We seem to have accrued interest... our A to Z of

Excel Functions both on the web and in last month's newsletter. So we've decided to add another two this time in our new regular feature, both looking at interest accrued. At our current rate of production, you should have the full set of functions by October 2043.

But there's more. We draw attention to a key ruling in the US that will have knock-on effects the world over – maybe smaller clients with sensitive data can use the cloud after all. Mind you, what's going on in the law courts of the world pales into insignificance compared with the über-influence of Pokémon Go: we thought we'd better take a look at it and its impact upon Excel (hey, there's a bandwagon over there – let me jump on it!). There's also mention of an improvement to PivotTables in the latest version of Excel and we introduce you to a new monthly blog challenge (we're open to suggestions for future questions!).

With the usual keyboard shortcuts and continuation of our A to Z of Excel Functions and Outer Limits series, hopefully there is something of interest to both our readers ☺

Until next month.

Liam Bastick, Managing Director, SumProduct

Microsoft Wins Data Privacy Appeal

Mid-July saw a US appeals court rule that the US government could not force Microsoft to give authorities access to the firm's servers located in other countries. This overturned an order previously granted by a court in Manhattan back in 2014.

A test case had been brought by the US Department of Justice, who had wanted to access a server in Ireland, as part of an investigation into a drugs case. The Department of Justice is said to be disappointed by the decision reversal and "...was considering what it would do next". If it appeals, the case could then move to the US Supreme Court.

Microsoft said it welcomed the ruling and thanked the companies that had backed its appeal, which included the likes of Amazon, Apple and Cisco. The decision is being seen as a precedent for protecting the privacy of cloud computing services.

This is particularly pertinent to SumProduct and our clients as many are considering cloud services for applications like Excel Online, Power BI, OneDrive and so on. Many clients have been hesitant to embrace a beneficial technology where data stored on Microsoft services may be viewed without company consent.

It's likely this case will rumble on a while longer, but hopefully, companies will become more trusting of the cloud. If you want to discuss how this ruling may assist your company in sharing files, creating dashboards and storing data in a secure cloud environment, feel free to drop us a line at contact@sumproduct.com.

Go Pokémon Go!

Well we might as well jump on the bandwagon – everybody else has!

Those of us in cities all around the world have probably noticed a change on the streets. A new breed of inhabitants has popped up on every street corner, like deer in headlights (sometimes literally) as they find themselves caught… by drivers, cyclists and other pedestrians frantically weaving out of the way to avoid the people with their eyes glued to their phones. Pokémon Go mania has hit the towns!

If this picture means nothing to you, you either don't have kids, or you grew up before the '90s.

What is Pokémon Go all about?

For those who have never played any Pokémon game and aren't familiar with the cartoon series, the goal in Pokémon is generally to catch all of the Pokémon available. Those Pokémon can be evolved to make them stronger, allowing you to send them off to battle with other people's Pokémon. Wait, when was slavery made illegal again..? *(Ed: Er, it's always been illegal…)*

Pokémon Go has evolved the basic concepts into an open-world game that allows you to find Pokémon in the real world using their Augmented Reality software to pair the game up with a smartphone camera. If you haven't seen the pictures all over Facebook, Twitter, Instagram, Snapchat, LinkedIn or whatever other social media or news presence you use, then I congratulate you for successfully having had your head in the ground for the last two to three weeks.

Is that a Doduo with only one head? A Dosolo, maybe?

What does this have to do with us?

We appreciate that it is a collaborative crowd-based game and there are precious few instructions in the game on what actually happens when you accumulate "candies" in the game to evolve your Pokémon. For those who don't play the game, each Pokémon that you catch has a certain rating ("CP") that represents its Combat Power. When you evolve a Pokémon, its CP is scaled up by a multiplier, making it more powerful. How much exactly is a bit of a mystery. This sounds like a forecasting problem, and we know how useful Excel can be when we're forecasting!

Excel, Power Query and Google Docs

An ambitious user on the site Reddit has crowdsourced data on evolutions to estimate what the evolution multipliers might be. CarlitoCarlin has put together a sheet on Google Docs and set up a form for the world to enter data in. Obviously, this means that the data coming out of it is subject to concerns around data quality, but it gives us a starting point to work with.

If you weren't aware, you can use Power Query in Excel to connect to a Google Document that has been shared. This gives us the ability to reach out to the internet, download the data that CarlitoCarlin has generously assembled for us, and import them into an Excel spreadsheet that we can easily use on our computer, or download to our phone.

Using the data on multipliers, we have created an easy-to-use spreadsheet that will allow you to input what your current levels of Pokémon candy and CP are for the ones you want to test, and calculate for you:

- How many additional Pokémon of that type you need to catch in order to evolve it (are you still saving up for that Gyarados..?)
- How powerful the Pokémon you evolve is likely to be
- If you have multiple stages of evolution, whether you will get a higher level by evolving the base Pokémon, or by evolving the first evolution
- If you don't trust the numbers coming out from Reddit, you can enter your own multipliers and see how they change the results.

So you get four candy effectively per catch… I need to catch how many fish exactly…!?

