

Have we gone off at a tangent this month?

Our A to Z of Excel Functions seem to think so as we try not to get too acute with our trigonometric functions [*Don't be so obtuse – Ed*]. We wouldn't want to be accused of talking a load of hyperbolics. It's not all functions either, as we also look at how to put a counter or running total in an Excel Table that actually works!

You know we have more to offer than that though, don't you? We're off on the road (again!) with presentations / conferences in Sydney, Melbourne, New York and Toronto. Feel free to come and join us.

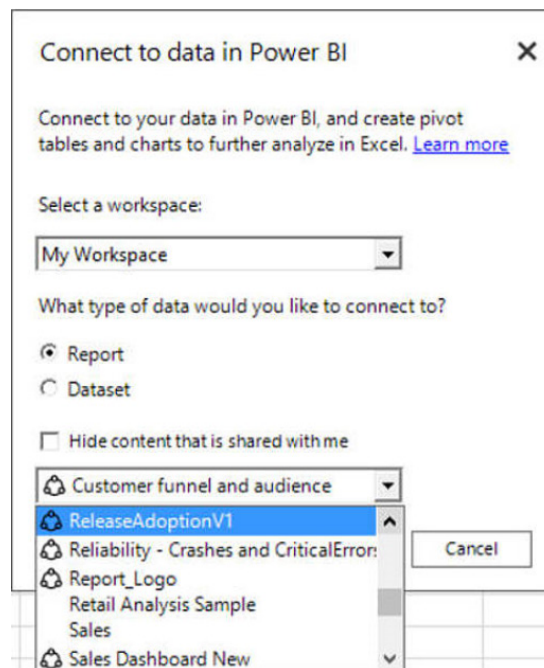
We also have updates on Windows 10, Power BI and ModelOff to go with the usual keyboard shortcuts and continuation of our Outer Limits series. Happy reading!

Until next month.

Liam Bastick, Managing Director, SumProduct



August Update for Power BI Publisher for Microsoft Excel



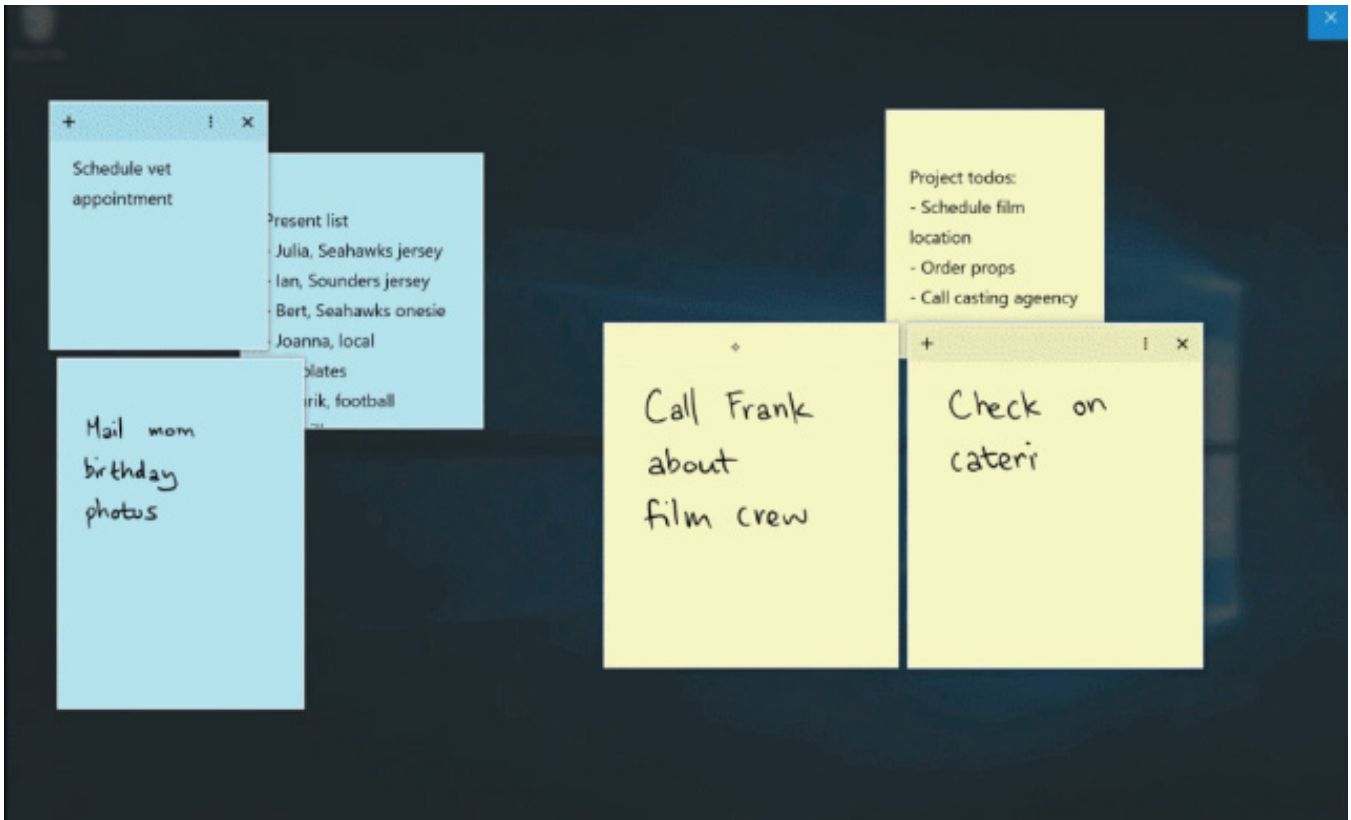
Microsoft has continued its regular updates of Power BI Publisher for Microsoft Excel with its late August update. With this latest release, you can now:

