It might be quite a COUP

as we regale the latest Power BI updates, supply more in our ongoing series of A to Z of Excel Functions (hence the pun) and fill you in with what's being going on in Excel Online, a variant we all too often forget.

We even have a new series for you: it may have a limited shelf life on other platforms but VBA refuses to die. So if you can't beat 'em we'll join 'em as we take a look at the elementary side of the macro in *Visual Basics*. It's not our only ongoing series though – as it joins Power Query Pointers and our Keyboard Shortcuts!

Happy reading and see you next month

*Liam Bastick,* Managing Director, SumProduct

Excel Online Updated

99% of this newsletter seems to be about updates and we start off our September edition proving that our lead article is no exception to the rule. Excel Online has been neglected for a good while and to be honest, we don't notice too many of our clients using it, given all its perceived limitations. And don't get us wrong, having tried to work with an online Table recently, there's still a few improvements to be made!

However, over the past couple of years, Microsoft has been working hard to improve its usability. Are you familiar with all the upgrades? We take a look below.
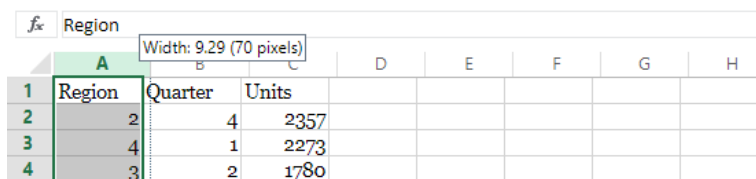
Adjusting Rows and Columns

It's now possible to adjust row height and column width from the context menu. Just right-click on a row or column label, and you'll see the option.
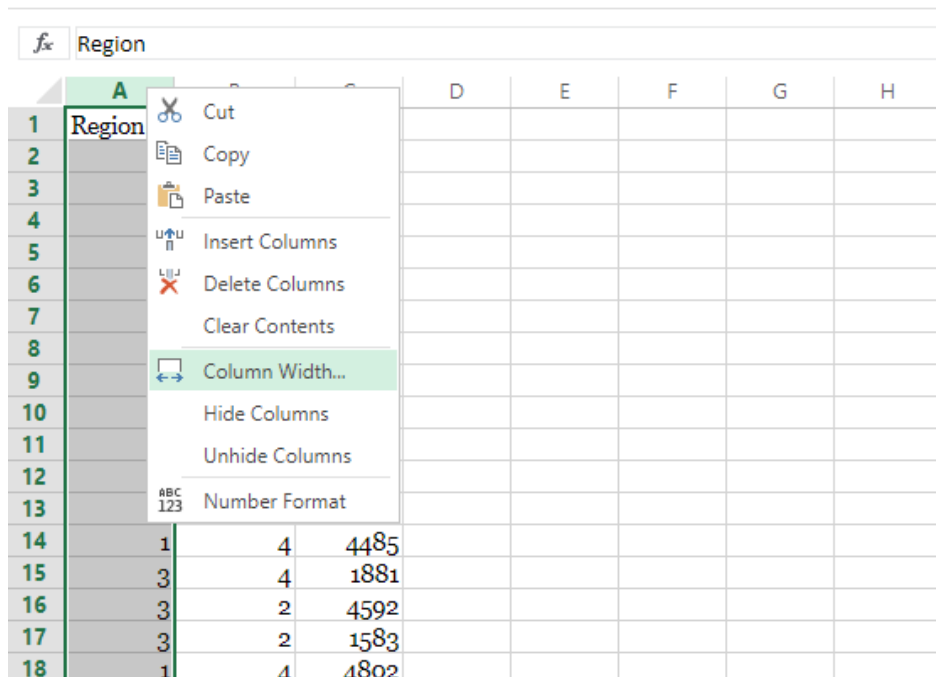
Click 'Row Height' or 'Column Width', enter a new value, and the selected row or column is adjusted. A valuable benefit of this is that you can now select multiple rows or columns and set them all to a specific height or width with just a few clicks.

Column Width Tooltip

If you want to resize a row or column without using the context menu, you can just grab the border and drag it to the desired size. Microsoft recently added a new feature for when you're dragging a column to a new size: a tooltip that displays the column width.
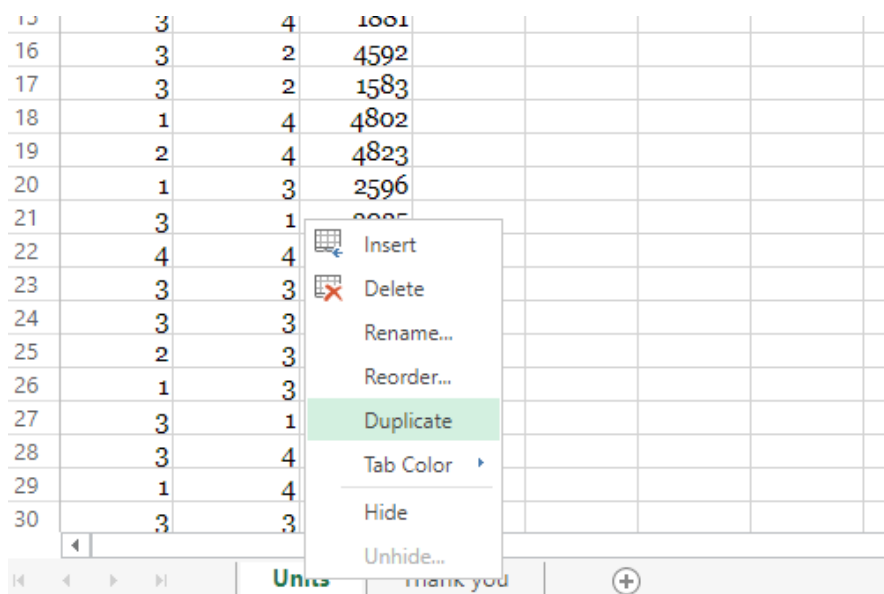

If you know how wide you want the column to be, or you'd like to make different columns the same width, this makes it much easier.

Duplicate Sheet

In previous editions of Excel Online, if you wanted to duplicate a sheet, you'd have to create a new sheet and then copy and paste data from the original sheet. Now, you can just right-click a sheet tab and select 'Duplicate'.
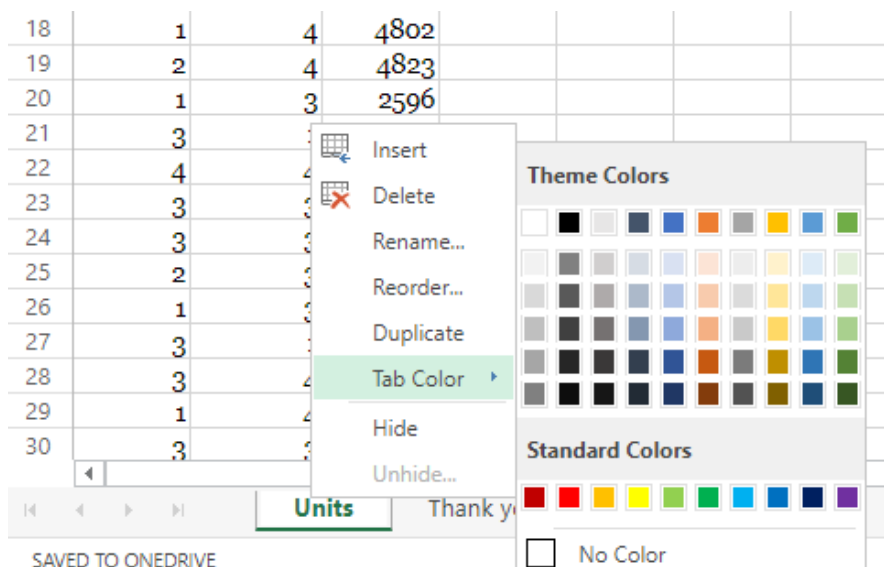

A new sheet will appear that is an exact copy of the first. At the moment, sheets with charts, images or shapes still can't be duplicated. But it's a start.

Change Sheet Tab Colo(u)r

Working on spreadsheets with a large number of sheets can be difficult. To assist, Excel Online now lets you change the colour of a sheet tab so you can find it quickly or categorise your sheets. Just right-click on the sheet tab, mouse over 'Tab Color', and select the colour you'd like.

Your sheet will now be highlighted with the selected colour.

Freeze Panes

When you're working with lots of data in the desktop version of Excel, 'Freeze Pane's is one of the most useful tools to know. By freezing the top row, your column headings are always visible.

You can now freeze any number of columns or rows in Excel Online, too. Just click into a cell and click **View > Freeze Panes > Freeze Panes** to freeze everything above and to the left of it.
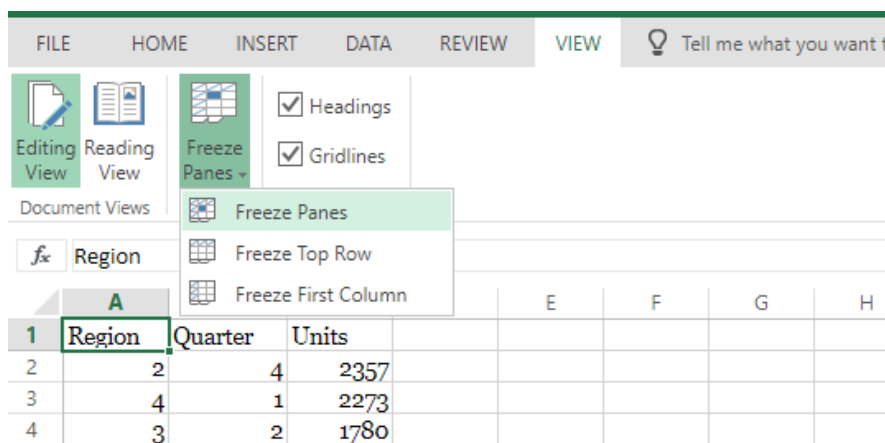
You can also select **View > Freeze Panes > Freeze Top Row or Freeze First Column** for the most commonly used freeze pane commands.

Changes in the Ribbon

Much of the added formatting power comes from new options in the Ribbon. The 'Home' tab now gives you access to a full selection of formatting options that you've become accustomed to in the full desktop version of Excel.

You can quickly select number formatting options from the 'Number' drop-down to format your number as a percentage, currency, date, or other options. Currency and accounting formats and alignment options are also available from the same part of the 'Home' tab.

Many of Excel's text formatting options are also easily available at the click of a button. For example, additional typeface formatting options like double-underline and strikethrough are easily accessible in the Font area.

More number formats are available from the number formatting drop-down in the centre of the 'Home' tab.
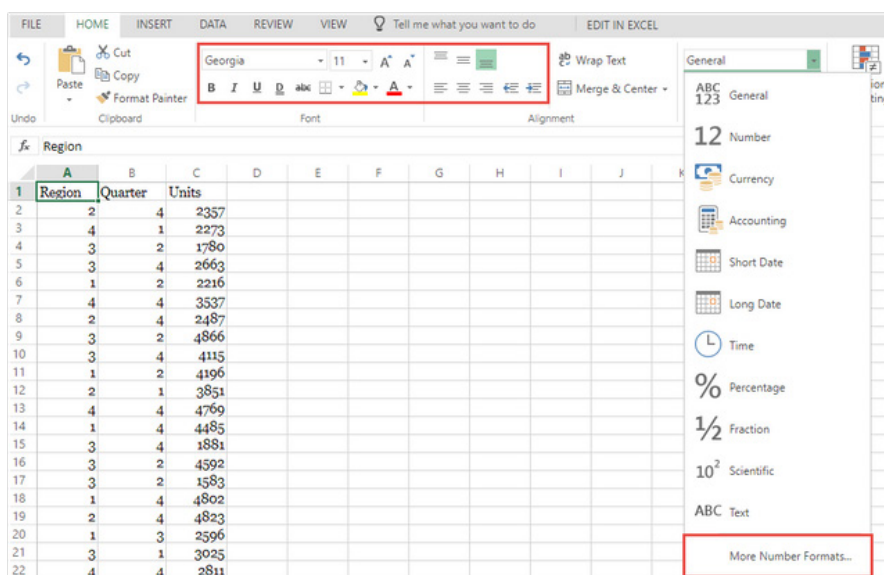
A full selection of border types, merging and unmerging, increasing and decreasing indentation, font size and other formatting options are available for both numbers and text as well. Additionally, Microsoft added the 'Most Recently Used' split button to the 'Borders', 'Fill Color' and 'Font Color' buttons in Excel Online.
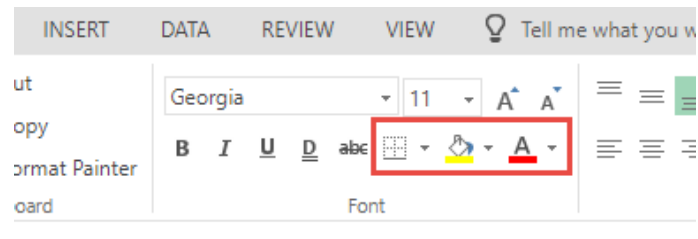
When you set a colour or a border from these buttons, Excel Online will now remember it, so you can just click the button to apply it somewhere else.

Shapes and Pictures

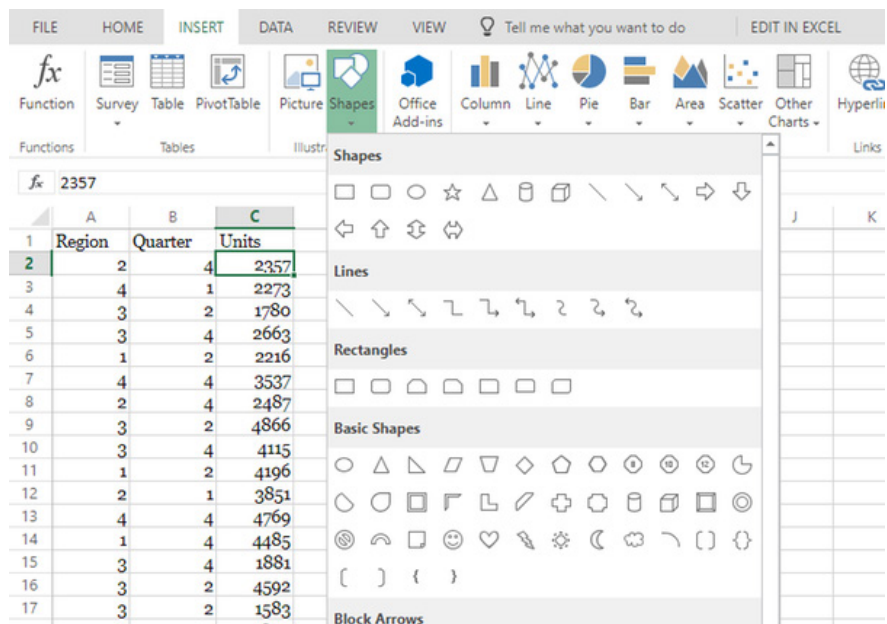When Excel Online was a simple spreadsheet viewer, there was no way to insert shapes or pictures into a spreadsheet. The new version of Excel Online can now do more. The 'Insert' tab now prominently features buttons for inserting pictures and shapes – and the menu of shapes contains just about any shape you could ever need.

It's easy to click and drag the image or shape into place, and the rotation handle lets you rotate it into any orientation you'd like. Also, you can now change the shape and border colour, as well as dimensions (width and length).
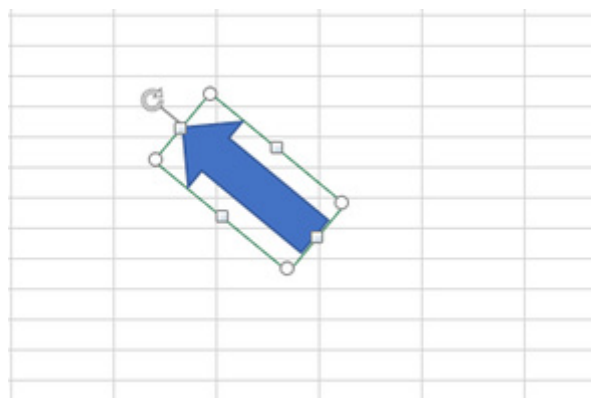
Conditional Formatting

By changing the format of a subset of cells, conditional formatting makes it easy to highlight the cells you want based on what they contain. Conditional formatting tools are now prominently displayed in the 'Home' tab, *viz*.
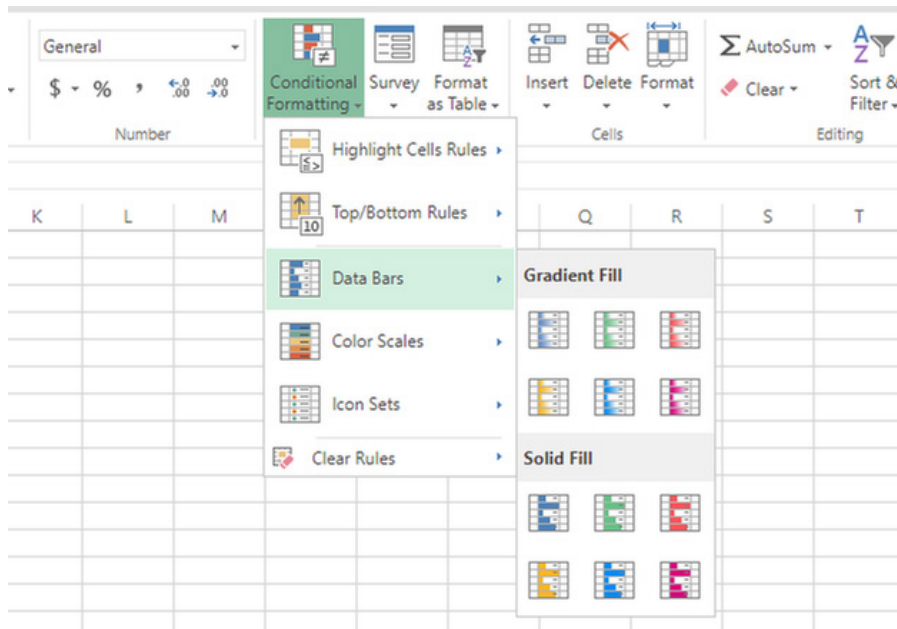
Just select the data you want to format, click 'Conditional Formatting', and select the formatting you'd like to apply. Here's what it looks like when we apply **Highlight Cells Rules > Above Average**.

Filtering

When you have a lot of data, being able to effectively filter it down to the information you want to see is crucial. The 'Data' tab now hosts a 'Filter' button that enables column-based filtering, just like in the desktop version of Excel.
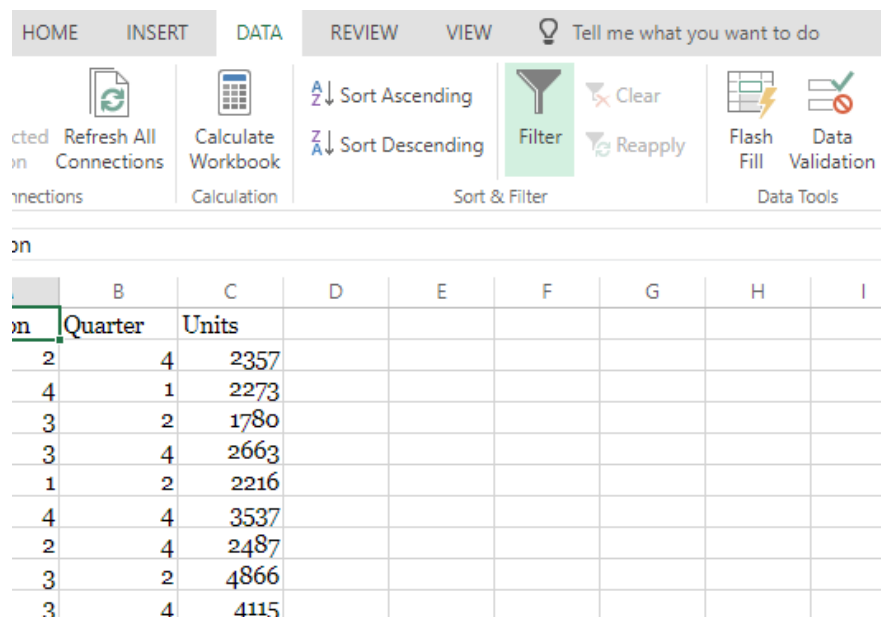
The in-spreadsheet dropdown doesn't contain individual-value filtering, but if you click 'Filter', you'll see the familiar options for viewing only certain values.

PivotTables

Excel Online makes it to the 20th century! Long considered one of Excel's most essential data analysis features, PivotTables give you powerful summaries of your data. Before Excel Online supported PivotTables, the desktop version of Excel was considered to be vastly superior. Now, it's just superior…

Tables

After PivotTables, Excel Online now gives you the power to work more effectively with regular Tables as well. When having a Table in your spreadsheet, you can include additional rows or columns in your table by right-clicking.