To download the calculator, click on the link here.

So if you're busy catching them all, but you're not sure whether to hold or transfer your Pokémon, have a go with our calculator and work out what you need to take down the Pokémon Gym down the street. But just remember, we would echo the developer, Niantic, in asking people to please keep your eyes up and open and stay aware of your surroundings!

If you're keen to know how to build a similar calculator of your own, everything we use from conditional formatting to Power Query is covered in our training courses. Feel free to drop us a line at contact@sumproduct.com or training@sumproduct.com if you want to know more!

Faster PivotTables for Excel 2016

PivotTables are now faster for those working in Excel 2016 with connections to Online Analytical Processing (OLAP) servers, either directly to an OLAP server or through a collection of data tables with relationships - known as a Data Model - in Excel. The recent Microsoft update contained several query and cache improvements:

- **Improved query efficiency:** Excel will query for subtotals only if they are needed to render the PivotTable results. This means less of a wait for the OLAP server to finish processing the query and for the results to transfer over your network connection;

- **Reduced the number of queries required:** Excel is smarter when refreshing your data. It now uses the LAST_SCHEMA_UPDATE property of a connection to limit schema requests to those times when it has actually changed; *and*

- **Smarter caches:** When the schema is retrieved, it is now shared across all of the PivotTables on that connection, further reducing the number of queries.

For more information on PivotTables, check out our Thought article here (please link to https://www.sumproduct.com/thought/pivotal-pivottables) or drop us a line at contact@sumproduct.com.

July Power BI Updata

That's not a typo.

With last month's release of Power BI publisher for Excel, ***Analyze in Excel*** has become easier to use and can now be initiated directly from Excel using the Power BI publisher. With this release, there's no longer any need to download .odc files or to manually install the *OLE DB* drivers. If you install the latest version of Power BI publisher for Excel, you can simply use Connect to Data from the Power BI Ribbon tab in Excel instead.

With Power BI publisher for Excel you are now able to utilise Excel connection to Power BI further:

- As mentioned above, there is no need to install the *AS OLE DB* drivers and keep them updated manually; with this latest release they are built in with Power BI publisher for Excel and automatically updated with Power BI publisher's updates

- No more downloading of *.odc* files to create the connections and PivotTables; Power BI publisher creates the connection and the PivotTable automatically

- You can now create multiple connections and PivotTables in the same workbook.

After signing in to Power BI and installing the July update of Power BI publisher for Excel, open Excel and go to the Power BI Ribbon tab.
Click 'Connect to Data' *viz*.

You'll see the following dialog, which lets you select the source data to connect to in Power BI. You can connect to Power BI reports or datasets using the following dialog box:
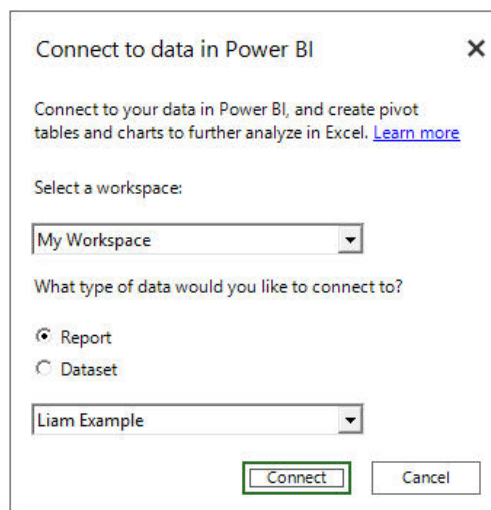
After you select the workspace and the report or dataset, just press the 'Connect' button and you're done. You may now analyse with a PivotTable connected to your data in Power BI. The connection is live, meaning that each interaction on the PivotTable will initiate a query to Power BI to get fresh data.

To find out more about PivotTables, please refer to our Thought article here (please link to https://www.sumproduct.com/thought/pivotal-pivottables). For more on this Power BI update, please connect to the Microsoft link here (please refer to https://powerbi.microsoft.com/en-us/blog/analyze-in-excel-from-power-bi-publisher-july-update/).

Final Friday Fix

Regular readers of our newsletters may know that we have an end of year Christmas Quiz in conjunction with the Chartered Institute of Management Accountants (CIMA). These quizzes tend to be popular for two reasons:

1. Many of our readers like to challenge themselves in Excel and see if they can figure out how to get Excel to perform certain tasks / calculations. Some of these puzzles have been a little devious and I know this appeals to analysts of all ages, shapes and sizes

2. There's cash prizes!!

Well, we thought we'd start a new thread in these blogs. Back on Friday 29 July (the "final Friday" of the month), we set our first "for fun" Excel challenge for you and your colleagues to puzzle over so that you can get your "Excel fix". Challenge your cohorts to see who can solve the puzzle quickest. There's no prizes at this stage, you're playing for bragging rights only!

We'll provide one suggested solution on the Monday after the Friday which you can all argue over as to why it's a really rubbish solution – but you are free to send in your answers (if it's better, we'll use that and pretend it was ours in the first place).

