within applications. With the new 'From Dataverse' connector in Excel for Windows, you can now connect and import data from a Dataverse environment into Excel. Users are able to immediately load data into Excel or use Power Query to transform the data prior to loading it into Excel.

To start using these connectors, go to Data tab on the Ribbon, click 'Get Data', go to 'From Power Platform category', and select 'From Dataflows' or 'From Dataverse' options.



### Running Office Scripts from a workbook button (Current Channel)

Mentioned in last month's newsletter, Microsoft has extended the notion of their recently introduced script buttons feature, allowing the same button to run Office Scripts in Excel for Windows.



With script buttons in Excel for Windows, Office Scripts moves ever nearer to becoming an automation solution you can use to manage your workflow anytime and anywhere. While you still need to use Excel on the web to create and manage your scripts, people use a variety of platforms to complete their tasks and Microsoft has stated that they "...intend to investigate more cross-platform investments as part of [their] future work".

To create a button in your workbook:

- from the Automate tab in Excel on the web, select a script
- go to the 'More options' (...) menu in either the 'Script Details', 'All Scripts' or 'Code Editor' pane
- select 'Add button'.

To run the button in Windows:

- open a file containing the button in Excel on Windows
- select the button in the workbook.

### Shaping data with Power Query Editor (Insider Beta)

Quite rightly, many users are requesting the ability to transform data using the Query Editor in Excel for Mac be added. Again, we mentioned this last month!

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When Power Query was first released in Excel for Mac, there was hope that it wouldn't take long for the features to mirror their Window counterparts. It's taking time, but the capabilities are improving. Beginning with the ability to refresh data two years ago, importing data was introduced this time last year, so this does seem to be an annual event! As you may imagine, Mac users have desperately requested the ability to transform data using the Query Editor, which would provide users with the full Power Query experience in Excel for Mac.

Well... it's getting there! You may now clean and shape your data with hundreds of transformations available in Power Query Editor in Excel for Mac.

To access, on the Data tab, click the Get Data (Power Query) button.

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Click Launch Power Query Editor to open the Query Editor.

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You can shape and transform your data using the Query Editor similarly to Excel for Windows. When you're done, click the 'Close & Load' button on the Home tab.

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The newly imported data appears in a new sheet.

Supported data sources include:

- text, CSV, XLSX, XML and JSON files
- SharePoint, SharePoint Lists, SharePoint Folders and OData
- local tables, Tables and ranges
- Microsoft SQL Server.

You may also access the Query Editor from the data import flow by clicking the Get Data (Power Query) button, choosing a data source, and clicking the Next button.

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#### Faster AutoFilter

Similar to Excel for Windows, users should now find AutoFilter noticeably faster on Excel for Mac too. Improvements were made to reduce memory usage and optimise calls made by the filter's comparison algorithm. The

optimisations should be especially noticeable on low-end devices that have less memory or slower CPU-memory throughput.

### Improved Find dialog and Find All

Excel users should now find the Find dialog in Excel for Mac more consistent with that in Excel for Windows including the option to Find All.

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# **Excel Features Availability**

	Insi	ider			Production		
Feature	Windows Find the latest Excel version for this platform	Mac Find the latest Excel version for this platform	Windows/CC Find the latest Excel version for this platform	Windows/MEC Find the latest Excel version for this platform	Windows/SA Find the latest Excel version for this platform	Mac Find the latest Excel version for this platform	Web
Power Query refresh for selected data sources							May 2022
Changing source file for workbook links							May 2022
Improved Recommended PivotTable experience	Version 2204 (Build 15128.10000) or later						
Faster recalc on resource constrained devices		Version 16.62 (Build 22050804) or later	Version 2204 (Build 15128.20248) or later				
Faster AutoFilter				Version 2204 (Build 15128.20248) or later		Version 16.61 (22050700) or later	
Dataflow connector				Version 2203 (Build 15028.20248) or later			
Dataverse connector			Version 2204 (Build 15128.20178) or later				
Shaping data with Power Query Editor		Version 16.61 (Build 22041701) or later					
Improved Find dialog and Find All						Version 16.60 (220410) or later	

C: Current Channel; MEC: Monthly Enterprise Channel; SA: Semi Annual Enterprise Channel

All information is subject to change.