The context menu also lets you delete rows and columns with a single click.
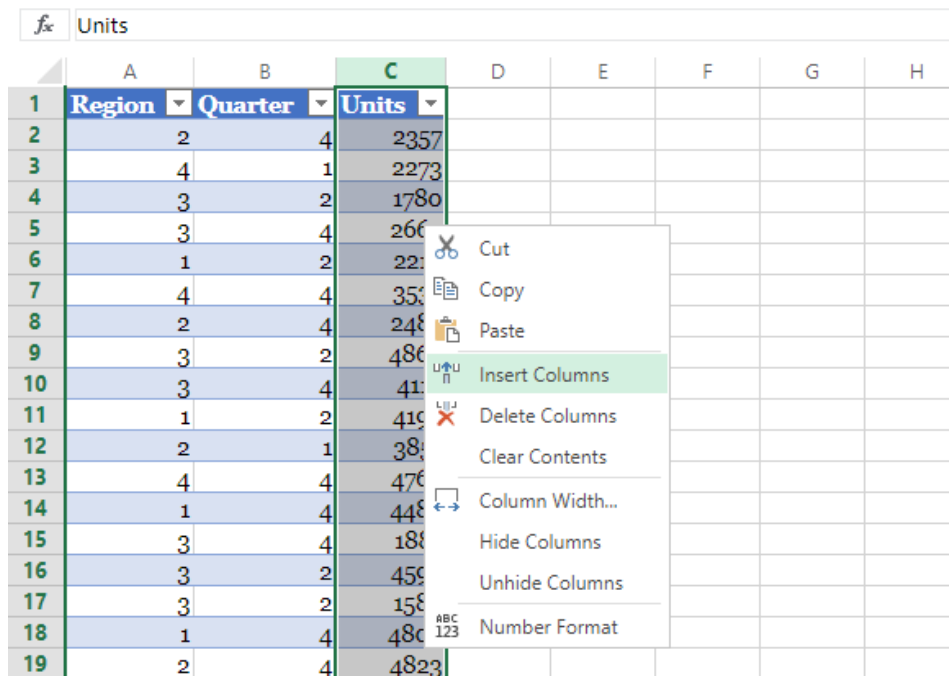
Another new feature is the ability to navigate through the table by pressing the Tab key on your keyboard, so you can navigate to the cells you want faster than ever without using your mouse.

To our mind though, this feature still has a long way to go, with an inability to toggle filtering.

Collaboration

Perhaps the most useful feature that Excel Online brings to the table *(not the one above!)* is collaboration. This is a real raison *d'être* for Excel Online. Instead of emailing files back and forth with other Office users, you can have an entire group of people working on a document in real time. If Excel Online were to work properly, let's face it, we'd all use it.

From Viewing to Editing

Making the change from a spreadsheet viewer to editor required Microsoft to make some big changes in the backend functionality of the application. For example, previous versions of Excel Online couldn't open protected workbooks. The latest version has no problem opening or editing these protected files.

Previous versions also couldn't edit files that contained cropped images—which made it difficult to collaborate with people on files that included images. Now, however, Excel Online has no problem editing files with cropped images.

The same is true of files that contain grouped shapes or images.

Excel Online has also seen some additional performance upgrades. You can now work with Excel files of up to 30MB if you have OneDrive for Business. That's three times the previous limit. It's also been upgraded with more power, so page load times will be lower and you'll see improved interactivity from the app itself.

Silent Reopen

Working and living in Australia, we're no novices when it comes to working with lousy internet. Wherever you are in the world, your Excel Online session can end while you still have your file open. In previous versions of Excel Online, you'd have to wait until your browser reconnected to the service to start working on the spreadsheet.

Now, however, you can start working on the file while your browser re-establishes the connection. It might not seem like much, but it eliminates a potentially annoying wait when you're trying to get work done.

Real-Time Co-authoring

With the 'Share' button, you can share your Excel Online spreadsheet with other users and everyone can edit the document at the same time. Just imagine the dog's breakfast you could make.
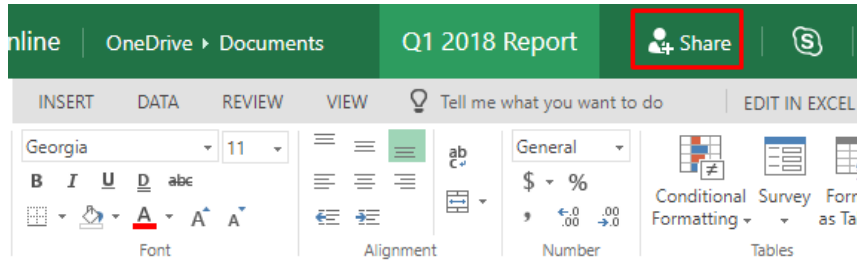
From here, you can choose who you'll invite to your spreadsheet and select if they'll be able to edit it or view it only.
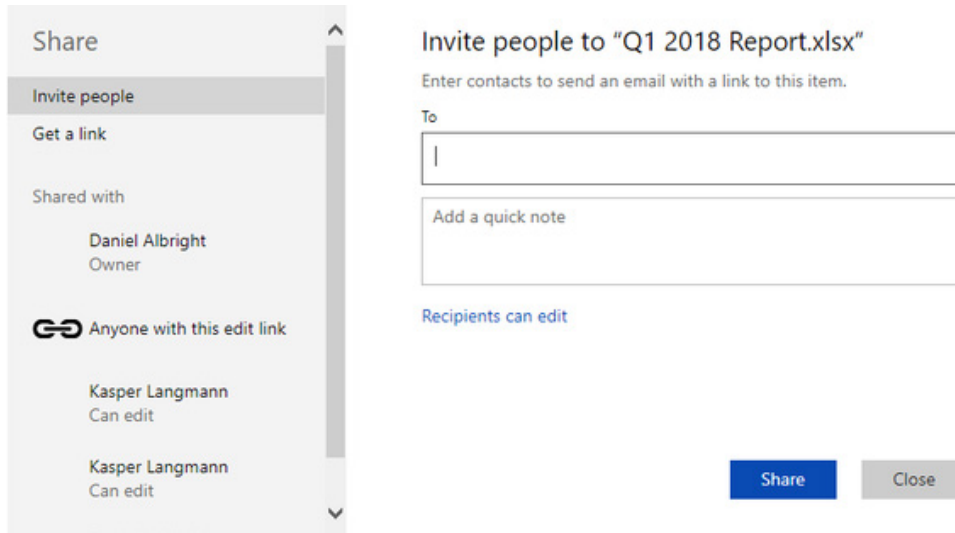
You can also tick an option that forces the invited to log in to their Office account before they can view or edit the spreadsheet. When you've shared your file, you'll see who's editing, which cell they have selected and the exact changes that they make.
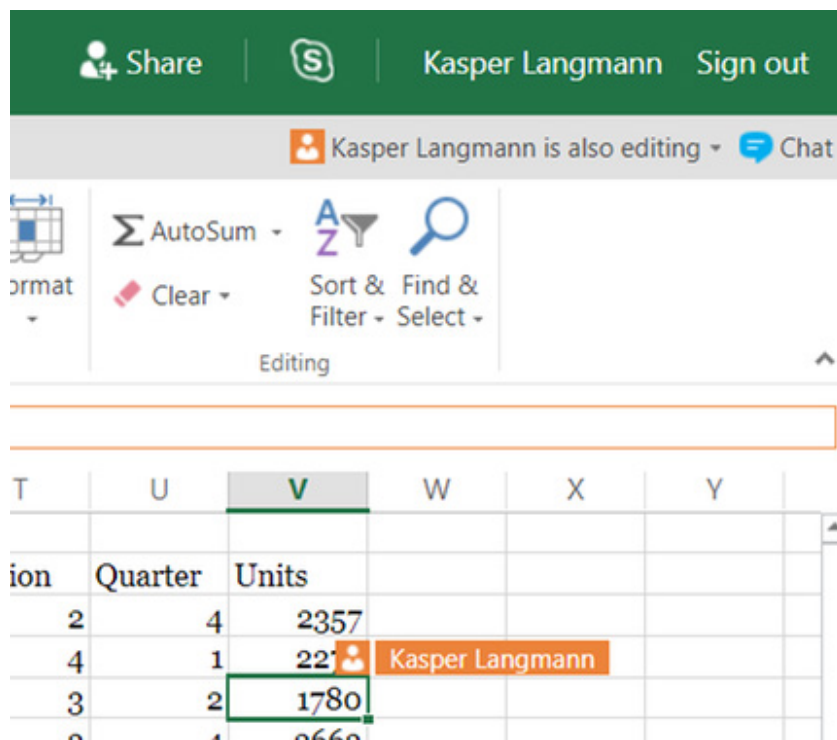
You can also leave comments to each other and chat while you're editing right in Excel Online. With the built-in Skype messenger, you may also chat with your contacts in the same window as your spreadsheet:
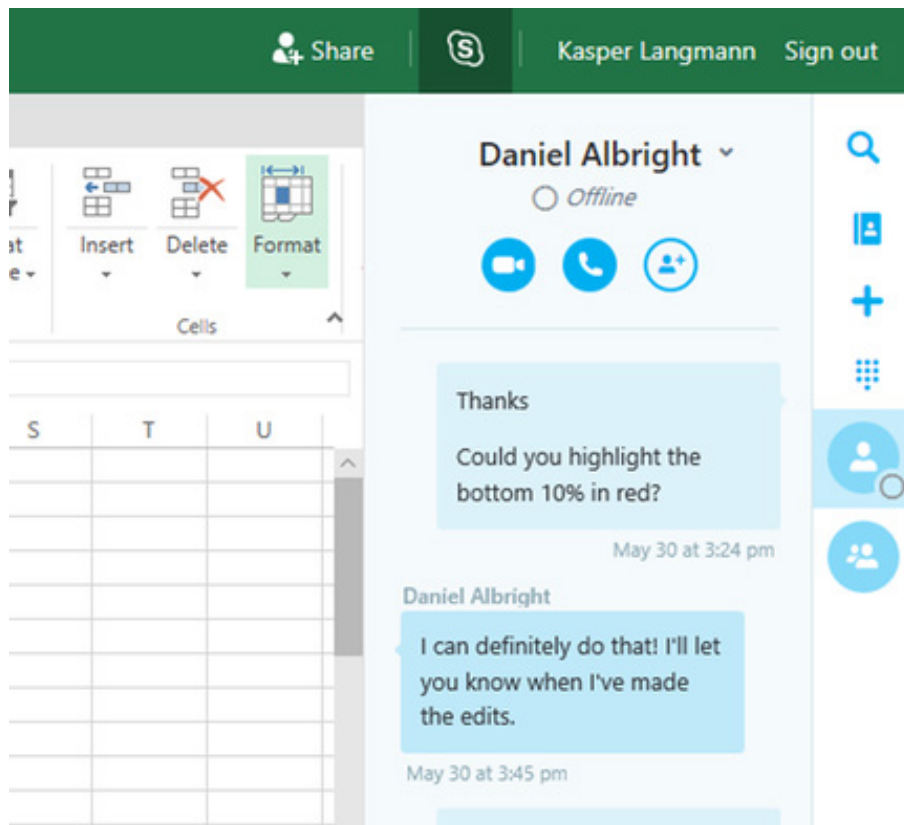
Drag Scroll Beyond Viewport

In early versions of Excel Online, if you clicked on a cell and dragged the selection to the bottom (or right side) of the viewport, the selection would stop there—you couldn't scroll. Now, you can click and drag to scroll and select as many cells as you want.

Printing

A new 'Print' dialog can be accessed from the 'File' tab of the Ribbon. This dialog gives you more options to help you get a better print of your spreadsheet.
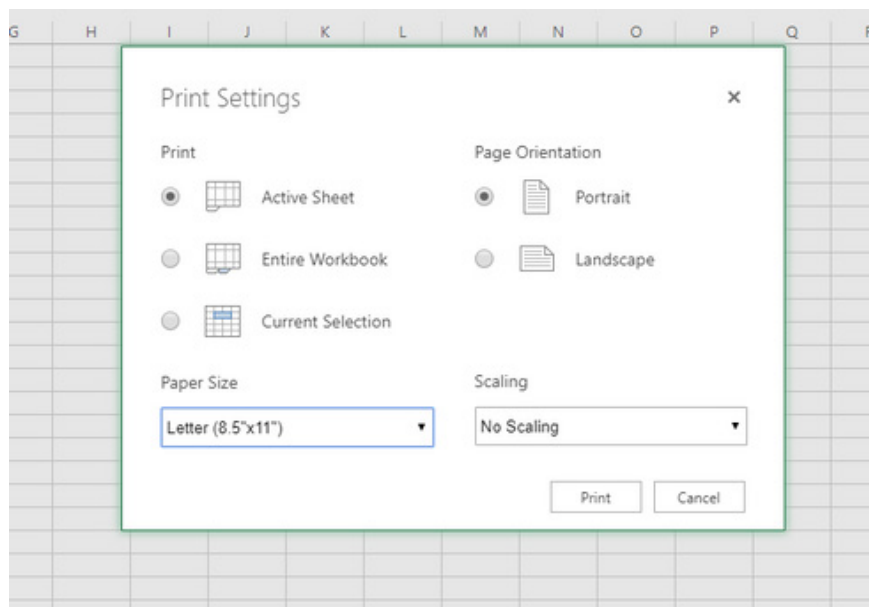
Choose what you print, how you print it and what you print it on all in one place.

Excel Surveys

Excel Online now includes the ability to create online forms that you can use to collect and analyse survey information. Just go to the 'Home' tab, click 'Survey', and select 'New Survey'.
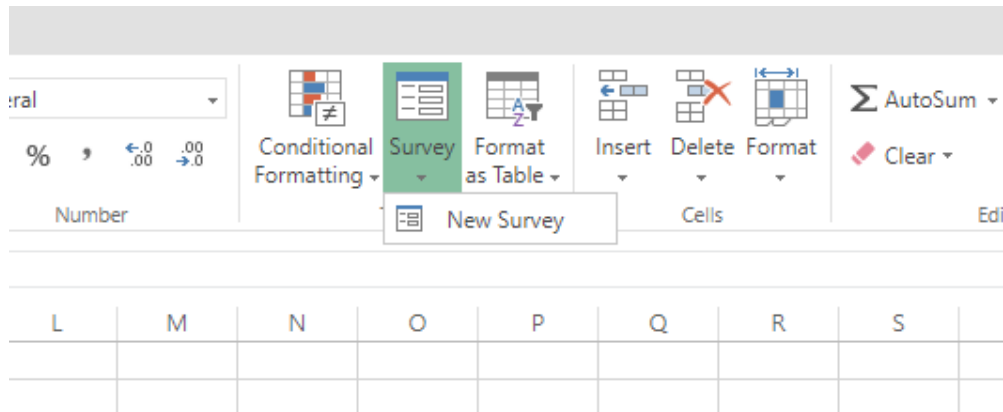
Then enter your survey questions.
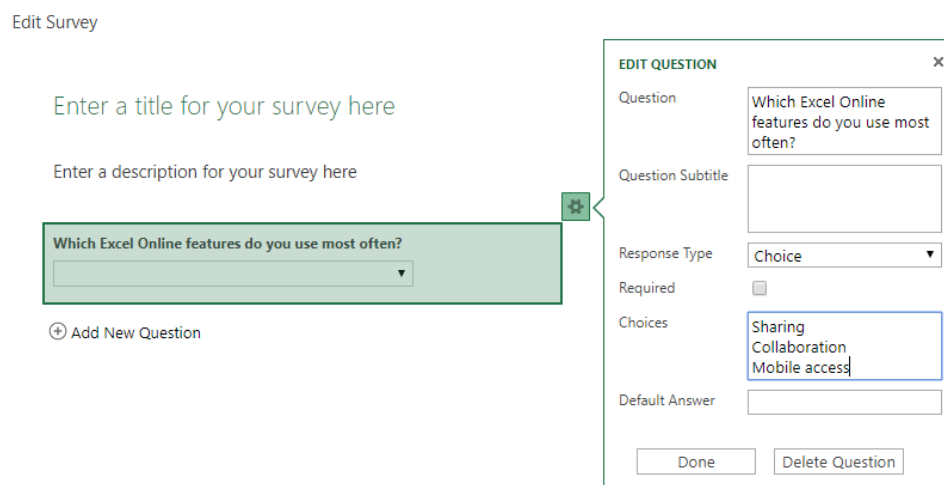
After that, you can share your survey and all results will be immediately imported into Excel Online, so you can analyse and share them.

Accessibility

The 'Accessibility Checker' tells you when users with disabilities might find your document hard to read and how you can fix the issues. There are improved screen reader support and a new high-contrast mode for visually impaired users, too.

Excel Online also has the same 'Tell me what you want to do' feature that desktop versions have, making it easier for people who aren't familiar with Excel to find what they want. This, combined with improved keyboard shortcuts for getting around the app, makes it more accessible for everyone.

There's no doubt it's getting better, but aside from surveys and collaborations, we're probably going to stick with its desktop counterpart for the time being, thank you for asking. But we will be keeping an eye on the future improvements…

# 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 grouping.

Grouping in Power Query is not intended to replace the excellent tools available in Excel spreadsheets to group and summarise data. Power Query's talent is its ability to manipulate very large data sets, and it can be useful to group data before uploading to an Excel spreadsheet so that there are less rows to deal with.

