POWER!

Are you a Power user?

Having run several Power Pivot, Power Query and Power BI courses in the past month and with our Sydney director off to the Microsoft Data Insight Summit in Seattle, we seem to have even more of a slant on the Power tools than usual. Don't be put off if you feel you are more of a "traditional" Excel user. Do try and add these to your repertoire – they're going to save you so much time and effort. We talk about Power updates, the future of Power BI and even the Power BI server.

It's not all about Power though. Although, er, yes, we have Power Query Pointers. We also have our continuing series of A to Z Functions and Keyboard Shortcuts. We even spend a MODicum amount of time on an under-used function: **MOD**. There's even time to welcome a new member of staff to the team as we continue to grow.

Until next month.

Liam Bastick, Managing Director, SumProduct

Microsoft Data Insights Summit

For those who haven't been paying attention to the News and Blog parts of our website, you may not have been aware that our very own **Tim Heng** travelled to Seattle in June to attend the Microsoft Data Insights Summit. While last year was a massive affair, with around 1,500 people attending, this year Microsoft scaled it up so that they could allow a sold-out crowd of 2,500 people to attend.

Last year, sessions at the Summit were generally split 25/75 between Excel and Power BI. This year, the Excel team were left a little in the shade, as 90% of the session was Power BI focused, with Excel being much of an afterthought. Instead of sessions on DAX and Power Query being Excel focused, this time around sessions were pitched towards Power BI users, with the additional fact that, oh, these can be used in Excel as well. Fair enough, Power BI is all the rage, and it does appear to be the future of data and insights.

So, in an attempt to cover at least part of what the Summit was all about (and to justify Tim's jaunt), let's run through a few things.

Upcoming features

The opening keynote included a range of new features, promised to us that they would appear in the next three months. That's just as well, because many of the items being showcased completely change the way Power BI can be used for reporting and analysis. Let's go through a few of the items:

- **Bookmarks**

  The Bookmark function has been demanded by the community for quite a while, with people seeking an easy way to switch between certain filters or views. Rather than having to deselect and reselect slicer and filter options, you can simply bookmark a report page containing the current state of settings, and then jump directly to that setting when you want to switch to it
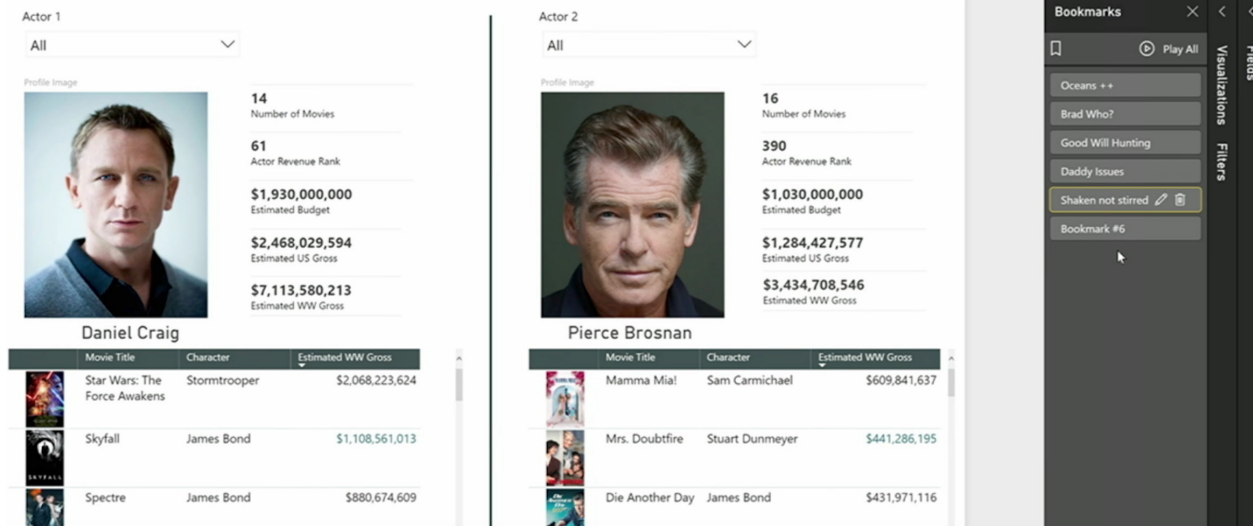
Do we compare James Bonds? Brad Pitt vs George Clooney?

This comes with other benefits too. As we can create a list of bookmarks that we might want to use to tell a story, Microsoft has set up a Play feature that will open each bookmark and cycle through them, giving us an easy backdrop to provide a narrative to. This leads nicely into the next cool feature…

- **Report layers / highlights**

  We're not exactly sure if these are the technical terms that the Microsoft team used, but Tim's opinion is that they describe the feature quite well. Take a look at the screenshot below and see if you can spot what's new:
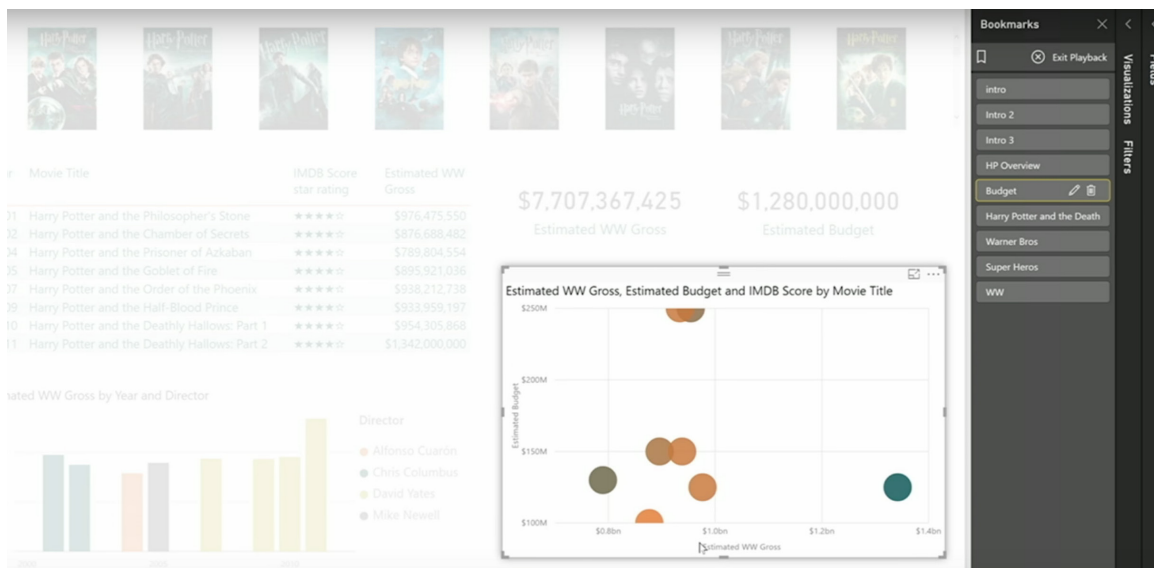

Do you see it? The chart in the bottom right jumps out, compared to the faded images in the rest of the report page. This is a new highlight tool that lets us focus in on a specific chart or table, without switching to Focus mode, meaning that we can focus on a particular graphic whilst retaining its context relative to other items on the page. The only question is, why would they call it a highlight, when really, the change is that we're fading out the other items..?

The other related aspect about highlights is that you will soon be able to hide and reveal items by toggling them on and off. This ability to set viewing layers effectively lets users change the look and feel of a sheet based on particular views that you might have – suppose you want to show a particular chart, but only when it's relevant because of X filter – this will allow you to do so, and perhaps hide it with a picture at other times. There will also be the ability to link these layers with different buttons and objects on the screen, so you can give users some really obvious report controls.