- connect to data in read-only groups
- connect to reports and datasets that were shared with you
- identify shared content easily
- filter out shared content by clicking on the **Hide content that is shared with me** option.

Additionally, this update addresses several known issues and glitches too. You can find out more about Power BI by visiting the dedicated website www.powerbi.com or by dropping us a line at contact@sumproduct.com.

Windows 10 Anniversary Update

We mentioned recently that it was Windows 10's first birthday. Well... it bought itself a present and came up with an "anniversary update".



The Windows 10 Anniversary Update begins rolling out in early August for customers around the world and contains features / improvements with Windows Ink, Cortana, gaming and more:

- **Windows Ink:** available for the first time with this update, Windows Ink lets you quickly and easily take notes, sketch on a screenshot or draw out an idea. You can even use sticky notes! You can learn more about Windows Ink in this blog post [here](#)
- **Improvements to security:** this update brings new improvements to Windows Defender, the free anti-malware service and introduces Windows Hello features for better security with Windows apps and Microsoft Edge (is there any security on this browser presently?) Check out more [here](#)
- **Better Microsoft Edge:** like having a better way to die (!), this update provides power saving improvements to elongate your PC's battery life. There's even Anniversary Update Microsoft Edge Extensions available in the Windows Store, such as Pinterest Pin It Button, Amazon Assistant, Adblock, Adblock Plus and LastPass. Find out more [here](#)
- **Cortana improves:** Cortana will now be available above your lock screen so you can do things like ask questions, play music from your PC or set a reminder without unlocking your device. Cortana can also save and recall key information across your devices. Find out more [here](#)
- **Gamer benefits:** a bit out of scope for our website we know, but just how much Solitaire can you play when the boss isn't looking? Combined with Cortana, more voice commands are becoming available
- **New education features:** now this is where it gets more interesting. Subscribers can enjoy a range of new education features in the Windows 10 Anniversary Update, including faster, simpler set up with all new tools to help educators get up and running quickly and the "Take a Test" app that creates a browser-based, locked down environment for more secure online assessments. To learn more click [here](#)
- **New Skype preview:** Skype Preview for Windows 10 PCs has been redesigned for Windows 10 and will come installed automatically with the Anniversary Update (*yup, something else you won't be able to get rid of...*). You can learn more [here](#).

Microsoft has gone to great pains to emphasise that this Windows 10 Anniversary Update is their most reliable update yet (no comment), with the focus on improvements to help your PC work better and last longer. The Windows 10 Anniversary Update has already started, but if you are the sort of crazy person that can't wait, you can get it sooner by visiting [here](#).

Now, how many IT technicians are presently off to purchase razor blades..?

CAANZ Business Valuation and Forensic Accounting Conference, Melbourne

SumProduct will be presenting *Modelling Techniques for Valuations in Excel* at the Crown Promenade in Melbourne on the afternoon of Tuesday 13 September. We've been lucky enough to have been invited by the Chartered Accountants of Australia and New Zealand (CAANZ) before – and we think we are going back this time to apologise.