You can find the updated version of this grid with the interactive links at aka.ms/ExcelFeaturesFlyer.

### The A to Z of Excel Functions: IMPOWER



This function is kind of IMPOWERing...

An imaginary number is a complex number that can be written as a real number multiplied by the imaginary unit **i** (sometimes denoted **j**) which is defined by its property  $\mathbf{i}^2 = -1$ . In general, the square of an imaginary number **bi** is  $-\mathbf{b}^2$ . For example, 9i is an imaginary number, and its square is -81. Zero is considered to be both real and imaginary.

An **imaginary** number **bi** can be added to a **real** number a to form a **complex number** of the form **a + bi**, where the real numbers **a** and **b** are called, respectively, the **real** part and the **imaginary** part of the **complex number**.

Sometimes you might wish to raise a complex number to a power. **IMPOWER** returns a complex number that is in the **x** + **yi** or **x** + **yj** text format to a given power.

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

### IMPOWER(inumber, number)

The IMPOWER function has the following arguments:

- inumber: this is required and represents the complex number you wish to raise to a power
- number: this is also required. This is the power to which you wish to raise the complex number.

It should be further noted that:

- you should use **COMPLEX** to convert real and imaginary coefficients into a complex number
- **IMPOWER** recognises either the **i** or **j** notation
- if inumber is a value that is not in the x + yi or x + yj text format, IMPOWER returns the #NUM! error value

- if inumber is a logical value, IMPOWER returns the #VALUE! error value
- if **number** is non-numeric, **IMPOWER** returns the #VALUE! error value
- if the complex number ends in +i or -i (or j), *i.e.* there is no coefficient between the operator and the imaginary unit, there must be no space, otherwise **IMPOWER** will return an #NUM! error
- a complex raised to a power is calculated as follows:

$$(x+yi)^n = r^n e^{in\theta} = r^n \cos n\,\delta^2 + ir^n \sin n\,\delta^2$$

where:

$$r = \sqrt{x^2 + y^2}$$
$$\theta = \tan^{-1}\left(\frac{y}{x}\right) \text{ and}$$
$$\theta \in (-\pi; \pi]$$

Please see our example below:

	Α	В	С	
1	Formula	Description	Result	
2	=IMPOWER("3 + 4i", 1.7)	3 + 4i raised to the power 1.7	-0.0864698058642243+15.4256042122232i	
~				

### The A to Z of Excel Functions: IMPRODUCT



Sometimes you might wish to multiply complex numbers together. **IMPRODUCT** returns the product of one to 255 complex numbers in the **x** + **yi** or **x** + **yj** text format.

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

#### IMPRODUCT(inumber1, [inumber2], ...)

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

• inumber1, inumber2, ...: the first argument is required (the remainder are optional). This / these represent(s) the complex number(s) you wish to multiply.

It should be further noted that:

- you should use COMPLEX to convert real and imaginary coefficients into a complex number
- IMPRODUCT recognises either the i or j notation
- if any of inumber1, [inumber2], ... is a value that is not in the x + yi or x + yj text format, IMPRODUCT returns the #NUM! error value
- if any of inumber1, [inumber2], ... is a logical value, IMPRODUCT returns the #VALUE! error value
- if any of inumber1, [inumber2], ... is non-numeric, IMPRODUCT returns the #VALUE! error value
- if any complex number ends in +i or -i (or j), i.e. there is no coefficient between the operator and the imaginary unit, there must be no space, otherwise IMPRODUCT will return an #NUM! error
- the product of two complex numbers is:

$$(a+bi)(c+di) = (ac-bd) + (ad+bc)i$$

	А	В	С
1	Formula	Description	Result
2	=IMPRODUCT("3 + 4i", "5 - 6i")	Product of two complex numbers	39+2i
3	=IMPRODUCT("1+j",2)	1+I (no spaces) doubled	2+2j
4			

### The A to Z of Excel Functions: IMREAL



 $\mathbb{N} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{A}_{\mathbb{R}} \subset \mathbb{R} \subset \mathbb{C}$ 

### IMREAL – are you?

The IMREAL function returns the real coefficient of a complex number in the form **a + bi**. It employs the following syntax to operate:

### **IMREAL(inumber)**

The **IMREAL** function has the following argument:

• inumber: this is required and represents the complex number for which you want the imaginary coefficient.