- **Drill-through**

  This is a feature that many people thought should have been in Power BI a long time ago, but for some reason wasn't there. We're soon going to have the ability to choose a subset of the data by clicking on any chart object, just like we would use chart interactions, and drill through to another page that shows more detail about the item. Here are some examples that they provided in the keynote. Which actor has had the highest worldwide sales from movies they participated in? Here's some of the data.
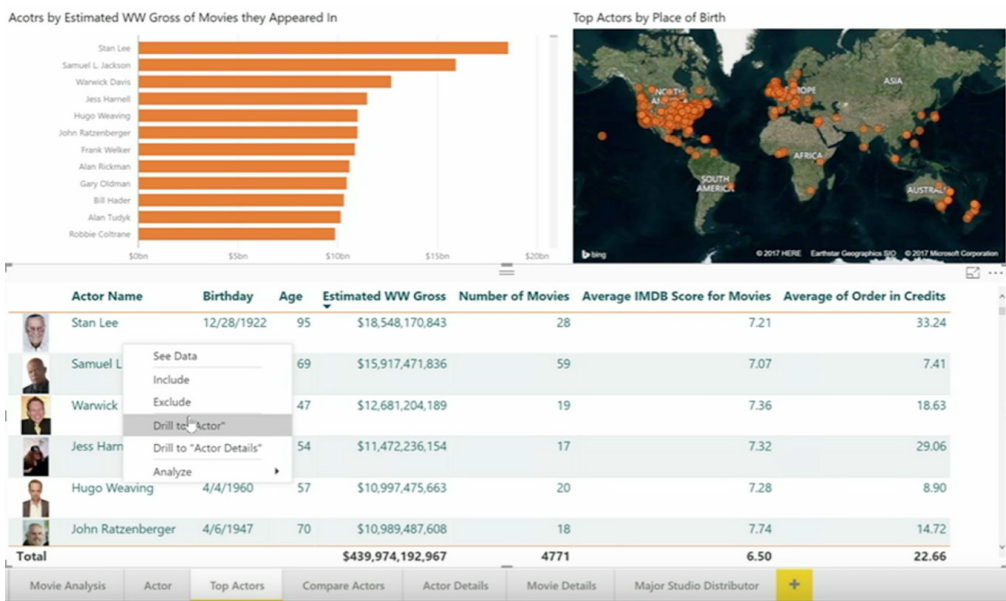
This may come as a surprise to some people – who on earth is Stan Lee? Certainly not one of the big-name actors. But with the upcoming versions of Power BI, we'll be able to drill through his name on this page, and bring up another report page showing a list of an actor's movies with a filter context based on Stan, as follows:
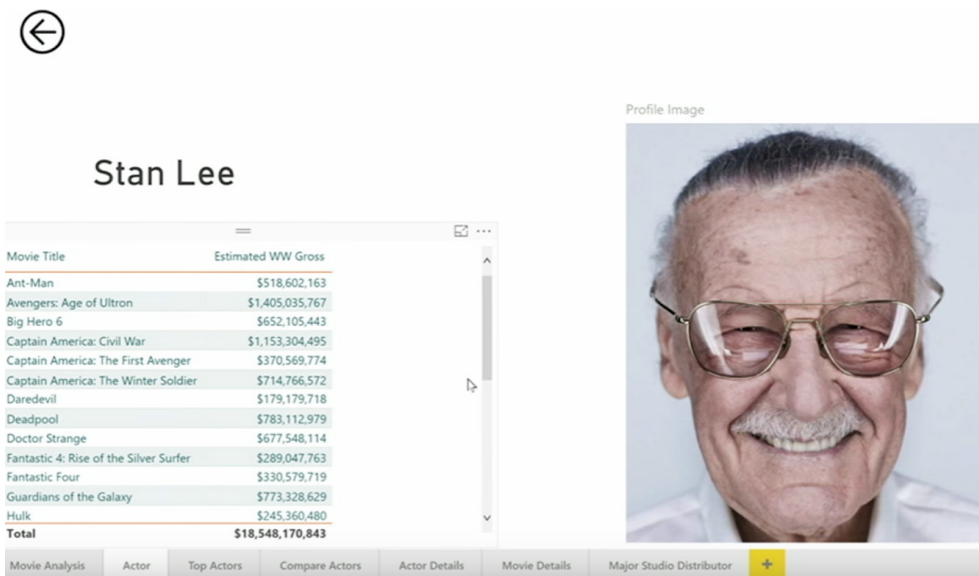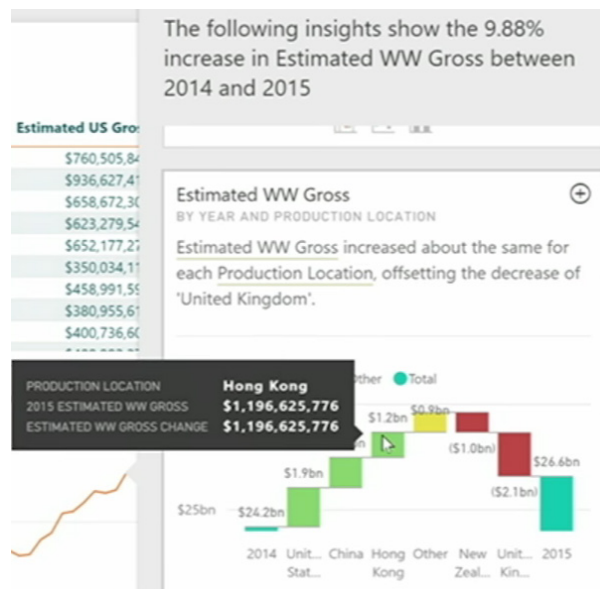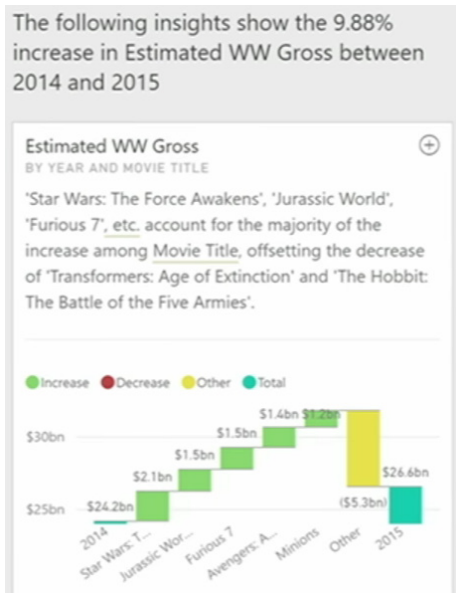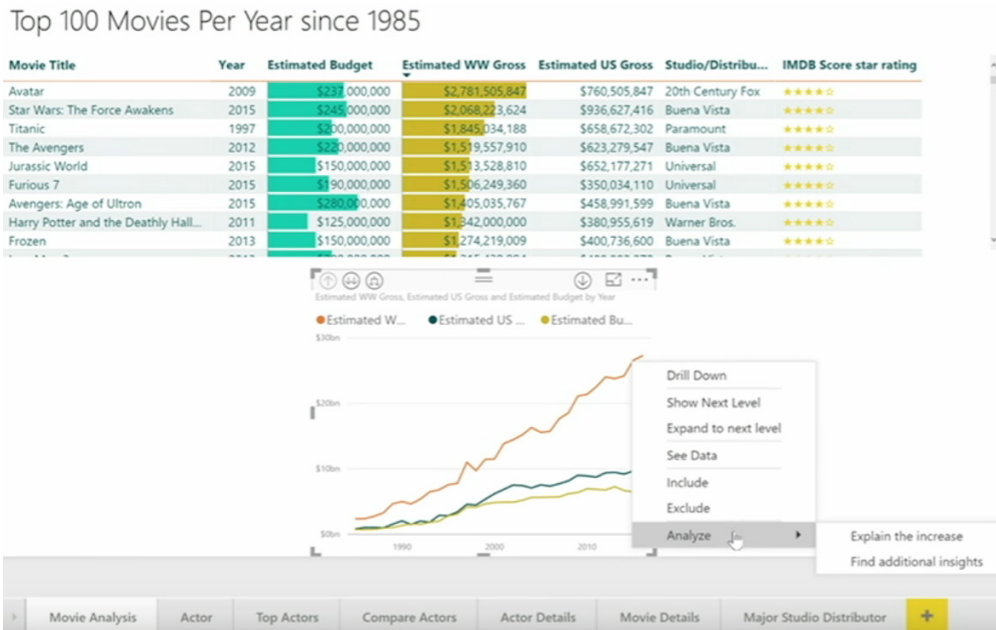

Or for more details:
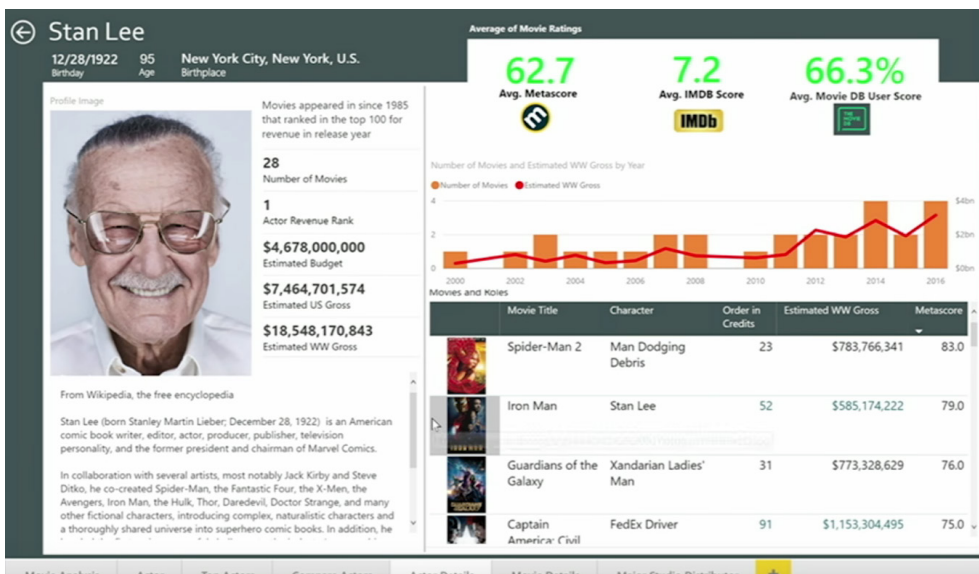
About time, if you ask us (not that anyone did). Coming soon to a Power BI report near you!

- **Analyze Differences**

The final really cool thing that's going to appear soon is the Analyze tool in reports. This one is much better explained in pictures, so here's a few thousand words to ponder.

Are you kidding me? Power BI is now able to help us work out what are the key drivers that cause changes in our results. This is going to be using the same algorithms as the Quick Insights tool that's currently available in the Power BI Service, but focused and honed in on trying to answer the specific question or investigate the data subset that you've selected.

There are two really important factors about this that make this feature game-changing. The first, is that unlike Quick Insights, when you decide to add one of these charts to your report in Power BI Desktop, it actually becomes an interactive chart that you can adjust and customise, just like any other. So this is now a really easy way to quickly create relevant charts that you can adapt and build upon.

The second important factor is that this is all encompassed in Power BI Desktop. We didn't think that it was actually possible, since we were previously under the impression that the Quick Insights tool required all of Microsoft's cloud computing capacity to help make it possible, but it seems like they've engineered a solution to get it to run on our simple laptops. We did ask if it was going to be processor intensive, and the response we got back was a wry acknowledgement that, yes, if you put it on a faster computer, you'll get your results back in a more timely manner. In an unrelated note, we heard Alienware is having a sale at the moment…

In our mind, these changes actually go a long way to making up for the damage caused by restricting dashboard sharing to the paid version. By making Power BI Desktop even more powerful, it's going to give people plenty of motivation to keep working with it, and possibly even persuade some people to be willing to pay a bit more to share the advanced features.

There was plenty more covered at the Summit, but our newsletter is already bulging at the seams! So with that in mind, what we'd recommend is checking out the Microsoft Power BI YouTube channel, where the kind folks at Microsoft have posted all of the recorded video footage from every session presented. There are a total of 76 videos available for you to check out relating to the Data Insights Summit, plus more videos with some great tips and ideas that they've put together over the years. Also, keep an eye out on the News and Blog parts of our website, as we will give you the heads up as soon as these features break ground. Happy insights everybody!

Introducing the MOD Function

It can't all be about Power stuff in this issue. Let's talk about a misunderstood but highly useful function. To put its benefits in context, do you build forecast models where certain transactions occur periodically but not every period? You might model monthly and pay tax quarterly; you may model quarterly yet pay dividends half-yearly, *etc*. What's the best way to mark these occasions?

The **MOD** function, **MOD(number,divisor)**, returns the remainder after the number (first argument) is divided by the divisor (second argument), known as the *modulus*. The result has the same sign as the divisor.

For example, 9 / 4 = 2.25, or 2 remainder 1. **MOD(9,4)** is an alternative way of expressing this, and hence equals 1 also. Note that the 1 may be obtained from the first calculation by (2.25 – 2) x 4 = 1, *i.e.* in general:

$$\text{MOD(n,d) = n - d*INT(n/d),}$$

where **INT()** is the integer function in Excel.

The idea is very simple: **MOD(x,n)** produces a repeating sequence of n values from 0 to **n**-1. For example, for **n** = 5 the values will rotate through 0 to 4:

But this might not be what you want. What if you want the repeating sequence 1, 2, 3, 4, 5 instead? The initial thought might be to write something like

=MOD(Counter,Modulus)+IF(MOD(Counter,Modulus)=0,Modulus,0)

It is reasonably easy to follow, but there is a much simpler – and more elegant – solution:

= MOD(Counter-1,Modulus)+1

It is now easy to trigger a calculation: you simply wrap your formula around this adjusted **MOD** counter for a particular value, *e.g.*

=IF(MOD(x,n)=y,Calc,0)

Pretty simple. For example, a tax calculation might look like the following:


This example uses a flag rather than an **IF** statement, but the effect is similar. **MOD** is a very useful function that can simplify your modelling calculations immensely. It has more uses than simply for effecting tailored periodic calculations. For example, **MOD(x,1)** provides the amount after the decimal point, *i.e.* it has the same effect as **x-INT(x)**. This can be useful for carrying forward amounts, *etc*.

The more you use it, the more you will use it! You can check out more in our Thought section here.

Power Query Pointers

Each month we'll reproduce one of our articles on Power Query (Excel 2010 and 2013) / Get & Transform (Excel 2016) 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 extracting metadata.

We have previously visited the idea of importing from a folder in – you can check this out at www.sumproduct.com/blog/article/power-query-5-one-folder-one-query. Whilst the filenames in that example did not contain any data we needed to load, it's not unusual to include a date as part of the name of the file – for example the date the expense claim was made. If we need to extract information from the file name, then the file properties can be preserved.