Topics to be covered will include:

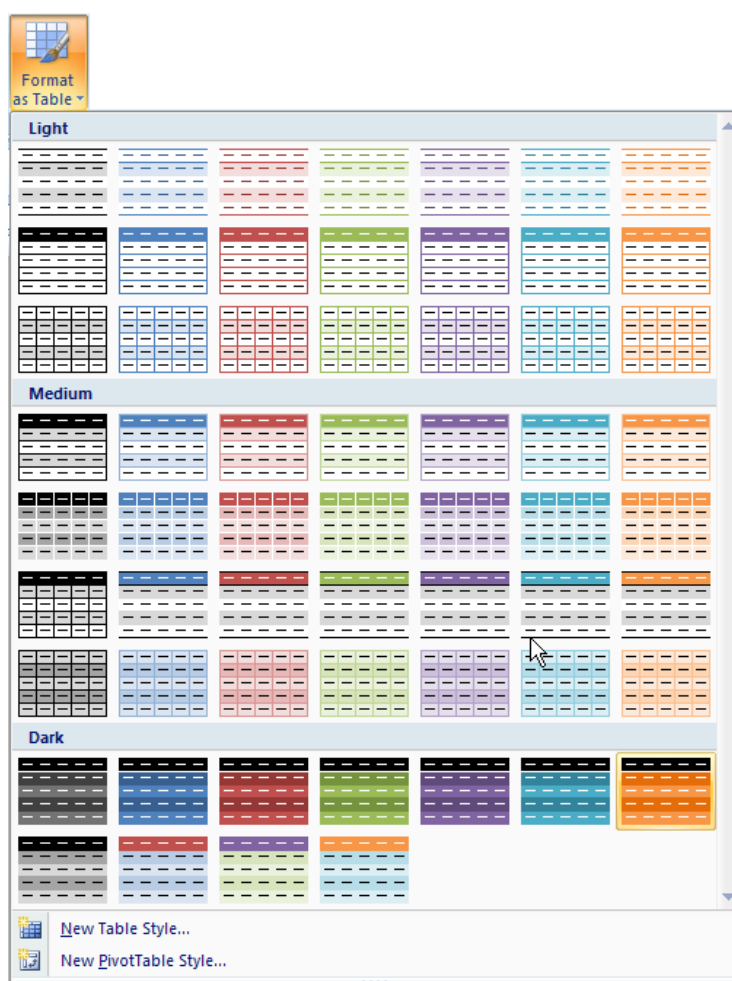
- Why valuations should be developed from first principles and why common functions **NPV** and **XNPV** should be avoided
- The dangers of calculating Internal Rates of Return in Excel using **IRR** and **XIRR**
- Key tips: when to use **MIRR**, **Goal Seek** and **Solver** to assist your analysis
- Introduction to normalising trends objectively using regression tools
- Smoothing out capital expenditure for terminal / annuity value calculations
- What-if analysis of key inputs (e.g. gearing, betas) using Data Tables, scenario tables, sensitivities and simulations analysis (no VBA required)
- Understanding key drivers of valuation using tornado charts and waterfall charts.

This is not Death by PowerPoint: it might be Death by Liam's jokes though. This will be a practical, hands-on half day tour of how to undertake more sophisticated analysis using an everyday Excel spreadsheet. If you are in the area, bring a laptop, a version of Excel and a sense of adventure. In return, you will be provided with examples to take away and apply back in the real world.

You can register for this event at www.charteredaccountants.com.au/busvalconference/Pricing-and-Registration.

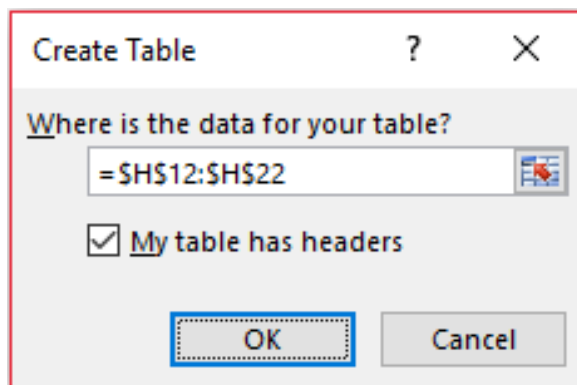
Running Totals and Counters in Tables

Creating a Table in Excel 2007 and later versions is straightforward, and simply requires the user to select the data to be used in the Table. You do not even need to select the whole range: Excel will prompt for the whole Table even if only one cell is selected (PivotTable creation works similarly). Next, from the Ribbon, in the 'Styles' group of the 'Home' tab, click on the button that says 'Format as Table':



After clicking this button, Excel shows a new user interface element called a gallery, with a number of formatting choices for your Table, as displayed above. New styles may be created by selecting 'New Table Style...' if required.

