

Sum Product

NEWSLETTER #50 - January 2017

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Celebrations are like buses... You don't see one for ages and then two come along in quick succession. Last month saw us celebrate our fourth birthday (yup, we've gone fourth and multiplied!) and this month sees us raise our bat to complete an unbeaten half century – 50 not out!

Yet again, there's plenty of updates in this issue – this time for both Power BI and Power Query – with the latter now getting its own regular article in this newsletter too (and about time too, I hear you say) as well as both forming part of our new flagship training course.

With the usual A to Z of Excel Functions, a Keyboard Shortcuts “refresher”, training updates *et al*, the newsletter that continues to grow, er, continues to grow. You know, I really should get this edited professionally (*hey! – Ed.*)

And before I forget – talking of celebrations – **HAPPY NEW YEAR!!** Wishing you all a prosperous 2017 as we hope to see some of you this year at our Excel Unlocked summits, our training courses or as returning or new clients. All the best!

That's it until next year. Seasons greetings to you all.

Liam Bastick, Managing Director, SumProduct



Lack of Interest in Interest?

Here at SumProduct we audit many models. With one of the most experienced teams of model auditors around, you start to recognise and look out for common errors in financial spreadsheets. One common are of malignant modelling is the inability of many analysts to convert an annual interest rate into a monthly or quarterly rate correctly. Sometimes the error is immaterial; other times, it can cause major issues (e.g. for bank forecasts). This isn't so much an Excel issue as a mathematical problem, but it is still relevant to financial modellers and more often than not, it's calculated incorrectly.

The key thing any modeller charged with this exercise must do is read the debt term sheet or deposit account prospectus to see what the effective annual rate is. Accountants talk about nominal interest rates and such like, but the **effective annual rate** is the amount of interest expressed as

a percentage of the opening debt or cash balance if interest were to be paid and calculated as per the terms of the underlying document.

It's easier said than done.

Consider this example: consider a loan of \$100 where interest is calculated in arrears on a monthly compounding basis paid quarterly at the end of each quarter. The effective rate is determined to be 12%. The question is, what is the appropriate monthly rate be for cashflow calculations?

Who said 1%? That's a common answer, derived as 12% divided by the number of months in a year (12). It sounds good, but if we crunch the numbers we will get the following result:

1. Simple Monthly Rate

Demonstration

Effective Interest Rate	% p.a.	12.00%
Rate Used	% p.m.	1.0000%
Opening Balance Assumed	\$	100

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Opening Balance	\$ 100.00	\$ 101.00	\$ 102.01	\$ 100.00	\$ 101.00	\$ 102.01	\$ 100.00	\$ 101.00	\$ 102.01	\$ 100.00	\$ 101.00	\$ 102.01
Interest Accrued	\$ 1.00	\$ 1.01	\$ 1.02	\$ 1.00	\$ 1.01	\$ 1.02	\$ 1.00	\$ 1.01	\$ 1.02	\$ 1.00	\$ 1.01	\$ 1.02
Interest Paid	\$ -	\$ -	\$ (3.03)	\$ -	\$ -	\$ (3.03)	\$ -	\$ -	\$ (3.03)	\$ -	\$ -	\$ (3.03)
Closing Balance	\$ 101.00	\$ 102.01	\$ 100.00	\$ 101.00	\$ 102.01	\$ 100.00	\$ 101.00	\$ 102.01	\$ 100.00	\$ 101.00	\$ 102.01	\$ 100.00

Total Interest For Year	\$	12.12
Opening Balance Assumed	\$	100
Effective Interest Rate	% p.a.	12.12%

On a \$100 balance with interest of 1% monthly paid quarterly, the total interest for the year will be \$12.12 – that's an effective annual rate of 12.12% rather than 12% (12.00%). This is not correct, as interest is being rolled up at the end of each of the first two months in the quarter and is attracting further interest, i.e. interest is compounding and has not been taken into account by simply dividing the annual rate by the number of months in a year.

So, what about using the compounding formula instead? Interest can then be calculated as

$$=(1+12\%)^{1/12} - 1$$



This equates to 0.9489% per month. This will take into account compounding – well, sort of:

1. Compounding Monthly Rate

Demonstration

Effective Interest Rate % p.a.
 Rate Used % p.m.
 Opening Balance Assumed \$

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Opening Balance	100.00	100.95	101.91	100.00	100.95	101.91	100.00	100.95	101.91	100.00	100.95	101.91
Interest Accrued	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97
Interest Paid	-	-	(2.87)	-	-	(2.87)	-	-	(2.87)	-	-	(2.87)
Closing Balance	100.95	101.91	100.00	100.95	101.91	100.00	100.95	101.91	100.00	100.95	101.91	100.00

Total Interest For Year \$ 11.49
 Opening Balance Assumed \$ 100
 Effective Interest Rate % p.a.

This hasn't worked either: interest has been under-accrued (that's a good word I've just made up) as only \$11.49 has been computed for the year – an effective rate of 11.49%.

Here, the calculation is again too simplistic as it does not take into account that the interest is paid quarterly. This means that compounding throughout the year does not occur, hence the shortfall of 0.51%.

The correct formula is in fact:

$$=(1+(\text{Effective Annual Interest Rate} \times \text{Payment Frequency} / \text{Months in Year}))^{1/\text{Payment Frequency}} - 1$$

If payments are made once every three months then there are four payments (equal to **Months in Year / Payment Frequency** or 12 / 3) each year. At these points, compounding stops. Therefore, the interest rate of 12% per annum is effectively 3% per quarter. The compounding formula can then be applied to the quarterly rate to get the monthly rate accordingly:

$$=(1+3\%)^{1/3} - 1$$

This equates to 0.9902%. This is correct, viz.

1. Correct Interest Rate

Demonstration

Effective Interest Rate % p.a.
 Rate Used % p.m.
 Opening Balance Assumed \$

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Opening Balance	100.00	100.99	101.99	100.00	100.99	101.99	100.00	100.99	101.99	100.00	100.99	101.99
Interest Accrued	0.99	1.00	1.01	0.99	1.00	1.01	0.99	1.00	1.01	0.99	1.00	1.01
Interest Paid	-	-	(3.00)	-	-	(3.00)	-	-	(3.00)	-	-	(3.00)
Closing Balance	100.99	101.99	100.00	100.99	101.99	100.00	100.99	101.99	100.00	100.99	101.99	100.00

Total Interest For Year \$ 12.00
 Opening Balance Assumed \$ 100.00
 Effective Interest Rate % p.a.

Success!

This is the formula that should be applied to calculate the appropriate monthly interest rate from a quoted effective annual one. It might not surprise you to learn we have developed a simple [Excel file](#) that provides examples and a template that may be used to convert annual interest rates to the correct monthly ones.

You can check out other useful ideas at www.sumproduct.com/thought.

Power BI Desktop Latest Update

As usual, it was too late for our last newsletter, but late November saw Microsoft release its latest Power BI Desktop update, which contained some of the most eagerly awaited feature updates and improvements yet, if Uservoice is to be believed.

By area, the list of updates by category includes:

- **Report View**

- o Dropdown slicer
- o Hierarchical axis
- o Matrix conditional formatting
- o Table and matrix column formatting
- o Axis label and title colour control
- o Phone reports scrolling

- **Analytic**
 - o Clustering (as a preview)
 - o Forecasting: now available on Power BI on the web
 - o Groups: Ribbon entry point
- **Data Connectors**
 - o Spark DirectQuery
 - o OData connector: folding of expand record operations
 - o Enhanced “combine binaries” experience
 - o Azure Analysis Services
 - o Web connector updates
- **Query Editing Improvements**
 - o Improved “function authoring” experience
 - o Support for percentage data type
 - o Maximize / Restore buttons in the Navigator and Query Dependencies dialogs

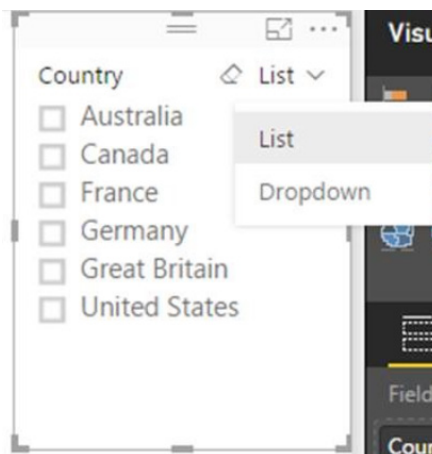
A summary of the major updates, can be found in Microsoft’s video [here](#).

Let’s take a look at each in more detail.

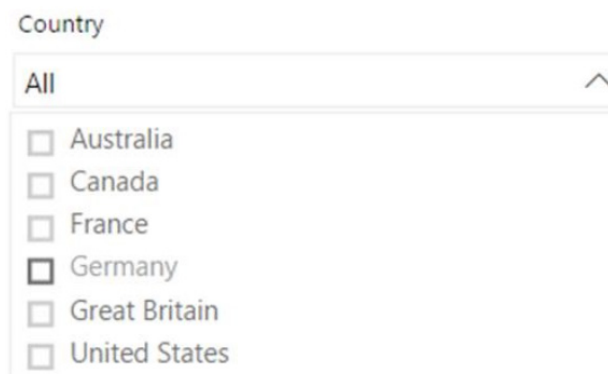
Dropdown slicer

Like trips to the butchers, users cannot seem to get enough of slicers. Last month saw the release of the date slicer, and in quick succession, it has now been befriended by the dropdown slicer. This slicer is particularly useful if you are tight on space in your report canvas or if you have a lot of category items in your slicer which you do not want to take up valuable real estate.

When you create a normal list slicer, you can turn it into a drop down by using the dropdown option next to the ‘Clear’ button.

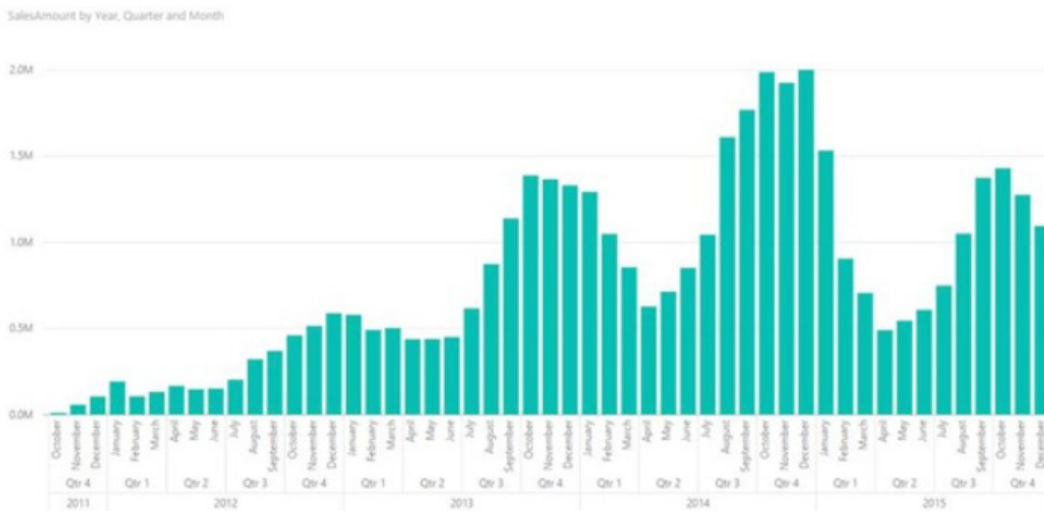


You can now use this dropdown slicer the same way as the list slicer.