Let's initially follow the same procedure from www.sumproduct.com/blog/article/power-query-5-one-folder-one-query. Opening a blank workbook, you can create a new query using the 'From File' option and then the drop down to select 'From Folder'. By filtering, choose those files with a csv / CSV extension as before, but this time let's pay more attention to the metadata.
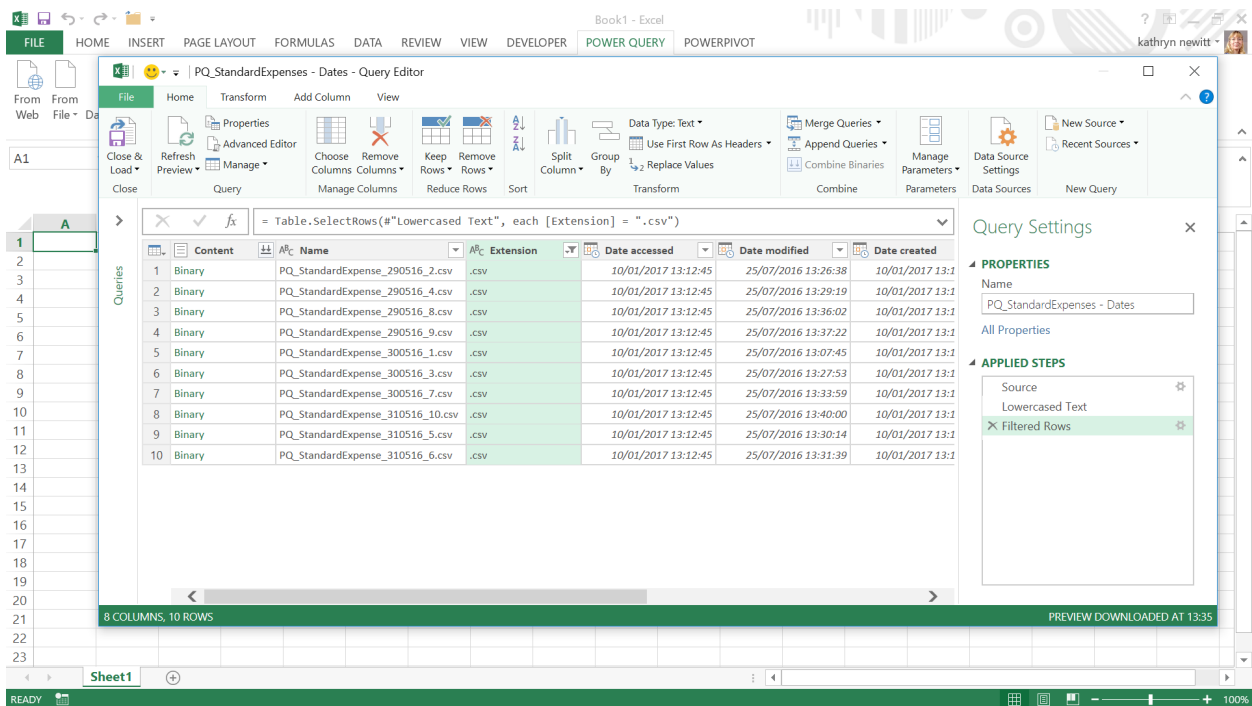
The only metadata we are interested in is the 'Name" and 'Content' columns, so rather than choosing what to remove, how about we choose what to keep instead. Whilst keeping the **CTRL** button pressed, select the 'Name' and 'Content' columns. Right-click either of these columns and choose to remove other columns – note that because Power Query is a sequential macro recorder, it will still keep track of the filtered extension column which is no longer visible:
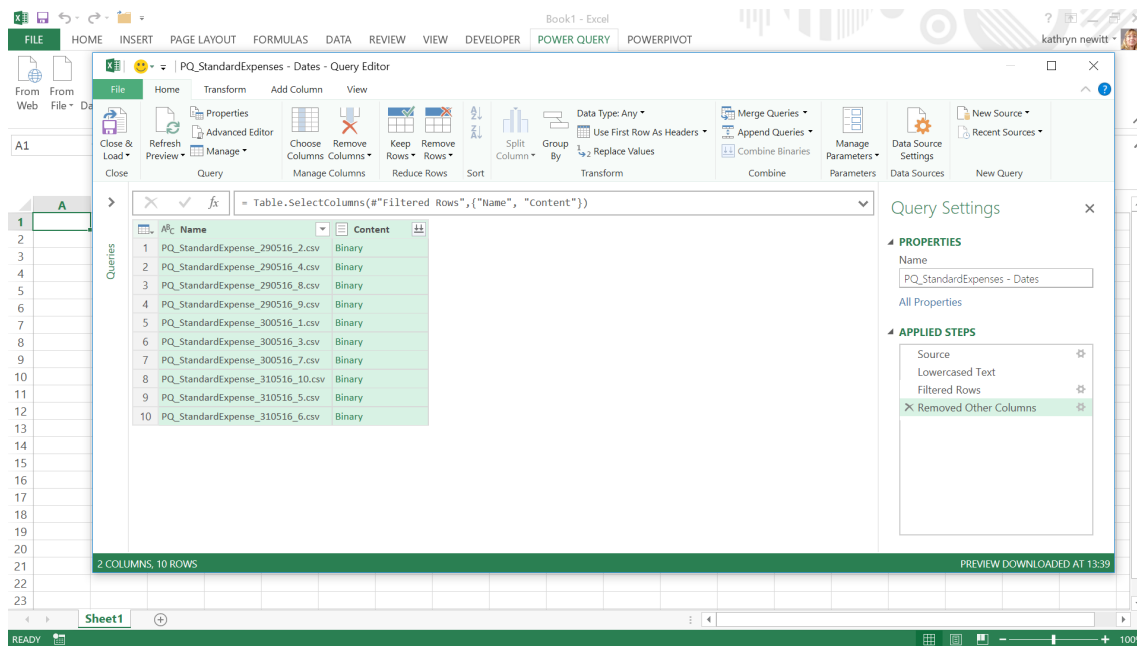

The text in the file name column can now be converted in order to extract the date.

Here, we have '**PQ_StandardExpense_290516_2.csv**', and we need to remove the unnecessary text. To do this, right-click the 'Name' column, then choose to replace values. You can repeat this process several times, in each case finding and replacing part of the text:

- find 'PQ_StandardExpense_' and replace with blank
- find '.csv' and replace with blank
- find '_10' and replace with blank (we repeat this step for each number).

Now we are left with '290516':
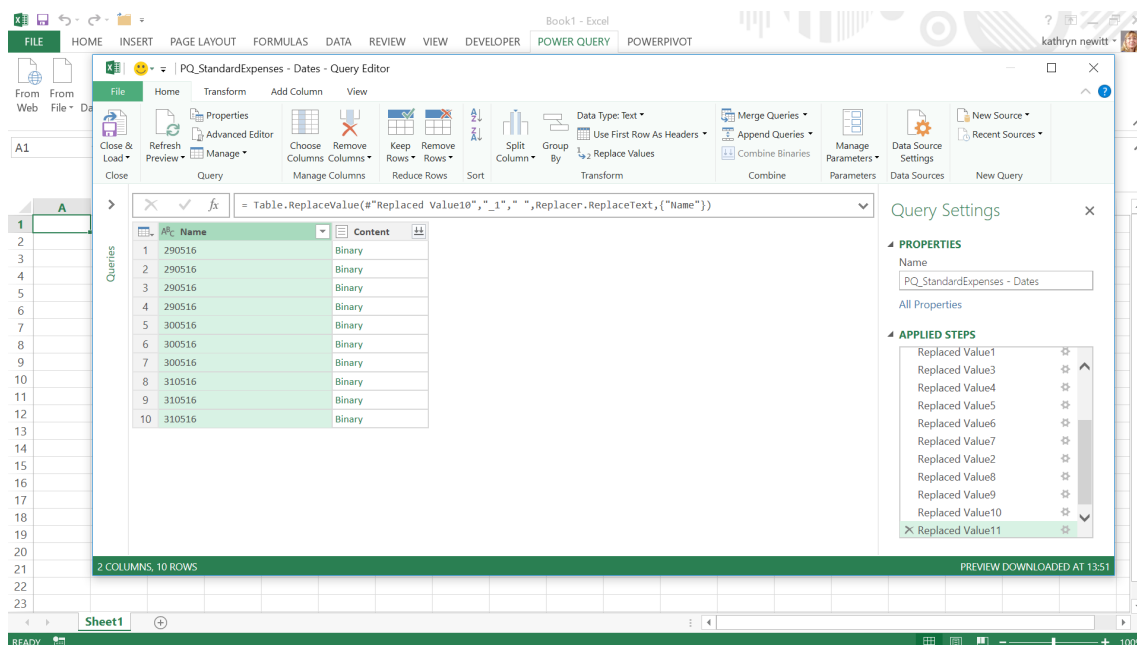
In order to convert this column to a date, we need to introduce some commas to the format, otherwise Power Query will fail to parse the date from the data.

In this instance (and there are plenty of other ways to do this), right-click the 'Name' column once more, then choose to replace values one more time. This time, the aim is to find "0516' and replace with ',05,16'.

Power Query will now allow the column to be converted to a date using Data type dropdown in the 'Transform' tab. The column can also be renamed to something more suitable like 'Claim Date' *viz*.
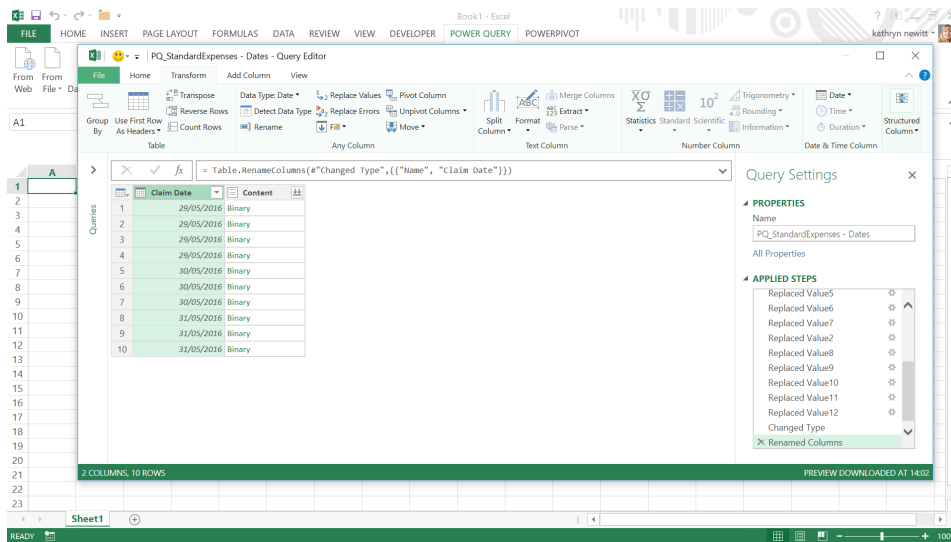
It might be tempting to use the 'Combine Binaries' button from here, however, this button will not preserve the 'Claim Date' column that was just created. The remaining data needs to be extracted from the 'Content' column first. To do this, create a custom column. On the 'Add Column' tab, there is an option to add a custom column, where the following formula must be entered:
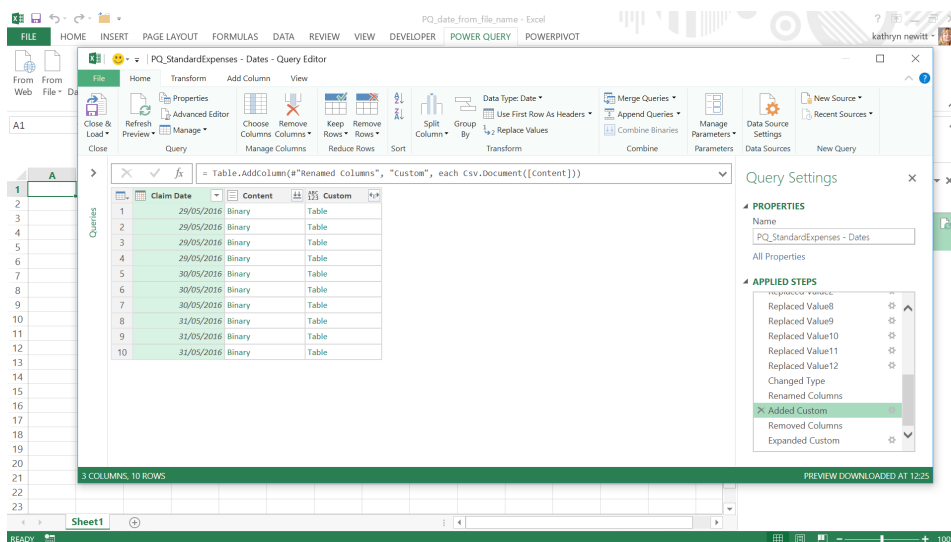
=Csv.Document([Content])

(The letter casing must be exact.)