In a previous article, we showed how to merge 'Order Charges' with 'Group' information from a database.
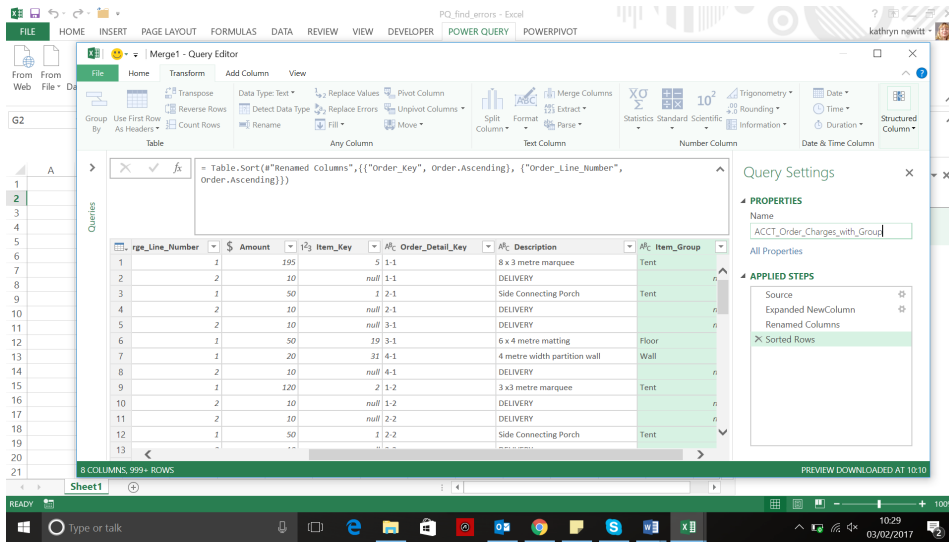
This time around, we will go back to this example query and try some grouping. To keep things easy to follow, let's begin by removing the columns we are not interested in– the various keys that would help us to link to other queries.
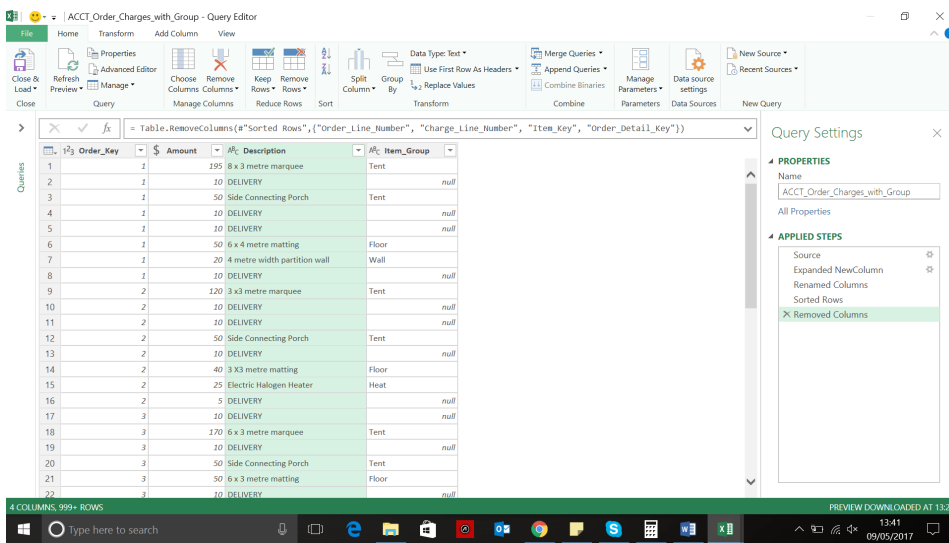
We are going to group by **Item_Group** and **Description**. To do this, we select the **Item_Group** column, and then choose the 'Group By' section on the 'Transform' tab:
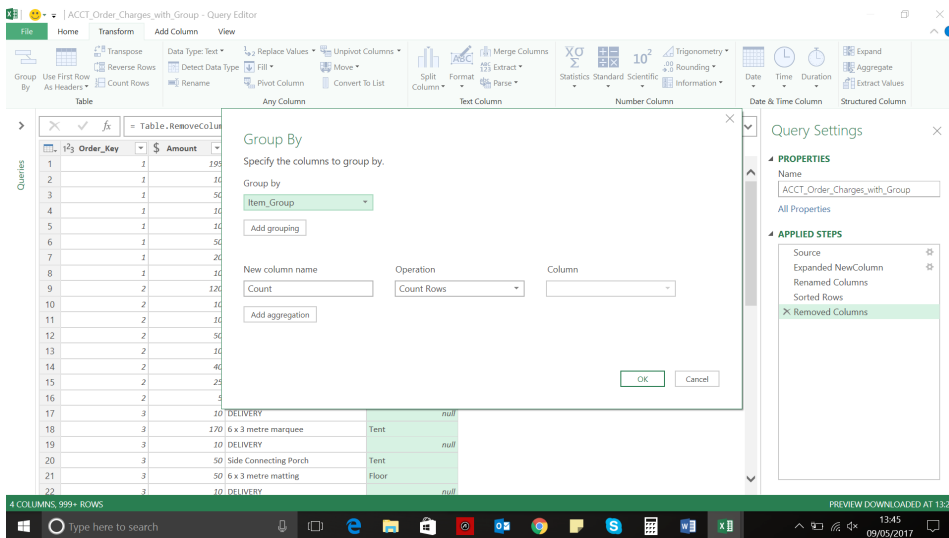
There are a few options to explore here – we'll begin by using the 'Add grouping' button to include the **Description** column.
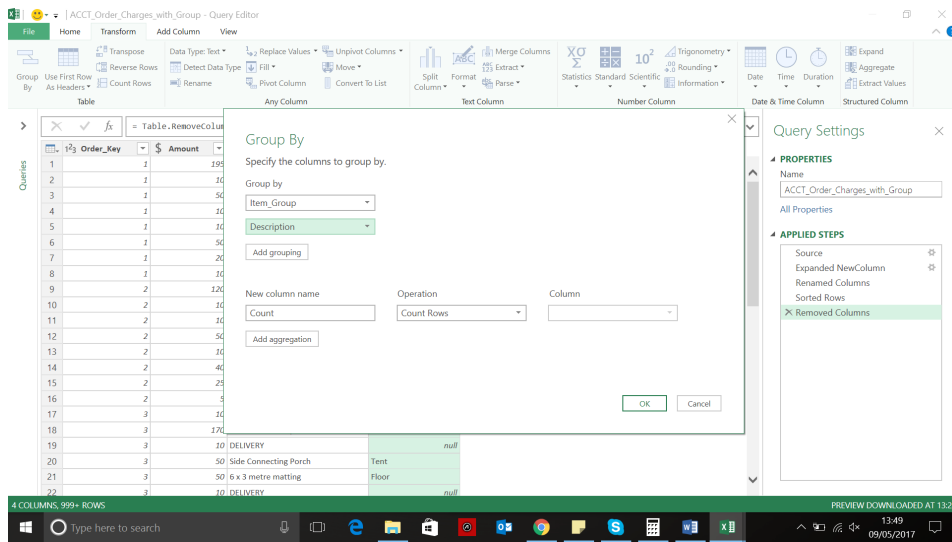
Power Query has helpfully suggested what we might like to do – count the rows. We'd like a better name for this column – 'Items Sold', and then we want to use the 'Add aggregation' button to add another column to sum my *Amount*.
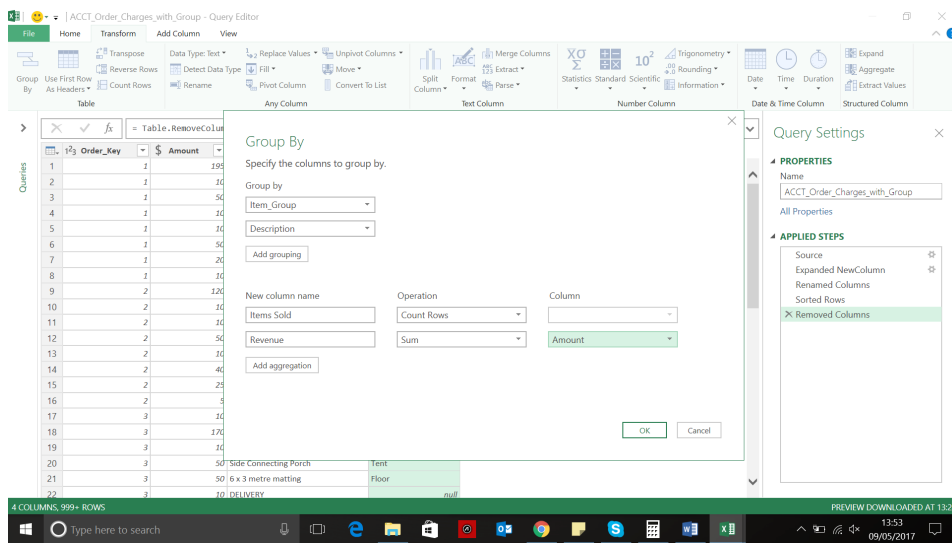
The column section is populated if Power Query needs to know what the 'Operation' should be performed on. Click on 'OK' to see how my data has been grouped, and then apply a sort.
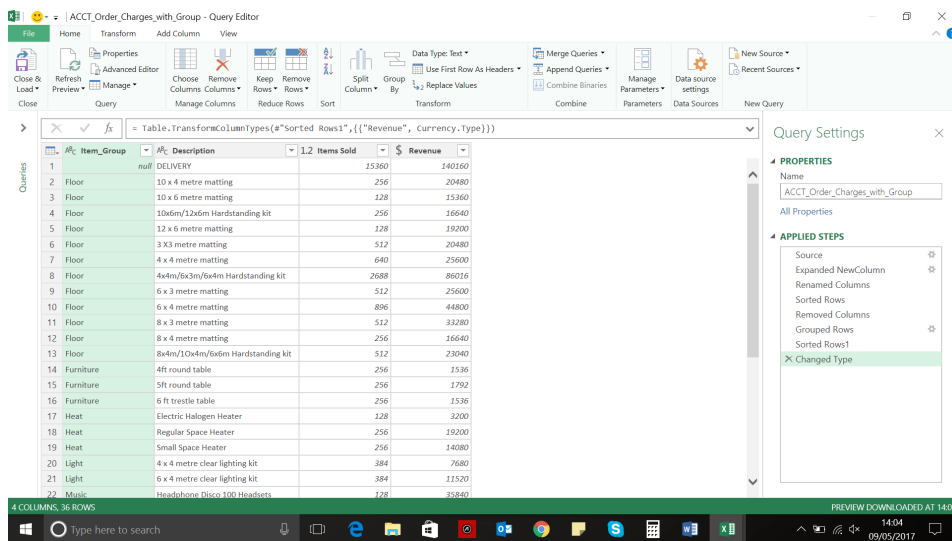
The data is now ready to load. Since it is grouped there are now less rows to upload, which illustrates how grouping in Power Query assists any work done in Excel.
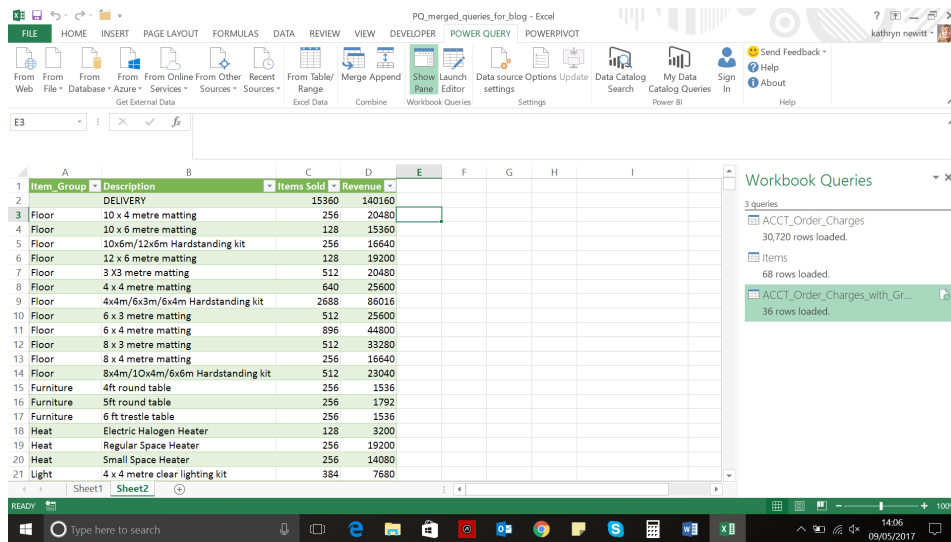
Voila!

Visual Basics

It's not all about the Power Tools, you know. We thought we'd run a new elementary series going through the rudiments of Visual Basic for Applications (VBA) as a springboard for newer users. This first part starts with the most basic of Visual Basics.

VBA (Visual Basic for Applications) is a programming language developed by Microsoft and is built into Excel and other Office programs. It enables building your own functions (known as User Defined Functions or UDFs for short), automating processes and interacting with libraries to work with the Windows operating system. It is also used to write some of the custom add-ins for Office applications.

In Office for Mac, VBA was upgraded in 2016 but some features and certain commands do not function correctly and herein lies the problem: it doesn't work everywhere – but lots of people use it as a readily accessible porthole for Microsoft Office and often Excel in particular.

You can't say "VBA" without talking about macros. A macro is simply a sequence of actions that can be executed together, written in VBA. Office applications (apart from PowerPoint) allow the "recording of

macros" where every single step performed is recorded and translated to Visual Basic code. After recording / writing a macro, these bits of code can be reused to automate these actions.

This is all well and good, but macros are disabled by default in the Office applications. This is because VBA scripts may be automatically executed whenever a spreadsheet is opened – and that's not good given all those nasty people out there. Some scripts can be malicious and cause issues on your machine. For example, some VBA scripts can delete files and your Outlook email address book.

To change the security settings for macros, these may be accessed in 'Excel Options' (**ALT + T + O**) in the 'Trust Center' group in the resulting left-hand column of the dialog box. Once there, click on the 'Trust Center Settings…' button, *viz*.
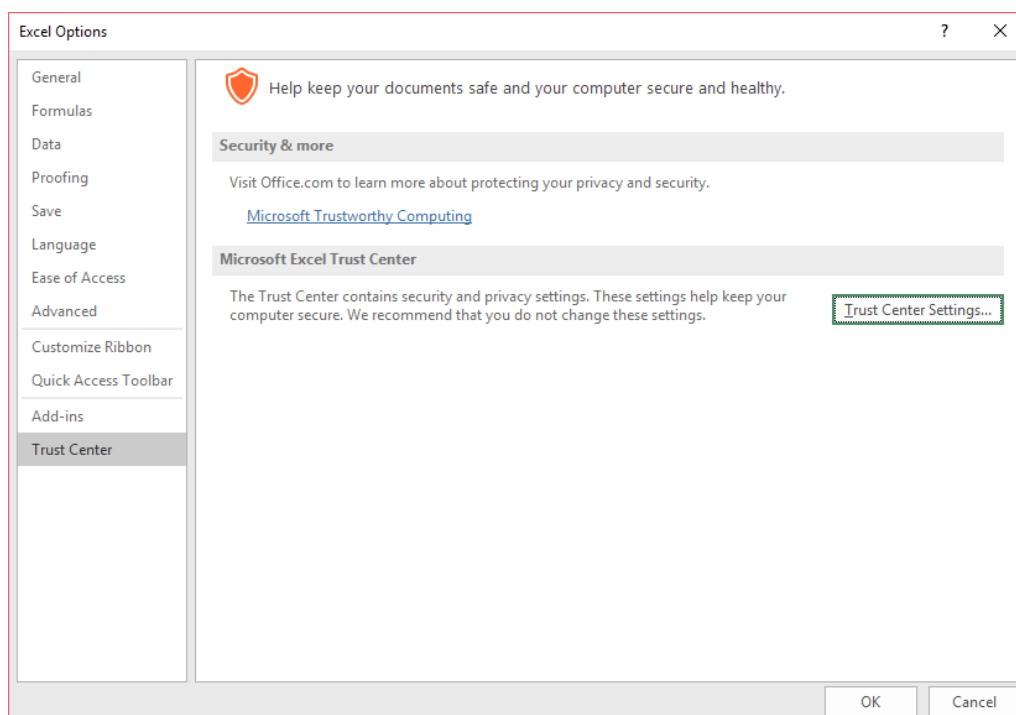
Under the 'Macro Settings' group, a set of options is presented:
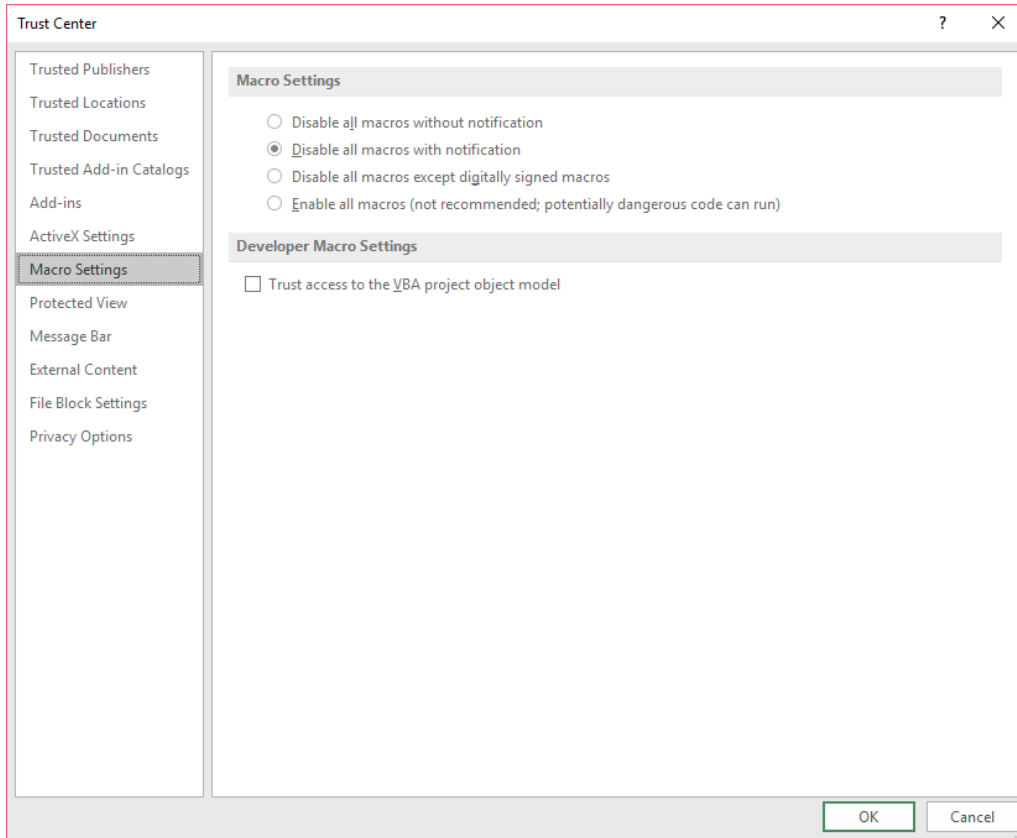
Excel defaults to 'Disable all macros with notification'. This means that whenever a workbook has a macro (only .xls, .xlsb and .xlsm files may have macros) a pop-up warning window will appear before opening a file:
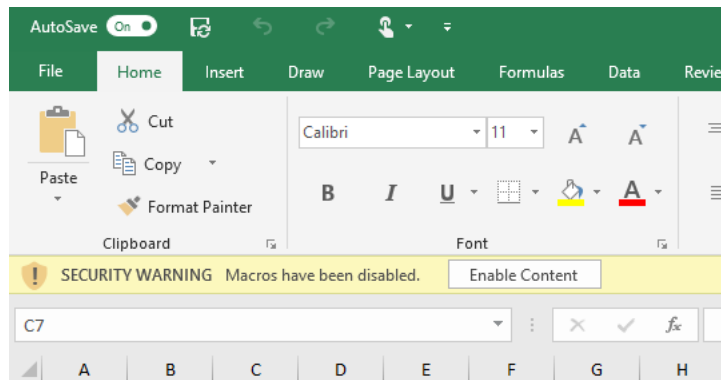
This is a little confusing for older users of Excel as the default is similar to Excel 2003, even if the setting starts with 'Disable'. It's not the only thing you have to do, mind you.

To fully utilise VBA in Excel, you need to have access to the 'Developer' tab, which shows the VBA tools available. By default, the Developer tab of the Ribbon is not made visible. To enable this as well, right-click on the Ribbon and select 'Customize the Ribbon…':
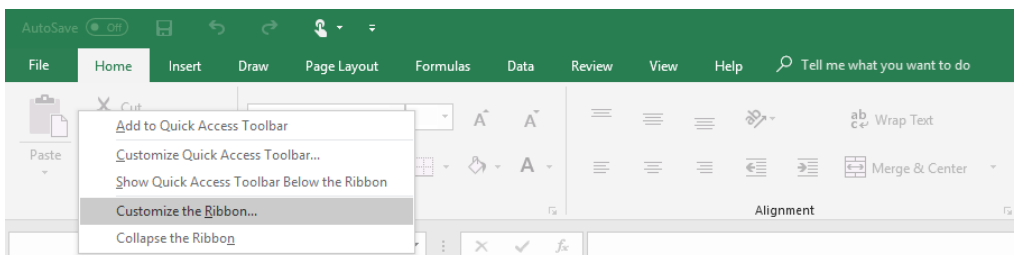
The 'Excel Options' menu will pop up. On the right-hand side, you'll see "Customize the Ribbon" where you can click which tabs are to be visible. Click on the check box next to 'Developer' and select 'OK'.
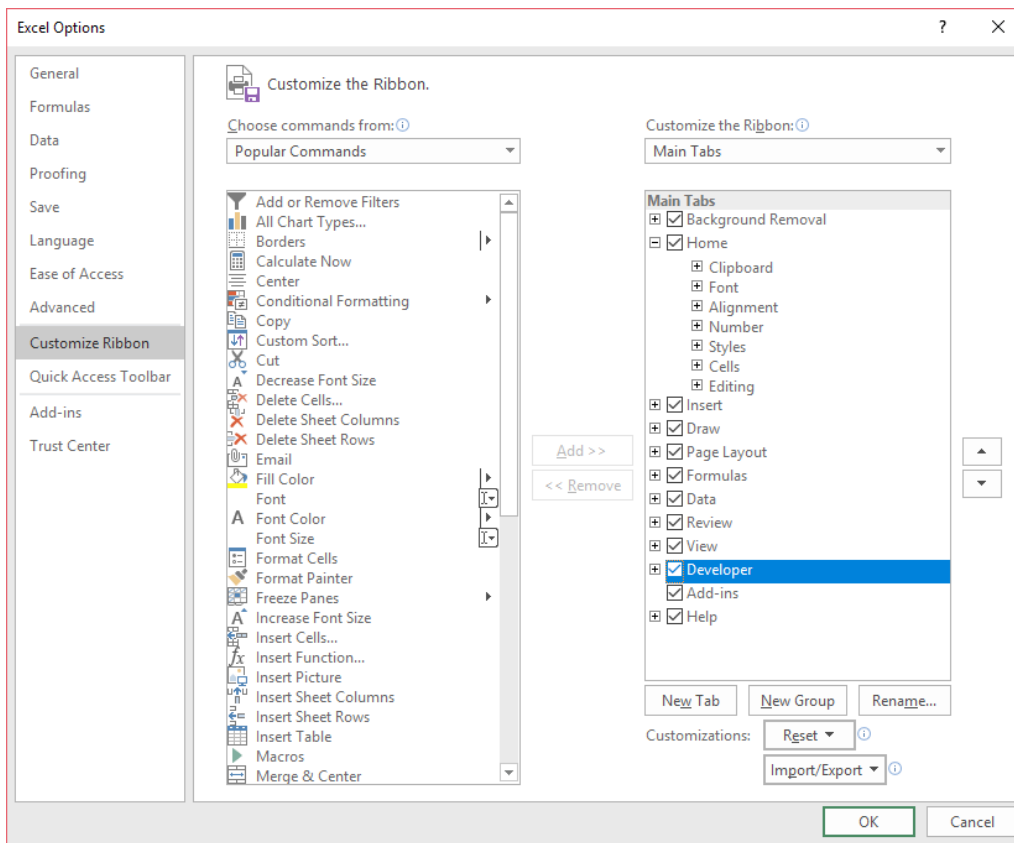
Then we'll see the 'Developer' tab on the screen.
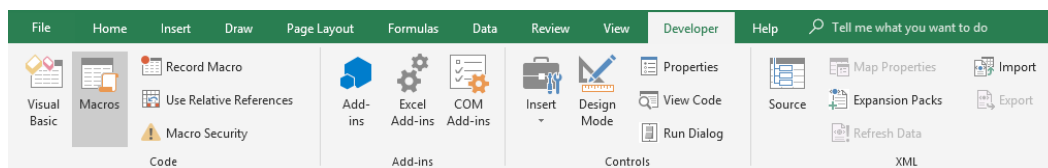
You're good to go!

August Updates for Power BI Desktop

After the avalanche of updates last month (nothing to do with the Microsoft Business Applications Summit we're sure), normal service has been resumed this month with a more reasonable number of updates to get your teeth into.

The August updates are as follows:

Reporting

- Print reports through Export to PDF
- Create bookmark groups
- Theming Generally Available
- Slicer restatement

Analytics

- Conditional formatting by values
- Python integration (Preview)
- Q&A improvements:
  - o Q&A in Power BI Desktop Generally Available
  - o Better matching experience for Power BI Desktop and Power BI Premium

Modelling

- Data categories for measures
- Statistical DAX functions

Custom Visuals

- 3AG Systems Column Chart with Variance
- Scatter Chart by Akvelon
- Small Multiples Line Chart
- Add Natural Language Summaries for BI
- Pivot Slicer

Data Connectivity

- Spark connector Generally Available.

As usual, let's go through each new feature in turn.