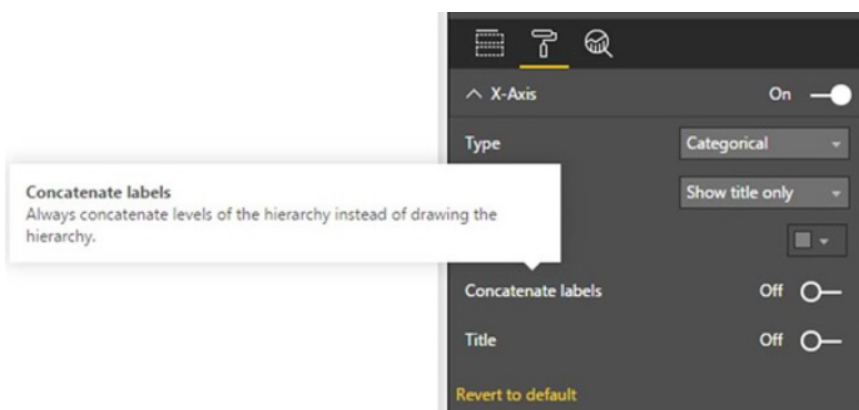


Hierarchical axis

With this latest release, Microsoft has improved how visuals may be viewed which contain a hierarchy through a new hierarchical axis. This allows you to clearly see the hierarchy within the visual. As you drill, you’ll be able to better understand where you are in the hierarchy. *(Is this the new world record for the number of hierarchies in one paragraph? – Ed.)*



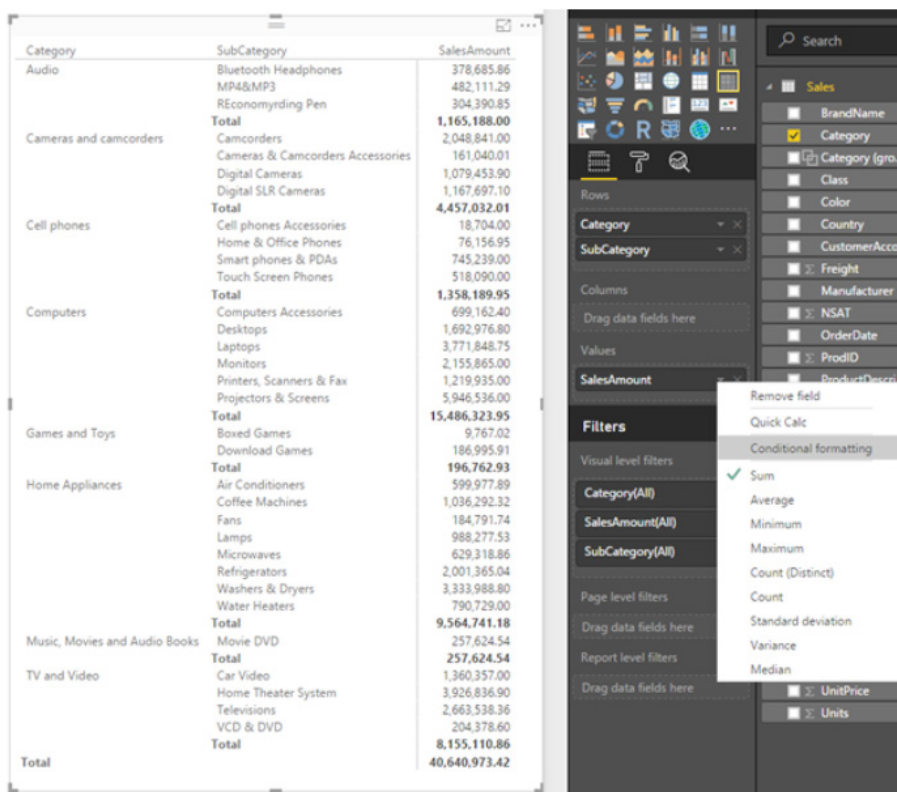
You can use hierarchical labels by turning off the label concatenation experience in the formatting pane:



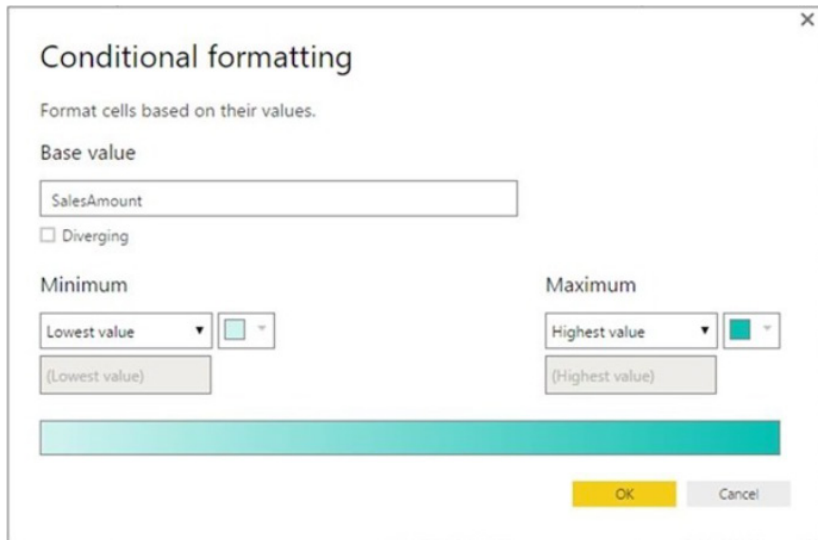
Matrix conditional formatting

Back in May, Power BI added the feature that allowed you to conditionally format measures in tables. Now, this has been extended to work for measures in matrices as well.

You can turn on conditional formatting by opening the field well menu for the measure and selecting 'Conditional formatting':



In the dialog, you can change various settings, including picking out which colours you wish to use:



Once you hit okay, you'll see the formatting applied:

Category	SubCategory	SalesAmount
Audio	Bluetooth Headphones	378,685.86
	MP4&MP3	482,111.29
	REconomyrding Pen	304,390.85
	Total	1,165,188.00
Cameras and camcorders	Camcorders	2,048,841.00
	Cameras & Camcorders Accessories	161,040.01
	Digital Cameras	1,079,453.90
	Digital SLR Cameras	1,167,697.10
	Total	4,457,032.01
Cell phones	Cell phones Accessories	18,704.00
	Home & Office Phones	76,156.95
	Smart phones & PDAs	745,239.00
	Touch Screen Phones	518,090.00
	Total	1,358,189.95
Computers	Computers Accessories	699,162.40
	Desktops	1,692,976.80
	Laptops	3,771,848.75
	Monitors	2,155,865.00
	Printers, Scanners & Fax	1,219,935.00
	Projectors & Screens	5,946,536.00
	Total	15,486,323.95
Games and Toys	Boxed Games	9,767.02
	Download Games	186,995.91
	Total	196,762.93
Home Appliances	Air Conditioners	599,977.89
	Coffee Machines	1,036,292.32
	Fans	184,791.74
	Lamps	988,277.53
	Microwaves	629,318.86
	Refrigerators	2,001,365.04
	Washers & Dryers	3,333,988.80
	Water Heaters	790,729.00
	Total	9,564,741.18
	Music, Movies and Audio Books	Movie DVD
Total		257,624.54
TV and Video	Car Video	1,360,357.00
	Home Theater System	3,926,836.90
	Televisions	2,663,538.36
	VCD & DVD	204,378.60
	Total	8,155,110.86
Total	Total	40,640,973.42

Table and matrix column formatting

It's not just conditional formatting that's available for matrices: the November update has also added the ability to format columns in tables and matrices too. This lets you set the font and background colour for any column.

In the formatting pane, you can now see the 'Column formatting' card. When you expand it, you will be able to select a column in the dropdown list and pick the font and background colours. You can also choose whether these settings should apply to headers and totals or only the values:

Category	SubCategory	SalesAmount
Computers	Projectors & Screens	5,946,536.00
TV and Video	Home Theater System	3,926,836.90
Computers	Laptops	3,771,848.75
Home Appliances	Washers & Dryers	3,333,988.80
TV and Video	Televisions	2,663,538.36
Computers	Monitors	2,155,865.00
Cameras and camcorders	Camcorders	2,048,841.00
Home Appliances	Refrigerators	2,001,365.04
Computers	Desktops	1,692,976.80
TV and Video	Car Video	1,360,357.00
Computers	Printers, Scanners & Fax	1,219,935.00
Cameras and camcorders	Digital SLR Cameras	1,167,697.10
Cameras and camcorders	Digital Cameras	1,079,453.90
Home Appliances	Coffee Machines	1,036,292.32
Home Appliances	Lamps	988,277.53
Home Appliances	Water Heaters	790,729.00
Cell phones	Smart phones & PDAs	745,239.00
Computers	Computers Accessories	699,162.40
Home Appliances	Microwaves	629,318.86
Home Appliances	Air Conditioners	599,977.89
Cell phones	Touch Screen Phones	518,090.00
Audio	MP4&MP3	482,111.29
Audio	Bluetooth Headphones	378,685.86
Audio	REconomyrding Pen	304,390.85
Music, Movies and Audio Books	Movie DVD	257,624.54
TV and Video	VCD & DVD	204,378.60
Games and Toys	Download Games	186,995.91
Home Appliances	Fans	184,791.74
Cameras and camcorders	Cameras & Camcorders Accessories	161,040.01
Cell phones	Home & Office Phones	76,156.95
Total		40,640,973.42

Axis label and title colour control

Just as in Excel, for most charts you can change the colours of your axis labels. This support has been expanded to all charts now. Additionally, you can now format your axis title colour separately from the axis labels.

Manufacturer	SalesAmount
Contoso, Ltd	~8.5M
Adventure Works	~6.5M
Proseware, Inc.	~5.5M
Fabrikam, Inc.	~5.0M
Litware, Inc.	~5.0M
Wide World Importers	~4.8M
Southridge Video	~2.0M
A. Datum Corporation	~1.5M
The Phone Company	~1.0M
Northwind Traders	~1.0M
Tailspin Toys	~0.5M

Phone reports scrolling

Require your Business Intelligence on the go? Back in September, Microsoft released a preview of phone report layouts, which allowed you to create custom layouts of your report for users to view when they are on their phones (presumably while they are driving...). This release makes an update to that preview: now, you can extend the length of your phone report and allow users to scroll to see the additional content.



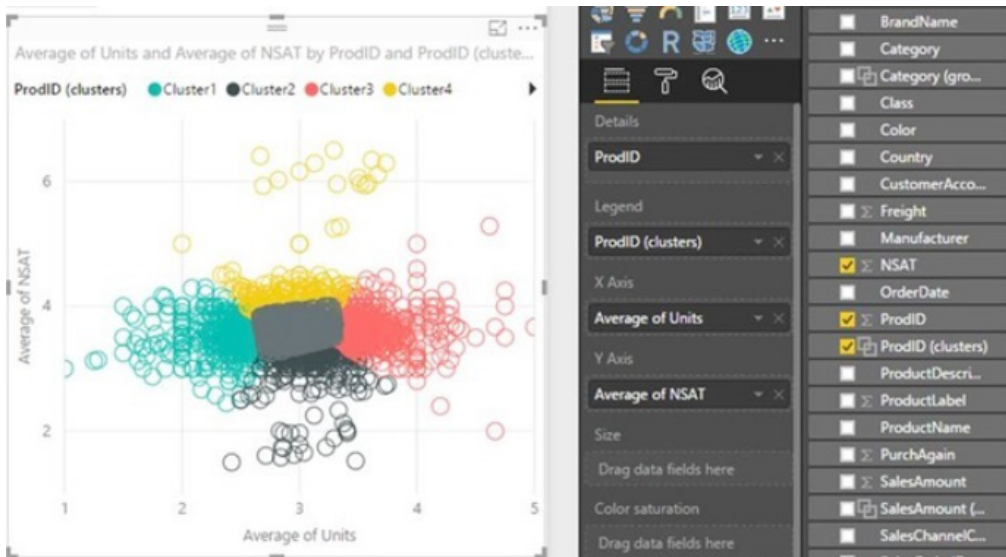
Clustering (preview)

One long-awaited analytical feature added to Power BI this update is clustering. Clustering lets you quickly find groups of similar data points in a subset of your data. You can use clustering on your scatter chart by clicking the “...” and then by selecting ‘Automatically find clusters’.