As the screenshot above shows, you will now get a new column called 'Custom' which contains the tables – clicking on the word 'Table' will drill into the table, clicking on the white space next to it will show table contents. Before expanding the custom (table) column, you can remove the content column by selecting and right clicking the 'Content' column and choosing to 'Remove'.

Note that on the 'Custom' column is an icon with two splitting arrows: this will extract the columns, and clicking it allows you to filter which columns you require. Clicking 'OK' will bring in all of the columns selected from the csv files. The data needs to be manually cleaned up before closing and loading; this clean-up process is similar to the steps taken in www.sumproduct.com/blog/article/power-query-5-one-folder-one-query, but we have now created a table where the claim date has been extracted from the file name and appended to the other expense data.
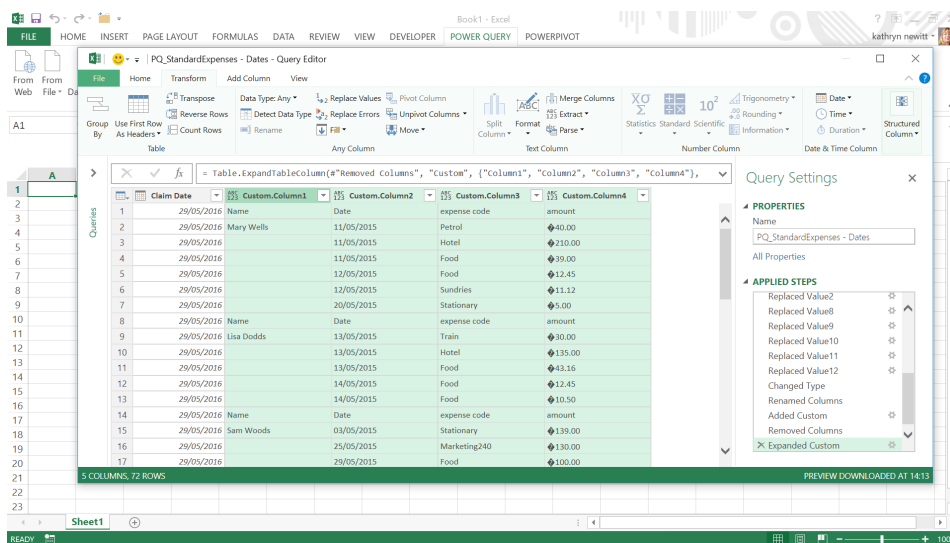
Practice makes perfect!

June 2017 Updates for Power BI Desktop

June saw in quite a few new updates for Power BI: it's clear the momentum of recent major changes is far from over. There were many updates to reporting and accessibility features, with important improvements in data connectivity as well.

In summary, the following updates have been released:

Report View:

- Data bars for new table and matrix visuals (Preview)
- Markers on line, area, and combo visuals (Preview)
- Visual font family setting
- Horizontal image slicer
- Combo chart formatting updates
- Bing maps improvements
- High density line sampling
- Accessible reports

Data Connectivity:

- Custom Data Connectors support
- Power BI service Live Connect to On-premises and Push streaming datasets
- Impala connector is now generally available
- Amazon Redshift connector is now generally available
- SAP BW connector - DirectQuery support
- IBM Netezza connector (beta)

Query Editing:

- Add Column from Examples enhancements.

Let's take a look at each of these in turn.

### *Data bars for new table and matrix visuals (Preview)*

Microsoft has added a new type of conditional formatting to the new table and matrix visuals: data bars. Data bars represent a quick way to format your data to make it easier to compare ranges of values. Essentially, it's like turning a column of your table or matrix into a bar chart.

Category	SalesAmount	Units
Audio		
Bluetooth Headphones	378,685.86	3752
MP4&MP3	482,111.29	3372
REconomyrding Pen	304,390.85	1519
Cameras and camcorders		
Camcorders	2,048,841.00	2730
Cameras & Camcorders Accessories	161,040.01	1793
Digital Cameras	1,079,453.90	5319
Digital SLR Cameras	1,167,697.10	2624
Cell phones		
Cell phones Accessories	18,704.00	886
Home & Office Phones	76,156.95	2545
Smart phones & PDAs	745,239.00	2635
Touch Screen Phones	518,090.00	1748
Computers		
Computers Accessories	699,162.40	15046
Desktops	1,692,976.80	3502
Laptops	3,771,848.75	5851
Monitors	2,155,865.00	6215
Printers, Scanners & Fax	1,219,935.00	7692
Projectors & Screens	5,946,536.00	7907

There are two ways to turn on data bars. The first is from the field well. From the right click menu, you can simply select 'Data bars' on any numeric measure on your table or matrix:

This launches a dialog for customising the data bars.
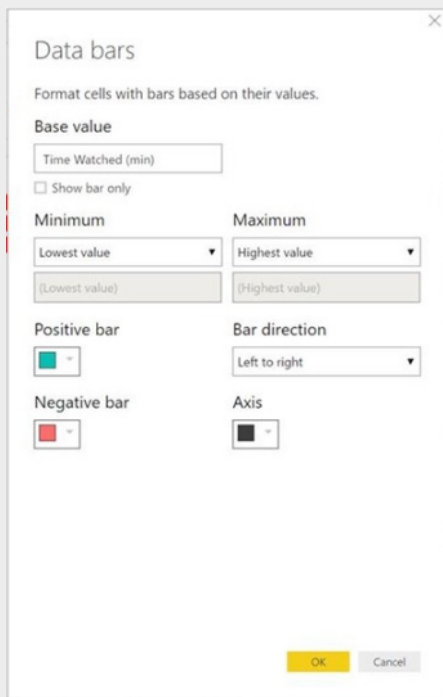
Once you confirm your settings, you'll see the data bars applied to the visual.

You can also turn on colour scales and data bars from the formatting pane by selecting Conditional formatting. Set 'Color *(yes, the spelling here is right – Ed.)* scales' or 'Data bars' to 'On' to apply the default settings or, to customize the settings, select 'Advanced controls'.
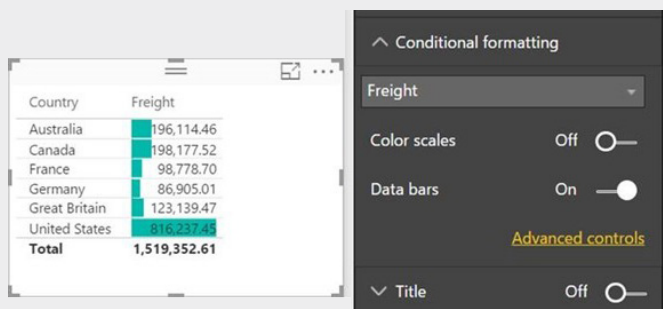
Markers on line, area, and combo visuals (Preview)

For line charts, area charts and the lines of combo charts, Microsoft has added a new formatting option that allows you to show markers on each line. You may pick between a list of different marker shapes and control the size and colour of the markers. By default, when you turn markers on, a circle will apply to each line, matching the colour of the line. Using the 'Show' option, you can also format each line separately, including stroke width and markers. With these features, they can be on and off independently from each other, which is useful if you want to call out only one line with markers or a thicker stroke. The legend of your line chart will automatically update to show the corresponding marker in the legend.

Microsoft is seriously considering colour-blind users these days. By adding markers to your lines, outputs are no longer relying solely on colour to differentiate the lines from each other.
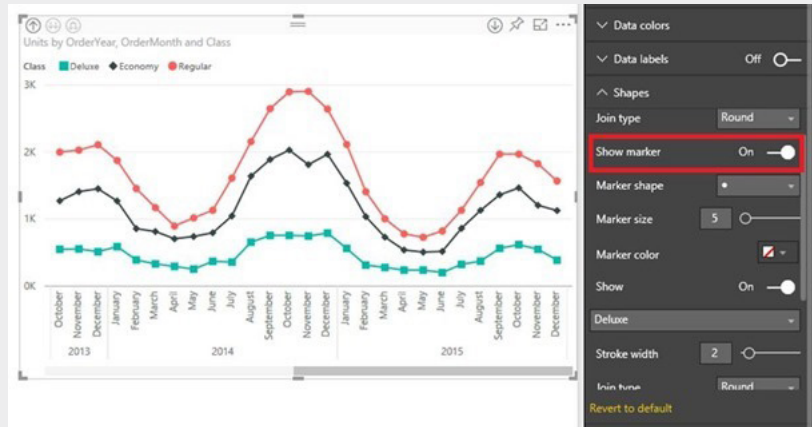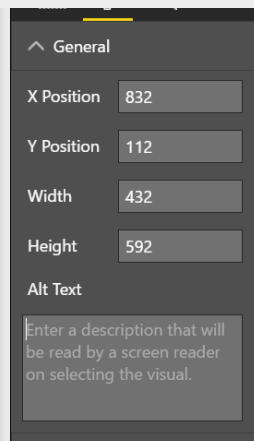

Accessible reports

As mentioned above, Microsoft is considering all users these days. Given over 10% of the population has a disability of some sort, Microsoft has gone on record that Power BI reports are designed for people of all abilities, so they are accessible to everyone. This month is the first of several updates with this accessibility in mind. This first release allows users to consume Power BI reports using keyboard navigation and screen readers. There's also new formatting options for report writers that help reports become more accessible to everyone.

If you want to consume a Power BI report with a keyboard and / or screen reader, you'll be able to work with a report as follows:

- Switch focus between the report page tabs and objects on a report page using **CTRL + F6**
- When focus is on report page tabs, tabbing will move focus between each page. The title of the page and whether it is currently selected is read out by the screen reader
- Load a page using **ENTER**
- When focus is on a loaded report page, tabbing will cycle focus between each object on the page, which includes all textboxes, images, shapes and charts. The screen reader reads the type of object and a description provided by the author.

When building accessible reports, Microsoft's website suggests there are a few things you should keep in mind:

- For line, area, and combo charts, make sure to use different markers for each line. This will make is easier for report consumers to differentiate lines from each other
- Pick a theme that is high contrast and colour blind friendly from the theme gallery and import it using the Theming preview feature
- For every object on your report, make sure to fill in the Alternative Text under the General card of the formatting pane.
  This will ensure that even if someone can't see the chart, image, shape, or textbox, they will be able to know what you wanted to communicate

- Consider embedding your reports in a SharePoint site or an app that is accessible to make it easier for viewers reach the reports. This will make consuming the reports much easier since currently, in the Power BI Desktop and service, only the reporting canvas is accessible. The rest of the experience and navigation are not guaranteed to be keyboard and screen reader navigable.

Visual font family setting

The support for font family control in visuals is now consistent with the level in textboxes. The "font family" is currently supported for:

- Axis labels
- Axis title
- Legend values
- Data labels
- Every section of the new Table and Matrix visuals
- Slicer header and items.