It should be further noted that:

- you should use COMPLEX to convert real and imaginary coefficients into a complex number
- IMREAL recognises either the i or j notation
- if the complex number ends in +i or -i (or j), *i.e.* there is no coefficient between the operator and the imaginary unit, there must be no space, otherwise **IMREAL** will return an #NUM! error.

Please see our final example for this month below:

	А	В	С
1	Formula	Description	Result
2	=IMREAL("3 + 4i")	Real coefficient of the complex number 3 + 4i	3
3	=IMREAL("0 - j")	Real coefficient of the complex number 0 - j (causes an error when there is a space between the operator and the imaginary unit)	#NUM!
4	=IMREAL("0-j")	Real coefficient of the complex number 0-j (works when there is no space between the operator and the imaginary unit)	0
5	=IMREAL("81j")	Real coefficient of the real number 81j	0
~			

More Excel Functions next month.

### **Beat the Boredom Suggested Solution**

The challenge this month was to create a formula for finding the first visible cell in a range. Easy, yes?

### The Challenge



As a reminder, in this challenge, earlier in the newsletter we required you to create a formula for finding first visible cell in a filtered range without using VBA and macros. As always, there was a requirement: this time, it was emphasised that this was a formula challenge; no Power Query / Get & Transform or VBA!

### Suggested Solutions

We have more than one this month! Before explaining our solutions, we will clarify the common idea regarding how we came up with them first.

### For Excel Office 365, Excel on the Web and Office Beta / Insider Versions

These Excel versions allow us to use Dynamic Arrays which help shorten a lot of steps.

To begin with, we can generate a new column using the **SUBTOTAL** function which produces a subtotal in a given list, table or database. Do not forget to use the **COUNTA** function in the **SUBTOTAL function** as the given data consists of text.

	A B C	D		E		М	N	1	0	
1	First Vi	sible C	ell							
2	First Vis	ible Cel	I-Sug	geste	d Solut	ions.xlsx				
3	Navigator									
4		Error Chec	ks:	M						
8	Su	iggested	Solut	tions						
9					Alterna	tive Optio	n			
10					These onl	y work in Office	e 365, Excel or	the Web	and Office Beta / In	sider
11					=SUBT	OTAL(3,D1	3)			
12		Month	IS 🔽			Value	~			
13		January					1			
14		February					1			
15		March					1			
16		April					1			
17		May					1			
18		June					1			
19		July					1			
20		August					1			
21		September	r				1			
22		October					1			
23		November					1			
24		December					1,			
25										
26										

The FILTER dynamic array function is used in order to find the first visible cell in a given range and uses the following formula:

### =FILTER(Example[Months],Example1[@Value]=1)

The resulting list will be spilled range created by the formula above written in only cell N13 as below:



### For All Current Excel Versions

As there is no **FILTER** function (*i.e.* Dynamic Array function) in other versions of Excel, firstly, we need to create few helper columns. To begin with, we will be using the row function in order to find out the rule number of the given data using the formula

#### =ROW(Example[Months])

1 2 F 3 N	First Visi First Visibl	ble Cell			
2 F 3 N	First Visib	o Coll Si			
3 N		e cell-St	acested	Solutions.xlsx	
_	lavigator		55		
4	Er	ror Checks:			
8	Sugo	ested So	lutions		
9					
10					
11				=ROW/Example/Months	:1)
12		Months	•	ROW	<i>"</i>
13	Ja	nuary			13
14	Fe	bruary			14
15	Ma	arch			15
16	Ap	ril			16
17	Ma	ау			17
18	Ju	ne			18
19	Ju	ly			19
20	Au	gust	_		20
21	Se	ptember	_		21
22	00	tober	_		22
23	N	ovember	-		23
24	De	ecember			24