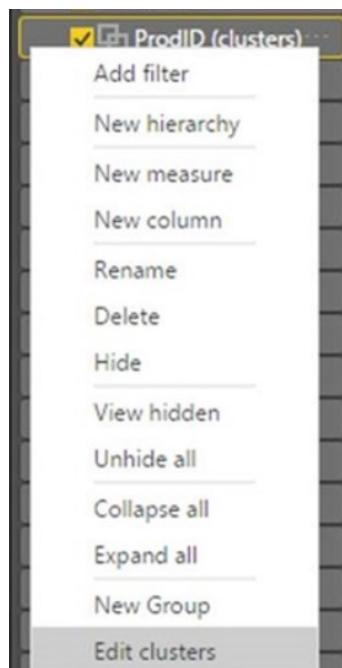


When you select this, a dialog opens where you can decide how many clusters you want to find. If you leave it blank, Power BI will automatically find the number of clusters it thinks makes the most sense concerning your data.

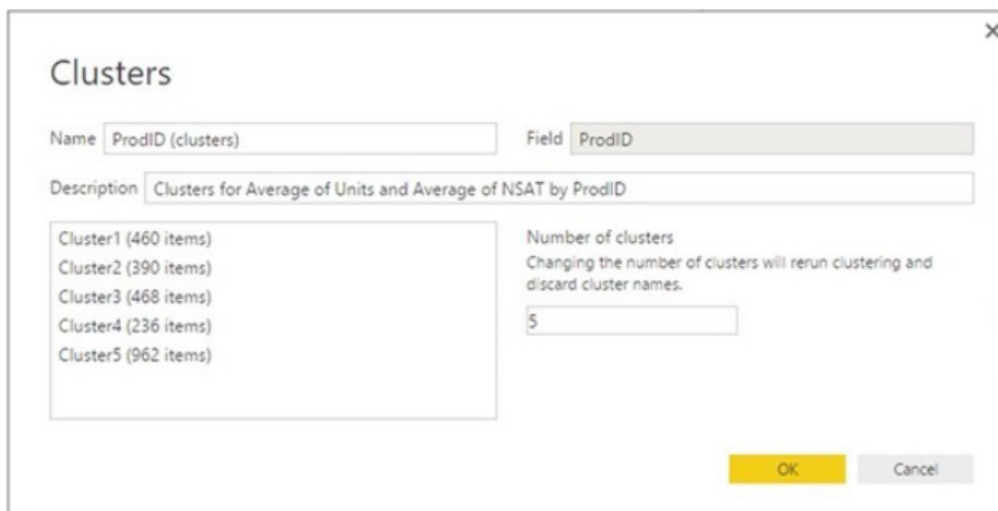
After the clustering algorithm runs, it will create a new categorical field with the different cluster groups in it. This new field will be adding to your scatter chart's legend field well bucket, which you can now use as a source of cross highlighting, just like any other legend field. You can also find it in your field list and use it in new visuals – again, just like any other field.



You can select 'Edit clusters' in the field list menu to configure it further, viz.



In this dialog, you can rename the field, name each of the clusters, or adjust the number of clusters you want to find.



If you want to find clusters using more than two measures, you can use a Table to add all the fields you want to use and run the clustering algorithm using the same process.

Category	Units	SalesAmount	Average...	Average...
Audio	8643	1,165,188.00	3.54	15.39
Cameras and camc...	12466	4,457,032.01	3.59	40.31
Cell phones	7814	1,358,189.95	3.58	19.57
Computers	46213	15,486,323.95	3.52	37.77
Games and Toys	4427	196,762.93	3.57	5.00
Home Appliances	18128	9,564,741.18	3.56	58.98
Music, Movies and...	2358	257,624.54	3.61	12.02
TV and Video	16560	8,155,110.86	3.95	55.50
Total	116609	40,640,973.42	3.60	39.23

Export data

Remove

Automatically find clusters

Category

Units

SalesAmount

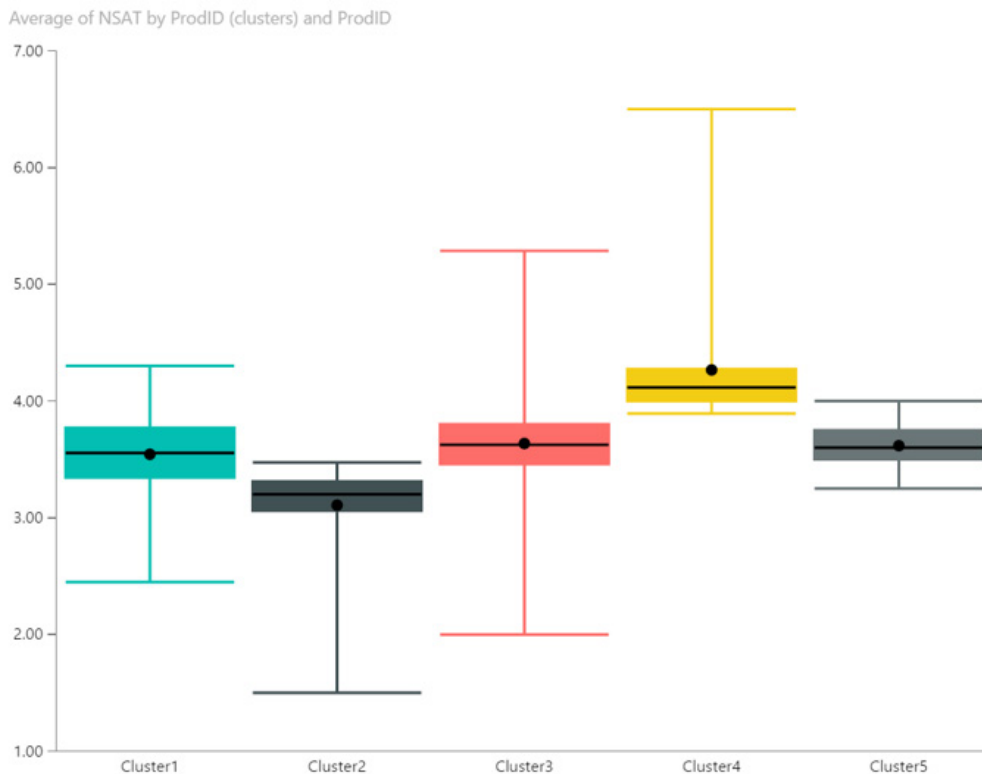
Average of NSAT

We will add the new field to the Table and the field list for you to use in your other charts.

Category	Units	SalesAmount	Average...	Average...	Category (clusters)
Games and Toys	4427	196,762.93	3.57	5.00	Cluster7
Audio	8643	1,165,188.00	3.54	15.39	Cluster6
Cell phones	7814	1,358,189.95	3.58	19.57	Cluster6
Cameras and camc...	12466	4,457,032.01	3.59	40.31	Cluster5
Home Appliances	18128	9,564,741.18	3.56	58.98	Cluster4
Music, Movies and...	2358	257,624.54	3.61	12.02	Cluster3
Computers	46213	15,486,323.95	3.52	37.77	Cluster2
TV and Video	16560	8,155,110.86	3.95	55.50	Cluster1
Total	116609	40,640,973.42	3.60	39.23	

One way for you to use your newly-created cluster field, for example, would be to use custom visuals to do further analysis and evaluate the clusters. You might use the cluster column and each of the associated measures in a radar chart to see the aggregate of each measure for each

cluster. You might use the cluster column and one of the measures in a box and whiskers plot to see the distribution of values for that measure in each cluster. This can help you determine the minimum, maximum and median values for that measure within each cluster very easily.

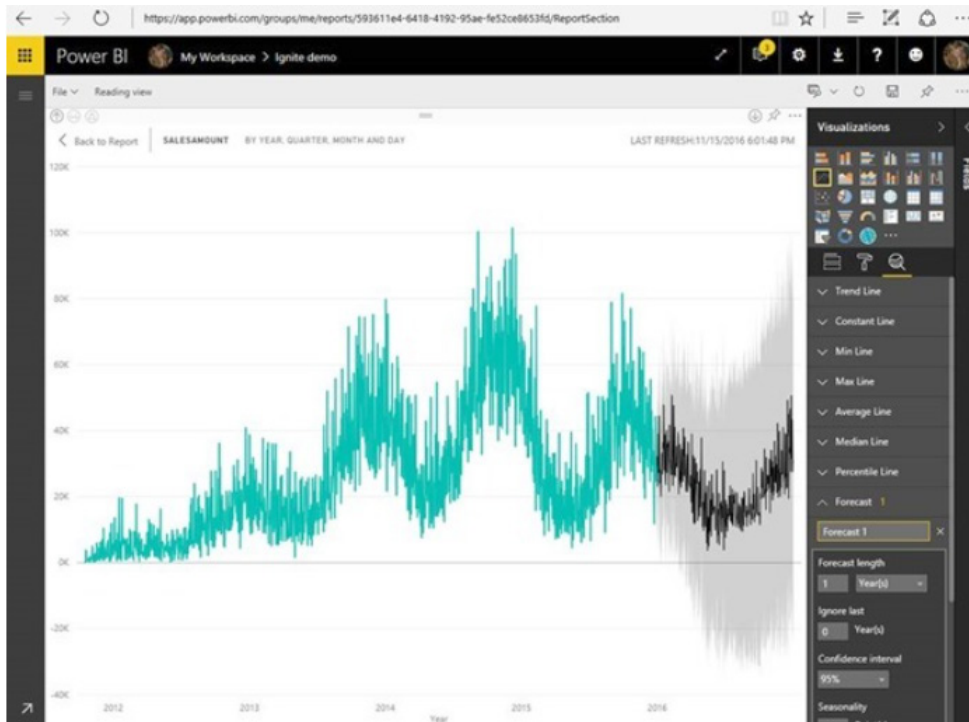


Clusters are not re-evaluated on Refresh, which may or may not be a blessing. Microsoft argues that this is intentional so that you may easily save your clusters and re-evaluate when needed. New points will therefore be assigned to a (blank) cluster.

Do note that since this is a preview feature, you will need to enable it in the 'Preview Features' tab in the 'Options' dialog.

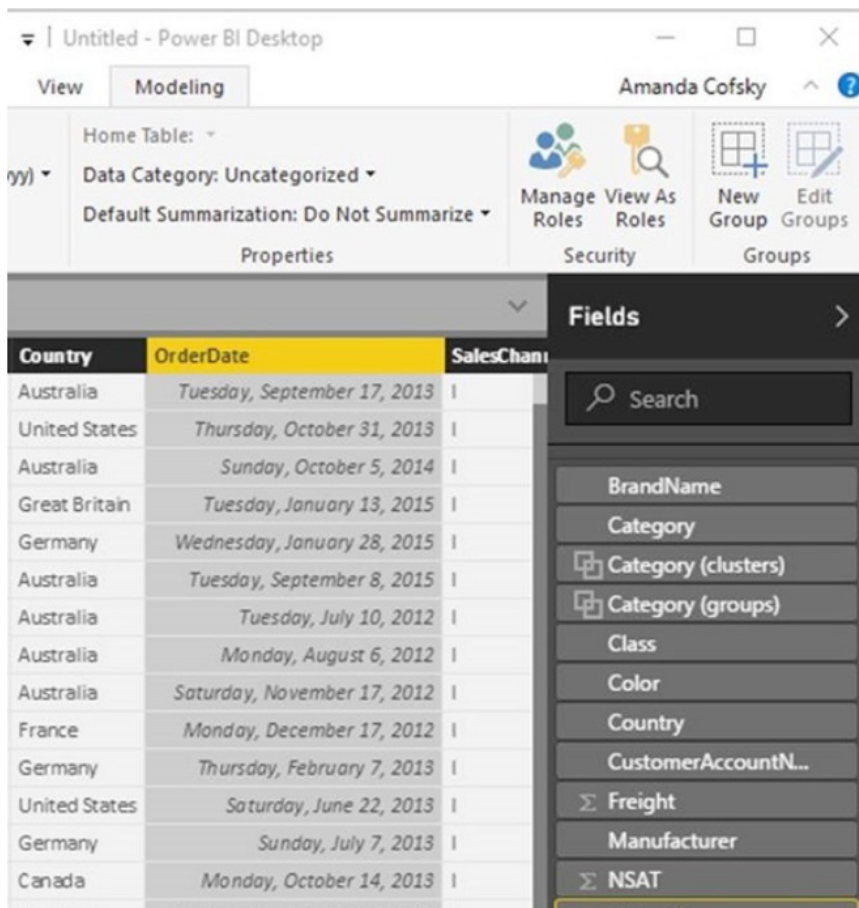
Forecasting – now available in the Power BI on the web

Forecasting was previewed back in September. With this release, the feature is generally available to everyone, so you no longer need to enable it through the Options dialog. Additionally, you can now see your forecasting in reports on the web and pinned tiles. You can also create new forecasts in the web report editing experience.