The settings are situated in the drop-down list in the appropriate cards in the formatting pane. There are only a few areas still missing this option, but we have been assured that these last few show up in coming releases of Power BI Desktop.
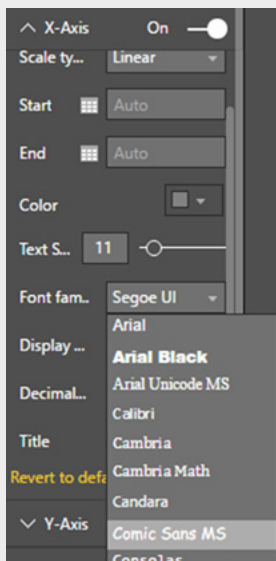
Horizontal image slicer

The image slicer now supports horizontal orientation. When you have a slicer containing image URLs, set the display to horizontal or vertical by expanding the General section in the formatting pane:
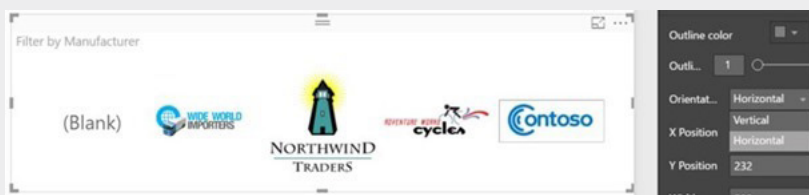
Combo chart formatting updates

There's two formatting updates to combo charts this month:

- **Force zeros to align between the two axes:**
  Depending on your data, the zeros of the two axes may not automatically align in your combo chart. If you want to force your zeros to align, you can now turn Align zeros on in the Y-Axis card of the formatting pane:
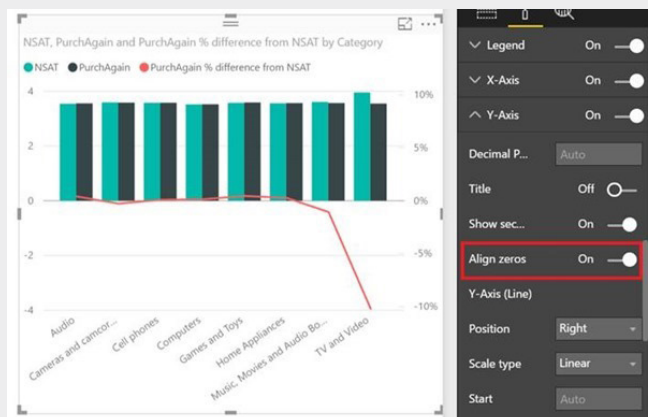
- **Shade area of the line:**

    Depending on your data, the zeros of the two axes may not automatically align in your combo chart. If you want to force your zeros to align, you can now turn Align zeros on in the Y-Axis card of the formatting pane:

Bing maps improvements

There's also upgrades to the Bing maps control. Microsoft has added map themes, so that you can better style your maps to match the rest of your report. Geocoding has been updated to take advantage of hierarchies. This will make it easier to work with your map and make geocoding more accurate.
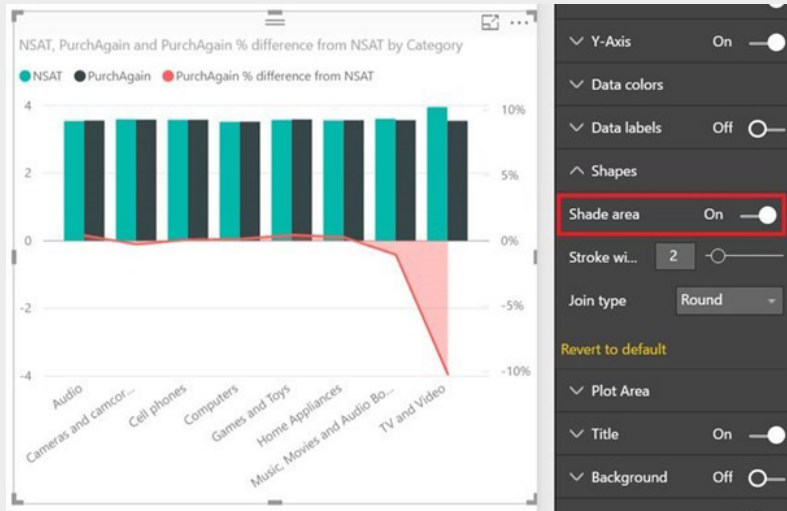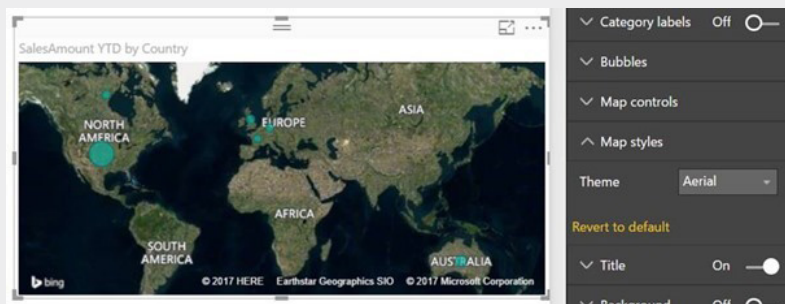
You can now pick different map themes to use in your maps: there's road (the default) and aerial. Perhaps you should use Arial font for aerial… You'll find this option under the Map styles card in the formatting pane:

By the time this newsletter is published, Bing should have upgraded the Bing Maps API used for the maps to their V8 map control API. For the most part, you shouldn't notice any changes to any maps you produce, but you will be able to take advantage of two more themes. When this happens, in addition to the two themes above, you'll see grayscale and dark as options in the dropdown too. This change will automatically take place without the need to update your Desktop version.

With this new API also comes a new geocoding experience. Now when you define a hierarchy in the field well of your map and use the "Expand" or "Drill down" option, Power BI Desktop will send all the hierarchy information to Bing to use in geocoding. This will greatly improve the accuracy of the geocoding, making sure for example that Paris, Texas shows up in Texas instead of France.
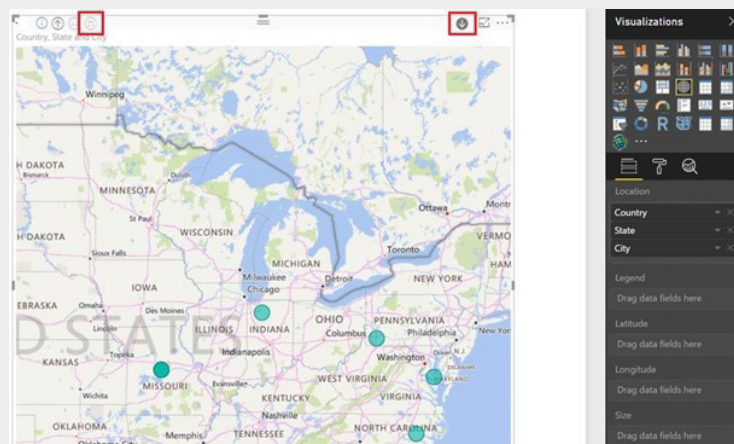
When using this feature, make sure to set the 'Data Category' in the 'Modeling' tab to the appropriate tag to improve geocoding as well.

High density line sampling

The sampling algorithm for line and area charts has been upgraded. This new algorithm will better preserve the shape of your data while also highlighting outliers. This new algorithm behind the scenes creates bins along your axis and preserves the minimum and maximum data points for each line within that bin. With this change, you should see better visuals for any line charts that exceed the data point limit. This sampling algorithm allows you to represent a large number of data points without sacrificing performance and load time. If you would like to use the previous sampling algorithm, you can go back by turning off 'High Density Sampling' in the 'General' card of the formatting pane.
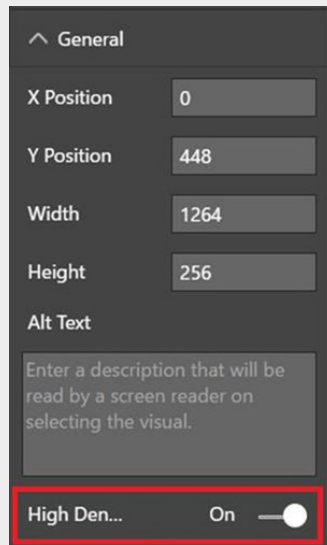
Custom Data Connectors support

The Data Connectors SDK Developer Preview was announced back in May. This new SDK allows developers to create their own data connectors that can be easily plugged into Power BI. June's update for Power BI Desktop adds to this to enable this capability and load custom connectors in Power BI Desktop.

You can enable this Preview feature from the Options dialog.
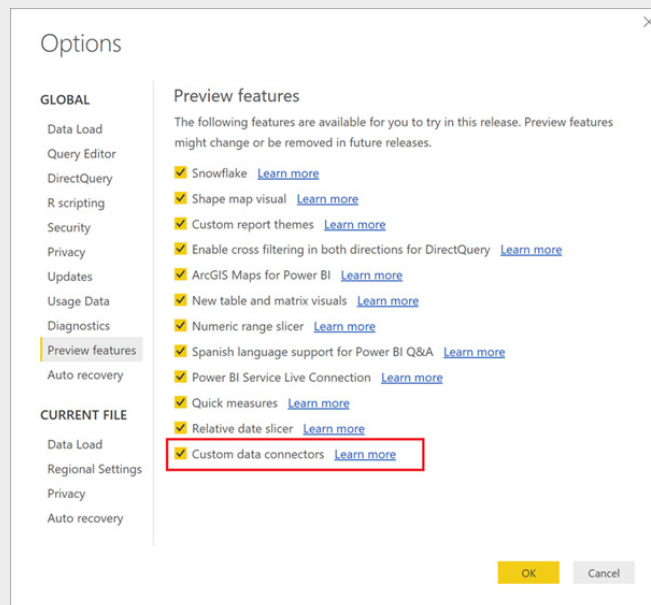
After the feature has been enabled, you can deploy custom data connectors to your Documents folder (under the "**Documents\Microsoft Power BI Desktop\Custom Connectors**" folder). These connectors will appear in the 'Get Data' dialog:
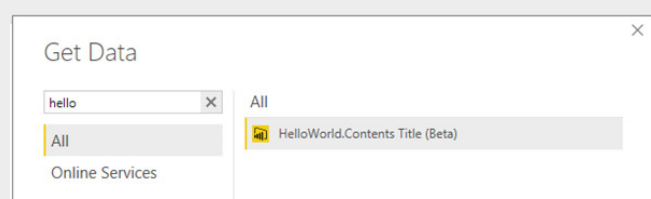
The Data Connectors SDK allow you to create new data sources, or customise and extend an existing source. Common use cases include:

- Creating a business analyst friendly view for a REST API
- Providing branding for a source supported by an existing connector (such as an OData service, or ODBC driver)
- Implementing an OAuth v2 authentication flow for a SaaS offering
- Exposing a limited / filtered view over your data source to improve usability
- Supporting different authentication modes when creating a Power BI Content Pack
- Enabling DirectQuery for a data source via an ODBC driver

Currently, Custom Data Connectors are only supported in Power BI Desktop. Support for them in the Power BI service and Gateway is apparently on its way.

Power BI service Live Connect to On-premises and Push streaming datasets

The Power BI service connector has been updated with support for two new types of datasets: on-premises and push streaming datasets.
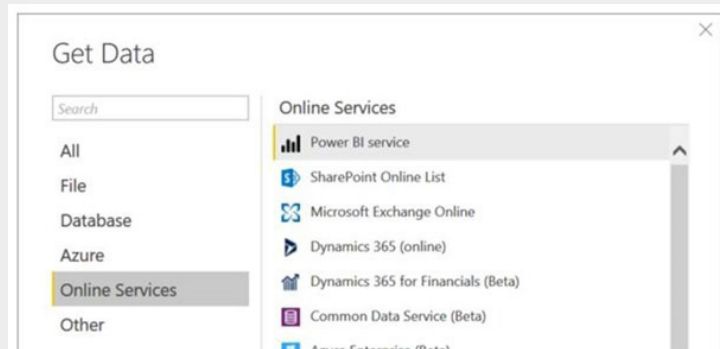
On premises datasets are created by publishing Desktop files connected live to SQL Service Analysis Services, Analysis Services Azure or Common Data Service, or by connecting directly to an AS database configured to work with an on-premises gateway in the Power BI service. Push streaming datasets are created by enabling historic data analysis when creating the streaming dataset.
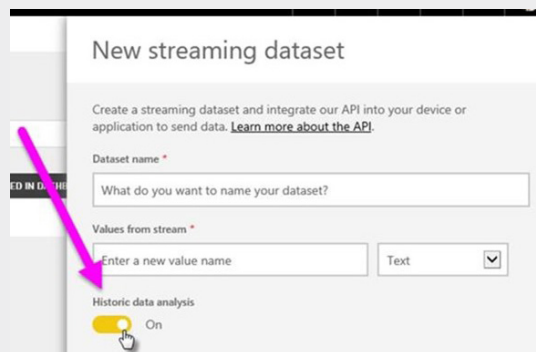
If you have one of these datasets in the service, you can connect live using our Power BI service option.
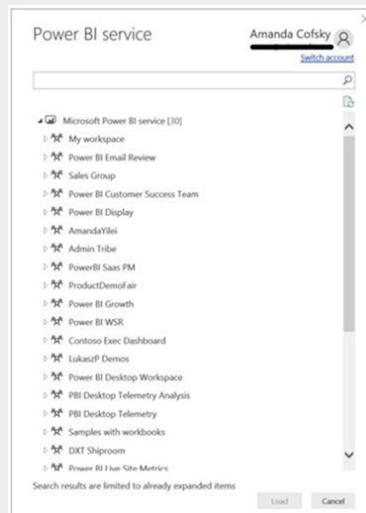
Impala connector is now generally available