Then, the next step would be to find out the counter number for each month using the given formula

### =F13-ROW(INDEX(Example[Months],1))

	A B C D	E	F	G
1	First Visible Cell			
2	First Visible Cell-S	uggested	Solution	ns.xlsx
3	Navigator	-		
4	Error Checks:			
8	Suggested So	lutions		
9				For All Versions of Excel
10	1			
11	1			=F13-ROW(INDEX(Example(Months).1))
12	Months	•	ROW	Counter
13	January		13	0
14	February		14	1
15	March		15	2
16	April		16	3
17	May		17	4
18	June		18	5
19	July		19	6
20	August		20	7
21	September		21	8
22	October		22	9
23	November		23	10
24	December		24	11
05	1			

The next step would be to use the **INDEX** function inside the **OFFSET** function in order to find out the given month for each counter number using formula

#### =OFFSET(INDEX(Example[Months],1),G13,0)

ABC	D		E	F		G		н
First Vi	sible C	ell						
First Visi	ble Cell-	-Suga	reste	d Soluti	ons	dsx		
lavigator		95	,					
	Error Check	s:						
1. Fir	st Visible	Cell						
Su	agested	Soluti	ions					
	00				For	r All Ve	rsions of Exc	el.
					10			
							-0550554005	
	Monthe			ROW	6	ountor	=OFFSET(INDE	A(Example[Months], 1),G13,0)
	Ianuani			ROW	12	ounter	lanuary	OFFSEI
	February	_			14	1	February	
	March	1.1			15	2	March	
	April				16	3	April	
	May				17	4	May	
	June				18	5	June	
	July				19	6	July	
	August	-			20	7	August	
	September				21	8	September	
	October				22	9	October	
	November				23	10	November	
					0.4		Deservices	
	First Vis First Visi lavigator	Tirst Visible Cell aviaator Error Check 1. First Visible Suggested Monthe January February March April May June July August September November	First Visible Cell First Visible Cell-Sugg aviaator Error Checks: 1. First Visible Cell Suggested Soluti March April March August September October November	February Harch Agril Months January February Harch Agril May June July August September October November	First Visible Cell First Visible Cell First Visible Cell First Visible Cell Suggested Solutions    Months	First Visible Cell         First Visible Cell-Suggested Solutions.)         lavigator         Error Checks:         I. First Visible Cell         Suggested Solutions         February         13         February         14         March         April         16         Jure         Jur         July         August         20         September         21         October         23	Months       ROW       Counter         January       13       0         For All Ve       15       2         April       16       3         May       17       4         January       18       5         January       19       6         Aggist       20       7         September       21       8         October       22       9         November       23       10	Months     Content       January     13     0 January       February     14     15 February       March     15     2 March       April     16     3 April       May     17     4 May       June     18     5 June       July     19     6 July       August     20     7 August       September     21     8 September       October     22     9 October       November     23     10 November

### The next step would be to use the COUNTA function inside the SUBTOTAL function in order to find the subtotal of text within the 'OFFSET' column using

### =SUBTOTAL(3,H13)

AE	B C D	E	F	G	н	
Firs	st Visible Cell					
Fire	t Visible Cell-S	undested	Solution	e vlev		
Naviga	tor	uggesteu	Colution	3.131		
INCLUIN C	Error Checks:					
	Endroneous.	_				
	1. First Visible Ce	ell				
-						
	Suggested So	lutions				
-	ouggeoted oo	lations		For All Vo	reione of Ex	col
						(Cel
1	Months	-	DOW	Counter	OFFEFT	=SUBIOTAL(3,H
2	lanuary	<u> </u>	KUW 12	Counter	UFFSET	SUBIUTAL
4	February	-	14	1	February	
5	March	-	15	2	March	
6	Anril	-	16	3	Anril	
7	May	-	17	4	May	
в	June	-	18	5	June	
9	July		19	6	July	
0	August		20	7	August	
1	September		21	8	September	
2	October		22	9	October	
3	November		23	10	November	
	December		24	11	December	