We're open to suggestions as well. If you have an Excel brainteaser, feel free to share it at contact@sumproduct.com. You don't even have to know the answer. Spread the word and watch this space. Remember, if you find yourself addicted to solving these puzzles each final Friday, it means you don't have enough work to do…

Power Query / Get and Transform – July Updates

Late July saw Microsoft announce 12 new data transformation and connectivity features. These updates are available as part of an Office 365 subscription, or if you have Excel 2010 or Excel 2013 you can also take advantage of these updates by downloading the latest Power Query for Excel add-in (please see the foot of this article for details).
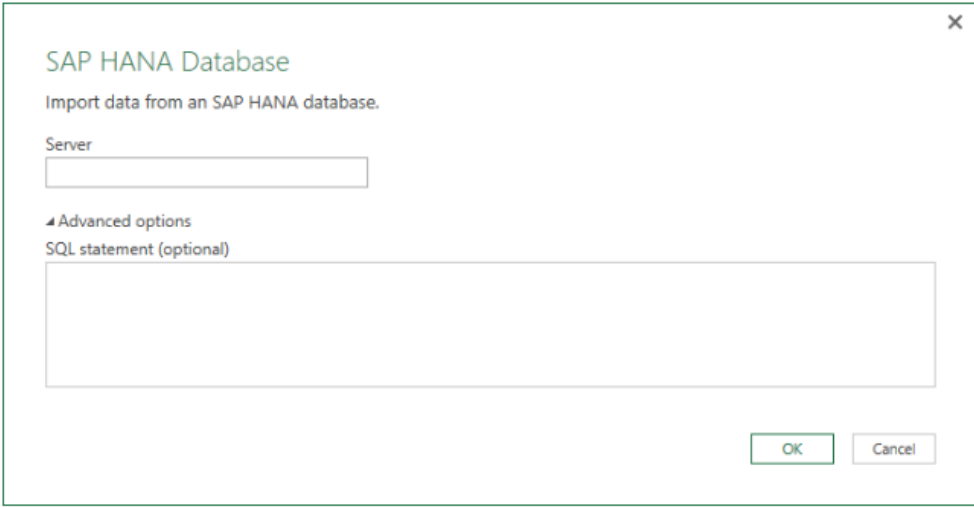
These updates include the following new or improved data connectivity and transformation features:

- New SAP HANA connector
- New SharePoint Folder connector
- New Online Services connectors category
- Improved DB2 connector, now leveraging the Microsoft driver for IBM DB2
- Improved Text/CSV connector, now exposing editable settings in the preview dialog
- Improved relational database connectors, now including Schema information as a part of the Navigation hierarchy
- Data Source Settings enhancements, including "Change Source" capability
- Advanced Filter Rows dialog mode within the Query Editor
- Inline Input controls for Function invocation within the Query Editor
- Support for reordering Query Steps within the Query Editor by using drag and drop gestures
- Date picker support for input Date values in Filter Rows and Conditional Columns dialogs
- New context menu entry to create new queries from the Queries pane within the Query Editor.

Let's take a brief look at each in turn.

1. New SAP HANA Connector

A new connector has now been added to allow users to import data from SAP HANA databases. This new connector can be found under **Data > New Query > Database** category, or from the Query Editor window.


2. New SharePoint Folder Connector

Available under **Data > New Query > File** category, this new SharePoint Folder connector enables users to import data from multiple files within a SharePoint folder, similar to how the existing Folder connector enables users to import and combine multiple files from a filesystem folder.
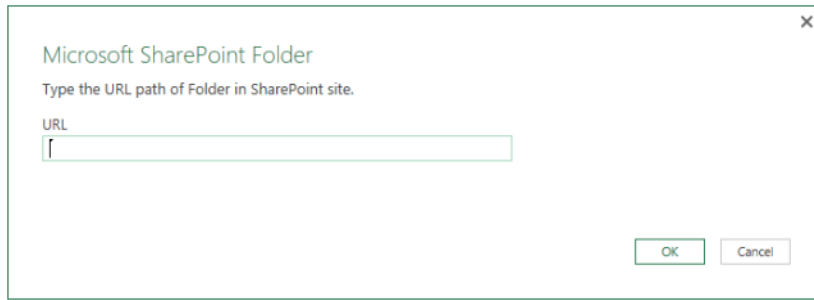
3. New Online Services Connectors Category