End-to-end support has been added for the Impala connector in the Power BI service using the on-premises Data Gateway. It is now added to 'Get Data':
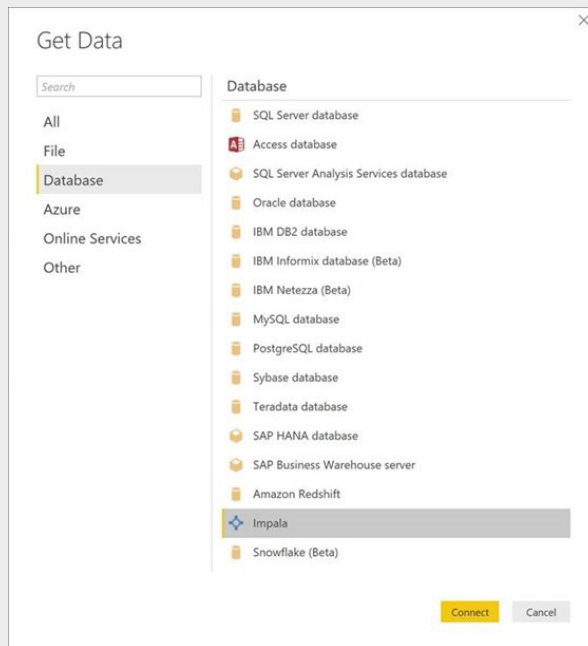
The Impala connector can be found under the Database category within the Get Data dialog. It allows you to create reports based on Impala databases data, either by using Import or DirectQuery modes.

Amazon Redshift connector is now generally available

Another connector now readily available is the Amazon Redshift connector. This was released late last year as a Preview feature and recently added E2E support via the Power BI service.
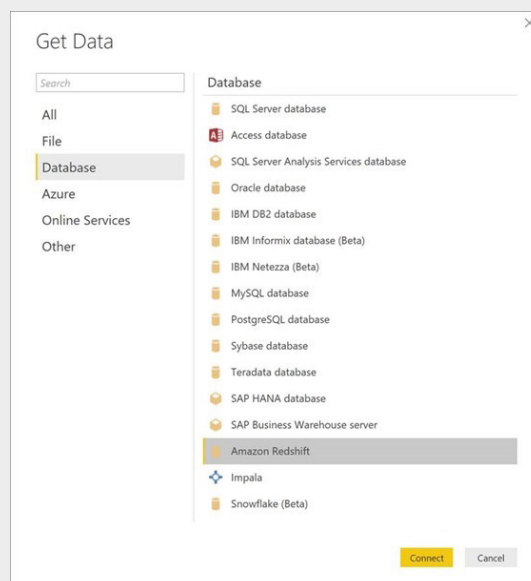
The Amazon Redshift connector, available under Database category in the Get Data dialog, enables you to easily create reports on top of your AWS Redshift data, by using Import or DirectQuery modes.
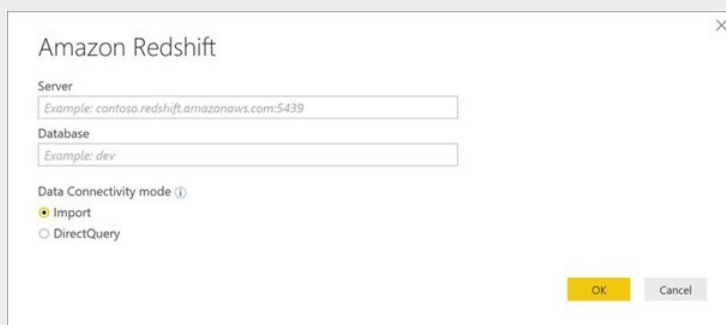
SAP BW connector - DirectQuery support

DirectQuery support has also been added as an enhanced capability to the SAP BW connector. Note that this new DirectQuery mode is presently available as a Beta feature only, with the main goal of gathering customer feedback about overall capabilities and performance. It's not recommended for use in production scenarios (unlike Import, which is already generally available).

When using the SAP BW connector, you will now get an option to select Import or DirectQuery in the connector dialog:
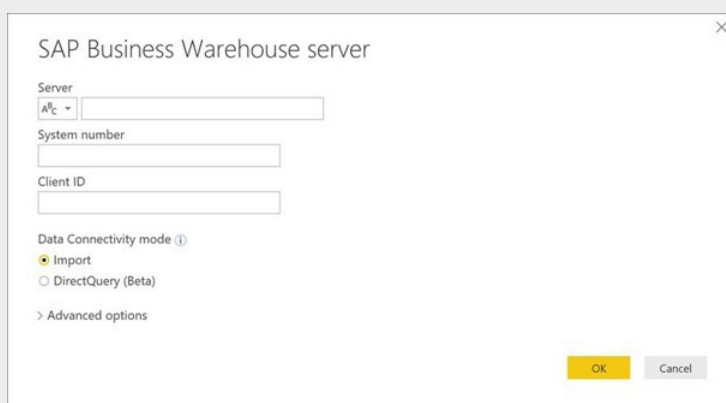
After selecting DirectQuery, you will be able to browse the list of cubes and provide any required or optional parameters needed. Once you click 'Load', you will be taken into the main Power BI Desktop window where you can start creating report elements that are directly connected to the underlying SAP BW cube objects (dimensions, measures, hierarchies, *etc.*).

IBM Netezza connector (beta)

There's another new Beta connector this month: IBM Netezza. This connector allows you to easily create reports on top of IBM Netezza databases, either by using Import or DirectQuery modes.

The new IBM Netezza connector can be found under the Database category within the Get Data dialog:
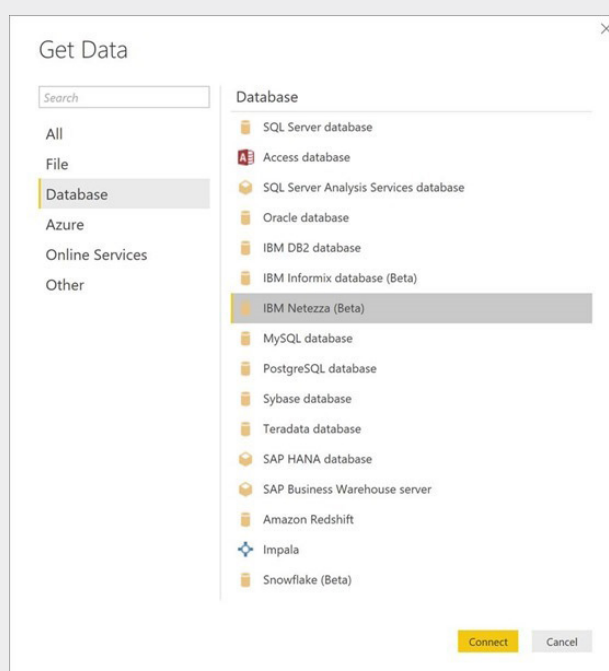
Upon selecting this connector, you can specify a server and, optionally, a database. You can also select which connectivity mode to use.
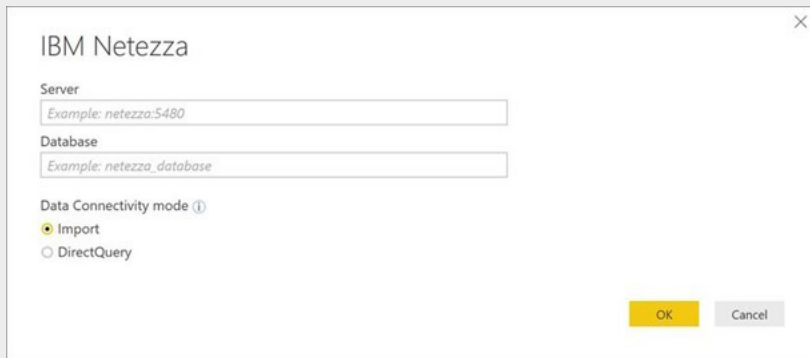
Add Column from Examples enhancements

Finally, there have been enhancements to the recently released "Add Column from Examples" feature:

- **Suggestions:** With this update, as you go into "Add Column from Examples" suggestions will be displayed for output values based on the contents of other columns and partial contents you typed. These suggestions also help differentiate between multiple transformations where the output value might be the same for a given row
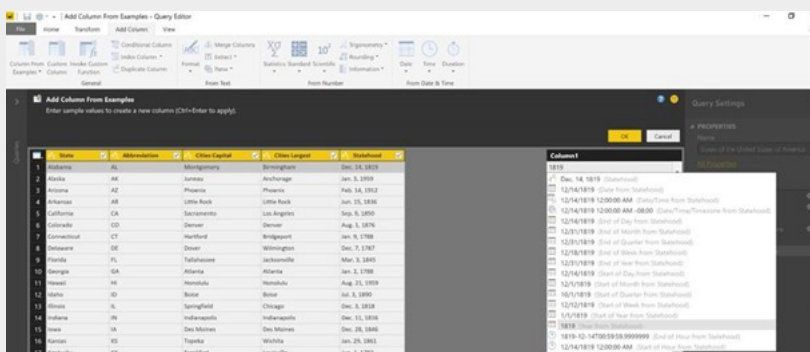
- **Support for additional transformations:** There's further support for additional transformations, including many Date / Time operations.

June 2017 Updates for Get & Transform / Power Query add-in

Are there any??

Could it be Microsoft is starting to slow down? For May's updates for Get & Transform (Excel 2016) / Power Query (Excel 2010 and 2013), there were only three new updates. Come on guys, are you really trying?

Those updates focused on the following new or improved data connectivity and transformation features:

- Split Column by Delimiter: automatic detection of delimiter character
- Combine Files: ability to select sample file to use
- DB2 Connector: option to specify Package Collection.

Let's revisit.

Split Column by Delimiter: automatic detection of delimiter character

When splitting column by delimiter inside Query Editor via **Home > Split Column**, Excel will automatically detect and populate the Delimiter field in this dialog, based on text pattern detection in the data preview rows. You can still change the delimiter if needed, but this automatic detection saves a few clicks in many cases.
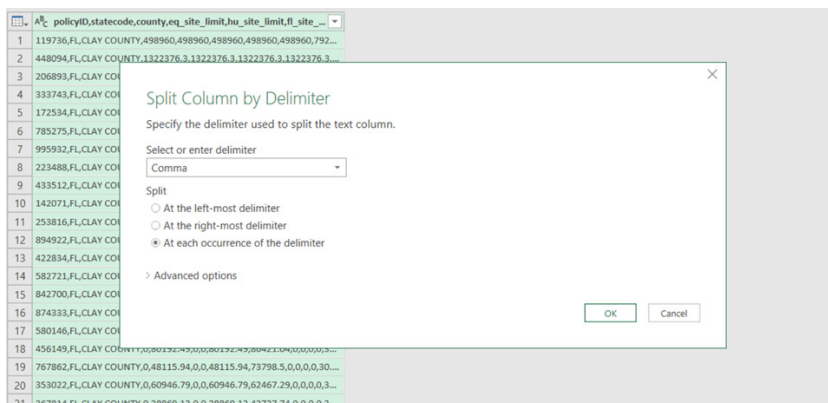
Combine Files: ability to select sample file to use

Just like the endless succession of *Resident Evil* films, the incremental enhancements to the Combine Files experience appear to be continuing forevermore. Microsoft has stated that one of the common areas of recent feedback has been to add the ability to select a file from a folder to use as the sample file to select objects and specify any custom transformation steps (if needed).