Then, we may use the IF function in order to return the row number against the subtotal column using formula

### =IF(I13,F13)

	A B C D	E F	G	н	1	J
1	First Visible Cell					
2	First Visible Cell-Suc	agested Solution	s.xlsx			
3	Navigator					
4	Error Checks:					
5						
6	1. First Visible Cell					
7						
8	Suggested Solu	itions				
9			For All Ve	rsions of Ex	cel	
10						
11						=IF(I13,F13)
				OFFORT		
12	Months 💌	ROW	Counter	OFFSET	SUBTOTAL	IF
12 13	Months January	ROW 13	Counter 0	January	SUBTOTAL 1	IF 13
12 13 14	Months January February	ROW 13 14	Counter 0 1	OFFSET January February	SUBTOTAL 1 1	IF 13 14
12 13 14 15	Months January February March	ROW 13 14 15	Counter 0 1 2	OFFSET January February March	SUBTOTAL 1 1 1	IF 13 14 15
12 13 14 15 16	Months V January February March April	ROW 13 14 15 16	Counter 0 1 2 3	OFFSET January February March April	SUBTOTAL 1 1 1 1	IF 13 14 15 16
12 13 14 15 16 17	Months V January February March April May	ROW 13 14 15 16 17	Counter 0 1 2 3 4	January February March April May	SUBTOTAL 1 1 1 1 1	F 13 14 15 16 17
12 13 14 15 16 17 18	Months V January February March April May June	ROW 13 14 15 16 17 18	Counter 0 1 2 3 4 5	OFFSET January February March April May June	SUBTOTAL 1 1 1 1 1 1 1	F 13 14 15 16 17 18
12 13 14 15 16 17 18 19	Months V January February March April May June July	ROW 13 14 15 16 17 18 19	Counter 0 1 2 3 4 5 6	OFFSET January February March April May June July	SUBTOTAL 1 1 1 1 1 1 1 1	F 13 14 15 16 17 18 19
12 13 14 15 16 17 18 19 20	Months V January February March April May June July August	ROW 13 14 15 16 17 18 19 20	Counter 0 1 2 3 4 5 6 7	OFFSET January February March April May June July August	SUBTOTAL 1 1 1 1 1 1 1 1 1 1	IF 13 14 15 16 17 18 19 20
12 13 14 15 16 17 18 19 20 21	Months       January       Jaruary       February       March       April       May       June       July       August       September	ROW 13 14 15 16 17 18 19 20 20 21	Counter 0 1 2 3 4 5 6 7 8	OFFSET January February March April May June July August September	SUBTOTAL 1 1 1 1 1 1 1 1 1 1 1	IF 13 14 15 16 17 18 19 20 21
12 13 14 15 16 17 18 19 20 21 22	Months February January February March April May June July August September October	ROW 13 14 15 16 17 17 18 19 20 21 21 22	Counter 0 1 2 3 4 5 6 7 8 9	OFFSET January February March April May June June July August September October	SUBTOTAL 1 1 1 1 1 1 1 1 1 1 1 1 1	IF 13 14 15 16 17 18 19 20 21 21 22
12 13 14 15 16 17 18 19 20 21 22 23	Months V January February March Anril May June July August September October November	ROW 13 14 15 16 17 17 18 19 20 21 22 23	Counter 0 1 2 3 4 5 6 7 8 9 10	OFFSET January February March April May June July August September October November	SUBTOTAL 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	IF 13 14 15 16 17 18 19 20 21 22 22 23
12 13 14 15 16 17 18 19 20 21 22 23 24	Months January January February March April May June July August September October November December	ROW 13 14 15 16 17 18 19 20 21 21 22 23 24	Counter 0 1 2 3 4 5 6 7 7 8 9 9 10	OFFSET January February March April May June July August September October November December	SUBTOTAL 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	IF 13 14 15 16 17 18 19 20 21 22 23 23 24