After one of the formats has been chosen, Excel will prompt the user regarding which cells are to be converted to a Table:

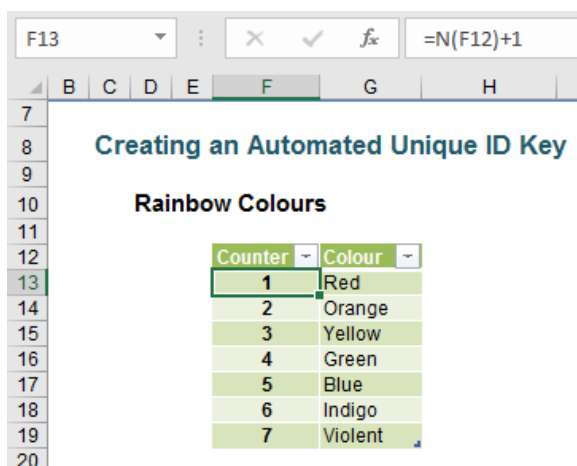


If the Table contains a heading row, ensure that the 'My table has headers' checkbox is checked. Click 'OK' to convert the range to a Table. The keyboard shortcut **CTRL + T** will have the same effect without allowing you to choose the formatting.

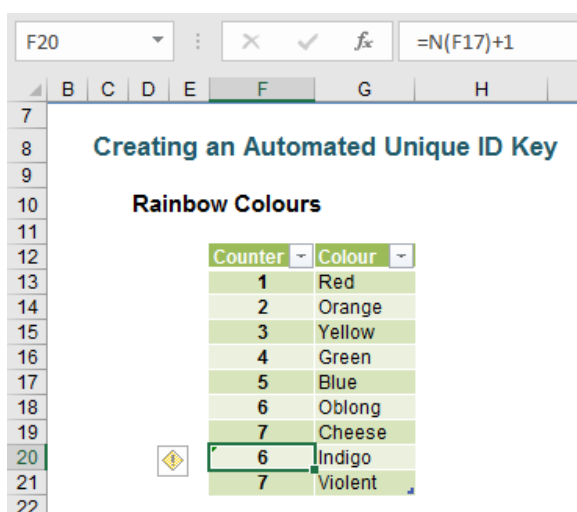
Tables have various useful functionalities, one such being the filtering which was done in lists in Excel 2003 and earlier versions. For example,

provided the Table has a header row, it will always have in-built filter and sorting, which can be readily accessed from this top row.

A Table will automatically resize to accommodate additional rows and / or columns, provided that data is entered in a cell immediately after the last column or row. If a formula is entered in the first cell for a given field, it will propagate throughout the column, *e.g.*



This example adds one to the value in the cell above; the **N()** function simply treats text as zero rather than generate an **#VALUE!** error. It seems to look fine. The problem occurs when rows are inserted into the Table:



Do you see what has happened? The formulae after the insertion point continue as if the added rows never occurred. It is very easy to miss this in practice and this can cause errors in reports *etc.* It needs to be avoided.

There are various solutions, **INDEX()** is of the most flexible:

The screenshot shows an Excel spreadsheet with the following data:

Counter	Colour
1	Red
2	Orange
3	Yellow
4	Green
5	Blue
6	Indigo
7	Violet

A little explanation:

- The **ROWS()** function simply counts the number of rows in a range. In this instance the range is denoted by **INDEX([Colour],1):[@Colour]**. This syntax may vary slightly depending upon whether you are using Excel 2007 or Excel 2010 and later versions.
- In Excel 2010 and later, **[Colour]** denotes the range **G13:G19** in our example (highlighting this range will cause **[Colour]** to appear).
- **INDEX([Colour],1)** means take the first cell reference in the range. This is cell **G13** in our example and it essentially anchors this cell, *i.e.* it is the equivalent of **\$G\$13**.
- **[@Colour]** in Excel 2010 and later is generated whenever a formula refers to a cell in the field **[Colour]** in the same row as the formula, so in cell **F13**, the reference **[@Colour]** is referring to the variable in cell **G13**.
- In essence, the Table formula is calculating **=ROWS(\$G\$13:G13)** – but in a way an Excel Table can understand.
- In Excel 2007, Table formula syntax was different:

The screenshot shows an Excel spreadsheet with the following data:

Counter	Colour
1	Red
2	Orange
3	Yellow
4	Green
5	Blue
6	Indigo
7	Violet

Rainbow_Colours refers to the name of the Table in this example.