They've listened. With this release, Microsoft has added a new control in the file preview dialog to allow you to choose a file available in the selected folder. The default selection is the first file found, but this can be easily customised by users if need be.
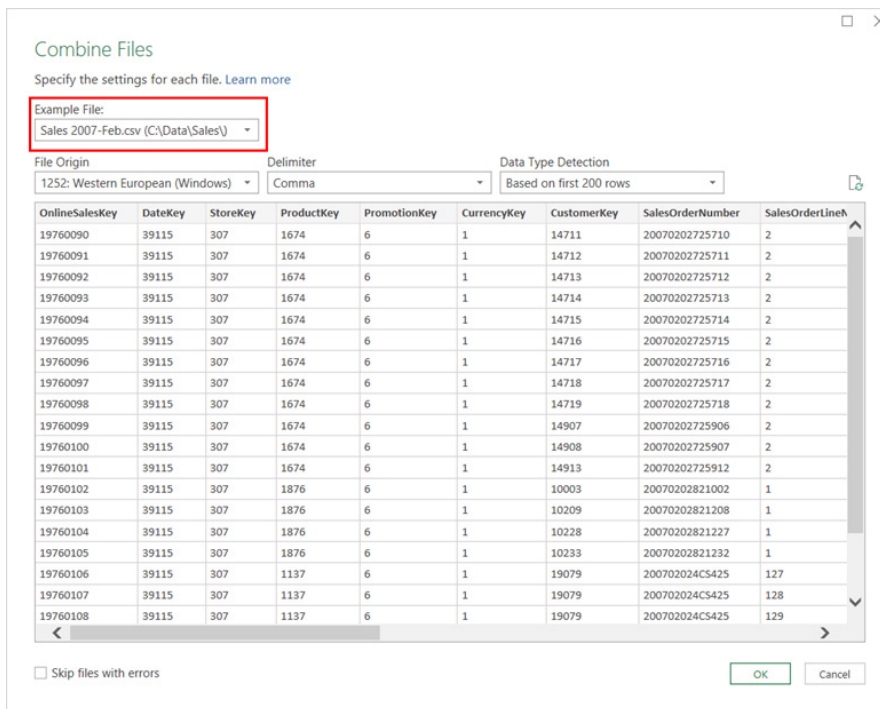
DB2 Connector: option to specify Package Collection

The DB2 connector window now includes an option to specify the package collection to connect to within a given DB2 server. This new option, available under the Advanced Options section in the DB2 connector dialog, can only be used with the Microsoft IBM DB2 driver.
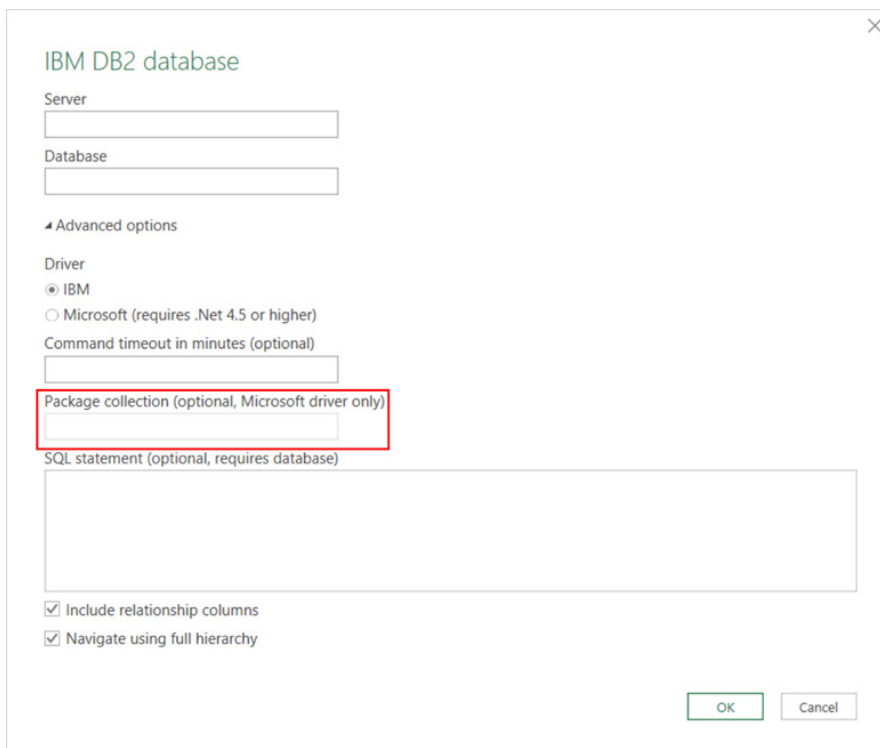
These updates are available as part of an Office 365 subscription. If you have Excel 2010 or Excel 2013, you can also take advantage of these updates by downloading the latest Power Query for Excel add-in.

You can find out more about Power Query, Power Pivot and Power BI on one of our training courses. Visit www.sumproduct.com/courses for more information and to book today.

Yet Another Power BI: an Overview of Power BI Report Server

You just can't seem to get enough Power BI. You wait forever and then six come along at once. As mentioned last newsletter, Microsoft announced Power BI Premium, a capacity-based licensing model that increases flexibility for how users access, share and distribute content. It turns out this new offering also introduces the ability to manage Power BI reports on-premises with the included Power BI Report Server. You can download a free trial here if interested.

With more clients starting to understand the benefits of the free Power BI Desktop, being a versatile tool for self-service BI and creating interactive reports, some of you have expressed a need for an on-premises solution for sharing these reports with business users rather than a cloud solution. In response, Microsoft has released Power BI Report Server, aimed at those who want SQL reporting capabilities plus self-service business intelligence (BI).

	SQL Server Reporting Services	Power BI Report Server	Power BI Service
Deployment	On-premises	On-premises	Cloud
Power BI dashboards			✓
Power BI apps			✓
Natural language query (Q&A)			✓
Power BI reports		✓	✓
Paginated reports (RDL)	✓	✓	
Mobile reports (Datazen-based)	✓	✓	
How to buy	SQL Server [1]	Power BI/SQL Server [2]	Power BI
Feature updates	SQL Server release cycle	Rapid release cycle	Rapid release cycle
Support lifecycle	SQL Server support policy	Modern Lifecycle Policy	Managed service

1. SQL Server Standard or Enterprise.
2. Power BI Premium (or SQL Server Enterprise with Software Assurance) per core + Power BI Pro per report publisher

If you purchase Power BI Premium, your subscription includes capacity in the cloud for the Power BI service as well as a license to run Power BI Report Server in your own on-premises capacity. Alternatively, if you have SQL Server Enterprise with active Software Assurance, you can use your Enterprise per-core licenses to run Power BI Report Server on-premises – although this provides no capacity in the cloud.

Either way you license Power BI Report Server, "publisher" users who publish Power BI reports to the report server for others to access need Power BI Pro licenses, whereas "reader" users who merely view reports don't need any per-user licenses.

With Power BI Desktop and Power BI Report Server, you can:

- Create interactive reports using Power BI Desktop
- Publish reports to Power BI Report Server
- View and interact with reports in your web browser or in Power BI Mobile on your phone or tablet
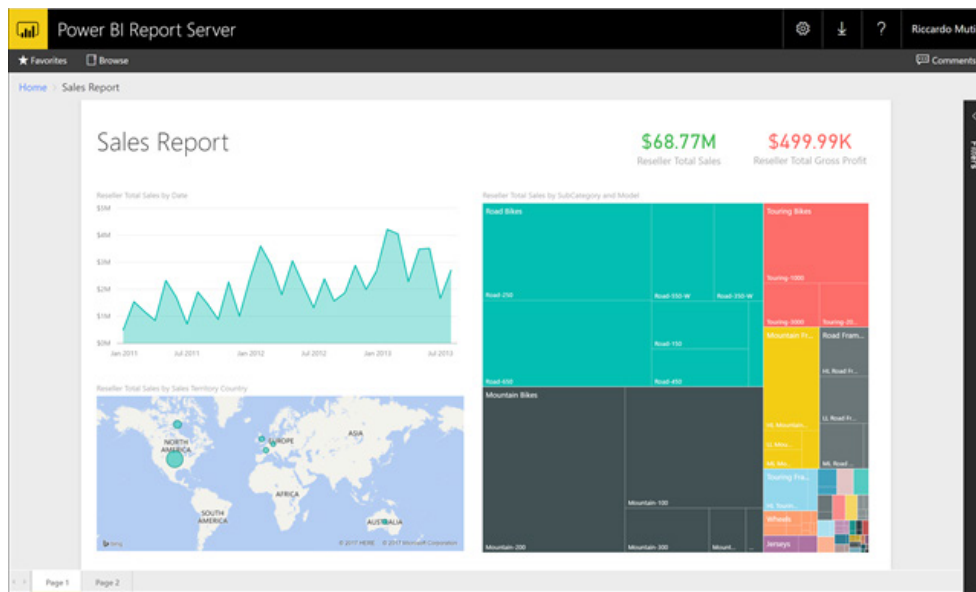
Power BI Report Server focuses on Power BI reports (the documents published to PowerBI.com) and on enabling users to view them in a web browser or on a mobile device. It's not as "Power-ful" as the Power BI service in the cloud supports as this also creates dashboards, real-time / streaming data and natural-language query ("Q&A").

At launch, Power BI Report Server will support most Power BI report features, included but not limited to:

- Create reports in Power BI Desktop
- Connect to Analysis Services data models (Tabular or Multidimensional)
- Visualize data using built-in or custom visuals
- View and interact with reports in your web browser
- Export report data to CSV
- Print a report page
- View and interact with reports in Power BI Mobile.

Further, with the Power BI Report Server web portal, you will be able to:

- Organise reports into folders and subfolders
- Control access with fine-grain security (who can view, download, and publish reports)
- Highlight important business metrics and trends using key performance indicators (KPIs).

With this first release, you connect directly to an Analysis Services data model, which in turn can connect to a variety of other data sources, including SQL Server, Oracle, Teradata, and more. That's not the complete set of Power BI Desktop data sources, but we understand Microsoft will improve this as the year progresses.

The same Power BI reports you create for Power BI Report Server can work in the Power BI service too. You can query your on-premises data via the On-premises Data Gateway, so if you feel like venturing into the cloud, you can take your reports with you and take advantage of the Power BI service's additional features.

It's not going to be for everyone but the free trial is certainly worth a look.

The A to Z of Excel Functions: BINOM.DIST

This month, free of charge, we provide a cure for insomnia,

In probability theory and statistics, the binomial distribution with parameters **n** and **p** is the discrete probability distribution of the number of successes in a sequence of **n** independent success / failure experiments, each of which yields success with probability **p**. For the record, a success / failure experiment is also called a Bernoulli experiment or Bernoulli trial. The binomial distribution is frequently used to model the number of successes in a sample of size **n** drawn with replacement from a population of size **N**.
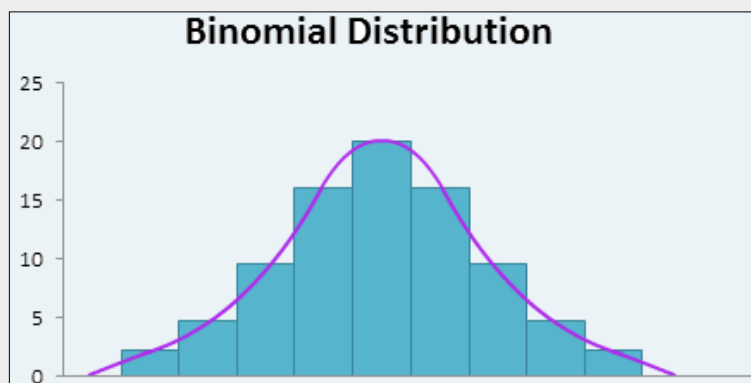
This function returns the individual term binomial distribution probability. The **BINOM.DIST** function should be used in problems with a fixed number of tests or trials, when the outcomes of any trial are only success or failure, when trials are independent and when the probability of success is constant throughout the experiment. For example, **BINOM.DIST** can calculate the probability that two of the next three babies born are male.