With this July update, a new category has been added that includes all available connectors for Online Services in Excel. This new category is available under **Data > New Query > Online Services** or from the Query Editor window.
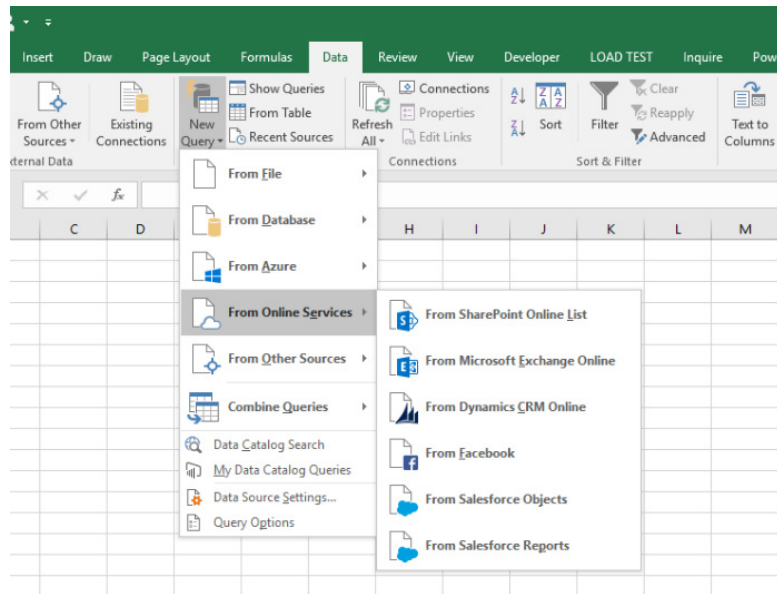
4. Improved DB2 Connector

In this release, the IBM DB2 connector has been improved to provide users the choice to leverage the Microsoft driver for IBM DB2, which is also automatically included in the Excel/Power Query installation. Within the IBM DB2 connector dialog, users can now select which driver to use under the Advanced options.
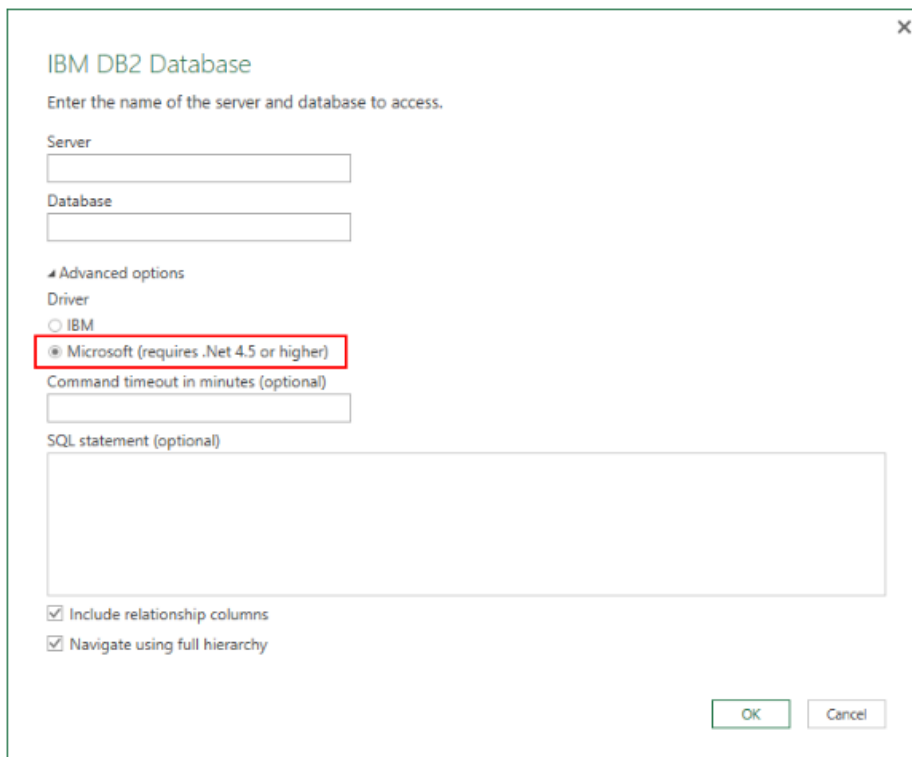
5. Improved Text / CSV Connector

The Text and CSV connectors have been upgraded so that users may configure basic import settings from within the preview dialog. These import settings include:

- File Origin

- Delimiter

- Detect Data Type (strategies include: Base on top 200 rows, Base on entire dataset or No data type detection).

Based on user choices, the preview in this dialog automatically updates. Users can then decide whether to directly load the data or edit first to apply additional data transformations.
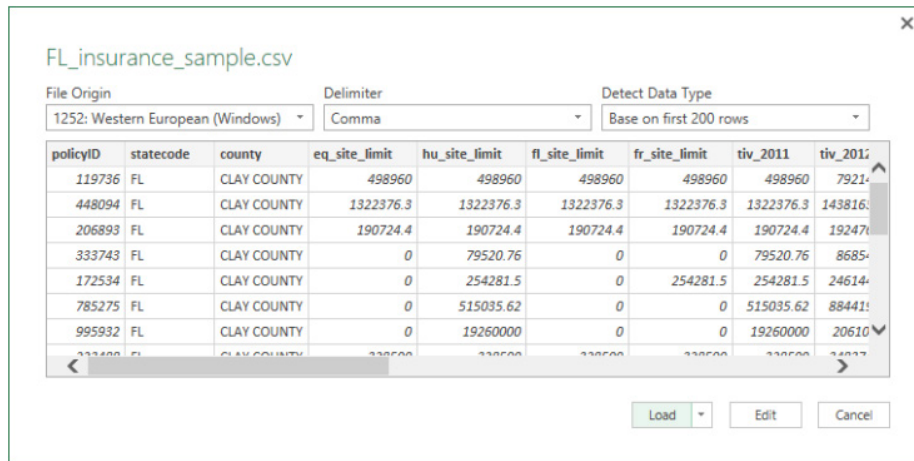
## 6. Improved Relational Database Connectors