Print reports through Export to PDF

Many have mentioned in the various feedback fora that they would like Power BI Desktop to easily print or email copies of their reports out to others in their company. This month's update now allows you to export all visible report pages to PDF. This new option is located under the 'File' menu.
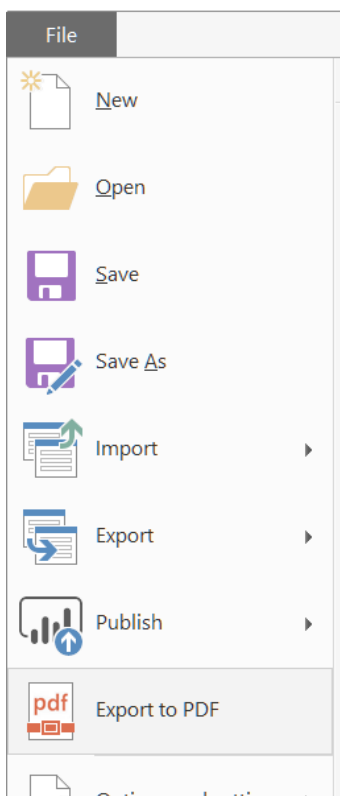
Once you select 'Export to PDF', Power BI will start generating the PDF. At the same time, a dialog will be displayed that lets you know the software is busy working on it, and you'll see each non-hidden page loading in order behind it. During this process, you won't be able to interact with the report. If you need to interact with your report again before we've finished you can cancel the export through the dialog.
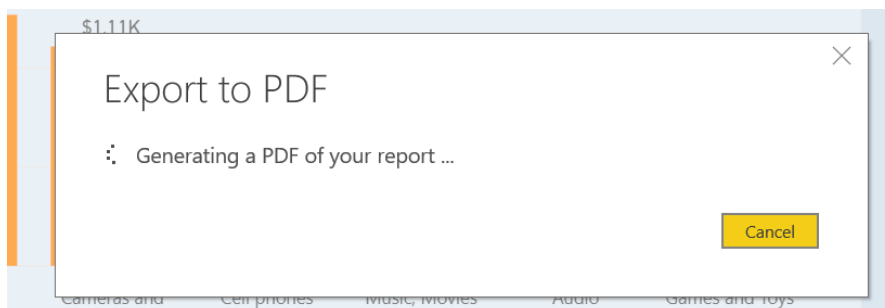
Once the PDF has been created, it will open in your default PDF viewer, which defaults to Microsoft Edge (ah well, can't have everything). From there you can save it wherever you like, email it as an attachment or print it.
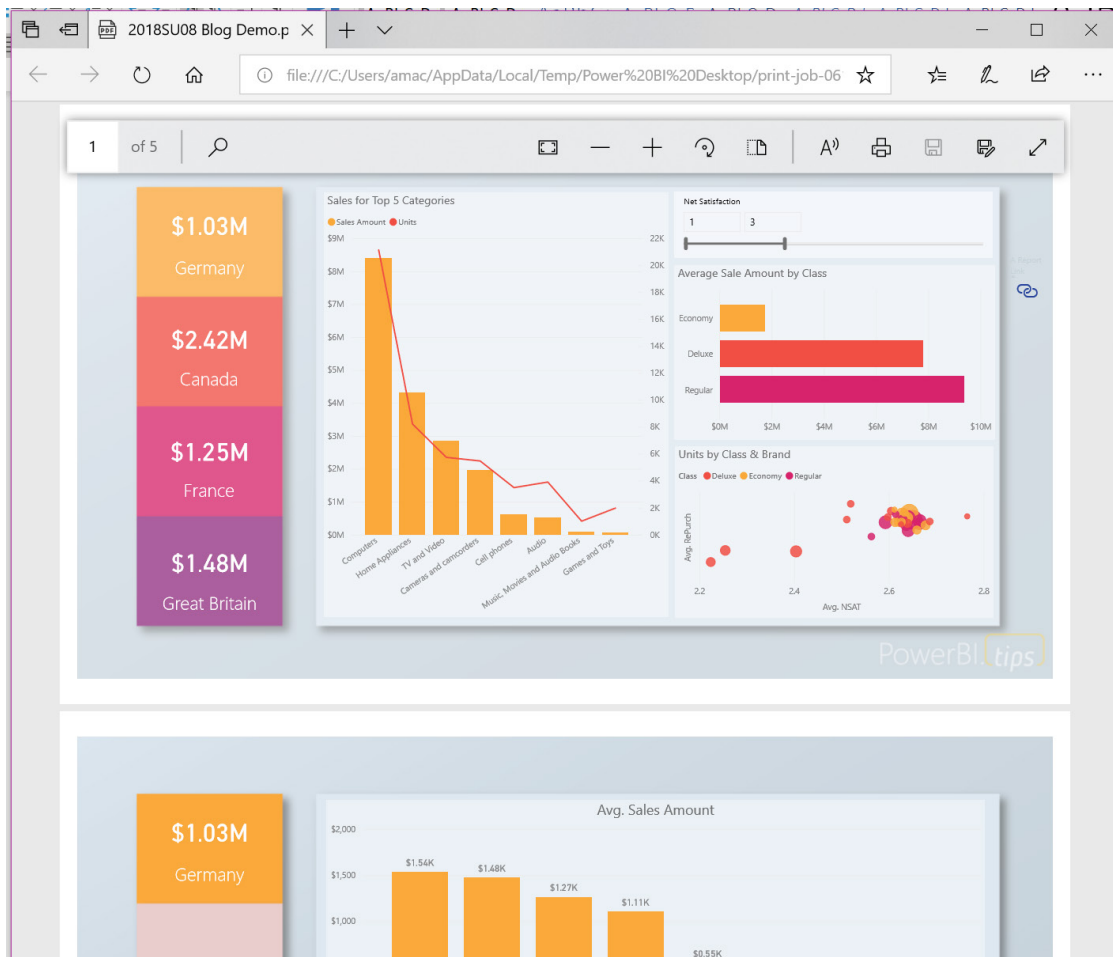
Currently export to PDF is only supported in Power BI Desktop. In the Power BI service, you can still use the normal 'Print' option that is available.

Currently, Power BI does not support printing wallpaper colour or images, only page backgrounds or images. If you have a dark wallpaper color and a transparent page colour, as a tip, you may wish to temporarily set the page background to match the wallpaper's colour to improve readability.

Create bookmark groups

If you use bookmarks extensively, there's a good chance you'll have tried to group them for different purposes / alternatives. For example, you may have different bookmarks per organisational division using your report or perhaps you have a set of bookmarks for navigation and several sets of bookmarks for different presentations.

In these cases, it's important to clearly separate out each group of bookmarks, and this update introduces bookmark grouping. This allows you to collect a set of bookmarks together and give it a name. Each group can be expanded and collapsed for easy viewing.

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In these cases, it's important to clearly separate out each group of bookmarks, and this update introduces bookmark grouping. This allows you to collect a set of bookmarks together and give it a name. Each group can be expanded and collapsed for easy viewing.

To create a bookmark group, click the first bookmark of the group and then **CTRL + CLICK** the other bookmarks you want to group with it. Then select the '…' menu for any of the bookmarks to group and pick the 'Group' option.

If you decide later you do not require that group anymore, just use 'Ungroup' to stop grouping that set of bookmarks.
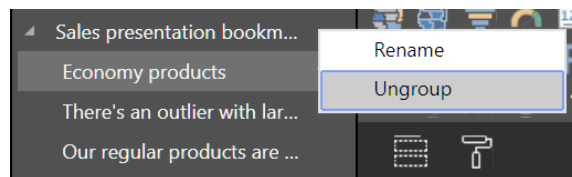
When you use 'View' to play a bookmark group, it will only include the bookmarks in that group.
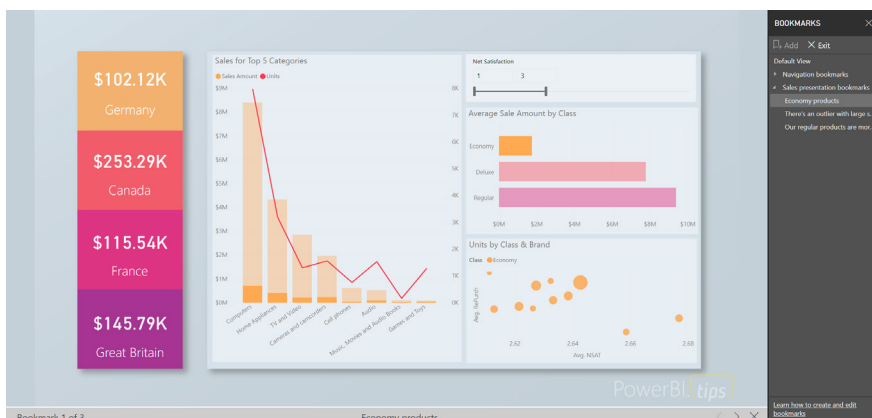
Playing from a bookmark at the root level, such as 'Default View' in this example, will still play through all bookmarks in your pane.

Theming Generally Available

Last month saw a major update for theming that added support for the remaining visuals properties and page level background and wallpaper colours. At this point, Microsoft has stated that they are satisfied with their level of theming support across report pages hence they are making theming Generally Available. This means you may start using it without needing to enable it through the 'Options' dialog. Microsoft has also advised this feature will be finding its way into next update of Power BI Desktop for Report Server too.

Slicer restatement

If you are using the list slicer, you can now add a restatement, similar to the restatement in the dropdown slicer, to the slicer header through an option in the 'Slicer header' card in the 'Formatting pane'.

Conditional formatting by values

There's a new type of conditional formatting for tables and matrices this month: format by field value. 'Format by field value' allows you to use a measure or column that specifies a colour, either through a hexcode or name and applies that colour to the background or font colour.

For example, each product in any given model has a colour. Instead of showing the colour name, you may set the cell to be filled with the colour instead.

With this feature, all you have to do is pick to format that colour by the colour name. You can do that by opening the 'Conditional Formatting' dialog for the 'Color' column in the example table *(below)*:
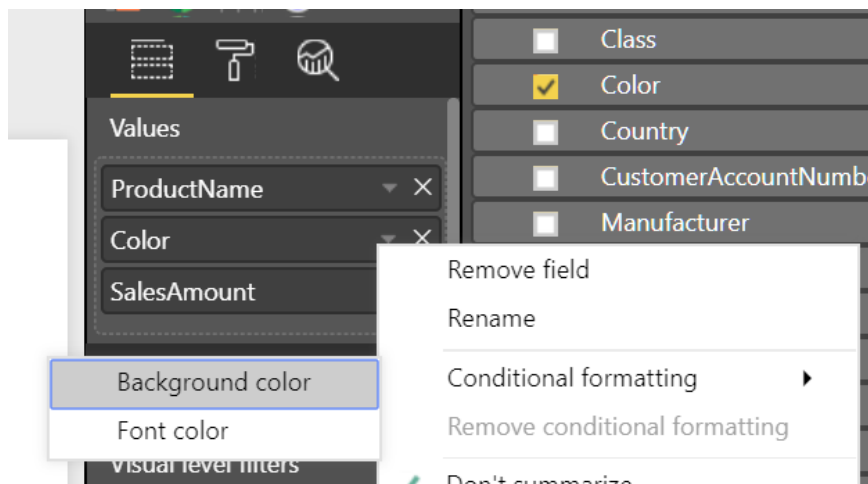
Then, in the dialog, pick to format by **Field value**. The dialog defaults to the 'Color' column with 'First for summarization'. Since there will always only be one colour value per table row, this is exactly what is required and you would just need to click 'OK'.

If you repeat this for font colour as well, the whole column will be filled with the product colour, which makes it easier for you to identify with a glance which product colour you are currently looking at.

Another example for this is to set up DAX calculations based on your business logic that outputs different hexcodes. You can then format by that calculation without having to worry about creating several cumbersome rules in the 'Conditional Formatting' dialog.

Python integration (Preview)

This update sees Python, a programming language widely used by statisticians, data scientists, and data analysts, is now integrated into Power BI Desktop. Once you enable the feature in the Preview settings, you can use Python to do data cleansing, analysis, and visualisation.

The first integration experience added is the ability to run Python scripts directly in Power BI Desktop to create your data model. You'll see an option for this new connector in the 'Get data' dialog.
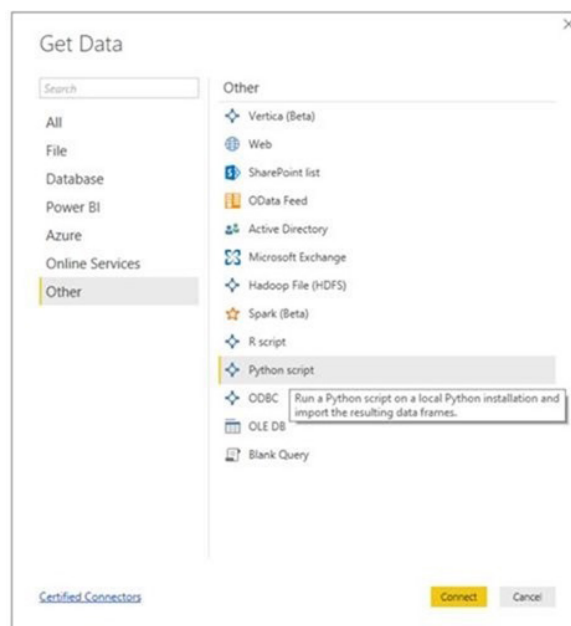
After selecting this option, you'll be able to paste in your script.
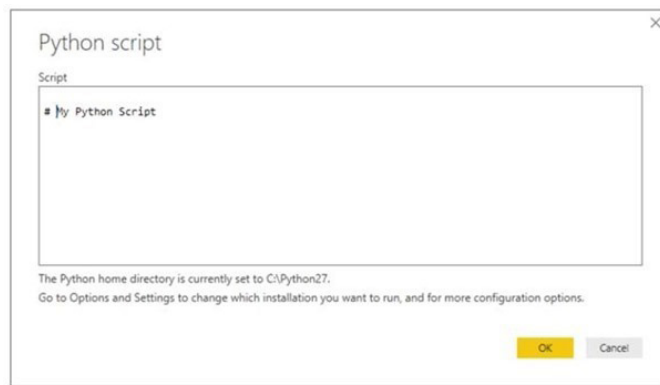
The Python integration in the Query Editor lets you perform data cleansing using Python and perform advanced data shaping and analytics in your data, including completion of missing data, predictions, and clustering, just to name a few.

You may also use Python to create new visuals on your report. Just like R visuals, the Python visuals will update with data refreshes and cross-filtering. However, the visual itself is not interactive.
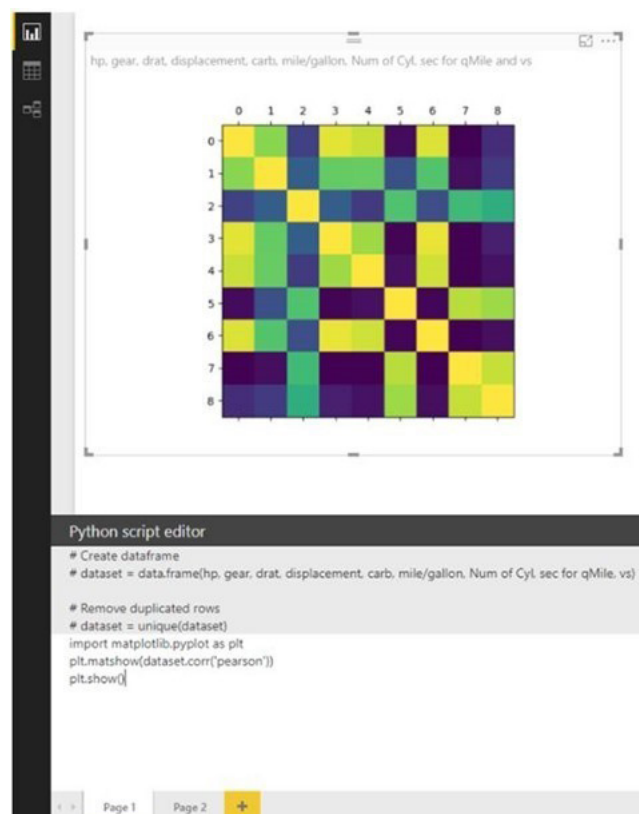
Q&A in Power BI Desktop Generally Available

This month sees Q&A in Power BI Desktop become Generally Available. This means you'll no longer need to turn on the Preview feature to use Q&A for visual creation or the Q&A Explorer in your reports.

Better matching experience for Power BI Desktop and Power BI Premium

Q&A in Power BI Premium and in Power BI Desktop now has improved matching capabilities regarding the data in your model:

- Values are compared word-by-word rather than the entire value at once. This allows for better matching in cases involving spelling-correction, plurals and punctuation, *e.g.*
  - Spelling corrections: "How much kamut wheet was sold yesterday?" will match "kamut wheat" rather than just "kaput wheat" or "kamut wheet"
  - Plurals: "Which employees are sales managers?" will now match "sales manager" rather than just "sales managers" or "sale manager"
  - Punctuation: "Who works for Contoso Inc?" will now match "Contoso, Inc." rather than just "Contoso Inc"
- Accent-insensitive matching is now used, allowing "Number of downloads of the latest Beyonce Knowles single" to match "Beyoncé Knowles"
- If you have plural values in your data, you can instruct Q&A to match singular values against them as well by setting the new PluralNormalization property on the column in the Linguistic Schema, allowing "Which cashier was hired last week?" to match "cashiers" in the data.

Data categories for measures

You can now pick data categories for measures. This means you can do things like use measures to dynamically create URLs and mark the data category as a Web URL. T hen when you display it in tables, you'll be able to click on the URL that's created based on your selection! This is especially useful if you want to link off to other Power BI reports with URL filter parameters:
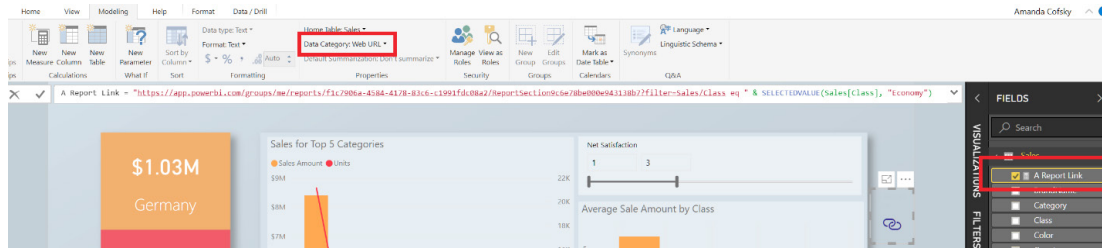
Another example for this feature is to create DAX measures to create interesting insights such as sparklines using SVG images:

Statistical DAX functions

Several new functions have been coded that expand the statistical capabilities of DAX. They sort of flew under the radar in July's update, but Microsoft has "announced" the following in this update:

- **NORM.DIST**
- **NORM.S.DIST**
- **NORM.INV**
- **NORM.S.INV**
- **T.DIST**
- **T.DIST.RT**
- **T.DIST.2**
- **T.INV**
- **T.INV.2T.**

These match the behaviours of their Excel counterparts, so it should be easy to migrate to if you're used to doing these types of statistical operations in Excel.

3AG Systems - Column Chart with Variance

The Column Chart with Variance custom visual by 3AG Systems allows you to use multiple measures to create overlapping column charts with a variance chart positioned directly above. This visual is geared towards showing actual, forecast, planned and previous year data.
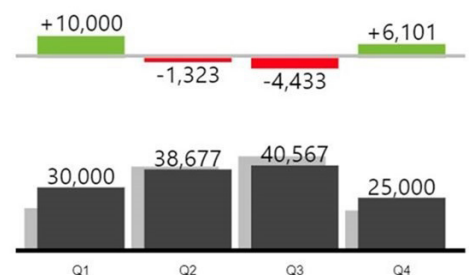
Scatter Chart by Akvelon

The Scatter Chart custom visual by Akvelon allows you to view compare your different metrics with the **x**- and **y**-axes coordinates, point size and saturation. It also supports rectangle selection for cross-highlighting other visuals on your report page. The visual also supports drilling, constant lines on both axes and various formatting options.
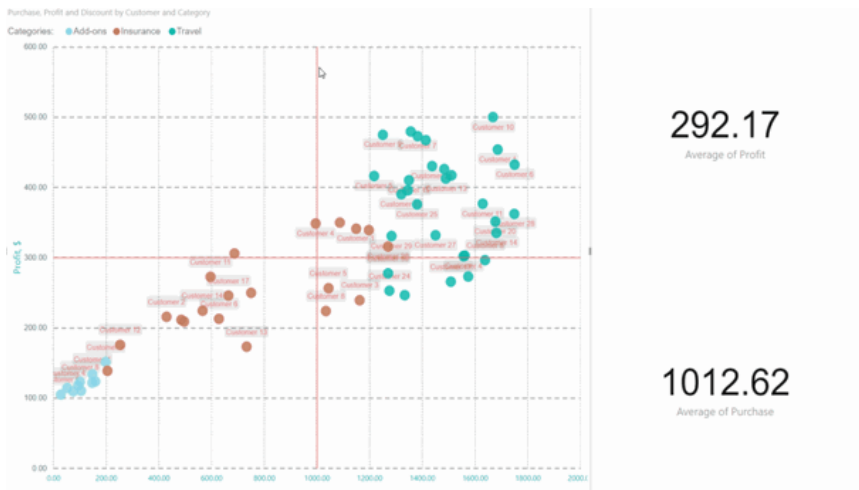
Small Multiples Line Chart

The Small Multiples Line Chart created by independent programmer Daniel Marsh-Patrick allows you to display multiple line charts across the values of a category using the same scale and axes. This makes it a lot easier to compare the trends across all values being compared. The visual also lets you control the labels, the number of multiples per row and the background shading.