### Then, we may find the minimum value

### =MIN(J13:J24)



The final step would be to use INDEX in order to find out the first visible cell in the given range using

=INDEX(Example[Months],G26-ROW(INDEX(Example[Months],1))+1)

	A B C D E	F	G H	I	J
1	First Visible Cell			· · · · · ·	
2	First Visible Cell-Suggest	ed Solutions.x	lsx		
3	Navigator	_			
4	Error Checks:				
5	1 Eirot Visible Coll				
7	1. First visible Cell				
-	Suggested Solutions				
-	Suggested Solutions	Eee			
9		FOR	All versions of Ex	cei	
10					
11	Months	ROW Co	unter OFFSET	SUBTOTAL	IE
13	January	13	0 January	1	13
14	February	14	1 February	1	14
15	March	15	2 March	1	15
16	April	16	3 April	1	16
17	May	17	4 May	1	17
18	June	18	5 June	1	18
19	July	19	6 July	1	19
20	August	20	7 August	1	20
21	September	21	8 September	1	21
22	October	22	9 October	1	22
23	December	23	11 December	1	23
24	December	24	TT December		24
26	MIN				
27	13				
28					
29					
30	INDEX				
31	=INDEX(Example[Months]	D27-ROW(INDEX(Ex)	ample[Months] 1))+1)		
33	-index(example(monuta)		amprofutoriario1, ()), ()		

Putting this all together we get the following behemoth:

=INDEX(Example[Months], MIN(IF(SUBTOTAL(3,OFFSET(INDEX(Example[Months],1),ROW(Example[Months])-ROW(INDEX(Example[Months],1)), 0)),ROW(Example[Months])-ROW(INDEX(Example[Months],1))+1)))

There we have it, did you come up with a better solution? Let us know at contact@sumproduct.com.

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)	Power Pivot, Power Query and Power Bl	19 - 21 Jul 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	26 Jul 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	27 - 28 Jul 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	2 Days
Online (Australia)	Excel Tips and Tricks	29 Aug 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	30 - 31 Aug 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power Bl	28 -30 Sep 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	5 Oct 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	1 Day
Online (Australia)	Financial Modelling	6 - 7 Oct 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power Bl	9 - 11 Nov 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	3 Days

Location	Course	Date	Date	Duration	Duration
Online (Australia)	Excel Tips and Tricks	16 Nov 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	1 Day
Online (Australia)	Financial Modelling	17 - 18 Nov 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power Bl	7 - 9 Dec 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	14 Dec 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	1 Day
Online (Australia)	Financial Modelling	15 - 16 Dec 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	2 Days

### **Key Strokes**

Each newsletter, we'd like to introduce you to useful keystrokes you may or may not be aware of. This month, we look at quick formatting using the CTRL and SHIFT keys:

Keystroke	What it does
CTRL + SHIFT + 0	Show column
CTRL + SHIFT + 1	Fixed decimal and comma format
CTRL + SHIFT + 2	Time (AM/PM) format
CTRL + SHIFT + 3	Date format
CTRL + SHIFT + 4	Currency format
CTRL + SHIFT + 5	Percentage format
CTRL + SHIFT + 6	Exponential format
CTRL + SHIFT + 7	Outline border
CTRL + SHIFT + 8	Select current region
CTRL + SHIFT + 9	Unhide row

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:

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- 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.

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Sydney Address:SumProduct Pty Ltd, Suite 803, Level 8, 276 Pitt Street, Sydney NSW 2000New York Address:SumProduct Pty Ltd, 48 Wall Street, New York, NY, USA 10005London Address:SumProduct Pty Ltd, Office 7, 3537 Ludgate Hill, London, EC4M 7JN, UKMelbourne Address:SumProduct Pty Ltd, Ground Floor, 470 St Kilda Road, Melbourne, VIC 3004Registered Address:SumProduct Pty Ltd, Level 14, 440 Collins Street, Melbourne, VIC 3000

contact@sumproduct.com www.sumproduct.com +61 3 9020 2071