In this update, the database connectors have been enhanced to expose an option that allows users to include Schema information as part of the Navigation hierarchy. This option is available under the Advanced option in all database connector dialogs, such as the SQL Server Database dialog below:
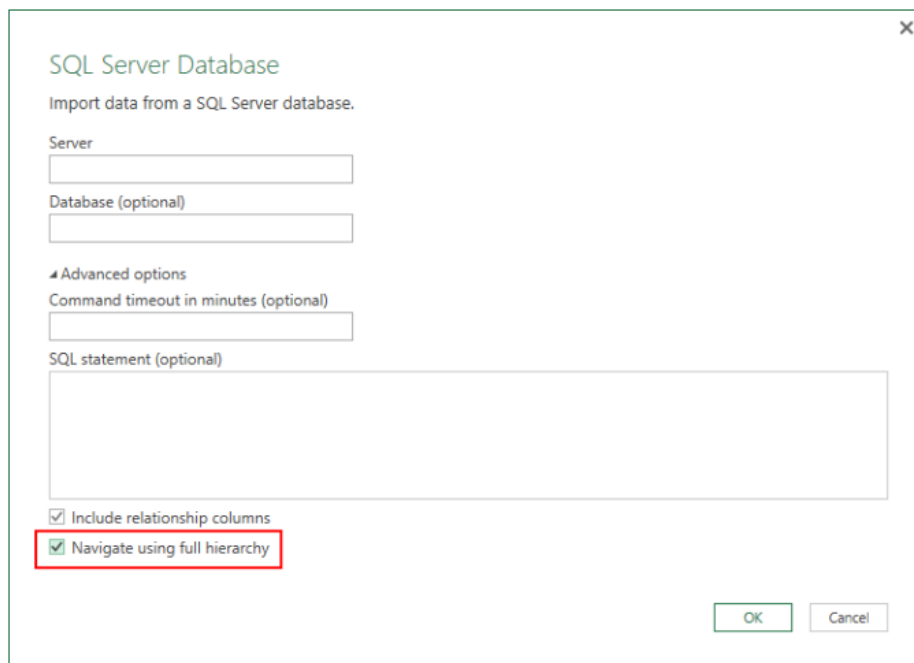
7. Data Source Settings enhancements

Users can now easily update the location of a data source for all queries connected to that data source within a single Excel workbook. Before this update, you had to update the data source location for each of the queries connected to the source. This new solution allows users to do this in a single step (yay!).

Within the Data Source Settings dialog (**Data > New Query > Data Source Settings**), there is a new Current Workbook scope option, which allows users to limit the list of displayed data sources to only those that are used in the current file. From this view, the users can modify credentials, privacy levels and other settings for that data source, or use the Change Source option to modify the location for that data source.
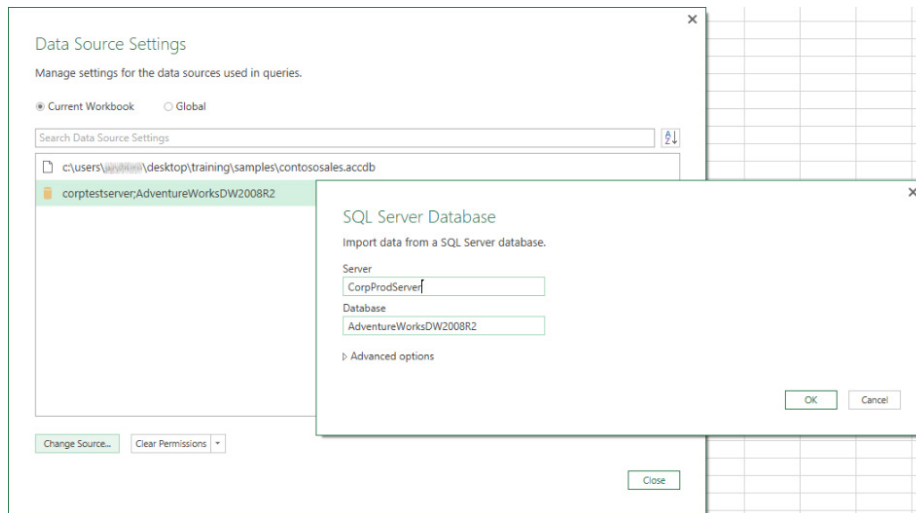
8. Advanced Filter Rows Dialog Mode within the Query Editor