Add Natural Language Summaries for BI

The Add Natural Language Summaries for BI custom visual by Arria NLG allows you to add narratives for the data you are displaying in your report. The visual will generate natural languages that explains the most important insights and key drivers in your data. Using Arria NLG's NLG Studio, you'll be able tweak starter projects or create your own templates to be used in your reports and have the narrative update based on your report's filter context.
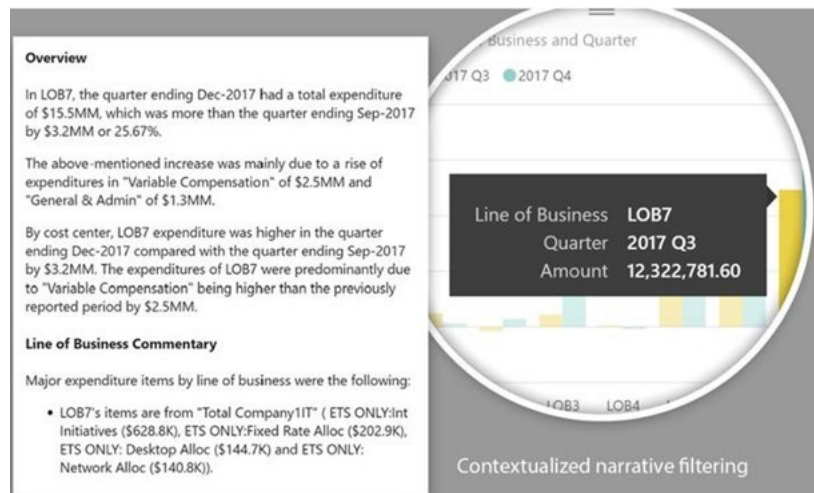
Pivot Slicer

The Pivot Slicer custom visual goes beyond the built-in slicers, letting you dynamically pivot the slicer based on any combination of categorical data types, numerical data attributes and linked data items. Some examples for this slicer include stacking multiple slicers in a single compact visual, exploring data rankings resulting from weighted combinations of numerical attributes and navigating the link structure of item hierarchies and networks. Items of interest can be pinned from any view for comparison of attribute values, link weights and linked items.
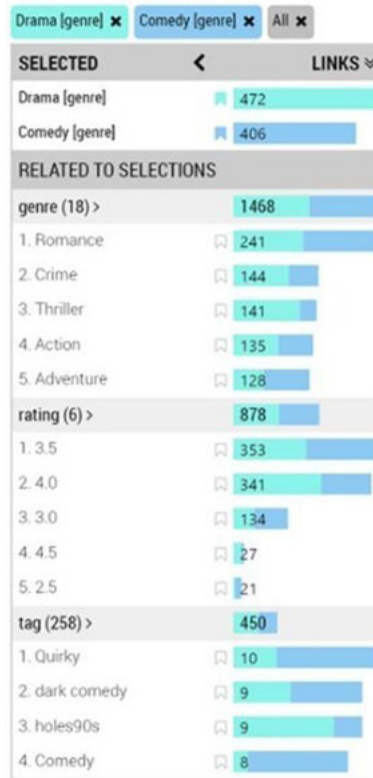
Spark connector Generally Available

Finally, the Spark connector has reached General Availability in this release. The Spark connector can be found under the 'Other' category within the 'Get Data' dialog:
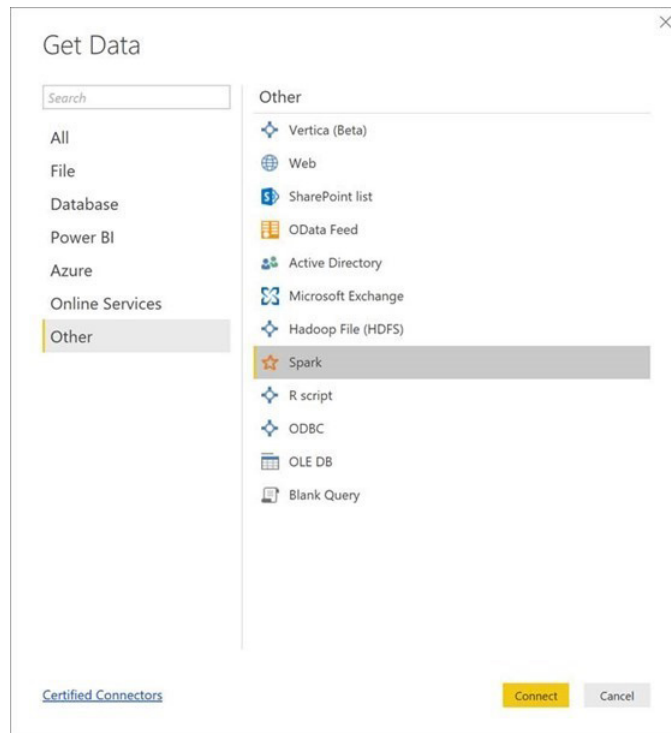
It enables you to create Import- or DirectQuery-based reports in Power BI against your data stored in Spark clusters.
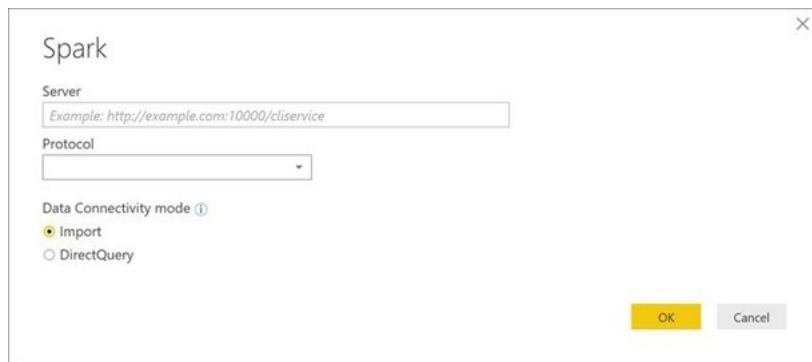
That's all of the updates dealt with, but before we end this section, you may not have noticed, but Microsoft has been hinting more about future updates in Power BI Desktop. They have been discussing various features, although the timescale for delivery is still unknown. Having said that, you might want to anticipate the following:

- The ability to expand and collapse options for row headers in matrix visuals. With this feature, you'll be able to expand specific rows of your hierarchy to easily compare just a few values, without having to see all the other values expanded as well. This was demonstrated at the Microsoft Business Application Summit

- There's also talk of a "major extension to [Microsoft's] scatter chart visual…". You'll soon be able to use categorical data on your **x**-axis, including hierarchical data, to create dot plots, while still being able to take advantage of all of the formatting options already available in scatter charts.

More updates and intel next month we're sure!

Latest Updates for Power BI Report Server

So, this month it's the Power BI Report Server that gets avalanched. Those who don't wish to read this may wish to skip to page 946 of this newsletter…

You can't really accuse Microsoft of doing things by halves. This release contains a fair few new features, including printing to PDF for Desktop, report theming, conditional formatting improvements and report page tooltips. You should note that for those users who are upgrading their report server from a previous version, Microsoft recommends clearing your browser cache before viewing your reports.

The full list of new stuff is as follows:

Reporting

- Report Theming
- Buttons to trigger actions
- Combo chart line styles
- Improved default sort for visuals
- Numeric range slicer
- Advanced slicer syncing
- Log axis improvements
- Data label options for funnel chart
- Set line stroke width to zero
- High contrast support for reports
- Donut radius control
- Pie and donut detail labels position control
- Format data labels separately for each measure in a combo chart
- New visual header with more flexibility and formatting
- Wallpaper formatting
- Tooltips for table and matrix
- Turn tooltips off for visuals
- Slicer accessibility
- Formatting pane improvements
- Stepped line support for line and combo charts
- Sorting experience improvement
- Print reports through Export to PDF (in Power BI Desktop)
- Create bookmark groups
- Slicer restatement
- Report page tooltips

Analytics

- New DAX function: **COMBINEVALUES()**
- Measure drillthrough
- Conditional formatting by a different field
- Conditional formatting by values

Modelling

- Filtering and sorting in data view
- Improved locale formatting
- Data categories for measures
- Statistical DAX functions.

We'll go through each in turn. You might wish to pack a lunch. And yes, we know there's repetition with the last section…

Report Theming

First cab off the block for this release of Power BI Report Server is report theming, which will allow you to quickly colour your entire report to match a theme or corporate branding. When you import a theme, all of your charts will automatically update to use the theme colours and you'll have access to the theme colours from the color *(sic)* palette.

You can upload a theme file using the 'Import Theme' option under the 'Switch Theme' button.
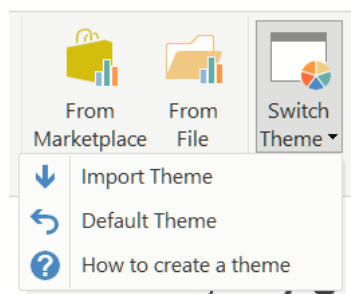
A theme file is a JSON file that includes all the colours you want us to use in your report along with any default formatting you want to apply to visuals. Here is a sample JSON theme that just updates the default colours of the report for egg-sample:

```
{
"name": "waveform",
"dataColors": [ "#31B6FD", "#4584D3", "#5BD078", "#A5D028", "#F5C040", "#05E0DB", "#3153FD", "#4C45D3", "#5BD0B0", "#54D028", "#D0F540", "#057BE0" ],
"background":"#FFFFFF",
"foreground": "#F2F2F2",
"tableAccent":"#5BD078"
}
```

When the theme is uploaded, the colours will automatically be applied to all charts.

Sunglasses are not included. You'll also see the colours in the color palette, so you will be able to use them in other places as well.
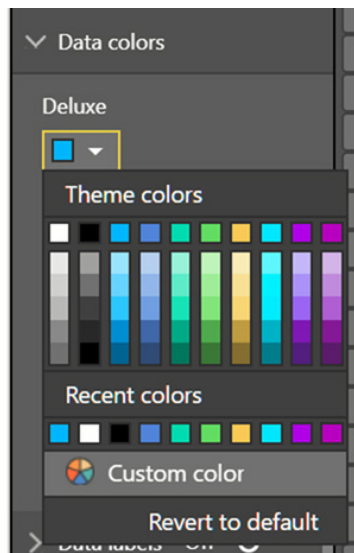
Applied theme colours will follow your reports when you save them to Power BI Report Server.

Buttons to trigger actions

Now that there are several different actions that can be triggered by just a click on a shape or image, Microsoft has decided it's time to add a button control to Power BI as well. These new buttons are geared towards letting you create an app-like experience with interactive elements in your report.

A button can be inserted from the Ribbon, by picking on of several icons or selecting a blank button. Once on your page, you can choose to add text, change the icon, add a fill color or give your button an outline. You have lots of control around the look of the icon and text including size, colour and alignment. Once you pick your default look for your button, you can then use the dropdown to change how it looks on hover or when it is being clicked on.

As with images and shapes, you can pick the action that will be performed on click through the 'Action' card. Currently, these actions include 'Back' and a specific bookmark. For certain icon types, you will discover a default action has already been assigned.

Combo chart line styles

You can now change your combo chart lines to different styles and have that optionally reflected in your legend.
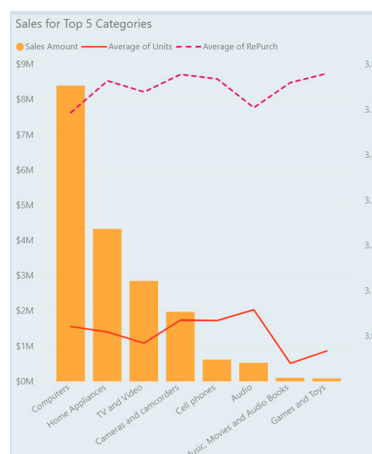
Improved default sort for visuals

We understand that one of the goals of this update was to make it fast and easy for you to create well-formatted reports. The default visual sort has been improved, so you won't need to change it nearly as frequently.

The new logic for sorting visuals is:

1. If your visual uses a column that has an associated order-by column, it will sort by that by default (you can set this up using the 'Sort by' column feature)
2. Otherwise, if your field is a date field, it will sort in chronological order
3. Finally, if you don't have an order-by column or date field, it will sort by the measure descending.

Of course, as always, you can sort manually too.

Numeric range slicer

The numeric range is Generally Available to use, and therefore, is now part of the Power BI Desktop for Report Server. You'll see it a slicer type option for numeric column without needing to turn on a Preview feature. Additionally, any newly created slicers using numeric columns will default to the 'between' mode of the numeric range slicer.

Advanced slicer syncing

The 'Advanced' section of the 'Slicer syncing' pane allows you to create custom groups of slicers to synchronise. By default, synchronised slicers will be put in a group with a name that matches the field used in the slicer, but you can override this with any name you want. This means you can create separate groups to sync slicers that use the same field; for example, you may have two slicers using the same field on the same page, and you want to sync one of them with a slicer on another page.

You can also put slicers that use different fields in the same group; for example, you may have two different date fields and you want to have the selected date sync between the slicers. If the value selected in the first slicer doesn't exist in the second slicer, you'll see it appear at the bottom of the list of values instead.
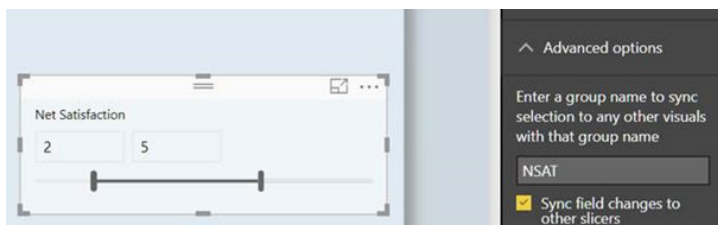
You can also check the 'Sync field changes to other slicers'. With this option checked, if you swap the field used in the slicer, all the synced slicers will update to use the same field.

Log axis improvements

The log axis in cartesian charts has been improved in this update. You should now be able to select log scale for the numeric axis of any cartesian chart, including combo chart, when you have data that is completely positive or completely negative. Reference lines should also observe the log scale and will cause the scale to resize in order to accommodate them.
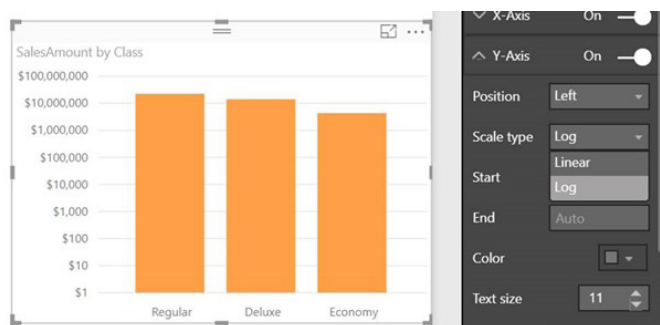
If you have data that crosses zero, you'll now get a helpful warning in the property pane, and the scale type will revert to linear. Once your data is updated to no longer include both positive and negative values, the visual will start to use the log axis again.

Data label options for funnel chart

There's now more control for data labels in a funnel chart. You may now pick if each bar shows the actual value, the percentage of the first bar, the percentage of the previous bar or the actual value and one of the two percentage options.
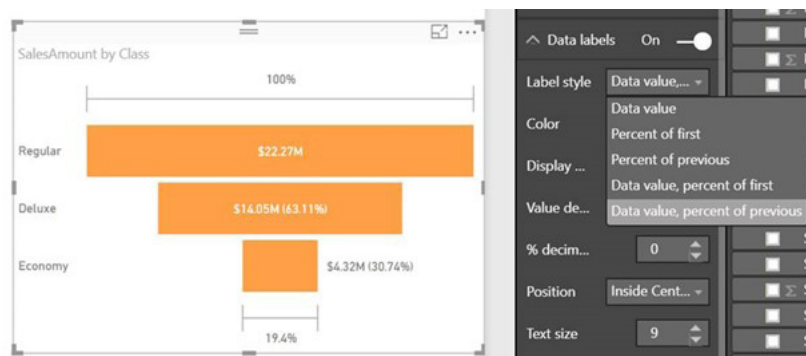
The first bar will always show only the data value since the percentages are always 100%.

Set line stroke width to zero

Another small formatting option added is the ability to set the stroke width of lines to zero (0).
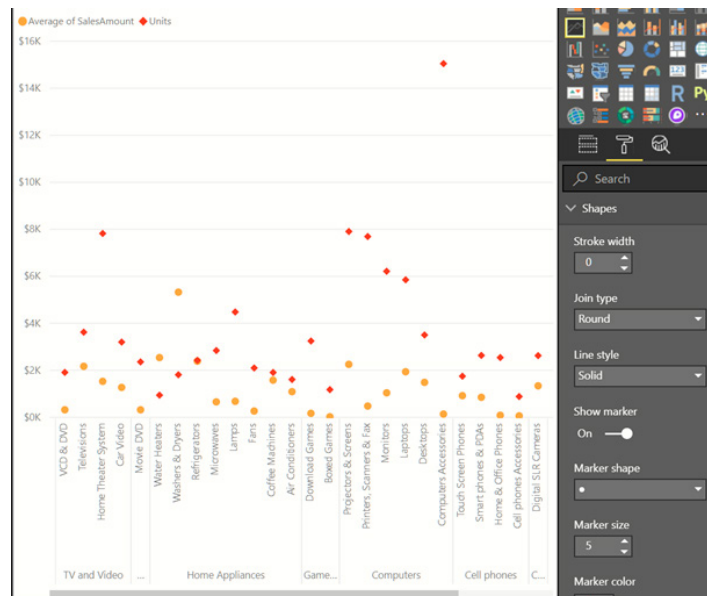
This works for combo charts as well as line charts.
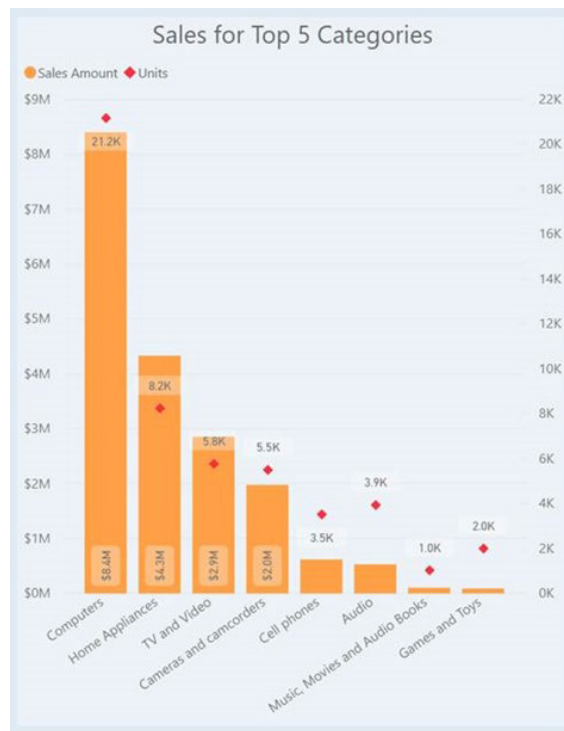
High contrast support for reports

If you're using the high contrast mode Windows settings, your Power BI reports will now respect the color palette you're using. When using Power BI Desktop, it will automatically detect which high contrast theme you're using and apply those colours across your report, similar to Excel
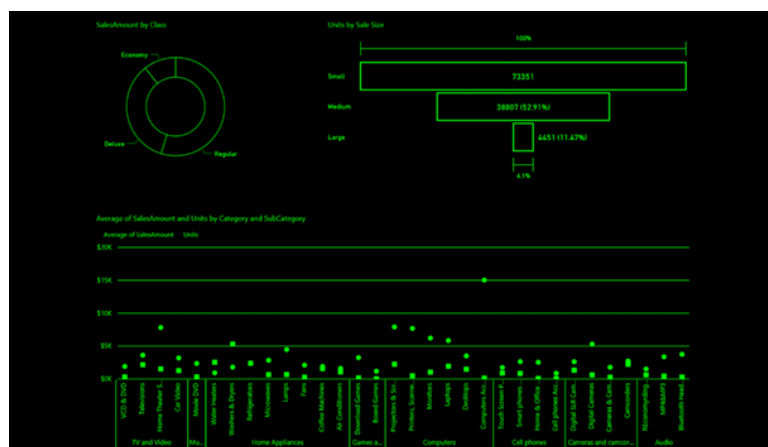
In Power BI Report Server, it will also try to detect which theme you're using and automatically apply it to your report, but depending on what browser you are using, it may not be able to. If you want to change the theme manually, you can select a high contrast theme under the 'View' dropdown.
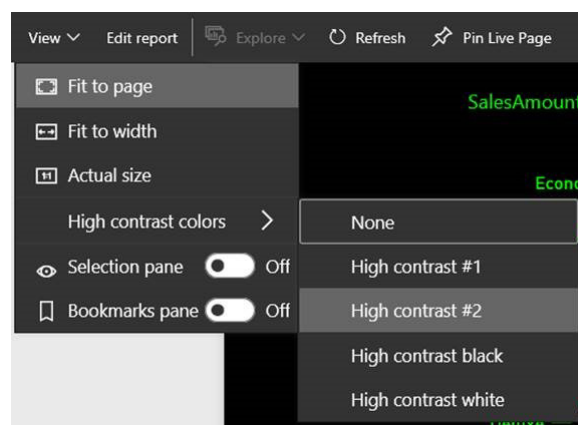
Note that if you're using high contrast themes on Power BI Desktop, you'll still see some areas of the product that aren't using your theme's colours. More support for high contrast will be available in future releases.