The **BINOM.DIST** function employs the following syntax to operate:

BINOM.DIST(number_s, trials, probability_s, cumulative)

The **BINOM.DIST** function has the following arguments:

- **number_s:** this is required and represents the number of successes in trials
- **trials:** this is also required. This is the number of independent trials
- **probability_s:** again, required. This is the probability of success on each trial
- **cumulative:** also required. This is a logical value that determines the form of the function. If **cumulative** is **TRUE**, then **BINOM. DIST** returns the cumulative distribution function, which is the probability that there are at most **number_s** successes; if **cumulative** is **FALSE**, it returns the probability mass function, which is the probability that there are **number_s** successes.

It should be further noted that:

- **number_s** and **trials** are truncated to integers
- if **number_s**, **trials**, or **probability_s** is / are non-numeric, **BINOM.DIST** returns the *#VALUE!* error value
- if **number_s** < 0 or **number_s** > **trials**, **BINOM.DIST** returns the *#NUM!* error value
- if **probability_s** < 0 or **probability_s** > 1, **BINOM.DIST** returns the *#NUM!* error value
- the binomial probability mass function is:

$$b(x;n,p) = \binom{n}{x} p^x (1-p)^{n-x}$$

where:

$$\binom{n}{x}$$

which is **COMBIN(n, x)**.

The cumulative binomial distribution is:

$$B(x;n,p) = \sum_{y=0}^{x} b(y;n,p)$$

All clear as mud? Please see the example below:

	A	B	C	D	E	F
1		Description			Value	
2		Number of successes in trials			6	
3		Number of independent trials			10	
4		Probability of success on each trial			60%	
5						
6						
7		Description			Result	Formula
8		Probability of exactly 6 out of 10 trials being successful			0.2508227	=BINOM.DIST(E2,E3,E4,FALSE)
9		Probability of exactly 4 out of 10 trials being unsuccessful			0.2508227	=BINOM.DIST(E3-E2,E3,1-E4,FALSE)
10						

Essentially, **BINOM.DIST** replaces **BINOMDIST** *(detailed below)*. First introduced in Excel 2010, this provides more compatibility with other statistical software. The former function is still recognised in Excel though for legacy reasons.

The A to Z of Excel Functions: BINOMDIST

So here's the earlier version. The BINOMDIST function (so very similar to BINOM.DIST) employs the following syntax to operate:

BINOMDIST(number_s, trials, probability_s, cumulative)

Like above, the **BINOMDIST** function has the following arguments:

- **number_s:** this is required and represents the number of successes in trials
- **trials:** this is also required. This is the number of independent trials
- **probability_s:** again, required. This is the probability of success on each trial
- **cumulative:** also required. This is a logical value that determines the form of the function. If cumulative is **TRUE**, then **BINOMDIST** returns the cumulative distribution function, which is the probability that there are at most **number_s** successes; if **cumulative is FALSE**, it returns the probability mass function, which is the probability that there are **number_s** successes.

It should be further noted that:

- **number_s** and **trials** are truncated to integers
- if **number_s**, **trials**, or **probability_s** is / are non-numeric, **BINOM.DIST** returns the *#VALUE!* error value
- if **number_s** < 0 or **number_s** > **trials**, **BINOM.DIST** returns the *#NUM!* error value

- if **probability_s** < 0 or **probability_s** > 1, **BINOM.DIST** returns the *#NUM!* error value
- the binomial probability mass function is:

$$b(x;n,p) = \binom{n}{x} p^x (1-p)^{n-x}$$

where:

$$\binom{n}{x}$$

which is **COMBIN(n, x)**.

The cumulative binomial distribution is:

$$B(x;n,p) = \sum_{y=0}^{N} b(y;n,p)$$

Compare and contrast this example with the earlier one (the numbers are identical deliberately):

	A	B	C	D	E	F
1		**Description**			**Value**	
2		Number of successes in trials			6	
3		Number of independent trials			10	
4		Probability of success on each trial			60%	
5						
6						
7	**Description**				**Result**	**Formula**
8	Probability of exactly 6 out of 10 trials being successful				0.2508227	=BINOMDIST(E2,E3,E4,FALSE)
9	Probability of exactly 4 out of 10 trials being unsuccessful				0.2508227	=BINOMDIST(E3-E2,E3,1-E4,FALSE)
10						

Essentially, **BINOMDIST** is the slightly less flexible version of **BINOM.DIST** and represents the version of the function used before its successor was introduced in Excel 2010.

The A to Z of Excel Functions: BINOM.DIST.RANGE

This function returns the probability of a trial result using a binomial distribution. The BINOM.DIST.RANGE function employs the following syntax to operate:

BINOM.DIST.RANGE(trials, probability_s, number_s, [number_s2])

The **BINOM.DIST.RANGE** function has the following arguments:

- **trials:** this is required and represents the number of independent trials. The value must be greater than or equal to 0
- **Probability_s:** this is also required. This is the probability of success in each trial. This must be greater than or equal to 0 and less than or equal to 1, just like every probability
- **Number_s:** again, required. This is the number of successes in trials. This must be greater than or equal to 0 and less than or equal to **trials**
- **Number_s2:** this argument is optional. If it is provided, this returns the probability that the number of successful trials will fall between **number_s** and **number_s2**. Must be greater than or equal to **Number_s** and less than or equal to **trials**.

It should be further noted that:

- if any arguments are outside of their constraints, **BINOM.DIST.RANGE** returns the *#NUM!* error value
- if any arguments are non-numeric values, **BINOM.DIST.RANGE** returns the *#VALUE!* error value
- the following equation is used:

$$\sum_{k=S}^{S2} \binom{N}{k} p^k (1-p)^{N-k}$$

- in the equation above, **N** is **trials**, **p** is **probability_s**, **s** is **Number_s**, **s2** is **Number_s2**, and **k** is the iteration variable
- numeric arguments are truncated to integers.

It can be demonstrated as follows:

	A	B	C	D	E	F
1		Description			Value	
2		Number of independent trials			60	
3		Probability of success on each trial			75%	
4		Number of successes in trials			45	
5		Second number of successes in trials			50	
6						
7	Description				Result	Formula
8	Returns the binomial distribution based on the probability of 45 successes in 60 trials with a 75% probability of success				0.1182280	=BINOM.DIST.RANGE(E2,E3,E4)
9	Returns the binomial distribution based on the probability of between 45 and 50 successes in 60 trials with a 75% probability of success				0.5236298	=BINOM.DIST.RANGE(E2,E3,E4,E5)
10						

The A to Z of Excel Functions: BINOM.INV

Bored of these functions yet? This function returns the smallest value for which the cumulative binomial distribution which is greater than or equal to a criterion value. This might sound like gobbledygook but it is useful for creating independent simulations analysis in Excel (please see Simulation Stimulation for more information).

The **BINOM.INV** function employs the following syntax to operate:

<div align="center">

BINOM.INV(trials, probability_s, alpha)

</div>

The **BINOM.INV** function has the following arguments:

- **trials:** this is required and represents the number of Bernoulli trials
- **probability_s:** this is also required. This is the probability of a success on each trial
- **alpha:** again, required. This represents the aforementioned criterion value.

It should be further noted that:

- if any argument is nonnumeric, **BINOM.INV** returns the *#VALUE!* error value
- If **trials** is not an integer, it is truncated
- If **trials** < 0, **BINOM.INV** returns the *#NUM!* error value
- If **probability_s** is < 0 or **probability_s** > 1, **BINOM.INV** returns the *#NUM!* error value
- If **alpha** < 0 or **alpha** > 1, **BINOM.INV** returns the *#NUM!* error value.

Our final example:

	A	B	C	D	E	F
1		Description			Value	
2		Number of Bernoulli trials			6	
3		Probability of success on each trial			50%	
4		Number of independent trials			0.75	
5						
6						
7	Description				Result	Formula
8	Smallest number for which the cumulative binomial distribution is greater than or equal to a criterion value				4	=BINOM.INV(E2,E3,E4)
9						

Meet Cecile Nguyen

…And we have another new recruit. Please meet Cecile Nguyen, who has worked in Insurance and Logistics over the course of her career. With a passion for understanding how one number gets to another, she is fascinated with understanding all the components that make a product what it is whether it be a life policy or a bottle of wine (we do help she can tell the difference…).

Previously having worked with CHR Consulting, MLC and Chubb Insurance in the actuarial field, she has assessed claim triangles, analysed profitability of insurance policies and produced pricing and other analytical models. Moving into logistics, she has worked extensively in Inventory Management both in Australia and Canada.

Cecile specialises in assisting clients with identifying their requirements and facilitating their understanding of reporting needs. She has also worked in operations, planning and wholesale departments and appreciates the complexities of product pricing, regulatory oversight and the global economy.

Cecile is outgoing (trust us here…) and enjoys untangling data. Nothing can't be solved without at least one Pivot Table and something starting with "Power"!

Upcoming SumProduct Training Courses

Location	Course	Date	Duration
Melbourne	Excel Tips & Tricks	3rd Jul 2017	1 day
Melbourne	Financial Modelling	4th - 5th Jul 2017	2 days
Sydney	Visual Basic for Applications	10th Jul 2017	1 day
Sydney	Power Pivot, Power Query and Power BI	17th - 19th Jul 2017	3 days
Adelaide	Power Pivot, Power Query and Power BI	24th - 26th Jul 2017	3 days
Sydney	Excel Tips & Tricks	31st Jul 2017	1 day
Sydney	Financial Modelling	1st - 2nd Aug 2017	2 days
Perth	Power Pivot, Power Query and Power BI	7th - 9th Aug 2017	3 days
Adelaide	Excel Tips & Tricks	14th Aug 2017	1 days
Adelaide	Financial Modelling	15th - 16th Aug 2017	2 day
Melbourne	Mergers and Acquisitions	21st - 24th Aug 2017	4 days
Brisbane	Power Pivot, Power Query and Power BI	28th - 30th Aug 2017	3 days
Melbourne	Excel Tips & Tricks	4th Sep 2017	1 day
Melbourne	Financial Modelling	5th - 6th Sep 2017	2 days
Melbourne	Power Pivot, Power Query and Power BI	12th - 14th Sep 2017	3 days
Sydney	Excel Tips & Tricks	25th Sep 2017	1 day

Sydney	Financial Modelling	26th - 27th Sep 2017	2 days
Sydney	Power Pivot, Power Query and Power BI	16th - 18th Oct 2017	3 days
Melbourne	Excel Tips & Tricks	23rd Oct 2017	1 day
Melbourne	Financial Modelling	24th - 25th Oct 2017	2 days
Sydney	Visual Basic for Applications	6th Nov 2017	1 day
Sydney	Excel Tips & Tricks	13th Nov 2017	1 day
Sydney	Financial Modelling	14th - 15th Nov 2017	2 days
Melbourne	Power Pivot, Power Query and Power BI	4th - 6th Dec 2017	3 days
Melbourne	Excel Tips & Tricks	11th Dec 2017	1 day
Melbourne	Financial Modelling	12th - 13th Dec 2017	2 days

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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. We're still going through the function keys – this time, having looked at binary functions, the F10 function key seems somehow appropriate:

Keystroke	What it does
F11	Insert chart on new sheet
ALT + F11	Open Visual Basic Editor
CTRL + F11	Insert new macro sheet
SHIFT + F11	Insert new worksheet
SHIFT + ALT + F11	Show Script Editor

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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· **Project finance**
· **Real options analysis**
· **Refinancing / restructuring**
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· **Valuations**
· **Working capital management**

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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".

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