There's a new mode in the Filter Rows dialog within the Query Editor. This new feature allows users to add multiple filter clauses within a single Filter Rows step (before this update, only one or two clauses were allowed) and also combine filter clauses based on multiple columns (before, all clauses were applied to a single column).
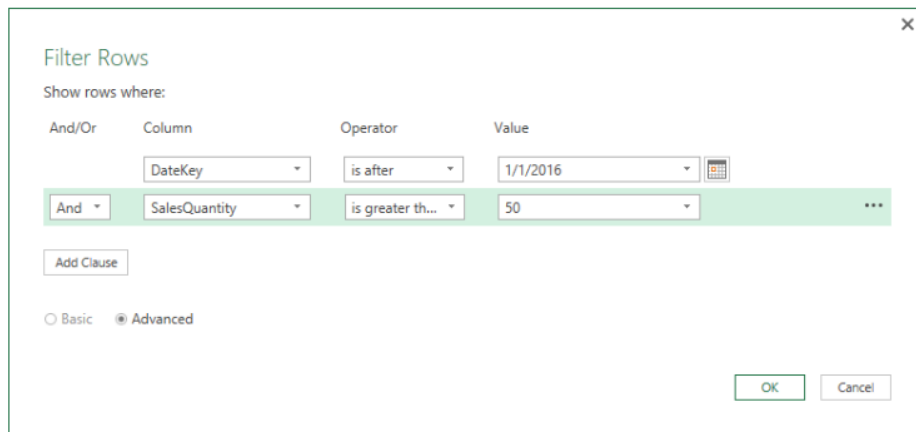
9. Inline Input Controls for Function Invocation within the Query Editor

The inline preview for functions within the Query Editor dialog has been improved to allow input values for function invocation. The new Enter Parameters section in the inline function preview is available for both "out of the box" functions (M Engine functions) as well as user-defined functions.
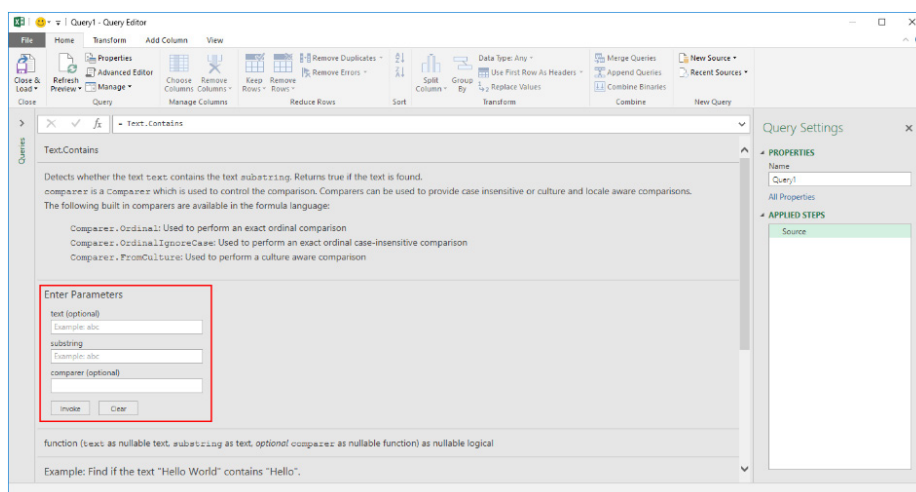
10. Support for Reordering Query Steps within the Query Editor by Using Drag and Drop Gestures
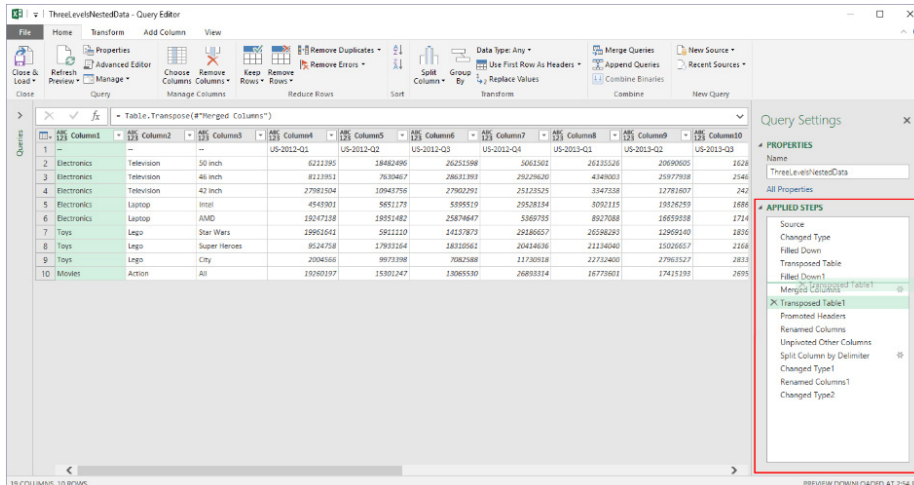
Now you're talking. For all the mouse users out there, Microsoft now supports reordering of Query Steps within the Query Editor by using drag and drop gestures. This can be done for each query via the Applied Steps section in the Query Editor.