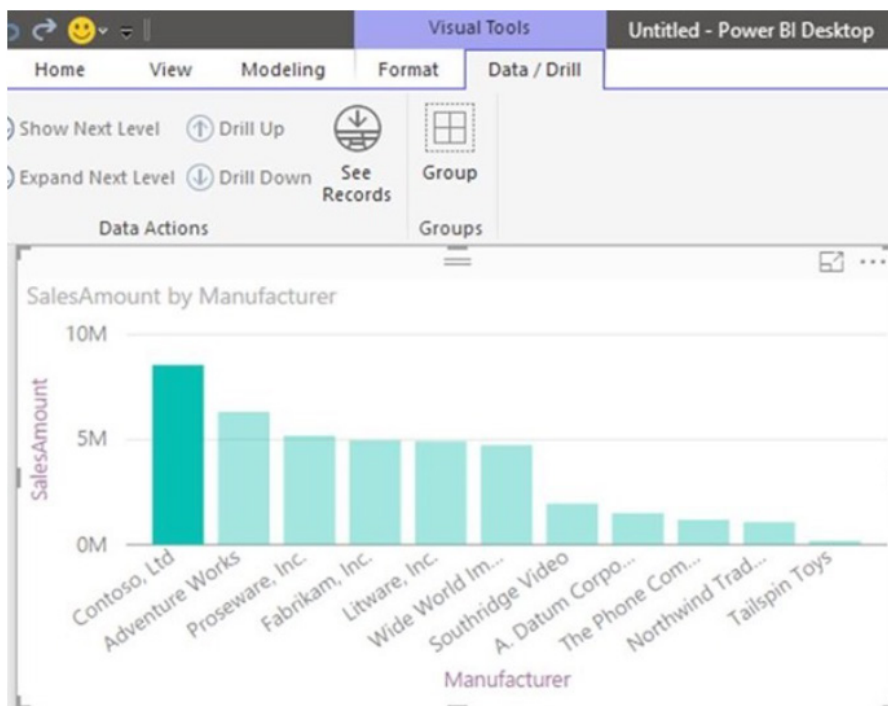


Groups: Ribbon entry points

Microsoft has added two new ways to create groups to make it even quicker and easier to use. You can create and edit groups from the 'Modeling' tab.



You can also create a new group from the 'Data / Drill tab' when you are on a chart:



Spark DirectQuery

Microsoft has now added DirectQuery support when connecting to Spark. This includes the HDInsight Spark connector (under **Get Data -> Azure**) as well as the Spark connector for other Spark distributions (under **Get Data -> Other**). It should be noted that this new DirectQuery mode is currently in Preview and not yet supported for Power BI web report consumption.

When using one of the Spark connectors, you are now able to pick which Connectivity Mode to use, either Import or DirectQuery.



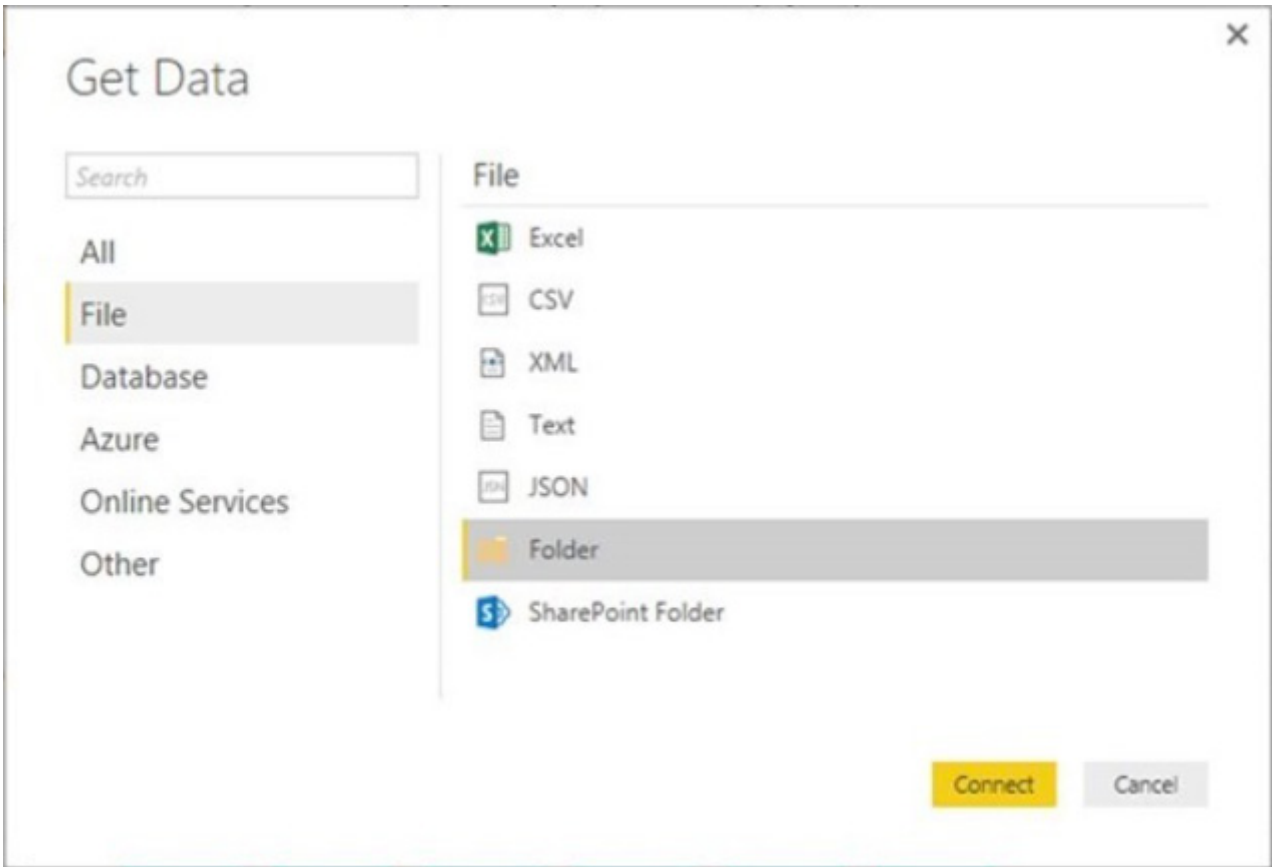
If you have no idea what DirectQuery is and wish to find out more, check out Microsoft's documentation on the subject [here](#).

OData Connector – folding of expand record operations

This latest update also provides a new feature to help improve the performance of complicated data models you are accessing through an OData feed. Microsoft has added support for the underlying OData Service which will perform the expand record operation rather than have this operation undertaken in Power BI. By having the underlying OData service handle this operation, the transaction is more efficient since less data is passed to Power BI. That makes sense to us.

Enhanced "combine binaries" experience

One common scenario in Power BI consists of leveraging one of the folder-like connectors (such as Folder, SharePoint folder, HDFS, etc.) to combine multiple files with the same schema into a single logical table.

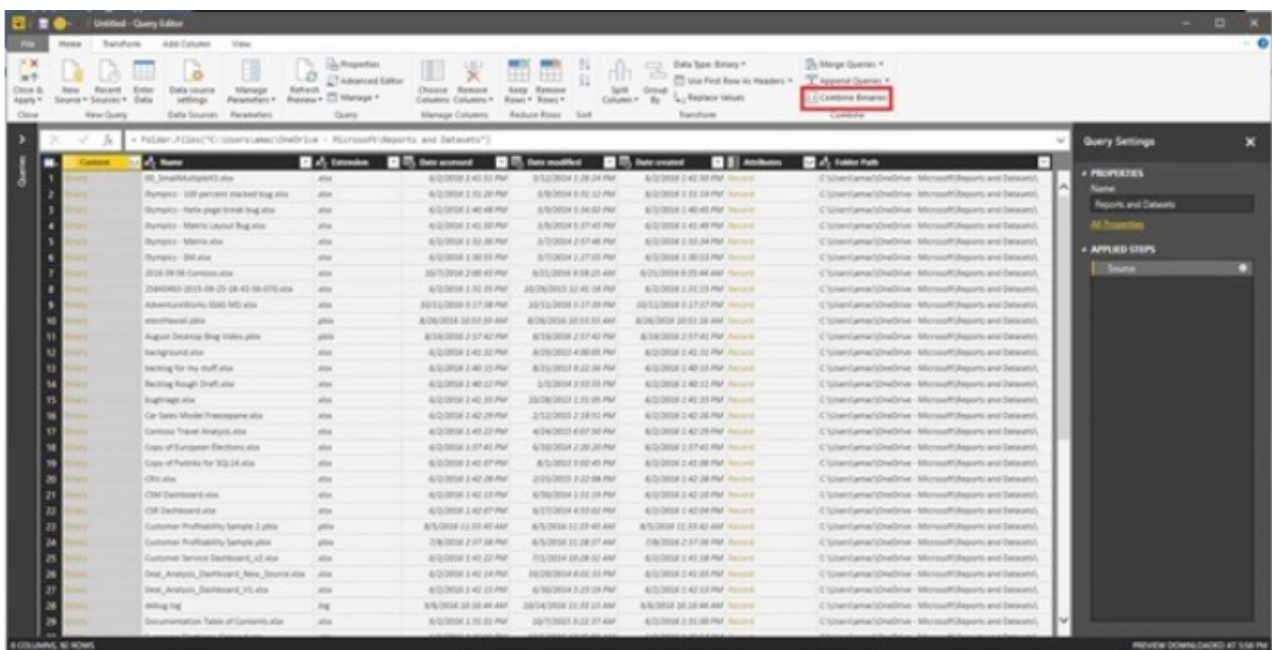


Before this latest release, users could combine Text or CSV files by using the “combine binaries” transform. However, this transformation had a few gaps:

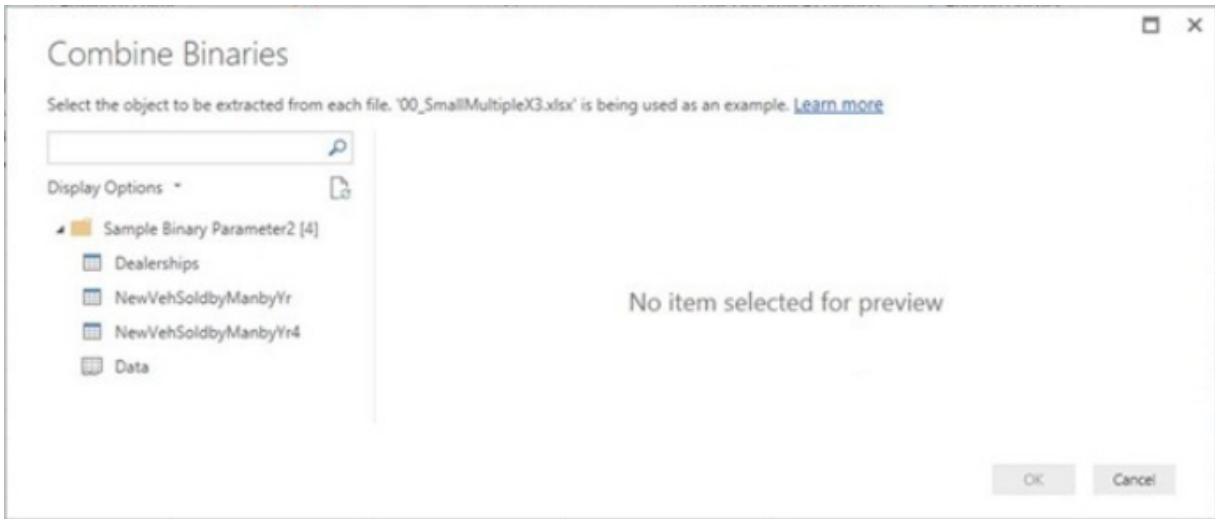
- It wouldn’t account for transformations required on each file before combining them into a single table. A typical example of this is Text / CSV files with column headers. You instead had to combine files into a single table first, then filter out the “header values” as a filter rows operation
- This “combine binaries” transform only worked (with above limitations) for Text or CSV files, but not for any of the other supported file formats (such as Excel Workbooks, JSON files, etc.).

