

Sum Product

NEWSLETTER #88 - March 2020

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As we March on

the newsletter continues its usual mix of Excel, Power BI, financial modelling tips and an unhealthy sense of humour. This month we look at the difference between formatting and modifying numbers, seek questions for the Excel MVP Summit and detail Microsoft's Excel survey.

But then there's the usual stuff too: VBA Basics, Power Pivot Principles, Power Query Pointers, the Power BI updates are back (!), and of course, the *A-Z of Excel Functions* are here for the **DURATION...**

Until next month.

Liam Bastick, Managing Director, SumProduct



Inappropriate Tweaking

Often when building even the simplest financial model, unit conversion becomes necessary. For example, your business may sell 437,911 widgets at a unit price of \$12.50 each. However, in your output summary sheet for senior management, do you really wish to show that the revenue earned is \$5,473,888 or is it more likely that you will display this figure as \$5.5m?

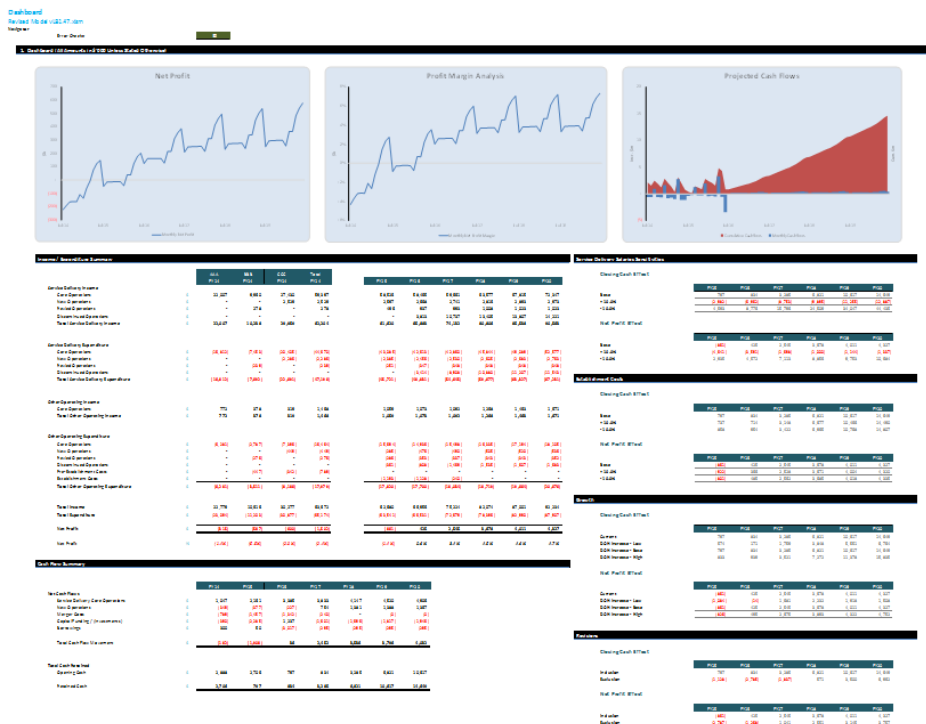
Sound familiar? If the latter idea strikes accord, you may be in danger of making a mistake in your additions. As model auditors with over 30 years' experience, we note that over 95% of all modellers will modify their number with a calculation such as

$$=437911*12.50/1000000.$$

Yes, cell references may be used instead and the million factor may be a range name, but in essence the value is derived by dividing the product of volume and unit sales price by one million.

It's just so much easier to read and basically so much more *dangerous*.

Let me explain: output sheets are usually dashboards of various key factors that management requires in order to make informed decisions, e.g.



The problem is, all sorts of different figures may appear on such an output. For example, key outputs could include:

- Unit prices (in \$'s)
- Overall profitability (in \$m)
- Internal Rate of Return (%)
- Payback date (date)
- Asset turnover (multiple)
- Other outputs (MWh, GBytes, KHz).