This formula may appear to be more cumbersome and convoluted but it does do the trick as adding rows will attest:

The screenshot shows an Excel spreadsheet with the following data:

Counter	Colour
1	Red
2	Orange
3	Yellow
4	Green
5	Blue
6	Gerbil
7	Cucumber
8	Indigo
9	Violet

It doesn't take much to extend this idea. Counters are very important in order to automatically generate row identifiers, but running totals can be useful too (simply swap the **ROWS()** function for the **SUM()** function):

The screenshot shows an Excel spreadsheet with the following data:

Counter	Cumulative Total
1	1
2	3
3	6
4	10
5	15
6	21
7	28
8	36
9	45
10	55

The formula bar shows: `=SUM(INDEX([Counter],1):[@Counter])`

If you only want to sum the visible rows, that's easy too:

The screenshot shows an Excel spreadsheet with the following data:

Counter	Cumulative Total	Visible Cumulative Total
1	1	1
2	3	3
4	10	7
8	36	15
10	55	25

The formula bar shows: `=SUBTOTAL(9,INDEX([Counter],1):[@Counter])`

It's the same idea over and over again though.

You can find out more about Tables and other functions at www.sumproduct.com/thought.

The A to Z of Excel Functions: ACOS

The **ACOS** function returns the arccosine, or inverse cosine, of a given **number**. The arccosine is the angle whose cosine is **number**. The returned angle is given in radians in the range 0 to pi. The syntax is very simple even if the principle is a little tangential (get it?):

=ACOS(number)

Here's an example:

	A	B	C	D
1	Inputs	Formula	Result	Description
2	0.5	=ACOS(A2)	1.047197551	Arccosine of 0.5 radians (2*pi/3)
3	0.5	=ACOS(A3)*180/PI()	60	Arccosine of 0.5 in degrees
4	0.5	=DEGREES(ACOS(A4))	60	Arccosine of 0.5

And while we are at it...

The A to Z of Excel Functions: ACOSH

This function returns the inverse hyperbolic cosine of a **number**. The inverse hyperbolic cosine is the value whose hyperbolic cosine is number, so **ACOSH(COSH(number))** equals **number**. Sounds like we will need to do an article on **COSH** in the near future!

The syntax only has one argument:

=ACOSH(number)

Here's an illustration:

	A	B	C	D
1	Inputs	Formula	Result	Description
2	3	=ACOSH(A2)	1.762747174	Inverse hyperbolic cosine of 3
3	45	=ACOSH(A3)	4.499686191	Inverse hyperbolic cosine of 45
4	150	=ACOSH(A4)	5.703771363	Inverse hyperbolic cosine of 150

Provided you follow the syntax and choose a number greater than or equal to 1, you can't go wrong!

Just like buses, they keep coming...

The A to Z of Excel Functions: ACOT

Now we know what you are thinking, the syntax for this function should be ACOT(baby), but it isn't that type of arrangement. Instead, this function returns the principal value of the arccotangent, or inverse cotangent, of a **number**.

Like many of these angular functions (e.g. the two above), the syntax requires only one argument:

=ACOT(number)

Its argument:

- **number**: the number is the cotangent of the angle you want. This must be a real number.

Some other things to remember:

- the returned angle is given in radians in the range 0 (zero) to pi
- if the number is a non-numeric value, **ACOT** returns the #VALUE! error value
- uses the **DEGREES** function or multiply by 180 divided by **PI** to convert the result from radians to degrees.

	A	B	C	D
1	Inputs	Formula	Result	Description
2	5	=ACOT(A2)	0.19739556	The arccotangent of 5, in radians
3	20	=ACOT(A3)	0.049958396	The arccotangent of 20, in radians
4	67	=ACOT(A4)	0.014924265	The arccotangent of 67, in radians

And last but not least for now...