11. Date Picker Support for Input Date Values in Filter Rows and Conditional Columns Dialogs

In this update, you may now leverage a Date picker control to provide input Date values in the Filter Rows and Conditional Columns dialogs.
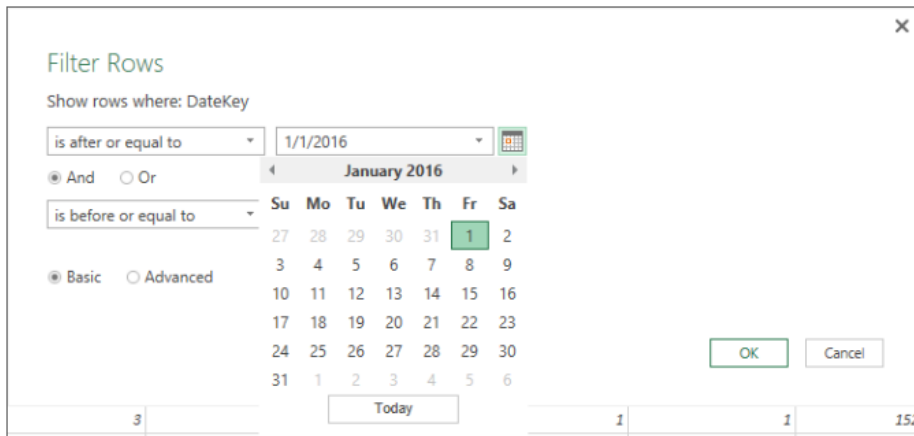
12. New Context Menu Entry to Create New Queries from the Queries Pane within the Query Editor

You can now add a new query in the Queries pane within the Query Editor when you right-click in the background of the pane or in a query group node. This allows a more intuitive experience for adding new queries when working in the Query Editor pane. Also, when you right-click a query group, the new query is added to the selected group.
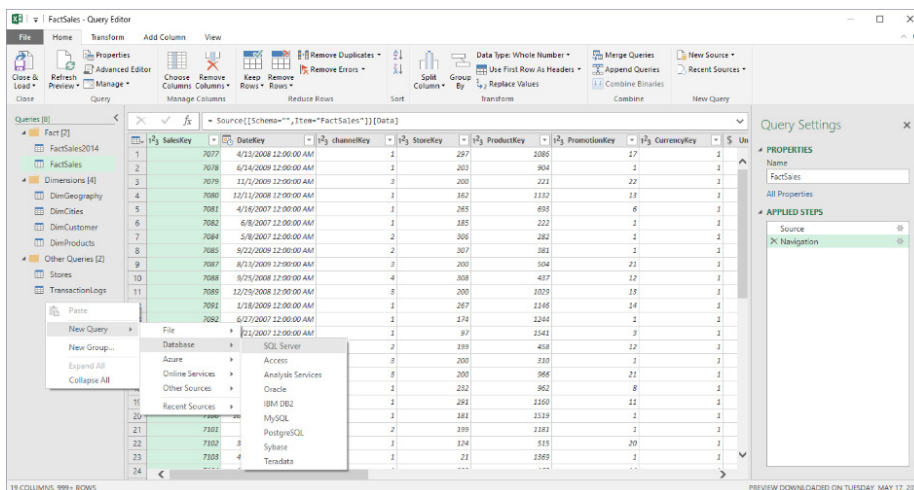
Power Query (for Excel 2010 and Excel 2013) and Get and Transform (for Excel 2016) is getting more and more powerful each month. If you haven't already played with this data manipulating tool, you should get on the bandwagon soon. Keep your Excel 2016 up to date or download the add-in for earlier versions from the Microsoft web site here.

The A to Z of Excel Functions: ACCRINT

The **ACCRINT** function returns the accrued interest for a security that pays interest on a periodic basis. This is useful for financing calculations and can avoid unnecessary computations.

It uses the following syntax:

=ACCRINT(issue_date, first_interest_date, settlement_date, rate, par, frequency, [basis], [calculation_method])

Please note: both **basis** and **calculation_method** is optional, which is why they appear in square brackets (don't add the square brackets!).

The arguments are defined as follows:

- **issue_date** – this is the issue date of the security (duh!)

- **first_interest_date** – this represents the initial date of interest

- **settlement_date** – this is the date after the issue date when the security is traded to the buyer

- **rate** – the security's <u>annual</u> coupon rate (be careful this is entered correctly)

- **par** – the security's par value, which is the face value of a share or other security rather than its market value

- **frequency** – this represents number of coupon payments per year. For annual payments, frequency = 1; for semi-annually, frequency = 2; for quarterly, frequency = 4. In other words, calculate based on 12 (number of months in year) divided by the duration (in months) between payments basis – The type of day count basis to use (check Excel for a full explanation)

- **calculation_method** – this value determines the way to calculate the total accrued interest when the date of settlement is after the **first_interest_date**. A value of TRUE (1) returns the total accrued interest from issue date to **settlement_date**. A value of FALSE (0) returns the accrued interest from **first_interest_date to settlement_date**. As mentioned, this argument is optional; if not specified, the default value is TRUE.