Donut radius control

The ability to control the inner radius of a donut chart has now been added. This lets you make the donut slimmer or thicker to get the style you want. You'll find this option under the 'Shapes' card in the 'Formatting' pane.
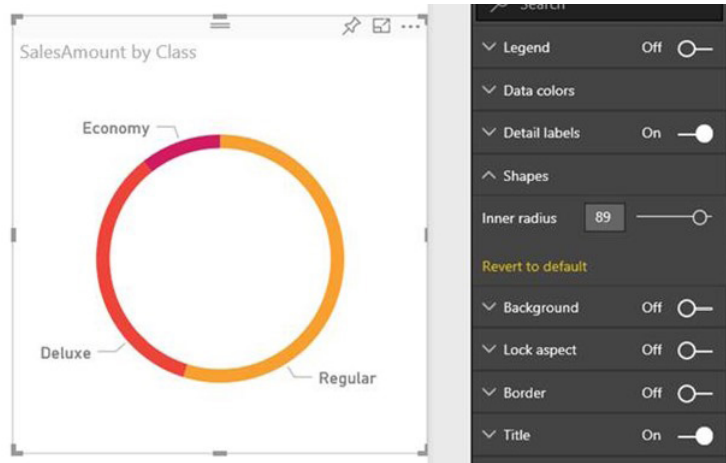
Pie and donut detail labels position control

Pie and donut charts now support moving detail labels inside. You can pick between forcing the labels to always be outside or inside or to prefer one position over the other.
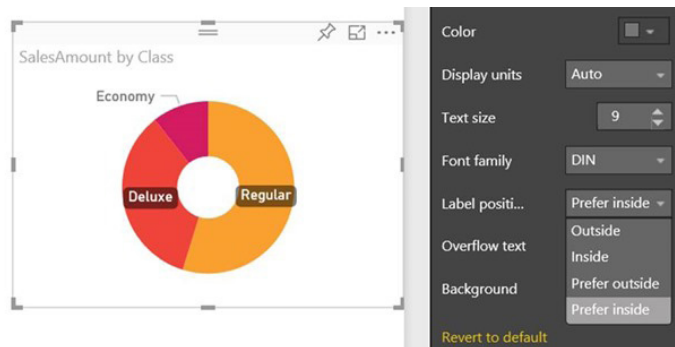
If you choose to move your labels inside the pie or donut chart, you can also choose whether the text can overflow past the edge of the shape and if the labels have a background or not.
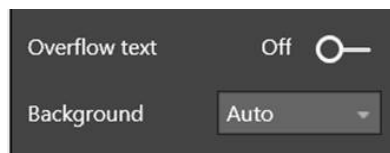
Format data labels separately for each measure in a combo chart

There's an update to data labels in combo charts in this release. Now you can customise individual series. In the 'Data labels' card of the 'Formatting' pane, you can turn the 'Customize series option' on to format an individual measure's formatting options, such as colour, display units and the number of decimal points.
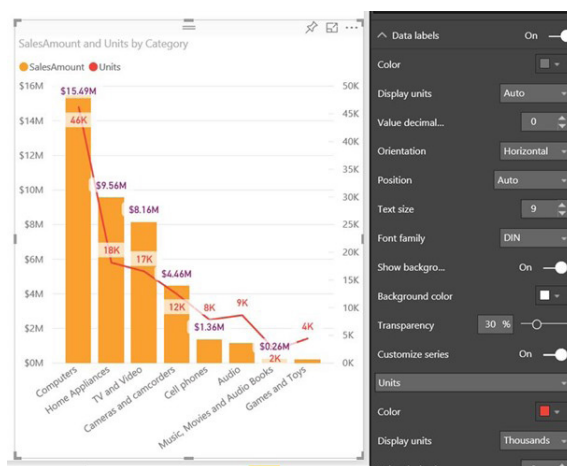
New visual header with more flexibility and formatting

A common concern was that the visual's header took up a lot of space and that it didn't fit with the design of users' reports. Based off this feedback, Microsoft has completely revamped its visual header.

Since the new visual header is detached from the visual, it can adapt its position based on the layout of the visual. By default, the header will appear inside the visual in line with the title.
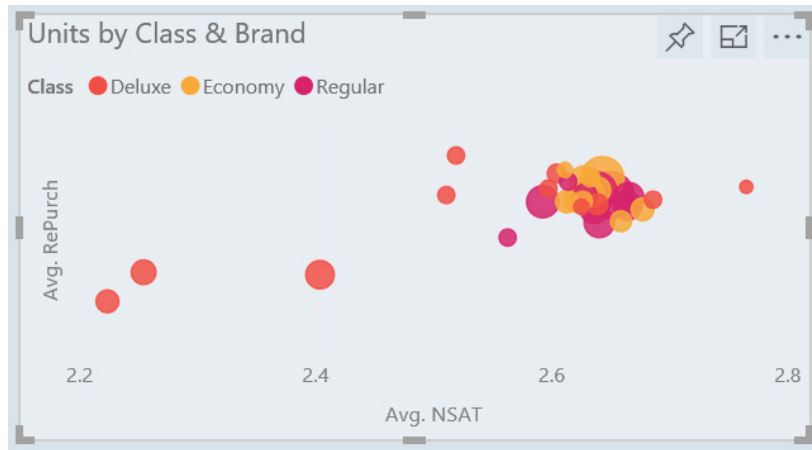
If your visual doesn't have a title, it will instead float on top of the visual, unless the visual is all the way to the top of the report, in which case it snaps to the bottom of the visual.
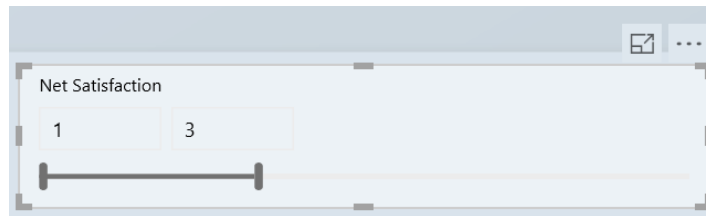
Every visual now has a new card in the 'Formatting' pane, called 'Visual header'. In this card, you'll find options to format the icon colour, the background and border colours and their transparency. You can also choose to turn off individual icons or the whole header for viewers of your report.

Note that the visibility toggles do not affect your report when authoring it. You'll need to publish your report and view it in reading mode to see the effect. This is because many of the options in the visual header are important during editing, especially the warning icons.

This new visual header is on by default for all new reports. For existing reports, you will need to enable it in the 'Options' dialog under the 'Report settings' section. Depending upon your report's layout, you may notice some shifts after upgrading reports to the new header, especially with background images.

Wallpaper formatting

With the new wallpaper feature, this update will now let you format that grey area outside your report page. This lets you theme the entire report area and gives it a more cohesive feel. The formatting options you have are similar to what you currently have for report pages, including colour, transparency and uploading an image. You can set the wallpaper per page or use our theming feature to set a new default experience for all your report pages.

This feature can be used to extend the main colour of any background images you are using for layouts to the rest of the space.
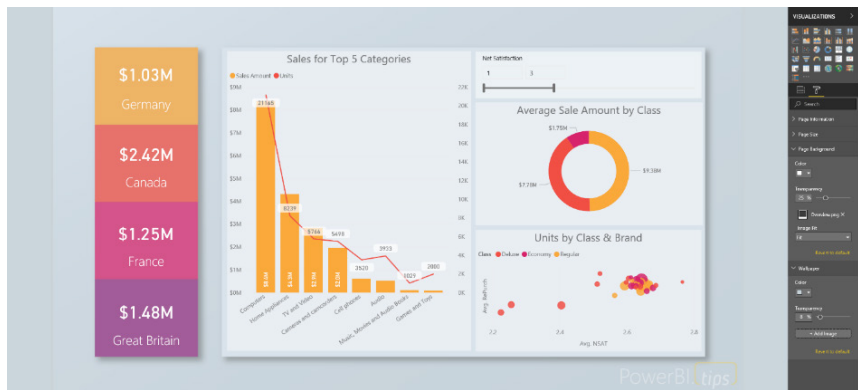
You can also make your report page transparent and have your charts float on top of the wallpaper.
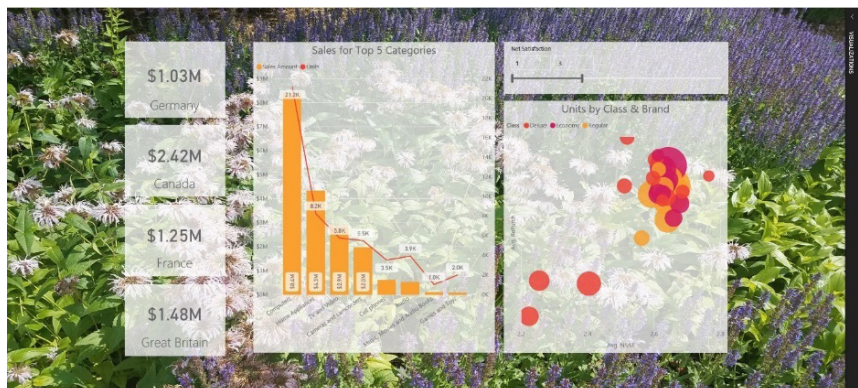
which can give your report a very different feeling depending on the image used.

You'll notice that when the page background has a transparency higher that 50%, the update will add a grey dotted line in editing mode to help you see where the edge of your page is.

As part of this update, Microsoft has also updated the default report page experience to have a completely transparent page background and a white wallpaper, which probably has a more professional look than a white page and grey wallpaper.

Tooltips for table and matrix

Based on end user feedback, Microsoft has decided to close the gap between table and matrix and other visuals in terms of tooltips. The software now supports the standard tooltips on both the table and matrix visuals.

You'll be able to turn tooltips on for table and matrix using the new tooltip card. Tooltips will be set by default to off, so you don't need to worry about your reports changing without you knowing.

Once the tooltip card is turned to on, you'll get the standard Power BI tooltip for your visual.

Turn tooltips off for visuals

Based on end user feedback, Microsoft has decided to close the gap between table and matrix and other visuals in terms of tooltips. The software now supports the standard tooltips on both the table and matrix visuals.

You'll be able to turn tooltips on for table and matrix using the new tooltip card. Tooltips will be set by default to off, so you don't need to worry about your reports changing without you knowing.
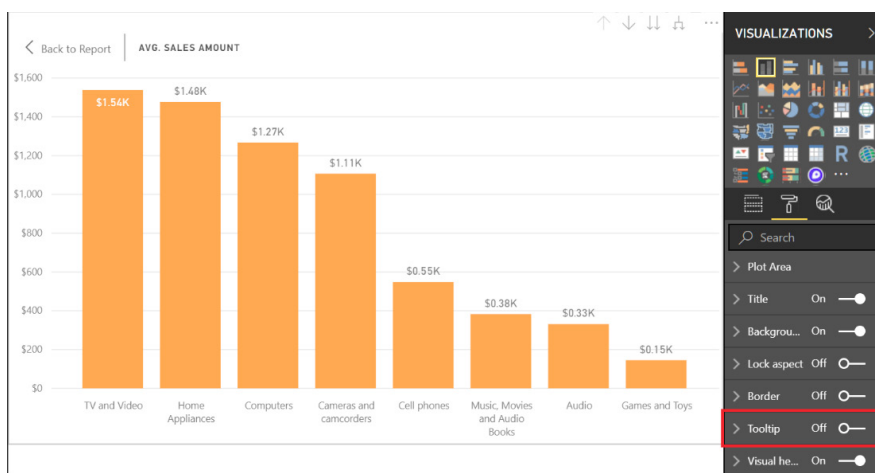
Slicer accessibility

Being able to interact with and change slicer values is one of the most important tasks for any report consumer, and for a while this wasn't available to users who relied solely on a keyboard to navigate. Rather than send everyone a mouse, Microsoft has announced that with this update keyboard and screen reader users can now go beyond consuming a report as is and can start interacting with slicers on their reports.

When you want to explore the current state of a slicer using just a keyboard, the first thing you'll need to do is enter into the slicer. You can do this with the **CTRL + Right Arrow** keyboard shortcut. This will move

your focus to the first element inside the slicer. You can then tab around the various components of the slicer, such as the clear icon, dropdowns and text fields to update values and the slicer type dropdown. As your focus moves, helpful information is also read out by the screen reader, if you have one on.

This is a big step forward in terms of accessibility and apparently, there are even more accessibility features planned for the coming months. Stay tuned.

Formatting pane improvements

If you are a report author, you probably spend a lot of time in the 'Formatting' pane updating the design of your visuals. Given its usage and the fact that it was originally designed when there were not many formatting options available, Microsoft has been wanting to revamp this for quite a while.

Hence, there are now updates:

• A lighter grey color used inside cards, so the entire pane doesn't blend together
• Animations and hover effects give the pane a more modern and polished feel
• Titles show above a given control to improve readability and reduce truncation.
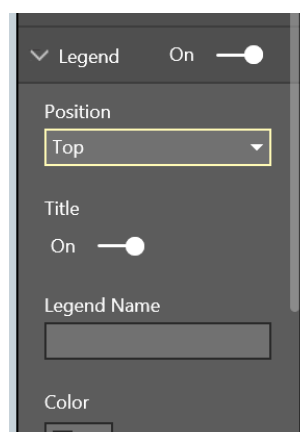
Stepped line support for line and combo charts

As a small formatting improvement, this update now supports changing the line in combo charts to a stepped format. You'll find this toggle in the 'Shapes' card. The type of stepped line currently supported changes height at the midpoint between two data points.
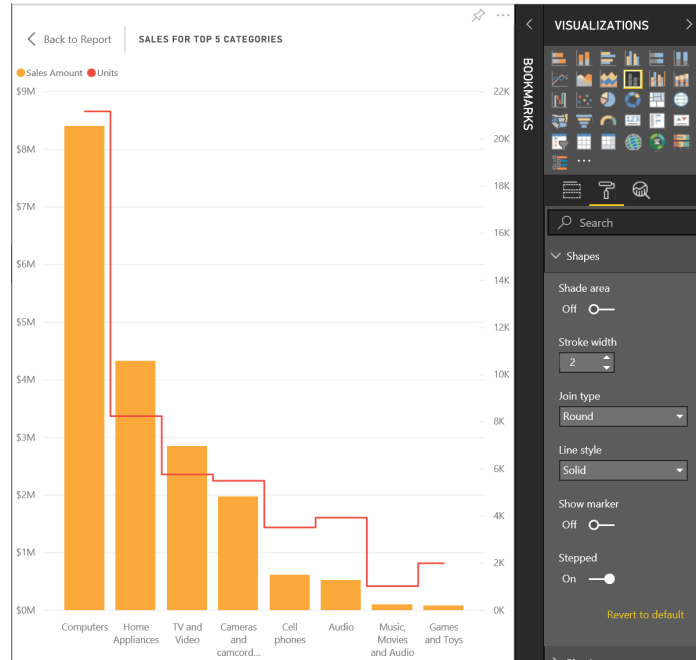
Sorting experience improvement

Microsoft discovered through user testing that the end user sort experience wasn't very clear or easy to use and wasn't accessible to keyboard users. This has now been improved by separating the controls to change sort direction from the control to pick the field to sort by. With this change, you can now also fully navigate this options flyout using only a keyboard.
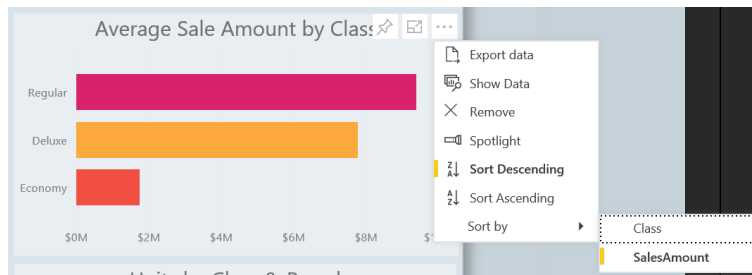
Print reports through Export to PDF (in Power BI Desktop)

This should have been the headline announcement. Microsoft has said that they have "…heard loud and clear…" that an option was required in Power BI Desktop to easily print or email copies of reports out to others in the same company. Believe it or not, Microsoft has been working on a solution to this problem for a while now and this month's update now allows you to export all visible report pages to PDF. You'll find this new option under the 'File' menu.
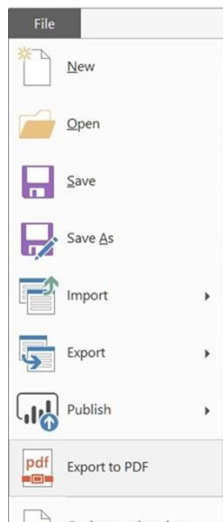
Once you select 'Export to PDF', the software will start generating the PDF. While it's doing this, it will also show you a dialog letting you know progress, and you'll see each non-hidden page loading in order behind it.

During this process, you won't be able to interact with the report. If you need to interact with your report again before we've finished you will need to cancel the export through the dialog.
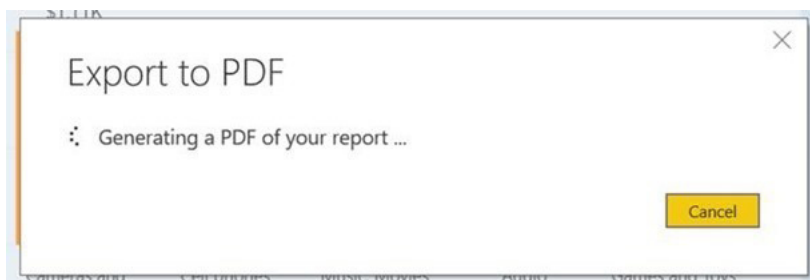
Once the PDF has been created, it will open in your default PDF viewer. From there, you can save it wherever you like, email it as an attachment, or even go old school and print it.
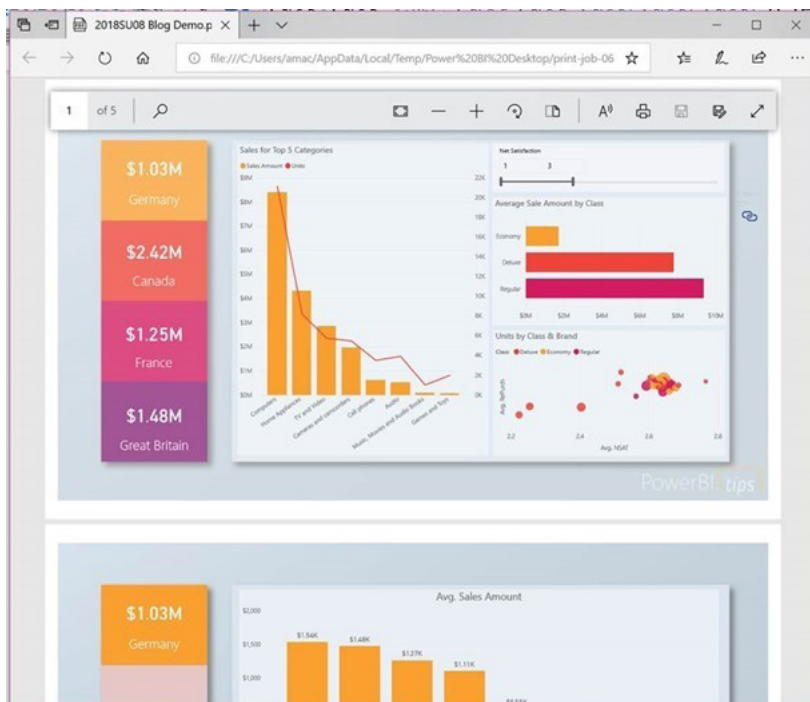
Currently, this update does not support printing wallpaper colour or images, only page backgrounds or images. If you have a dark wallpaper colour and a transparent page colour, you may want to temporarily set the page background to match the wallpaper's colour to improve readability.
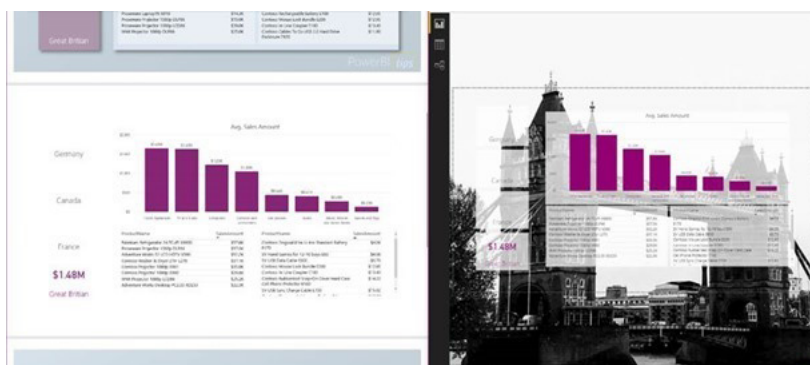
Create bookmark groups

If you are using bookmarks extensively, you will probably have sets of bookmarks for different purposes. For example, you may have different bookmarks per organisational division using your report, or perhaps you have a set of bookmarks for navigation and several sets of bookmarks for different presentations.

In these cases, it's important to clearly separate out each group of bookmarks, and this month, this update makes it easier to do with the introduction of bookmarking grouping. Bookmark grouping lets you collect a set of bookmarks together and give it a name. Each group can be expanded and collapsed for easy viewing.
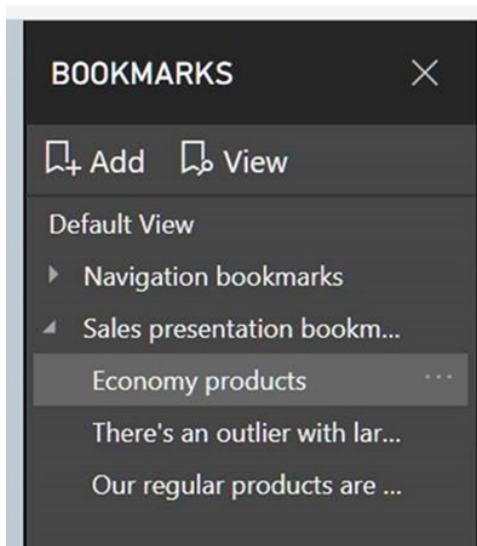
To create a bookmark group, click the first bookmark of the group and then **CTRL + Click** the other bookmarks you want to group with it. Then select the "…" menu for any of the bookmarks to group and pick the group option.
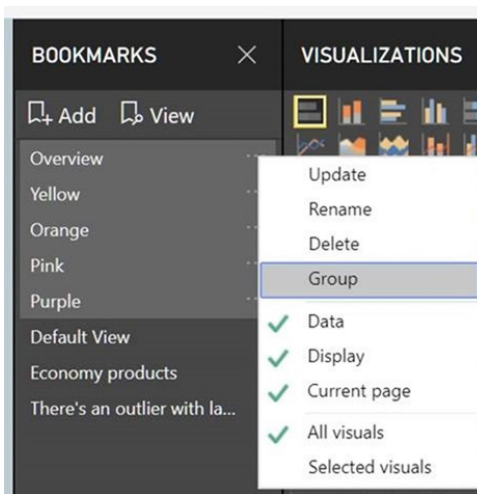
If you decide later you don't want that group anymore, just use 'Ungroup' to stop grouping that set of bookmarks.
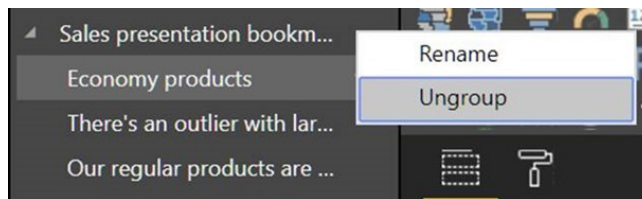
When you use 'View' to play a bookmark group, it will only include the bookmarks in that group.