With this release, the “combine binaries” transform has been improved so that:

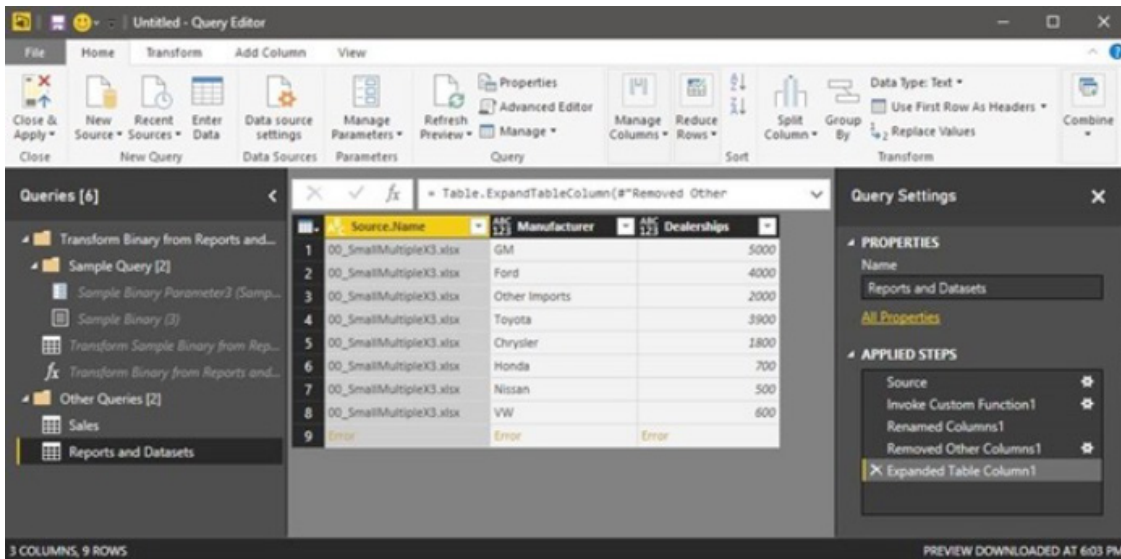
- It analyses the input files and detects the right file format to use (e.g. Text vs. Excel Workbook)



- It provides you with the chance to select a specific object from the first file (for example, a spreadsheet to use)



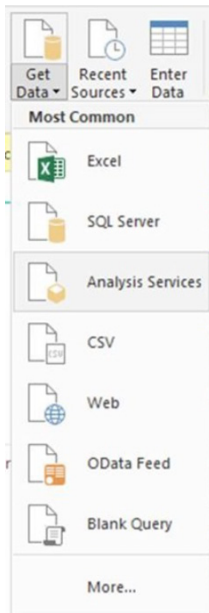
- It automatically creates a few different artefacts:
 - o An example query that performs all required “extraction” steps in a single file
 - o A function query that parameterises the file / binary input to the exemplar query. Both the exemplar query and the function query are linked, so that changes to the exemplar query are reflected in the function query
 - o It applies the function query to the original query with input binaries (*i.e.* the Folder query), so that it applies the function query for binary inputs on each row, then expands the resulting data extraction as top-level columns.



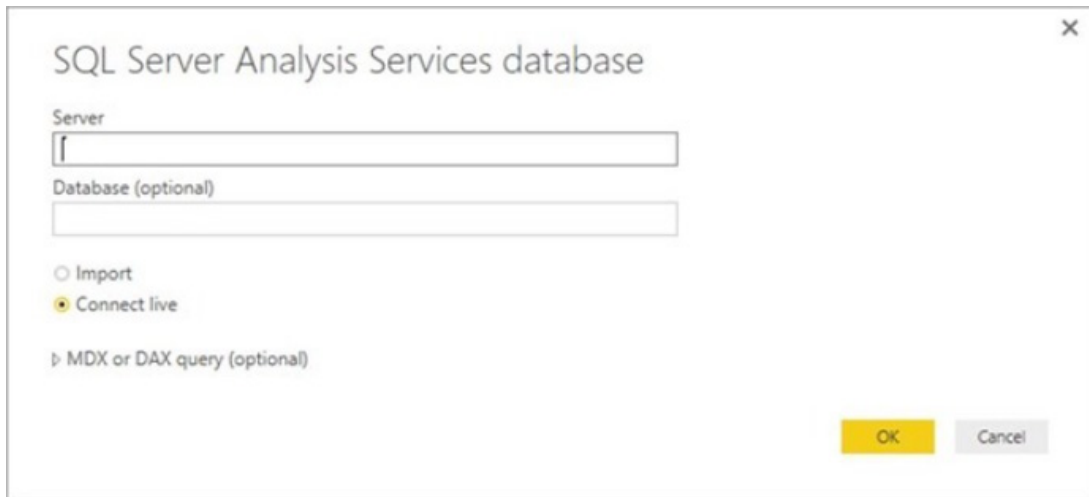
With this new approach, you can easily combine all binaries within a folder as long as they have a homogeneous file type and structure (*i.e.* columns). You can also easily apply additional transformation / extraction steps by modifying the exemplar query without having to worry about any additional function invocation steps, since they are automatically generated.

Azure Analysis Services

In the October update, the public preview of Microsoft Azure Analysis Services was announced. You can now connect to Azure Analysis Services in the Power BI Desktop. To connect, select 'Analysis Services' in the 'Get Data' menu:



In the dialog, enter the server name, which you can find in the Azure portal. You will need to use the entire server name including the azure:// prefix. You can also include the name of the tabular model database or perspective you want to connect to. If you do not include this, you can select the database or perspective on the Navigator dialog that follows. Also, be sure to leave the 'Connect live' option selected:



Web connector updates

Microsoft states that they are currently working on improvements to the refresh of cloud based data sources. As part of this, one of the changes made recently is that new datasets that leverage import from Web pages will not be automatically configured for refresh in Power BI on the web and will require the use of a gateway. If you would like to

use this capability, please consider using the Personal Gateway or On-Premises data gateway. Microsoft has emphasised that the software giant is working on removing this restriction in the near future. Watch this space.

Improved "function authoring" experience

As a general case for one of the capabilities described in the "combine binaries" scenario, the latest release has made it easier to update function definitions without the need to maintain the underlying M code.

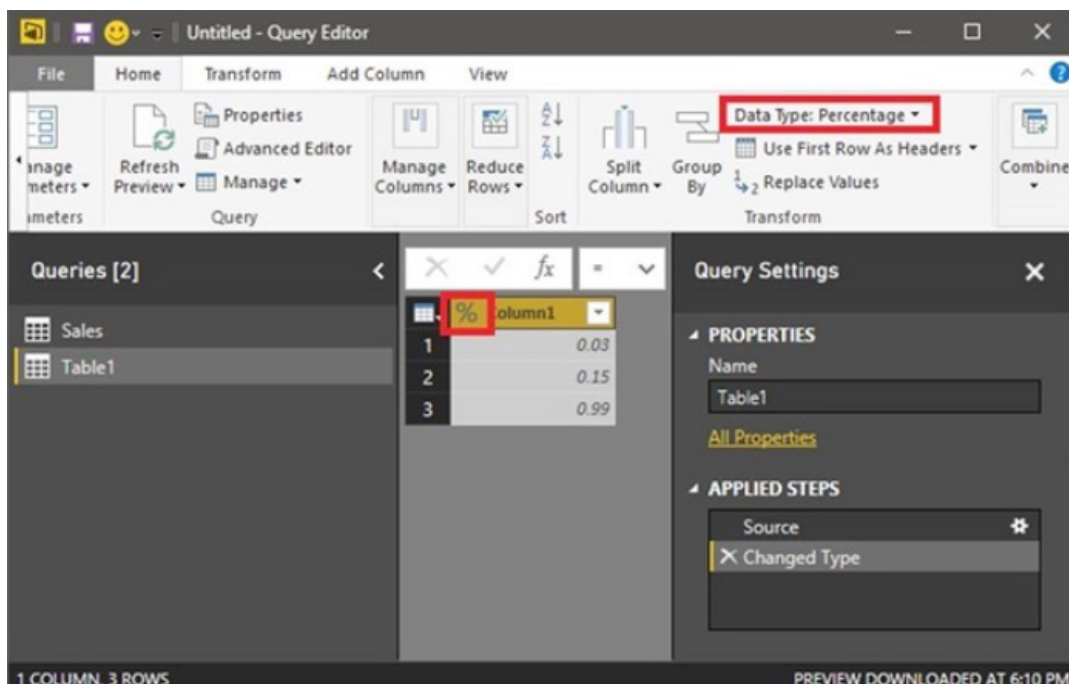
When a function definition has been created based on another query (e.g. using the "Convert to Function" option on the Queries context menu), a link will be created between the original / exemplar query and the newly

generated function, so that you can simply modify the exemplar query steps and the linked function will be automatically updated for them. When using query parameters, creating a function out of a query will allow you to use function inputs to replace parameter values in the generalized function query.

Support for Percentage Data Type

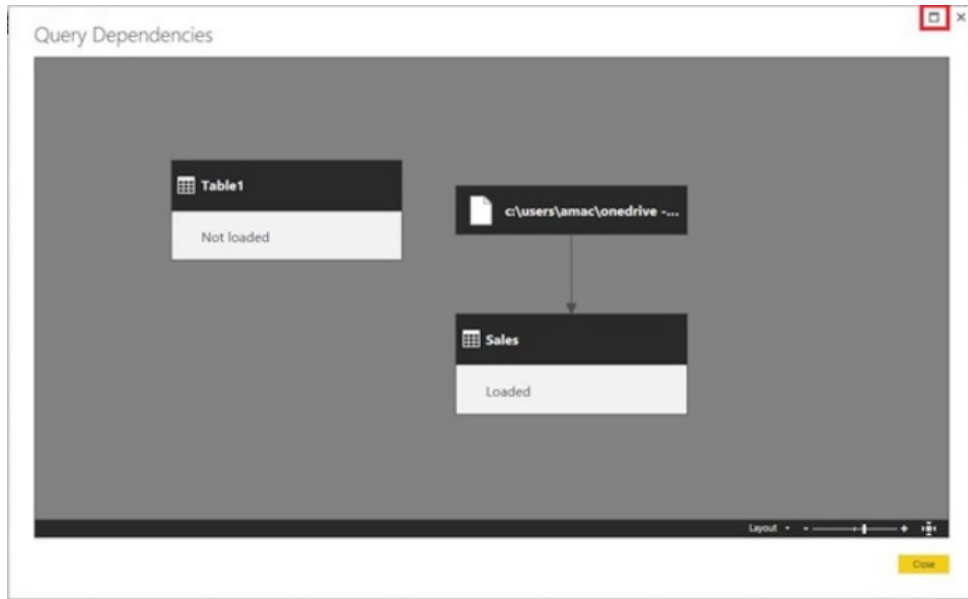
This latest release adds support for Percentage data types so they can easily be used in arithmetical operations. An input value such as "5%" will be automatically recognized as a Percentage value and converted to a 2-digit precision decimal number (e.g. 0.05), which can then be used in arithmetical operations within the Query Editor or the Data Model.

Besides automatic type recognition from schemaless sources (such as Text, CSV or HTML), users can also convert any value to Percentage by using the Change Type options in the Query Editor: column header type indicators, 'Change Type' menu under the Home or Transform column tabs, 'Change Type Using Locale' transform via context menu, etc.