Here's an example:

▲	A	B	C
1	Issue Date	01-Jan-16	
2	First Interest Date	01-Jan-16	
3	Settlement Date	01-Mar-16	
4	Rate	10%	
5	Par	$5,000.00	
6	Frequency	2	
7	Basis	0	
8	Calculated Method	TRUE	
9	Accrued Interest	$ 83.33	
10	Formula	=ACCRINT(B1,B2,B3,B4,B5,B6,B7,B8)	
11			

And while we are at it…

The A to Z of Excel Functions: ACCRINTM

The **ACCRINTM** function returns the accrued interest for a security that pays interest <u>on maturity</u>. This differs from the **ACCRINT** function discussed above as that pays interest on a <u>periodic basis</u>.

To use ACCRINTM, please note the following syntax:

=ACCRINTM(issue, settlement, rate, par, [basis])

Prior to trying out this function there are a few things you need to know:

- Excel stores dates as sequential serial numbers so they can be used in calculations. By default, January 1, 1900 is serial number 1 and January 1, 2008 is serial number 39448 because it is 39,447 days after January 1, 1900 – which is Day 1

- Issue, settlement, and basis and truncated to integers

- If issues or settlement is not a valid date, **ACCRINTM** returns the *#VALUE!* error value

- If **rate** < 0 or if **par** > 0, **ACCRINTM** returns the *#VALUE!* error value

- If **basis** < 0 or if **basis** > 4, **ACCRINTM** returns the *#NUM!* error value

- If issue > **settlement**, **ACCRINTM** returns the *#NUM!* error value

- **ACCRINTM = par x rate x A/D**

where:

A is the number of accrued days counted according to a monthly basis. For interest at maturity items, the number of days from the issue date to the maturity date is used

**D** represents the Annual Year Basis.

The arguments used are as follows:

- **issue** – The security's issue date
- **settlement** – The security's maturity date
- **rate** – The security's annual coupon rate
- **par** – The security's par value. If you omit **par**, ACCRINTM uses $1,000
- **basis** – Optional and is defined as the type of day count basis to use.

Please see our example to the right: →

▲	A	B	C	D
1	Issue date	01-Feb-16		
2	Maturity date	15-May-16		
3	Percent coupon	10%		
4	Par value	$1,000.00		
5	Actual / 365 basis	3		
6	Result	$ 28.49		
7	Formula	=ACCRINTM(B1,B2,B3,B4,B5)		

The Outer Limits, Episode 2
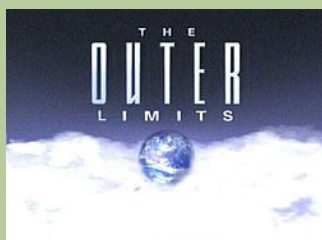
There is nothing wrong with your computer. Do not attempt to adjust the Excel settings. Microsoft is now in control of the transmission. They control the horizontal and the vertical. They can deluge you with a thousand errors, or expand one single cell to crystal clarity and beyond. Excel can shape your 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.

OK so we might be continuing to breach copyrights, but no one sued us last month. One question we often get asked is about the limitations and specifications of Excel. In this second part of our five-part series, this month we look at calculation specifications and limitations.

Feature	Maximum Limit
Area dependency	Limited by available memory
Area dependency per worksheet	Limited by available memory
Arguments in a function	255, unless restricted by syntax otherwise
Cross-worksheet array formula dependency	Limited by available memory
Cross-worksheet dependency	64,000 worksheets that can refer to other sheets
Dependency on a single cell	4 billion formulae that can depend on a single cell
Earliest date allowed for calculation	January 1, 1900 (January 1, 1904, if 1904 date system)
Internal length of formula	16,384 bytes
Iterations	32,767
Largest allowed negative number	-1.00×10^{308}
Largest allowed negative number via formula	$-1.7976931348623158 \times 10^{308}$
Largest allowed positive number	1.00×10^{308}
Largest allowed positive number via formula	$1.7976931348623158 \times 10^{308}$
Largest amount of time that can be entered	9999:59:59
Latest date allowed for calculation	December 31, 9999
Length of formula contents	8,192 characters
Linked cell content length from closed workbooks	32,767
Nested levels of functions	64 (Excel 2007 onwards); 7 previously
Number of available worksheet functions	341, although this really depends upon your definition of "available functions" – we are planning to go through 474 functions in our A to Z of Excel Functions series
Number precision	15 digits
Selected ranges	2,048
Size of the operand stack	1,024
Smallest allowed negative number	-2.23×10^{-308}
Smallest allowed positive number	2.23×10^{-308}
User defined function categories	255
Worksheet arrays	Limited by available memory

Upcoming SumProduct Training Courses

Location	Course	Date	Duration
Sydney	Excel Tips and Tricks	8th Aug 2016	1 day
Sydney	Financial Modelling	9th - 10th Aug 2016	2 days
Melbourne	Excel Tips and Tricks	29th Aug 2016	1 day
Melbourne	Financial Modelling	30th - 31th Aug 2016	2 days
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

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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 adding and subtracting:

Keystroke	What it does
CTRL + ADD (+)	Open Insert Dialog dialog box
SUBTRACT (-)	Extend Selection mode
SHIFT + SUBTRACT (-)	Add to selection mode (not subtract!)
CTRL + SUBTRACT (-)	Delete cells

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.

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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

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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.

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