Playing from a bookmark at the root level, such as 'Default View' in this example, will still play through all bookmarks in your pane.

Slicer restatement

I am beginning to feel this whole newsletter is in repeat mode! The problem is, people only read what is relevant to them so apologies for the duplication. The problem is, people only read what is relevant to them so apologies for the duplication. The problem is, people only read what is relevant to them so apologies for the duplication. The problem is, people only read what is relevant to them so apologies for the duplication… *(Groan! Ed.)*

If you are using the list slicer, you can now add a restatement, similar to the restatement in the dropdown slicer, to the slicer header through an option in the 'Slicer header' card in the 'Formatting' pane.
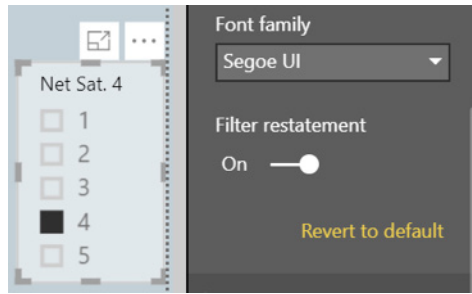
Report page tooltips

This feature lets you design a report page to be used as a custom tooltip for other visuals in your report. This gives you full flexibility to design whatever kind of custom tooltips you want, from using cards to show detailed information to miniature drillthrough pages shown on hover.

To start creating your custom report page tooltips, first you have to design the tooltip you want to show. We recommend you use a smaller page size, so you don't have to worry about the tooltip being too large to show on your normal report pages. Microsoft has added a new page size template called Tooltip to use as a starting point, but you can use any page size you want.
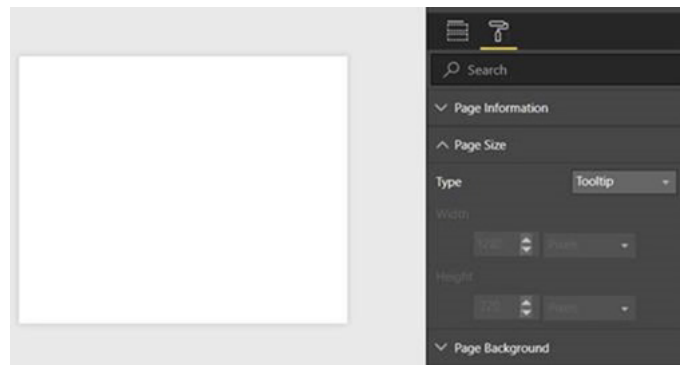
While designing your tooltip, we recommend viewing it in 'Actual' size, so you know exactly what your tooltip will look like on hover.
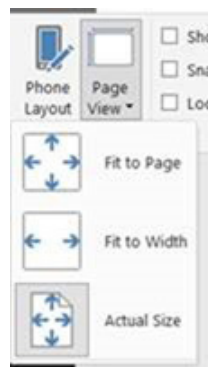
Once you've finished creating your tooltip report page, you'll need to mark the page as a tooltip so Power BI knows you want to use it as such.
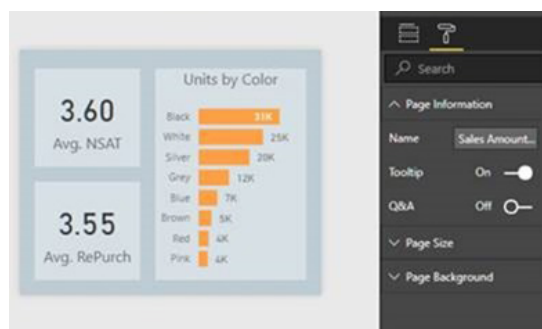
From here, there are two ways you can start using this tooltip in your report. The first is to tie it to a specific field using the 'Tooltip fields' bucket below the 'Filters' pane. This behaves similarly to the drillthrough fields bucket. Any fields you put into the tooltip fields bucket will be tied to this tooltip. If you use this field in charts throughout your report, this tooltip will be used instead of the default Power BI tooltip. You can put both categorical and numerical fields in this bucket, including measures.

For example, if you put **SalesAmount** in the Tooltip fields bucket,
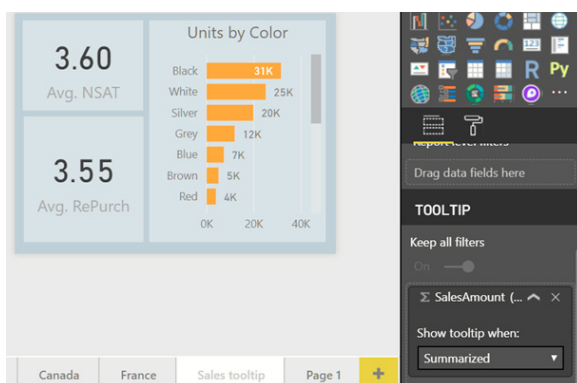
That page will be used as a tooltip in other visuals using the **SalesAmount** field.

The other way you can tie a custom tooltip page to your visuals is to manually set it through the 'Tooltip' card in the 'Formatting' pane. In the card, you can set any page that's marked as a Tooltip page, even if it doesn't have anything in the Tooltip field bucket, to be the tooltip for this visual. This is useful if you want to design a tooltip to be used for a specific visual.
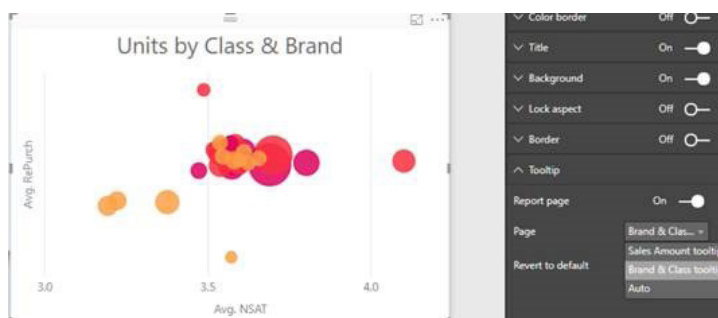
Another use case is to manually override the automatically selected tooltip if Power BI picked the wrong one to use. For example, in the chart above, if you had one tooltip tied to the 'Units' field and one tied to the 'Category' field (the two fields used to create the chart), Power BI would pick one of these tooltips to use automatically. If you didn't like the tooltip selected, you can use this manual override to pick the other one.

If you manually override the tooltip in this card, you can always go back to the 'automatic' selection by selecting 'Auto' in the dropdown list. You can also completely turn the report page tooltips off for a chart by setting the tooltip type dropdown to 'Default'. This will force a chart to use Power BI's default tooltip, even if there are matching report page tooltips in the report.
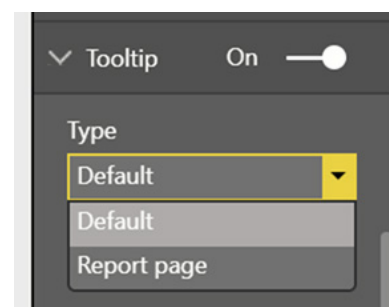
There are a couple of other things to consider when building report page tooltips. Firstly, when using these custom tooltips for line charts, you will only get one tooltip for all lines in the chart, as you do today. The field in the legend does not get passed through as a filter on the tooltip. In the example below, the tooltip is showing all units sold on that day across all three classes: Deluxe, Economy, and Regular:

Secondly, when a chart is being cross-highlighted, the report page tooltips will always show the cross-highlighted data, even if you are hovering over the "faded out" section of the data point. To see the unfiltered data in the tooltip, you will need to clear the highlighting.
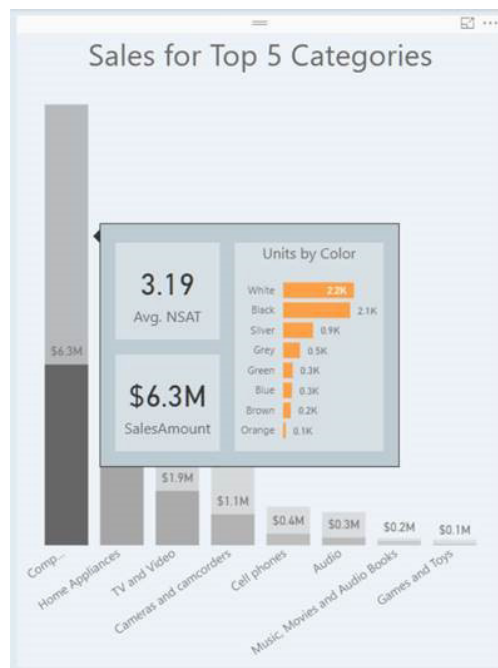
New DAX function: COMBINEVALUES()

This month's update adds a new DAX function **COMBINEVALUES()**, that allows multi part keys to be handled in a more efficient way when using DirectQuery.

Power BI doesn't directly support relationships that use multi-part keys. For example, consider the relationship between **Shipment**, and **OrderLine** *(say)*. If an OrderLine is uniquely identified by a combination of **OrderID** and **LineID**, then the relationship from **Shipment** to **OrderLine** would need to use those pair of columns. The common workaround is to create a calculated column on each table, that combines the values with some separator. For example:

Key = CONCATENATE(CONCATENATE([OrderID],":"),[LineID])

Then the relationship can be defined as normal. The problem with this workaround is when you're using DirectQuery since now cases which require a join between the two tables will send a SQL query that joins on an expression. This often results in indices no longer being used, and therefore a less efficient query.

This new **COMBINEVALUES** takes as arguments a separator (e.g. ":") and one or more expressions. It will concatenate the values of all the expressions, with the given separator. For example, in the case above, the calculated column can now be defined using the expression:

Key = COMBINEVALUES(":",[OrderID],[LineID])

This is still simply a DAX expression, and the calculated columns are still used in the relationship as before. The difference is that this is then optimised, such that upon joining using this relationship, the condition defined in the SQL query decomposes back to use the underlying columns **[OrderID]** and **[LineID]** directly. This generally results a much more efficient SQL query.

As another use case for this new DAX function, you might also want to use this function to join a set of values with a common delimiter without having a set of nested **CONCATENATE()** functions.

Measure drillthrough

In the previous Power BI Report Server release, Microsoft added a drillthrough experience that allows you to move from one page to another carrying specified filters through. You'd set this up by creating your drillthrough page (*i.e.* the page you want to land on) and then adding any categorical fields to the Drillthrough filters bucket in the filter pane as you want.
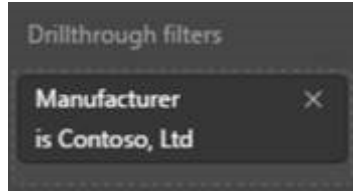
Any fields you put in this bucket would be tied to the page. Any chart in the rest of the report that uses that field could be right-clicked on to move to the drillthrough page.

This is a very powerful feature but was limited that only filters on the fields explicitly placed in the Drillthrough filters bucket would be carried through. There was no way to carry the entire filter context of your data point through the drillthrough page.

Microsoft is closing this gap by allowing you to carry all filters through. When you are setting up your drillthrough page, if you want all filters to pass through and not just the fields placed in the bucket, you can turn the 'Pass all filters' toggle on.
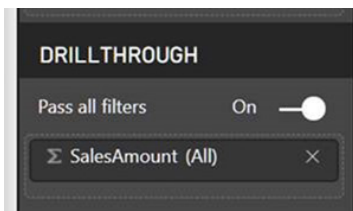
Once the toggle is on, whenever you right click on a data point and drillthrough, all filter context from the source page is passed to the drillthrough page. You'll be able to see a restatement of all these filters in the Drillthrough bucket.
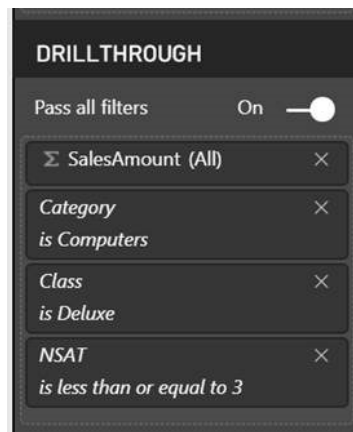
With the toggle turned off, only filters on the columns specified will be carried through.

With this drillthrough update, you can also now use measures and summarised numeric columns in the drillthrough bucket. You can pick if you want to allow drillthrough on numeric columns when used as a category (*e.g.* a chart showing number of reviews by rating) or summarised (*e.g.* a chart showing average rating by category).
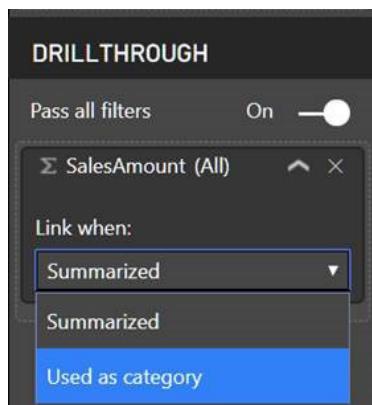
The 'Pass all filters' option is on by default for new drillthrough pages and off by default for existing pages.

Conditional formatting by a different field

There's a major improvement regarding conditional formatting, *i.e.* the ability to formatting a column by a different field in your model.

Now, whenever you open the conditional formatting dialog, you'll see two new dropdowns. The first, 'Based on field', is where you can pick what field from your model to base your rules on, and the second, 'Summarization', is where you'll pick the aggregation type for that field. You'll be able to see what field in your table or matrix is being formatted currently through the title of the dialog.
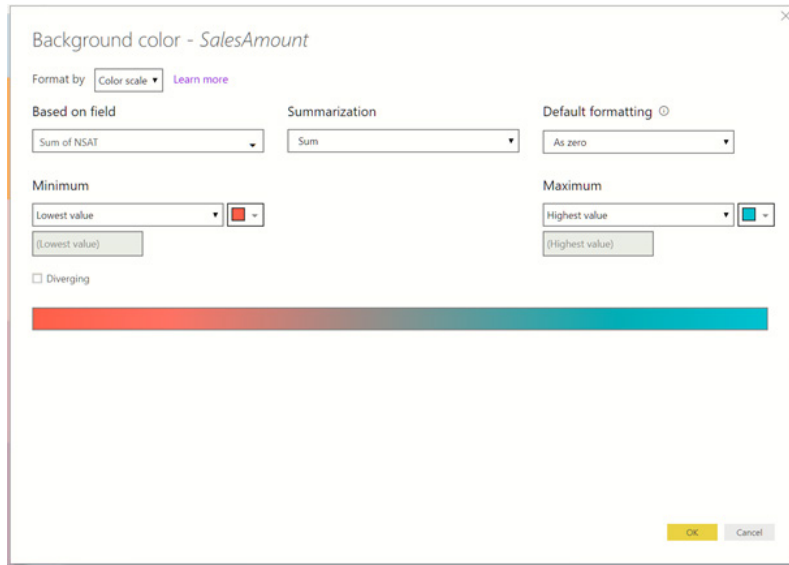
The field and summarisation type to colour by are auto-populated with the same column in your table you've chosen to format, so you won't have to do any extra configurations unless you want to customise it.

When you do customise the field for the colour to be based on, you'll get a similar experience to the field list where you can expand and collapse tables in your model and search to help you find the field you're looking for.
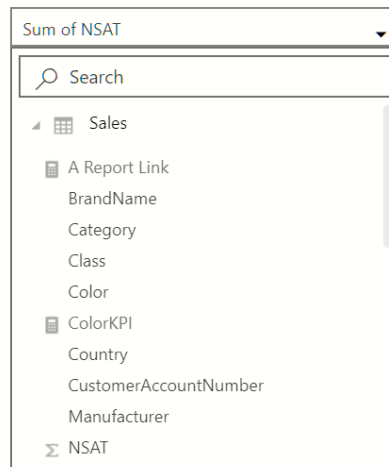
In the below example, we are using showing the total sales by product and colouring that column by the average net satisfaction of the product.
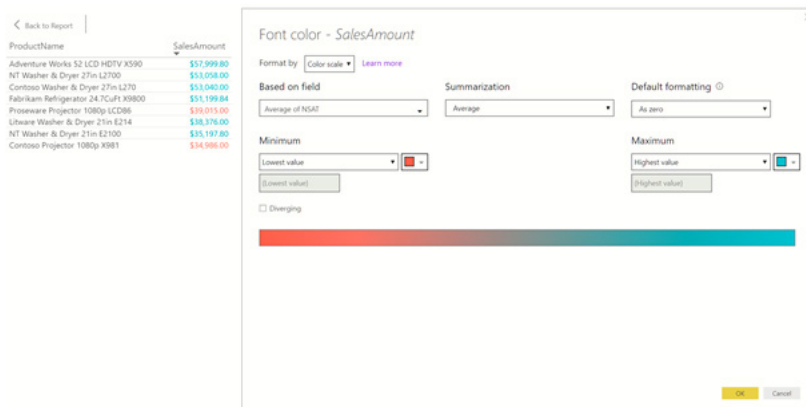
You can also pick a new source of formatting when using the 'Color by' rules version of conditional formatting.

With this update, Power BI is also opening up conditional formatting to text and date fields as well, as long as you choose a numeric value to format on.
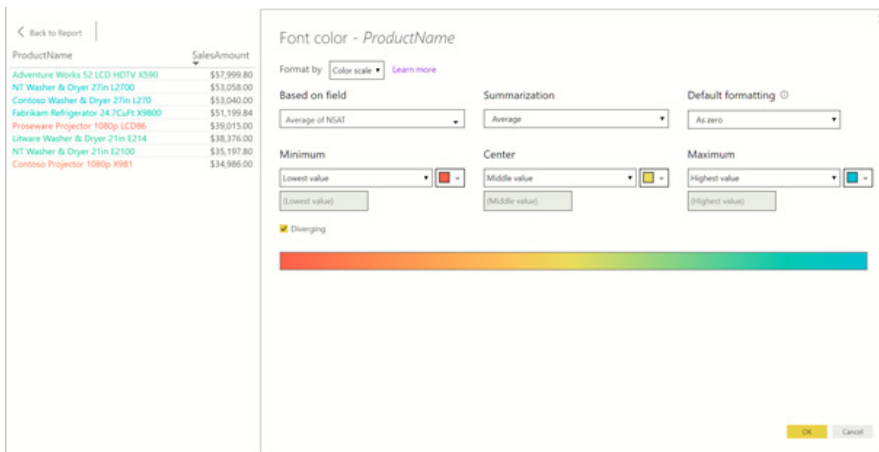
A common use case for this would be to create a measure in your model that does your custom business logic, such as comparing target with actuals and then use 'Color by' rules to format the text based on the result. For example, you could create a measure to return a -1, 0, or 1 if a product is under, at, or above its sales expectations, and then in 'Color by' rules mode chose to format the product name red if the measure returns -1, yellow if it returns 0 and green if it returns 1.

Conditional formatting by values

Another new conditional formatting type this month is 'Format by field value'. This will let you use a measure or column that specifies a colour, either through a hex code or name and applies that colour to the background or font colour.

For example, each product in my model has a colour. Instead of showing the colour name, we'd prefer if the cell were filled with the colour instead.

With this feature all we have to do is pick to format that colour by the colour name. We'll do that by opening the conditional formatting dialog for the **Color** column in the table
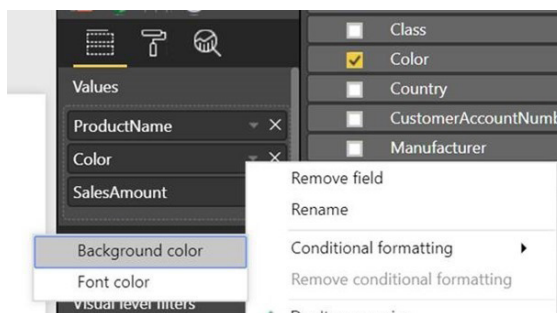
and then in the dialog, pick to format by Field value. The dialog defaults to the 'Color' column with 'First' for 'Summarization'. Since we are always only going to have one colour value per table row, this is exactly what we want.
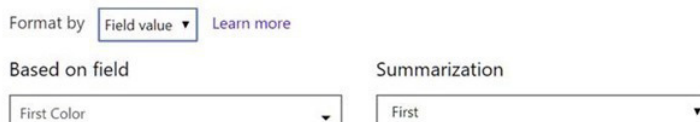
If we repeat this for font colour as well, the whole column will be filled with the product colour, which makes it easier for us to identify with a glance which product colour we are currently looking at.

Another great use case for this is to set up a DAX calculation based on your business logic that outputs different hex codes. You can then format by that calculation without having to worry about creating a set of rules in the conditional formatting dialog. For example, you could use a switch statement to create your KPI…


```
ColorKPI = SWITCH(
              TRUE()
              ,SUM(Sales[SalesAmount]) < 10000, "#b20000"
              ,SUM(Sales[SalesAmount]) < 14000, "#ffc04c"
              ,SUM(Sales[SalesAmount]) < 15000, "#a500ff"
              ,"#198c19"
           )
```

… pick to conditionally format by that measure…

Background color - *SalesAmount*

Format by [Field value ▾]   Learn more

Based on field

[ColorKPI   ▾]

… and see the results in your table or matrix.