The A to Z of Excel Functions: ACOTH

This **ACOTH** function returns the inverse hyperbolic cotangent of a number, which is defined as

$$\coth(N) = \frac{1}{2} \ln\left(\frac{x+1}{x-1}\right)$$

The syntax for this Excel function is as follows:

=ACOTH(number)

Arguments:

- **number**: the absolute value of **number** must be greater than 1.

Some things to remember:

- the hyperbolic arccotangent is an analogue of the ordinary (circular) arccotangent
- if **number** is less than 1, **ACOTH** returns the #NUM! error value
- if the absolute value of **number** is less than 1, **ACOT** returns the #VALUE! error value.

Please see an example below:

	A	B	C	D
1	Inputs	Formula	Result	Description
2	10	=ACOTH(A2)	0.100335348	Returns the hyperbolic arccotangent of 10
3	79	=ACOTH(A3)	0.012658904	Returns the hyperbolic arccotangent of 79
4	100	=ACOTH(A4)	0.010000333	Returns the hyperbolic arccotangent of 100

That's plenty for now!

The Outer Limits, Episode 3



There is nothing wrong with your computer. Do not attempt to adjust the Excel settings. Microsoft is now in control of the transmission. They control the horizontal and the vertical. They can deluge you with a thousand errors, or expand one single cell to crystal clarity and beyond. Excel can shape your vision to anything your imagination can conceive. For the next paragraph, Excel will control all that you see and hear as we take you to the Outer Limits of Excel.

Is the introduction wearing thin yet? One question we often get asked is about the limitations and specifications of Excel. In this third part of our five-part series, this month we look at worksheet and workbook specifications and limitations.

Feature	Maximum Limit
Adjustable cells in Solver	200
Changing cells allowed in Scenario Manager	32
Characters in a header or footer	255
Colours in a workbook	16 million colours (32 bit with full access to 24 bit colour spectrum)
Column width	255 characters
Conditional formats	Limited by available memory
Custom functions	Limited by available memory
Custom number formats in a cell	4 (positive, negative, zero and text) or 3 (two conditions and a remainder)
Fields in a data form	32
Fill styles	256
Hyperlinks in a worksheet	66,530 hyperlinks
Items displayed in filter drop-down lists	10,000 from Excel 2007 onwards; 1,000 previously
Line styles	256
Line weight	256
Linked sheets	Limited by available memory
Named views in a workbook	Limited by available memory
Names in a workbook	Limited by available memory
Non-contiguous cells that can be selected	2,147,483,648 cells, although if you selected one cell a second at that rate, it would still take you slightly over 68 years without eating, drinking or sleeping! However, note that you may only select a maximum of 2,048 separate ranges
Number formats in a workbook	Between 200 and 250, depending upon the language version of Excel installed
Open workbooks	Limited by available memory and system resources
Page breaks	1,026 horizontal and vertical
Panes in a window	4
Reports	Limited by available memory
Row height	409 points
Scenarios in Scenario Manager	Limited by available memory; a summary report shows only the first 251 scenarios
Sheets in a workbook	Limited by available memory (default is 3 sheets in Excel 2007 onwards; 16 previously)
Sort references	64 in a single sort; unlimited when using sequential sorts
Total number of characters that a cell can contain	32,767 characters
Undo levels	100
Unique cell formats/cell styles	64,000
Unique font types	1,024 global fonts available for use; 512 per workbook
Windows in a workbook	Limited by available memory
Workbook parameters	255 parameters per workbook
Worksheet size	1,048,576 rows by 16,384 columns
Zoom range	10% to 400%

Give the New Excel API a REST

Early August has seen the Microsoft Excel team announce the general availability of the Microsoft Excel REST API for Office 365. You will be able to take a REST from now and never work again. Er no, that's apparently not how it works.

This new Microsoft REST API for Office 365 can extend the reach and value of your data, calculations, reporting and dashboards as the software manufacturers strive to make Office an open platform for developers. Given that the Office developer framework uses many of the current web development standards, developers can build smarter apps that operate as part of Office on mobile, web and desktop platforms.

Suggested practical examples of how developers may use the new tool include:

- as a calculation service (e.g. a mortgage calculator)
- as a reporting service (e.g. create Dashboards - isn't that what Power BI is for? - or analyse large data sets)
- as a data service to track and store data.

For more information, check out the Microsoft blog blogs.office.com and associated examples dev.office.com/excel/rest. Should you require assistance, don't hesitate to drop us a line at contact@sumproduct.com - we're only too happy to help too.