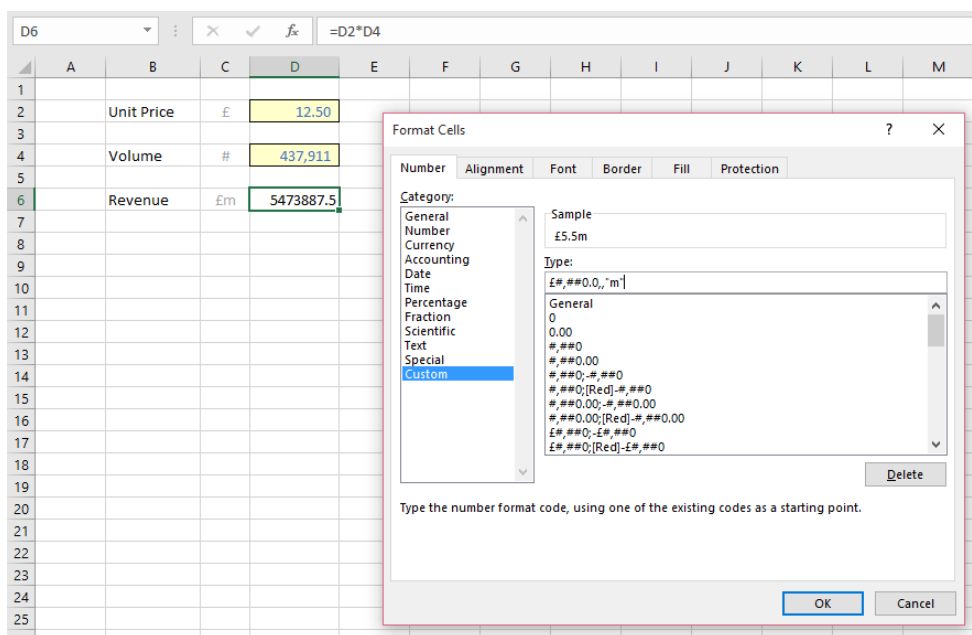
I hope that modellers are not adding percentages to KHz (not much I can do about that), but it is common for modellers to confuse financial data, e.g.

$$= \$5.5m - \$3.76k = \$1.74??$$

Not only have I no idea of units, the answer should be \$5,470,128. If you don't think you have ever made that mistake, are you sure you had the units right for your accounting ratio or debt credit metric? It can be a scary thought.

This issue is easily overcome. We need to remember from our example that \$5.5m is actually \$5,473,888 and we should make the number *appear* to be \$5.5m (by formatting) rather than *actually* be 5.5 (by modifying).

To do this we use number formatting (**CTRL + 1**) on the calculation:



In the above illustration, the unit price has simply been multiplied by the volume. Then, the resulting product has been custom number formatted as displayed in the dialog box:

£#,##0.0,,"m"

This may not be immediately obvious, even allowing for my fickle change of currency symbol! Time for a crash course in hieroglyphics:

- **£** is the currency symbol. Excel recognises various symbols, including the euro, the dollar and the yen
- **#** means put a number *if necessary*
- **0** means put a number whether it's necessary or not, e.g. the number format "000" used on the number 7 would provide you with a Licence To Kill: 007
- **,** (comma) is the thousands separator and serves two purposes. It puts a comma in at the thousand / million / billion mark when the syntax "#,###" or "0,000" etc. is used, but it also divides by a thousand each time it is entered after the number formatting so "0," will be in thousands, "##," will be in millions and so on
- **.** (decimal point / period) is the decimal point
- **"m"** – whatever is inserted inside inverted commas is added as text to the number format.

Therefore, **£#,##0.0,,"m"** will display numbers in £m to one decimal place (*i.e.* to the nearest hundred thousand) but the underlying number will still be 5,473,888 and hence avoid a common mistake in financial modelling.

Now before everyone writes in and comes up with 34,380 (*should that be 34.4k?*) reasons why a calculation should be divided by a conversion factor rather than just given the appearance it has been, I do recognise sometimes this needs to be done. My point is, often it does not and using a divisor is fraught with risks – so why not avoid the issue?

Excel Survey

How you Use Excel

This survey helps Microsoft understand how you use Excel and will guide us with improvements.
Expected time = 5 minutes

Microsoft is presently looking for users who are - or continue - learning new things in Excel to complete a short (five minute) survey. The Excel team is looking to continue to improve the "Excel experience". Whether you are a novice, intermediate, advanced or MVP user, they want to hear from you. If you are interested, please fill out the survey at aka.ms/Using-Excel-Survey.

Visual Basics

We thought we'd run an elementary series going through the rudiments of Visual Basic for Applications (VBA) as a springboard for newer users. This month, we consider the Status Bar in Excel.

Last month, we talked about putting a message box into your VBA code. This newsletter, we're going to look at another useful way of giving information back: the Status Bar.

The Status Bar is the little bit at the bottom of the Excel screen. By default, it often tells you useful information such as when you need to manually calculate your spreadsheet. However, we can take control of it using VBA to deliver a customised message to users.