Maximize / Restore buttons in the Navigator and Query Dependencies dialogs

The Navigator and Query Dependencies dialogs support window resizing by dragging the bottom / right edges of the dialog. In this release, it also makes it possible to maximise / restore these dialogs by exposing 'Maximize' and 'Restore' icons in the top-right corner of the dialogs so that they behave like standard Windows dialogs.



For the second month running, you will probably agree Microsoft has gone to town adding updates to this free and versatile software. If you are a regular user of Power BI, do remember that you can all still vote for other features that you would like to see in the Power BI Desktop by visiting www.powerbi.com. And if you are not an experienced user but would like to find out more (including venturing on a training course) feel free to drop us a line at contact@sumproduct.com.

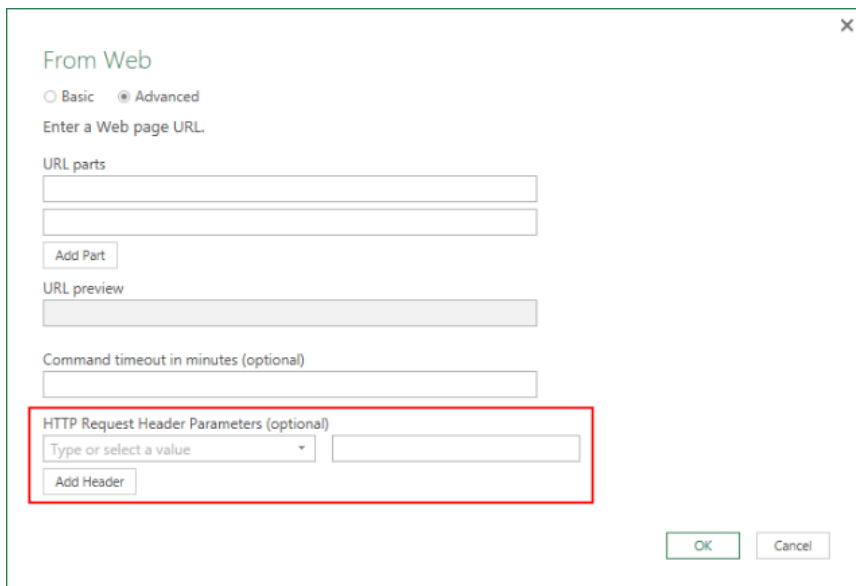
November 2016 updates for Get & Transform in Excel 2016 / Power Query add-in (Excel 2010 and 2013)

Microsoft recently announced 10 new data transformation and connectivity features that have been requested by customers. These updates include the following new or improved data connectivity and transformation features:

- Web Connector: UX support for specifying HTTP Request Headers
- OData Connector: support for 'Select Related Tables' option
- Oracle Connector: improved Navigator preview performance
- SAP HANA Connector: enhancements to parameter input UX
- Query Dependencies view from Query Editor
- Query Editor Ribbon support for scalar values
- Add custom column based on function invocation
- Expand & Aggregate columns provide support for 'Load More' values
- Convert table column to a list: new transformation
- Select as you type in drop-down menus.

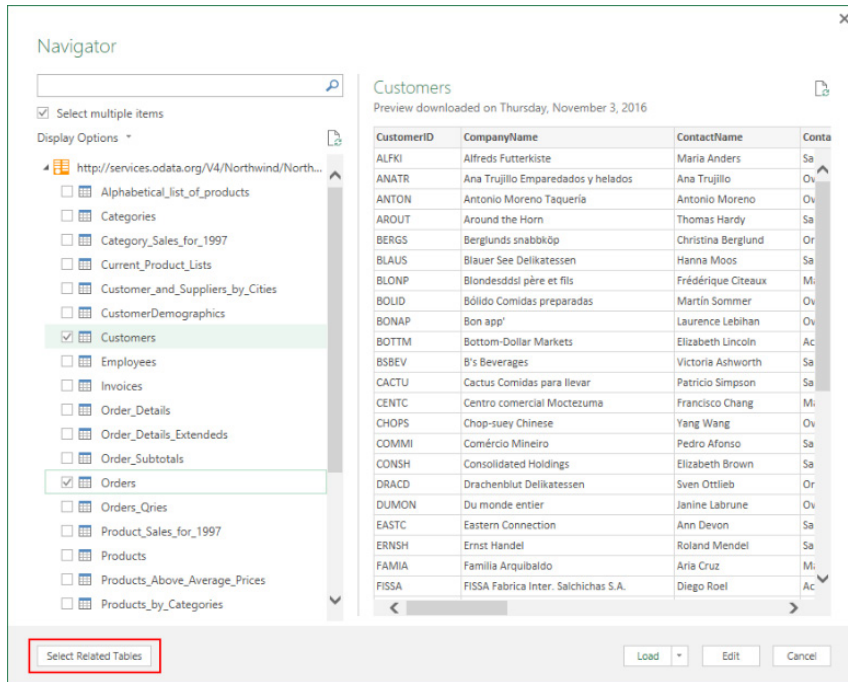
Web Connector: UX support for specifying HTTP Request Headers

With this update, Microsoft has added support for specifying 'HTTP Request Headers (Parameters)' within the 'Web connector' dialog. Users can specify header name / value pairs from the 'Advanced' mode in this dialog:



OData Connector: support for 'Select Related Tables' option

In this update, Microsoft has also added relationship detection support for OData V4 feeds. When connecting to OData V4 feeds, users will be able to use the 'Select Related Tables' button in the 'Navigator' dialog to help you easily select all the tables needed for your reports:



Oracle Connector: improved Navigator preview performance

The performance for previewing tables in the 'Navigator' dialog when connecting to Oracle databases has been improved. In most cases, previews should take up to 30% less time to display than before.

SAP HANA Connector: enhancements to parameter input UX

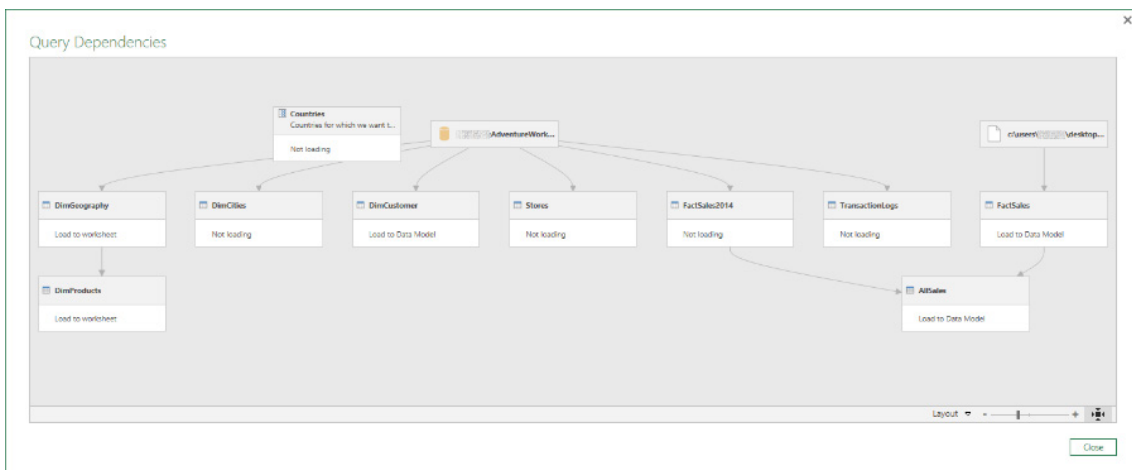
Enhancements have been made to the parameter input controls within the 'Navigator' dialog when connecting to SAP HANA. These enhancements include:

- For single-selection parameters:
 - o Support for typing values, in addition to selecting values from the drop-down list
 - o 'Member ID' and 'Member Caption' are now exposed within the drop-down list
- For multi-selection parameters:
 - o 'Member ID' and 'Member Caption' are now exposed within the drop-down list
 - o Users can leverage the 'Search' box to search across both 'Member ID' and 'Member Caption' fields.

Query Dependencies view from Query Editor

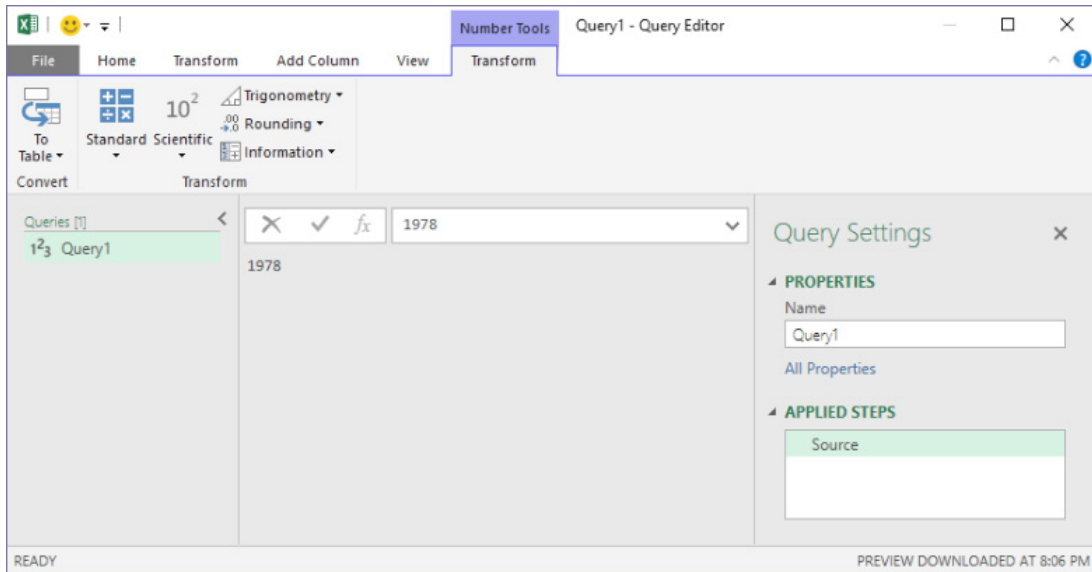
One of the most popular requests in the Data preparation area for the past several months has been having the ability to easily understand dependencies across all queries in a given workbook. In this release, a 'Query Dependencies' view in the 'Query Editor' (under the 'View' tab

on the Ribbon) has been added that allows users to see all queries and dependencies on other queries or data sources at a glance, as well as an indicator of their 'Load' status.



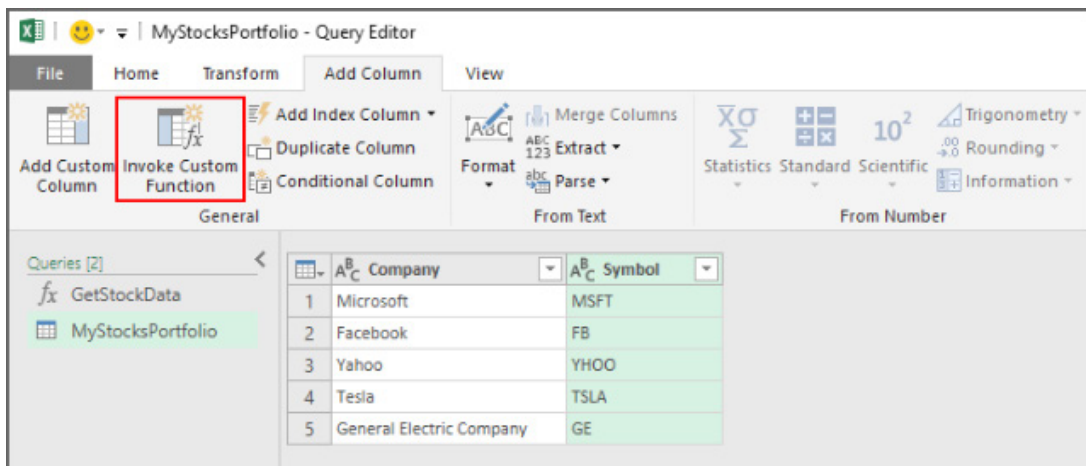
Query Editor Ribbon support for scalar values

'Query Editor' Ribbon support for common operations has now also been included when dealing with scalar-type queries. This includes new 'Contextual Ribbon' tabs that expose common transformations for Text, Date / Time and Number values.