Running Totals and Counters in Tables

Is it that time of year again already? ModelOff has recently announced the dates for the 2016 ModelOff "World Championship", with Round 1 kicking off on Saturday 22 October this year.

We still think it's slightly aimed at the aggressive end of financial modelling (effectively, have you tried coding with boxing gloves?), this competition purports to find the champion financial modeller of 2016. It seeks out a combination of (arguably some subjective) financial modelling, accounting, mathematical and statistical skills with an emphasis on speed, aimed at young professionals / students (that rules us out then).

Nevertheless, it would be churlish not to mention anything that advances the cause of financial modelling recognition and makes one lucky



Maybe this year's winner..?

entrant a little richer. For more information on registering, please visit the ModelOff website (www.modeloff.com/register/). For modelling tips and tricks in the meantime, keep checking out our Thought section (www.sumproduct.com/thought) and our Excel Tip of the Day (located at the bottom of our home page, www.sumproduct.com).

SumProduct's very own Liam Bastick was at the wash-up dinner in London last year and you never know, one of us might be there again this year (we're working on it!).

Global Training Camps



And while we are on the subject of ModelOff, we've mentioned their Global Training Camps before, aimed at technical training development programs for young and emerging business leaders.

These camps feature training sessions on Advanced Excel for Business Analysis and Decision Making by the Microsoft Excel Development Team – and we have managed to tag along for the ride. This year, there are global training programmes in Sydney, Toronto, New York, Hong Kong and London.

We'll be there (subject to final confirmation) in Sydney (1-2 Sep), Toronto (22-23 Sep) and New York (6-7 Oct) (we're still hoping to grab a spot in London too). Microsoft MVP Liam Bastick will be presenting sessions on Power BI and Excel Tricks and Tips.

Please note this is subject to final confirmation which is not available at the time of publishing this newsletter. If you require confirmation, please drop us a line at contact@sumproduct.com nearer the relevant dates.

On the Road – North East America

Further to our excursions elsewhere, SumProduct is pleased to announce a big marketing / meet and greet spree in both New York and Toronto in mid to late September. If you'd like us to drop in on you and explain how we can help your business with consulting, training and review services, we'd be delighted to come and see you.

To arrange a mutually convenient time, drop us a line at contact@sumproduct.com.



Upcoming SumProduct Training Courses

Location	Course	Date	Duration
Sydney	Power of Power Pivot	19th - 20th Sept 2016	2 days
Melbourne	Power of Power Pivot	4th - 5th Oct 2016	2 days
Perth	Financial Modelling	10th - 11th Oct 2016	2 days
Brisbane	Financial Modelling	20th - 21st Oct 2016	2 days
Darwin	Excel Tips and Tricks	9th Nov 2016	1 day



Referral Programme

Have you heard about the SumProduct Referral programme? If you successfully introduce us to a client we will pay you 10% of the net profits of the engagement won upon receipt of client payment. Sounds like a pretty good deal to us!

Terms and conditions apply. Referrer must be over 18 years of age, able to issue an invoice and not be an employee, director, agent or other related party of the client engaged. For further information, drop us a line at contact@sumproduct.com. We hope to hear from you!

Key Strokes

Each newsletter, we'd like to introduce you to useful keystrokes you may or may not be aware of. This month we decided we'd look at the F1 function key (it doesn't make you go faster...):

Keystroke	What it does
F1	Help
ALT + F1	Insert Chart as an object on the sheet (<i>Excel 2007 onwards</i>)
CTRL + F1	Show / hide Ribbon (<i>Excel 2007 onwards, obviously!</i>)
SHIFT + F1	What Is... (Help)
SHIFT + ALT + F1	Insert new sheet
CTRL + ALT + F1	Insert new macro sheet

There are over 540 keyboard shortcuts in Excel. For a comprehensive list, please download our Excel file a www.sumproduct.com/thought/keyboard-shortcuts. Also, check out our new daily **Excel Tip of the Day** feature on the www.sumproduct.com homepage.

Our Services

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

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

If you require modelling assistance of any kind, please do not hesitate to contact us at contact@sumproduct.com.

Link to Others

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

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

Any Questions?

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

Training

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

Check out our more popular courses in our training brochure:



Drop us a line at training@sumproduct.com for a copy of the brochure or download it directly from <http://www.sumproduct.com/training>.