Filtering and sorting in data view

Next up is the addition of filtering and sorting in the data view. For every column in your model, you can now see the sort direction if it is applied on that column and either filter individual values out or using advanced filtering options for that column type.
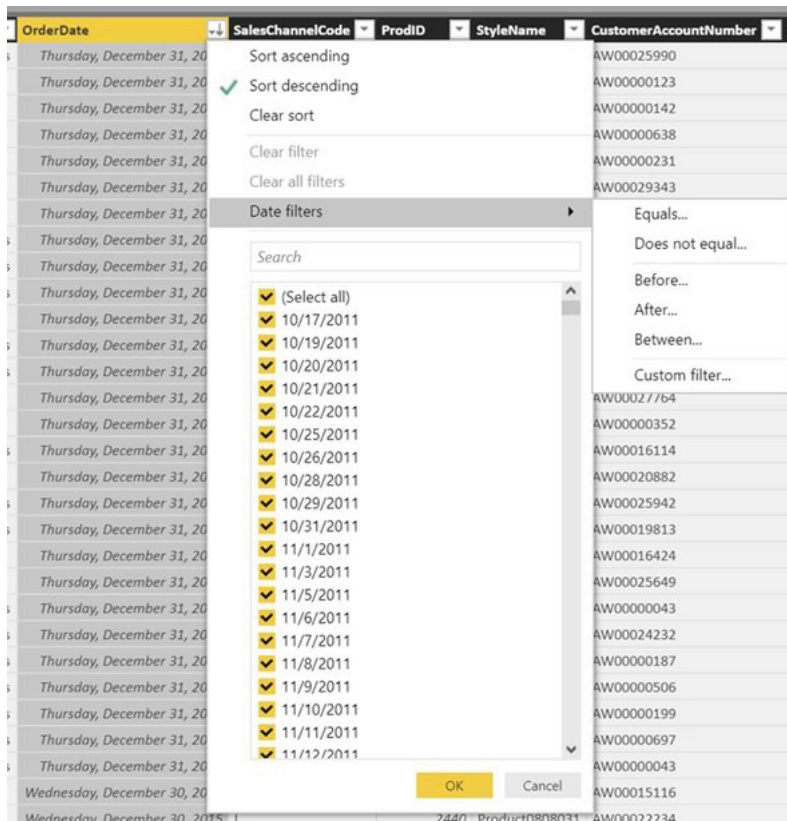
Improved locale formatting

Microsoft is increasing the number of specific locales it supports for formatting when viewing your reports in Power BI Report Server. With this update, they have added support for a total of 670 locales! For example, you'll now see support for Mexico's variant of Spanish along with many other Spanish variants. In Desktop, we detect and use the 'date, time and number formatting' format set for the operating system. Internet Explorer and Edge will pass this same OS locale through, but other browsers often have their own, separate, language and region settings.

Make sure to use the default data format for your field if you want the system locale settings to flow through. You can tell you are using system locale formatting by the * next to the format.
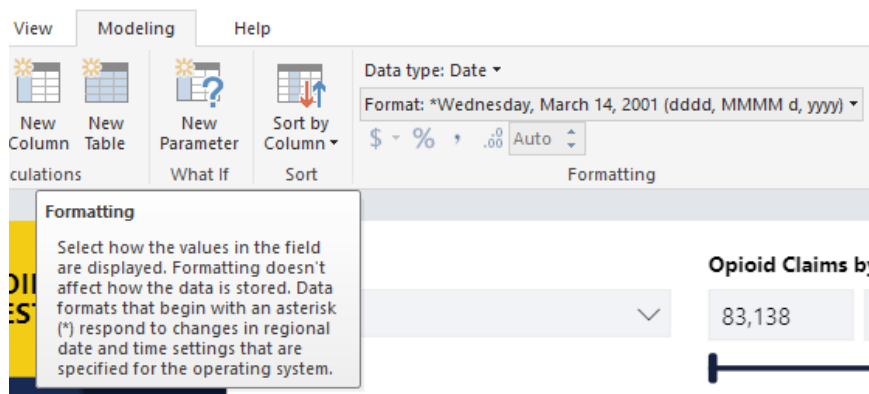
Data categories for measures

You can now pick data categories for measures. This means you can do things like use measures to dynamically create URLs and mark the data category as a Web URL. Then when you display it in tables, you'll be able to click on the URL that's created based on your selection!
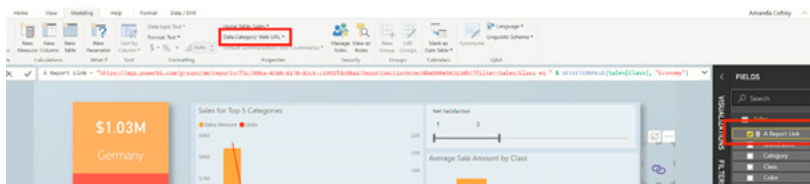
Another great use case for this feature is to create DAX measures to create interesting insights such as sparklines using SVG images.

Statistical DAX functions

Several new functions have been coded that expand the statistical capabilities of DAX. They sort of flew under the radar in July's update, but Microsoft has "announced" the following in this update:

- **NORM.DIST**
- **NORM.S.DIST**
- **NORM.INV**
- **NORM.S.INV**
- **T.DIST**
- **T.DIST.RT**
- **T.DIST.2**
- **T.INV**
- **T.INV.2T.**

These match the behaviours of their Excel counterparts, so it should be easy to migrate to if you're used to doing these types of statistical operations in Excel.

Phew! Congratulations on making the end of that section. Don't ask me how long that took Microsoft and then me to put together!!

The A to Z of Excel Functions: COUPDAYBS

We're planning a coup this month with lots of **COUP** functions!

Bonds that pay interest prior to maturity are known as **coupon bonds**. When you purchase such a bond, you should know how far into a coupon period you are buying the bond, so you can tell how long you'll have to wait to receive your first interest payment. You can calculate the number of days between the coupon beginning and settlement date using the **coup**on **day**s between **b**eginning **s**ettlement function, which is abbreviated to **COUPDAYBS**. This function returns the number of days from the beginning of a coupon period until its settlement date.

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

COUPDAYBS(settlement, maturity, frequency, [basis])

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

- **settlement:** this represents the security's settlement date. The security settlement date is the date after the issue date when the security is traded to the buyer

- **maturity:** this is the security's maturity date, *i.e.* when the security expires
- **frequency:** The number of coupon payments per year. For annual payments, frequency is 1; for semiannual, **frequency** is 2; for quarterly, **frequency** is 4. These are the only options *(see below)*
- **basis:** the type of day count basis to use. This is optional. There are five options:

Basis	Day count basis
0 or omitted	US (NASD) 30 / 360
1	Actual / actual
2	Actual / 360
3	Actual / 365
4	European 30 / 360

It should be further noted that:

- Microsoft Excel stores dates as sequential serial numbers so they can be used in calculations. By default, January 1, 1900 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900
- dates should be entered using the **DATE** function, or as results of other formulae or functions. For example, use **=DATE(2020,2,29)** for the 29th of February, 2020. Problems may occur if dates are entered as text
- the settlement date is the date a buyer purchases a coupon, such as a bond. The maturity date is the date when a coupon expires. For example, suppose a 30-year bond is issued on January 1, 2008, and is purchased by a buyer six months later. The issue date would be January 1, 2008, the settlement date would be July 1, 2008, and the maturity date would be January 1, 2038, 30 years after the January 1, 2008, issue date
- all arguments are truncated to integers
- if **settlement** or **maturity** is not a valid date, **COUPDAYBS** returns the *#VALUE!* error value
- if **frequency** is any number other than 1, 2, or 4, **COUPDAYBS** returns the *#NUM!* error value
- if **basis** < 0 or if **basis** > 4, **COUPDAYBS** returns the *#NUM!* error value
- if **settlement** ≥ **maturity**, **COUPDAYBS** returns the *#NUM!* error value.

Please see our example below:

	A	B	C
1	Data	Description	
2	25/01/2020	Settlement date	
3	15-Nov-20	Maturity date	
4	2	Semi-annual coupon	
5	1	Actual / actual basis	
6			
7			
8	Formula	Description	Result
9	=COUPDAYBS(A2,A3,A4,A5)	The number of days from the beginning of the coupon period to the settlement date, for a bond with the above terms	71
10			

The A to Z of Excel Functions: COUPDAYS

When you invest in a coupon bond, that is a bond that pays interest before maturity, you can evaluate your investment more accurately if you know the number of days in the coupon period. To find that value you can use the **COUPDAYS** function, which is short for **coup**on **days**.

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

COUPDAYS(settlement, maturity, frequency, [basis])

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

- **settlement:** this represents the security's settlement date. The security settlement date is the date after the issue date when the security is traded to the buyer

- **maturity**: this is the security's maturity date, *i.e.* when the security expires
- **frequency**: The number of coupon payments per year. For annual payments, **frequency** is 1; for semiannual, **frequency** is 2; for quarterly, **frequency** is 4. These are the only options *(see below)*
- **basis**: the type of day count basis to use. This is optional. There are five options:

Basis	Day count basis
0 or omitted	US (NASD) 30 / 360
1	Actual / actual
2	Actual / 360
3	Actual / 365
4	European 30 / 360

It should be further noted that:

- Microsoft Excel stores dates as sequential serial numbers so they can be used in calculations. By default, January 1, 1900 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900
- dates should be entered using the **DATE** function, or as results of other formulae or functions. For example, use **=DATE(2020,2,29)** for the 29th of February, 2020. Problems may occur if dates are entered as text
- the settlement date is the date a buyer purchases a coupon, such as a bond. The maturity date is the date when a coupon expires. For example, suppose a 30-year bond is issued on January 1, 2008, and is purchased by a buyer six months later. The issue date would be January 1, 2008, the settlement date would be July 1, 2008, and the maturity date would be January 1, 2038, 30 years after the January 1, 2008, issue date
- all arguments are truncated to integers
- if **settlement** or **maturity** is not a valid date, **COUPDAYS** returns the *#VALUE!* error value
- if **frequency** is any number other than 1, 2, or 4, **COUPDAYS** returns the *#NUM!* error value
- if **basis** < 0 or if **basis** > 4, **COUPDAYS** returns the *#NUM!* error value
- if **settlement** ≥ **maturity**, **COUPDAYS** returns the *#NUM!* error value.

Please see our example below:

▲	A	B	C
1	Data	Description	
2	25/01/2020	Settlement date	
3	15-Nov-20	Maturity date	
4	2	Semi-annual coupon	
5	1	Actual / actual basis	
6			
7			
8	Formula	Description	Result
9	=COUPDAYS(A2,A3,A4,A5)	The number of days in the coupon period that contains the settlement date, for a bond with the above terms	182
10			

The A to Z of Excel Functions: COUPDAYSNC

Coupon bonds pay interest at regular intervals, either one, two or four times a year. In Excel, you can use the **COUPDAYSNC** function to calculate the number of **coup**on **day**s from the settlement date to the **n**ext **c**oupon date.

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

- **settlement**: this represents the security's settlement date. The security settlement date is the date <u>after</u> the issue date when the security is traded to the buyer
- **maturity**: this is the security's maturity date, *i.e.* when the security expires
- **frequency**: The number of coupon payments per year. For annual payments, **frequency** is 1; for semiannual, **frequency** is 2; for quarterly, **frequency** is 4. These are the only options *(see below)*

- **basis**: the type of day count basis to use. This is optional. There are five options:

Basis	Day count basis
0 or omitted	US (NASD) 30 / 360
1	Actual / actual
2	Actual / 360
3	Actual / 365
4	European 30 / 360

It should be further noted that:

- Microsoft Excel stores dates as sequential serial numbers so they can be used in calculations. By default, January 1, 1900 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900
- dates should be entered using the **DATE** function, or as results of other formulae or functions. For example, use **=DATE(2020,2,29)** for the 29th of February, 2020. Problems may occur if dates are entered as text
- the settlement date is the date a buyer purchases a coupon, such as a bond. The maturity date is the date when a coupon expires. For example, suppose a 30-year bond is issued on January 1, 2008, and is purchased by a buyer six months later. The issue date would be January 1, 2008, the settlement date would be July 1, 2008, and the maturity date would be January 1, 2038, 30 years after the January 1, 2008, issue date
- all arguments are truncated to integers
- if **settlement** or **maturity** is not a valid date, **COUPDAYSNC** returns the *#VALUE!* error value
- if **frequency** is any number other than 1, 2, or 4, **COUPDAYSNC** returns the *#NUM!* error value
- if **basis** < 0 or if **basis** > 4, **COUPDAYSNC** returns the *#NUM!* error value
- if **settlement** ≥ **maturity**, **COUPDAYSNC** returns the *#NUM!* error value.

Please see yet another example below:

	A	B	C
1	**Data**	**Description**	
2	25/01/2020	Settlement date	
3	15-Nov-20	Maturity date	
4	2	Semi-annual coupon	
5	1	Actual / actual basis	
6			
7			
8	**Formula**	**Description**	**Result**
9	=COUPDAYSNC(A2,A3,A4,A5)	The number of days from the settlement date to the next coupon date, for a bond with the above terms	111
10			

The A to Z of Excel Functions: COUPNCD

Coupon bonds are bonds that pay interest prior to maturity and those interest payments are paid on a regular schedule which can occur either one, two or four times a year. After you take possession of the bond, you can calculate the calendar date of your next coupon date using the **COUPNCD** function.

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

COUPNCD(settlement, maturity, frequency, [basis])

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

- **settlement**: this represents the security's settlement date. The security settlement date is the date <u>after</u> the issue date when the security is traded to the buyer
- **maturity**: this is the security's maturity date, *i.e.* when the security expires

- **frequency**: The number of coupon payments per year. For annual payments, **frequency** is 1; for semiannual, **frequency** is 2; for quarterly, **frequency** is 4. These are the only options *(see below)*
- **basis**: the type of day count basis to use. This is optional. There are five options:

Basis	Day count basis
0 or omitted	US (NASD) 30 / 360
1	Actual / actual
2	Actual / 360
3	Actual / 365
4	European 30 / 360

It should be further noted that:

- Microsoft Excel stores dates as sequential serial numbers so they can be used in calculations. By default, January 1, 1900 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900
- dates should be entered using the **DATE** function, or as results of other formulae or functions. For example, use **=DATE(2020,2,29)** for the 29th of February, 2020. Problems may occur if dates are entered as text
- the settlement date is the date a buyer purchases a coupon, such as a bond. The maturity date is the date when a coupon expires. For example, suppose a 30-year bond is issued on January 1, 2008, and is purchased by a buyer six months later. The issue date would be January 1, 2008, the settlement date would be July 1, 2008, and the maturity date would be January 1, 2038, 30 years after the January 1, 2008, issue date
- all arguments are truncated to integers
- if **settlement** or **maturity** is not a valid date, **COUPNCD** returns the *#VALUE!* error value
- if **frequency** is any number other than 1, 2, or 4, **COUPNCD** returns the *#NUM!* error value
- if **basis** < 0 or if **basis** > 4, **COUPNCD** returns the *#NUM!* error value
- if **settlement** ≥ **maturity**, **COUPNCD** returns the *#NUM!* error value.

Please see my example below:

	A	B	C
1	Data	Description	
2	25/01/2020	Settlement date	
3	15-Nov-20	Maturity date	
4	2	Semi-annual coupon	
5	1	Actual / actual basis	
6			
7			
8	Formula	Description	Result
9	=COUPNCD(A2,A3,A4,A5)	The next coupon date after the settlement date, for a bond with the above terms	15 May 20
10			

The A to Z of Excel Functions: COUPNUM

A coupon bond is a bond that pays interest before maturity. Once you own the bond, you can calculate the **num**ber of **coup**on payments you will receive over the life of the bond by using the **COUPNUM** function. Essentially, this function returns the number of coupons payable between the settlement date and maturity date, rounded up to the nearest whole coupon.

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

COUPNUM(settlement, maturity, frequency, [basis])

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

- **settlement**: this represents the security's settlement date. The security settlement date is the date after the issue date when the security is traded to the buyer
- **maturity**: this is the security's maturity date, *i.e.* when the security expires

- **frequency**: The number of coupon payments per year. For annual payments, **frequency** is 1; for semiannual, **frequency** is 2; for quarterly, **frequency** is 4. These are the only options *(see below)*
- **basis**: the type of day count basis to use. This is optional. There are five options:

Basis	Day count basis
0 or omitted	US (NASD) 30 / 360
1	Actual / actual
2	Actual / 360
3	Actual / 365
4	European 30 / 360

It should be further noted that:

- Microsoft Excel stores dates as sequential serial numbers so they can be used in calculations. By default, January 1, 1900 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900
- dates should be entered using the **DATE** function, or as results of other formulae or functions. For example, use **=DATE(2020,2,29)** for the 29th of February, 2020. Problems may occur if dates are entered as text
- the settlement date is the date a buyer purchases a coupon, such as a bond. The maturity date is the date when a coupon expires. For example, suppose a 30-year bond is issued on January 1, 2008, and is purchased by a buyer six months later. The issue date would be January 1, 2008, the settlement date would be July 1, 2008, and the maturity date would be January 1, 2038, 30 years after the January 1, 2008, issue date
- all arguments are truncated to integers
- if **settlement** or **maturity** is not a valid date, **COUPNUM** returns the *#VALUE!* error value
- if **frequency** is any number other than 1, 2, or 4, **COUPNUM** returns the *#NUM!* error value
- if **basis** < 0 or if **basis** > 4, **COUPNUM** returns the *#NUM!* error value
- if **settlement** ≥ **maturity**, **COUPNUM** returns the *#NUM!* error value.

An example:

	A	B	C
1	Data	Description	
2	25/01/2020	Settlement date	
3	15-Nov-21	Maturity date	
4	2	Semi-annual coupon	
5	1	Actual / actual basis	
6			
7			
8	Formula	Description	Result
9	=COUPNUM(A2,A3,A4,A5)	The next coupon date after the settlement date, for a bond with the above terms	4
10			

The A to Z of Excel Functions: COUPPCD

A coupon bond is a bond that pays interest before the bond matures. That interest is paid on a regular schedule and in Excel that can be either annually (once a year), semiannually (twice a year), or quarterly (four times a year). If you're thinking about investing in a coupon bond before its initiation date, *i.e.* the first day that the bond is available, then you can calculate the calendar date of the most recent coupon payment by using the **COUPPCD** function. This function returns a number that represents the **p**revious **c**oupon **d**ate before the settlement date.

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

COUPPCD(settlement, maturity, frequency, [basis])

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

- **settlement**: this represents the security's settlement date. The security settlement date is the date <u>after</u> the issue date when the security is traded to the buyer
- **maturity**: this is the security's maturity date, *i.e.* when the security expires

- **frequency**: The number of coupon payments per year. For annual payments, **frequency** is 1; for semiannual, **frequency** is 2; for quarterly, **frequency** is 4. These are the only options *(see below)*
- **basis**: the type of day count basis to use. This is optional. There are five options:

Basis	Day count basis
0 or omitted	US (NASD) 30 / 360
1	Actual / actual
2	Actual / 360
3	Actual / 365
4	European 30 / 360

It should be further noted that:

- Microsoft Excel stores dates as sequential serial numbers so they can be used in calculations. By default, January 1, 1900 is serial number 1, and January 1, 2008 is serial number 39448 because it is 39,448 days after January 1, 1900
- dates should be entered using the **DATE** function, or as results of other formulae or functions. For example, use **=DATE(2020,2,29)** for the 29th of February, 2020. Problems may occur if dates are entered as text
- the settlement date is the date a buyer purchases a coupon, such as a bond. The maturity date is the date when a coupon expires. For example, suppose a 30-year bond is issued on January 1, 2008, and is purchased by a buyer six months later. The issue date would be January 1, 2008, the settlement date would be July 1, 2008, and the maturity date would be January 1, 2038, 30 years after the January 1, 2008, issue date
- all arguments are truncated to integers
- if **settlement** or **maturity** is not a valid date, **COUPPCD** returns the *#VALUE!* error value
- if **frequency** is any number other than 1, 2, or 4, **COUPPCD** returns the *#NUM!* error value
- if **basis** < 0 or if **basis** > 4, **COUPPCD** returns the *#NUM!* error value
- if **settlement** ≥ **maturity**, **COUPPCD** returns the *#NUM!* error value.

Please see our final example below:

	A	B	C
1	**Data**	**Description**	
2	25/01/2020	Settlement date	
3	15-Nov-21	Maturity date	
4	2	Semi-annual coupon	
5	1	Actual / actual basis	
6			
7			
8	**Formula**	**Description**	**Result**
9	=COUPPCD(A2,A3,A4,A5)	The previous coupon date before the settlement date, for a bond with the above terms	**15 Nov 19**
10			

Key Strokes

Each newsletter, we'd like to introduce you to useful keystrokes you may or may not be aware of. This month, it's time to combine **CONTROL** with **SHIFT**:

Keystroke	What it does
CTRL + SHIFT + F3	Create names
CTRL + SHIFT + F4	Find previous (from most recent search)
CTRL + SHIFT + F6	Previous Window / Workbook
CTRL + SHIFT + F12	Print
CTRL + SHIFT + Down Arrow	Extend selection down to last cell in area down
CTRL + SHIFT + End	Extends the selection to the last cell (by final row and final column) in the sheet
CTRL + SHIFT + ENTER	Fill value in edited cell into all cells and do not move
CTRL + SHIFT + ESC	Task Manager (for Windows: overrides an Excel command)
CTRL + SHIFT + Execute	Fill value in edited cell into all cells and do not move
CTRL + SHIFT + Left Arrow	Extend selection down to last cell in area left
CTRL + SHIFT + Page Down	Extend selection one sheet down (to the right)
CTRL + SHIFT + Page Up	Extend selection one sheet up (to the left)
CTRL + SHIFT + Return	Fill value in edited cell into all cells and do not move
CTRL + SHIFT + Right Arrow	Extend selection down to last cell in area right
CTRL + SHIFT + Space	Select contiguous area
CTRL + SHIFT + TAB	Previous Window
CTRL + SHIFT + Up Arrow	Extend selection up to the end of the region
CTRL + SHIFT + A	Insert arguments in formula
CTRL + SHIFT + B	Address book (only when emailing not as an attachment)
CTRL + SHIFT + F	Font face
CTRL + SHIFT + L	Toggle AutoFilter
CTRL + SHIFT + O	Select Comments
CTRL + SHIFT + P	Font size
CTRL + SHIFT + T	Toggle Total Row

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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