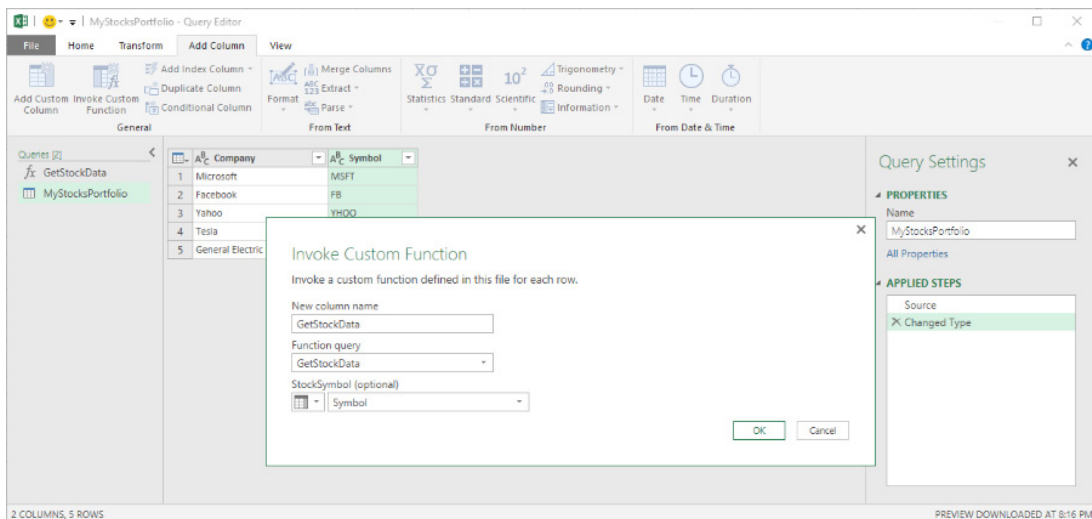


Add custom column based on function invocation

A common scenario when working with custom functions is invoking such functions over each row in a table. Before this update, users had to create custom columns and manually type an **M** expression to invoke a custom function with the right set of arguments. However, with this update, users may now invoke a custom function over a table. Users can now simply leverage the new 'Invoke Custom Function' operation from the 'Add Column' tab on the Ribbon.



This dialog gives you the option to pick one of the custom functions defined in the current workbook and specify input arguments, which may include static values or references to other columns in the current table query.



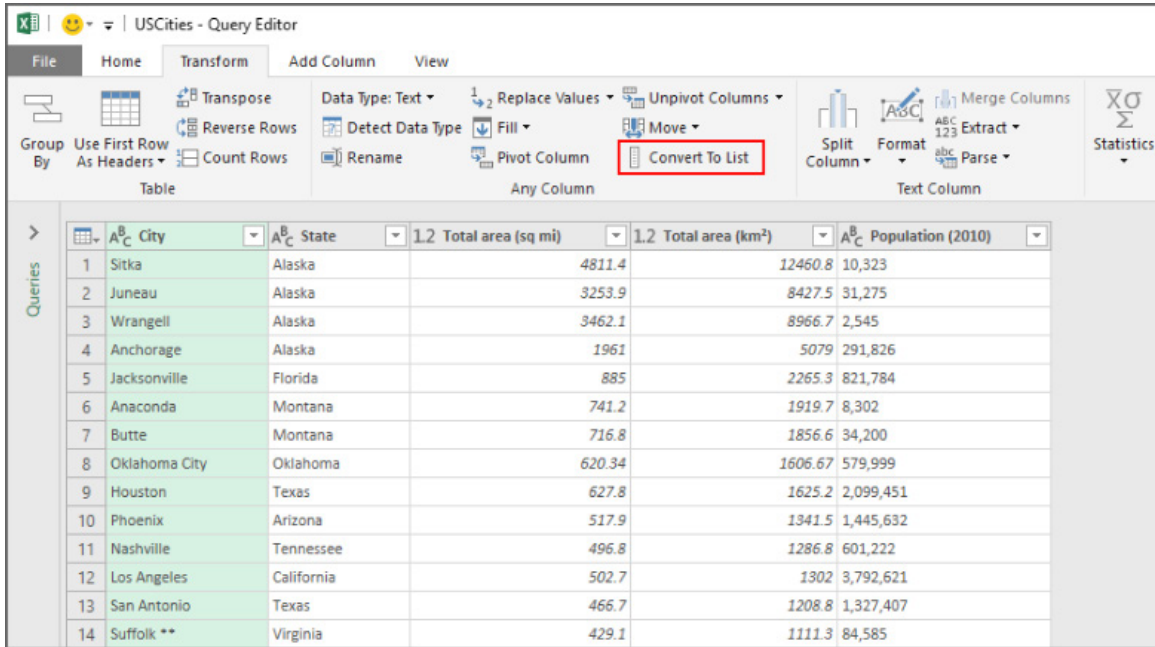
Expand & Aggregate columns provide support for “Load More” values

When dealing with columns with nested data structures, such as Records or Tables, it is a common requirement that not all nested structures have the same schema. Excel leverages schema detection to provide information such as the list of nested columns in the ‘Expand & Aggregate column’ experiences. Before this update, Excel would only look at the top few rows of nested data to construct the list of columns to display.

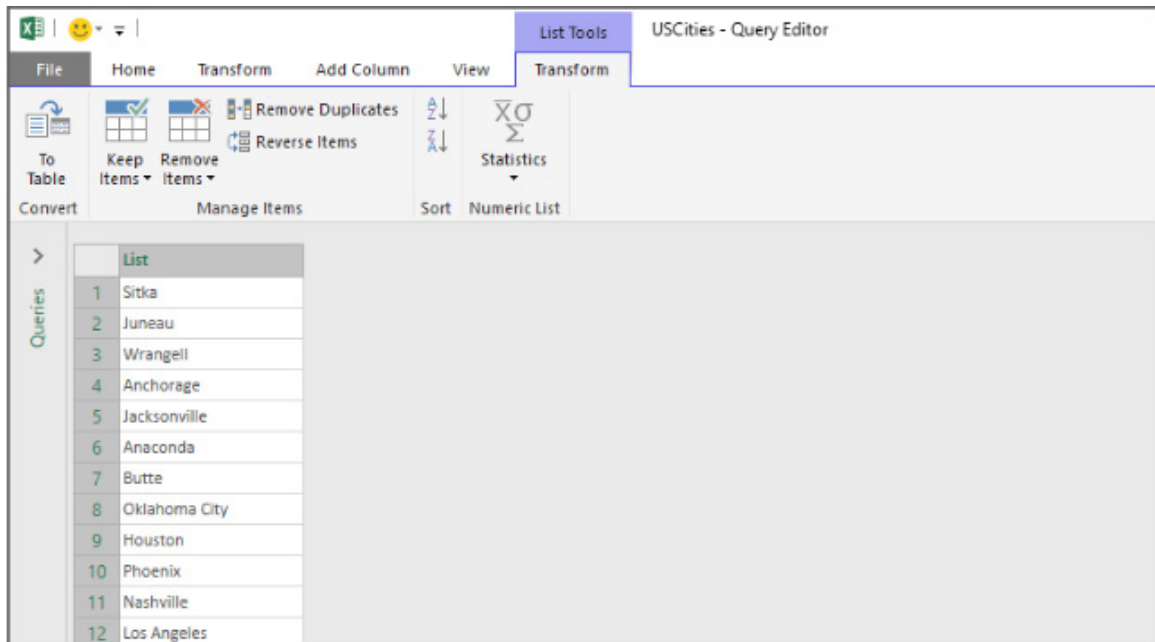
With this update, the ‘Load More’ option has been added to the existing features to the ‘Expand & Aggregate columns’ list in ‘Query Editor’ so that users can tell Excel to look at more rows to detect additional nested fields / columns. When using the ‘Load More’ option, Excel scans up to the top 1,000 rows of nested data to calculate the list of columns to display in the ‘Expand & Aggregate columns’ list.

Convert table column to a list: new transformation

With this update, users may readily turn a given column within a table into a list. All you have to do is select the column in the ‘Query Editor Preview’ and use the newly added ‘Convert to List’ button in the ‘Transform’ tab on the Ribbon.



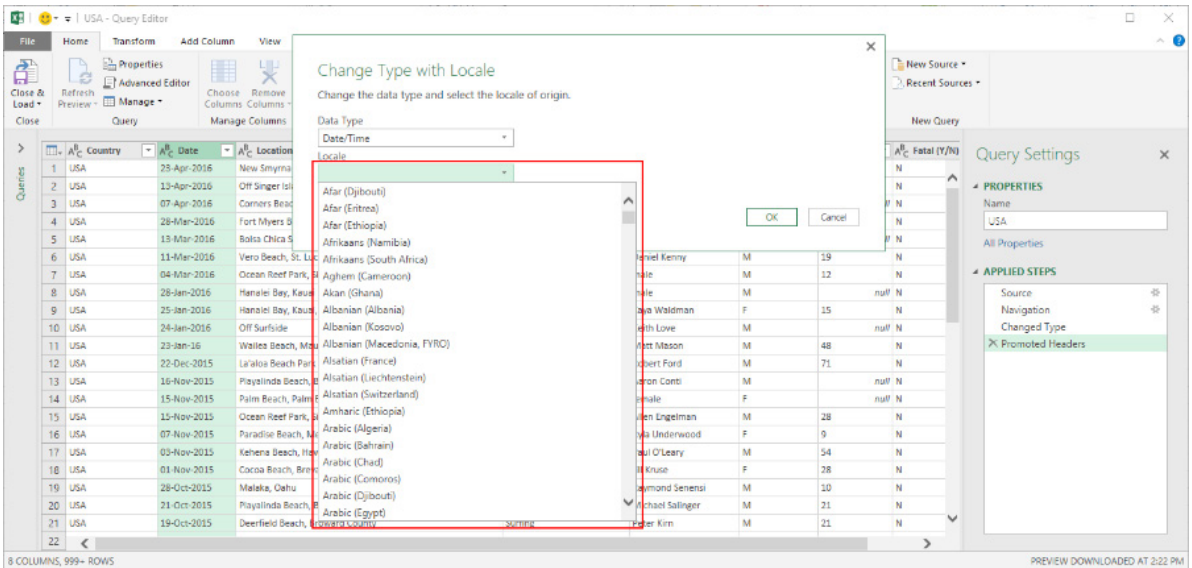
The output lists can be further transformed by using the contextual ‘Lists Tools’ Ribbon tab to perform common operations (such as ‘Remove Duplicates’, ‘Sort’, ‘Perform Statistic Calculations’, etc.). ‘List Queries’ may also be used as input for the ‘Accepted Values’ property in ‘Query Parameters’.



Select as you type in drop-down menus

With this update, the navigation and selection interactions within drop-down menus have been improved with the addition of select-as-you-type capabilities. This allows users to type one or more characters and these will get matched with the prefix of drop-down menu items. This

is something users have been wanting for years. This behaviour is now available in all ‘Get & Transform’ drop-down menus, but it is particularly useful for menus with many list items (such as the ‘Change Type with Locale’ dialog or the single-value parameter lists for SAP HANA, etc.).



If you haven't started playing with Power Query / Get & Transform, perhaps now is a good time to get acquainted. Microsoft has been going gangbusters on several fronts recently – and it's all free. Power Query is essential for turning data lying around into information with Power BI then on hand to assist providing those much sought after analytical

insights. We have courses that explain the rudiments of both of these plus how Power Pivot fits in too. For more details on course outline, pricing and next available sessions, check out the website or drop us a line at training@sumproduct.com.

Power Query Pointers

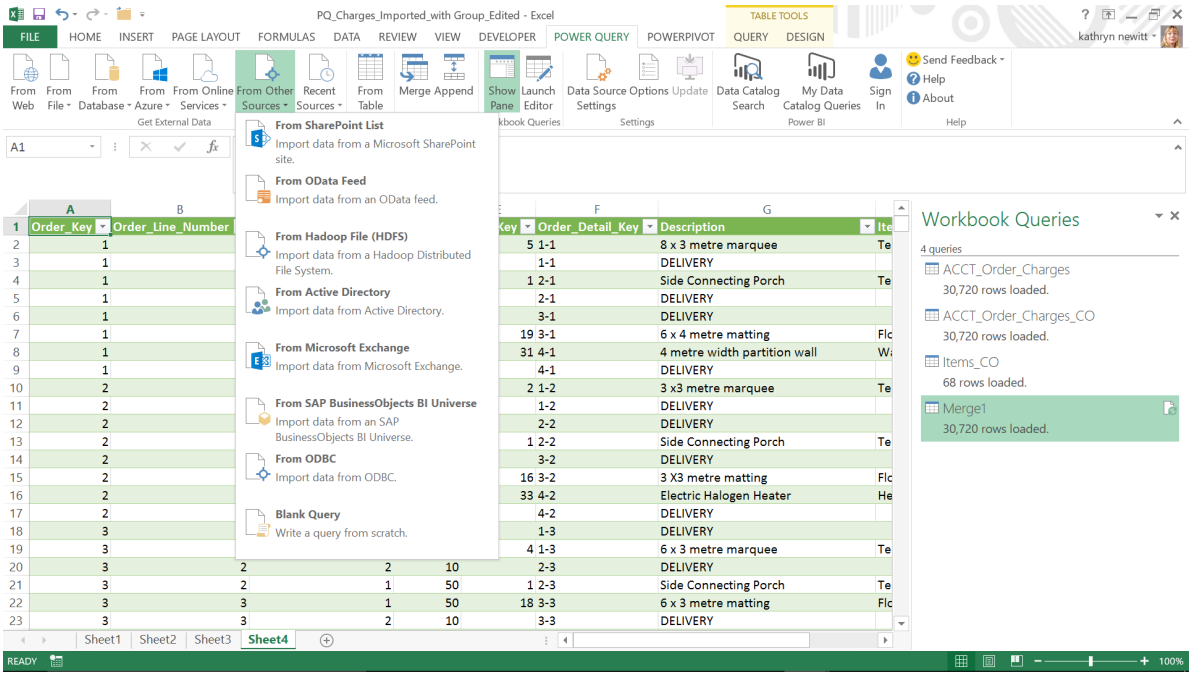
Talking of Power Query / Get & Transform, December saw the start of our latest blog series, with a weekly post on this very subject. For those looking to seek out the power of Power Query, you might wish to take a gander. We'll be reproducing some of these articles each month in these newsletters (we start with the first one below). You can stay up to date though by checking them out at source at www.sumproduct.com/blog.

Enter Power Query, which has been designed for Excel users to enable the rapid uploading and cleaning of data without needing to turn (in)to VBA and SQL experts.

Regular users of Excel are well aware of the possibilities to manipulate and present data that has come from a variety of sources. Getting that data ready for each solution can be time consuming – complex solutions can require VBA or SQL expertise, and simple solutions often involve repetitive tasks before the data is ready to be uploaded to PivotTables.

Power Query is a free add-in ETL (extract, transform and load) tool for users of Excel 2010 (Professional Plus with Software Assurance version only) and 2013, where it has its own tab on the Ribbon, and is now fully integrated into Excel 2016, where it can be found on the data tab under 'Get & Transform'.

As shown below in Excel 2013, Power Query is able to upload from many sources:



Having extracted the data from the appropriate source (more on the details of this process in later blogs), the transformation can take place – cleaning away any unrequired detail, merging where appropriate (all without the erstwhile **VLOOKUP**), and enhancing by calculating and adding new columns. There is even a button to unpivot data!

Whilst the majority of transformations can be done with no formulas or coding, each step is stored in **M**, the language behind Power Query. For the more ambitious user, **M** can be used to refine and build on what Power Query creates automatically.

The final step for the ETL tool is to load - to excel tables, Power Pivot, Power BI, or just store a query for use by other queries; a building block that can be re-used.

Since everything is recorded in **M**, then to reload to the same destination – simply refresh.

More next month...

A New Course, Of Course

December was a busy month! The end of 2016 also saw the successful completion of the first running of our new three-day training course, the catchily-titled “Power Pivot, Power Query and Power BI”. Yes, maybe we need to change the name. We’ll get back to you on that one.

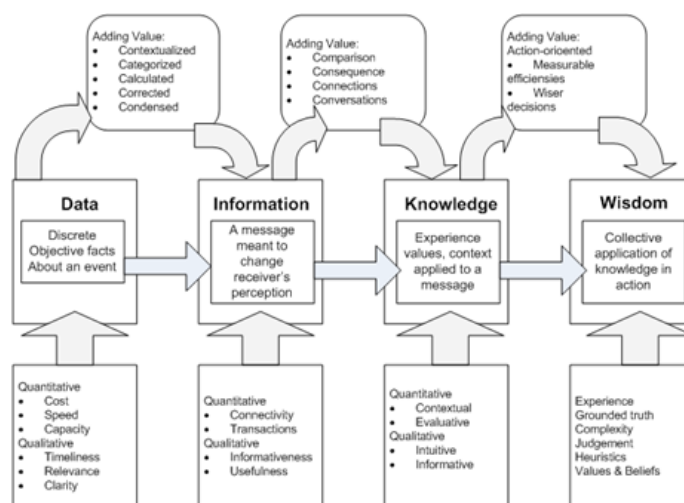


Assuming you know how to switch on a computer and have access to Excel 2010 or better (with one or two caveats), this course covers all you need to know to hit the ground running with Microsoft’s powerful suite of data analysis and business intelligence tools.

This course covers:

- the basics: how to manipulate PivotTables and create Tables in Excel
- the power of Power Pivot: how to bring in data, why you should bring it in that way, how to link data from different sources and create calculated fields and measures using Data Analysis eXpressions (DAX)
- the essentials of Power Query: how to automate tidying up data, manipulate it, and create directories to drop in source data
- the analysis of Power BI: using both the Desktop version and its online counterpart, learn how to create amazing interactive dashboards quickly. Access hidden insights within minutes and create an interface where end users can answer their own questions
- when to use what where and why: it’s daunting realising all the power at your fingertips. We help you identify the order to use these tools in to get the most out of your data.

Remember, from data you can get information. Information leads to knowledge and ultimately wisdom. Isn’t it time you wised up?



You can find out more in the [Courses](#) section of our website. For further information, drop us a line at training@sumproduct.com.

The A to Z of Excel Functions: ASIN

As the Pet Shop Boys announced, “It’s **ASIN**”. Yes, for the religious amongst you, we have finally committed **ASIN**. It’s no use; the further we delve into this ad hoc series, the more bored we get and the worse the puns become.

On a more serious note, this function returns the arcsine, or inverse sine, of a number. Yes, we are deep in trigonometric functions this month. The arcsine is the angle whose sine is number. The returned angle is given in radians in the range $-\pi/2$ to $\pi/2$.

The ASIN function employs the following syntax to operate:

ASIN(number)

The **ASIN** function syntax has the following arguments:

- **number**: this is required. The sine of the angle required: this must be in the range from -1 to 1.

To express the arcsine in degrees, multiply the result by **180/PI()** or use the **DEGREES** function.

Check out our example below:

	A	B	C	D
1	Value	Formula	Result	Description
2	1	=ASIN(A2)	1.57079633	Arcsine of 1 in radians
3	1	=ASIN(A3)*180/PI()	90	Arcsine of 1 in degrees
4	1	=DEGREES(ASIN(A4))	90	Arcsine of 1 in degrees
5				

The A to Z of Excel Functions: ASINH

The **ASINH** function returns the inverse hyperbolic sine of a number. The inverse hyperbolic sine is the value whose hyperbolic sine is number, so **ASINH(SINH(number))** equals **number**.

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

ASINH(number)

The **ASINH** function has only one argument:

- **number**: this is required and may be any real number.

Please see the example below:

	A	B	C
1	Value	Result	Formula
2	-2.5	-1.6472311	=ASINH(A2)
3	50	4.60527017	=ASINH(A3)
4			

The A to Z of Excel Functions: ATAN

Lazing at the beach and think you should get **ATAN**? The **ATAN** function returns the arctangent, or inverse tangent, of a number. The arctangent is the angle whose tangent is number. The returned angle is given in radians in the range $-\pi/2$ to $\pi/2$.

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

ATAN(number)

The **ATAN** function has only one argument:

- **number**: this is required and should be the tangent of the angle you require.

To express the arctangent in degrees, multiply the result by **180/PI()** or use the **DEGREES** function.

An example:

	A	B	C
1	Value	Result	Formula
2	1	0.785398163	=ATAN(A2)
3	1	45	=ATAN(A3)*180/PI()
4	1	45	=DEGREES(ATAN(A4))
5			

The A to Z of Excel Functions: ATAN2

After **ATAN**, you might see that bronzed figure on the beach and you think, maybe I should get **ATAN2**. Yes, this function returns the arctangent, or inverse tangent, of the specified **x**- and **y**-coordinates. The arctangent is the angle from the **x**-axis to a line containing the origin (0, 0) and a point with coordinates (**x_num**, **y_num**). The angle is given in radians between $-\pi$ and π , excluding $-\pi$.

The **ATAN2** function employs the following syntax to operate:

ATAN2(x_num, y_num)

The **ATAN2** has the following arguments:

- **x_num**: this is required and represents the x-coordinate of the point
- **y_num**: this is also required and represents the y-coordinate of the point.

It should be further noted that:

- A positive result represents an anti-clockwise angle from the **x-axis**; a negative result represents a clockwise angle
- **ATAN2(a,b)** equals **ATAN(b/a)**, except that a can equal 0 in **ATAN2**
- If both **x_num** and **y_num** are 0, **ATAN2** returns the **#DIV/0!** error value
- To express the arctangent in degrees, multiply the result by **180/PI ()** or use the **DEGREES** function.

Time for another example:

	A	B	C	D
1	x-coordinate	y-coordinate	Result	Formula
2	1	1	0.785398163	=ATAN2(A2,B2)
3	-2	2	2.35619449	=ATAN2(A3,B3)
4	-2	2	135	=ATAN2(A4,B4)*180/PI()
5	-2	2	135	=DEGREES(ATAN2(A5,B5))
6				

The A to Z of Excel Functions: ATANH

Now it's time to talk a complete load of hyperbolics. The **ATANH** function returns the inverse hyperbolic tangent of a number ("number"). This **number** must be between -1 and 1 (excluding -1 and 1). The inverse hyperbolic tangent is the value whose hyperbolic tangent is number, so **ATANH(TANH(number))** must equal **number**.

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

ATANH(number)

The **ATANH** function contains only one argument:

- **number**: this is required and should be any real number between 1 and -1, not including the two extremities.

Please see our final example for this newsletter:

	A	B	C
1	Value	Result	Formula
2	0.76159416	1.00000001	=ATANH(A2)
3	0.999	3.800201167	=ATANH(A3)
4	-0.999	-3.800201167	=ATANH(A4)
5			

ModelOff Finals

December saw us in London and we were privileged enough to attend where we saw Australia's own **Joseph Lau** retain his title as World Heavyweight Champion – no, that's not it! – ModelOff's world financial modelling champion as he managed to develop **INDEX MATCH** formulae in the time it takes us to type "December saw us in London"! Congratulations Joseph.



We were on hand to extol to delegates the virtues of Power BI and to enjoy a free-flowing Excel Tips and Tricks session, which revolved heavily around the different types of drop down boxes, Data Tables and scaring the living daylight out of work colleagues.

London also saw us hold discussions with several third-party training organisers and prospective clients. You'll find 2017 is going to see us with more of an active role in Brexit Land after the opening of our office there a few months ago. Watch this space – or drop us a line at contact@sumproduct.com if you can't wait!

Upcoming SumProduct Training Courses



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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 continue going through the function keys – this time, with the **F5** function key:

Keystroke	What it does
F5	Go To / Refresh File List
ALT + F5	Refresh
CTRL + F5	Restore window
SHIFT + F5	Find dialog box
CTRL + ALT + F5	Refresh all

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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- **Power BI, Power Query & Power Pivot**
- **Project finance**
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- **Refinancing / restructuring**
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- **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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