To change this, we have to use the **Application.StatusBar** property. This is because the Status Bar is something that is application-wide (i.e. it's not linked to just your spreadsheet or worksheet), and the **StatusBar** is the name of the object associated with it.

To take control, we can write a macro that looks like this:

```
Sub Control_Status()  
  
Application.StatusBar = "I have the power!"  
  
End Sub
```

Then, to release it, we can write an even simpler macro:

```
Sub Release_Status()  
  
Application.StatusBar = False  
  
End Sub
```

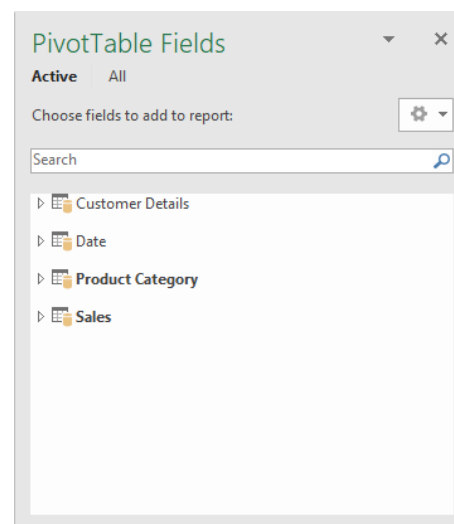
That's it – to give Excel control back, you use the same code, but simply type in "False" instead of the text that you would normally use. Next month, we will cover how to use the Status Bar to provide updates while the macro is running, without needing to wait for user input to keep things running behind the scenes. Stay tuned!

Power Pivot Principles

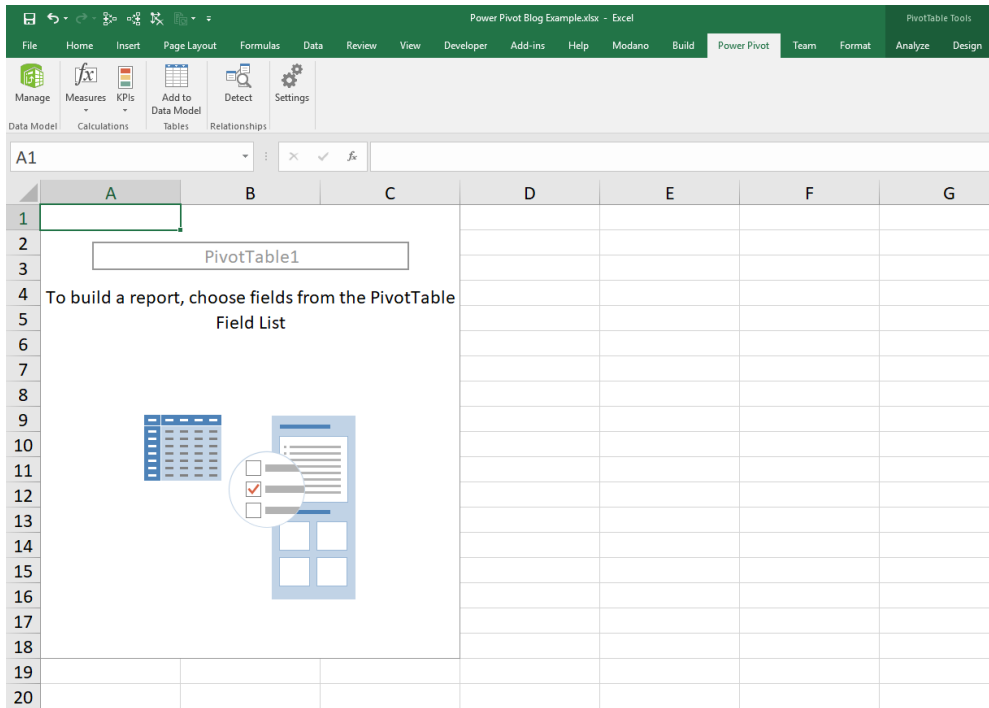
We continue our series on the Excel COM add-in, Power Pivot. This month, we discuss some pointers to consider when creating PivotTables from Power Pivot.

After importing data into Power Pivot, we may wish to create a PivotTable. There are a few things to note when creating a PivotTable from Power Pivot:

- The fields list contains fields from **all** of the tables from the Power Pivot model
- There is an included 'Search' bar, to help us find the specific field we are after:



- Note that the PivotTable is created on an ordinary Excel sheet. Power Pivot does not render any reports or visualisations: this is done elsewhere such as in a PivotChart, Excel or Power BI.



Other than that, we can just create a PivotTable like we normally would in Excel.

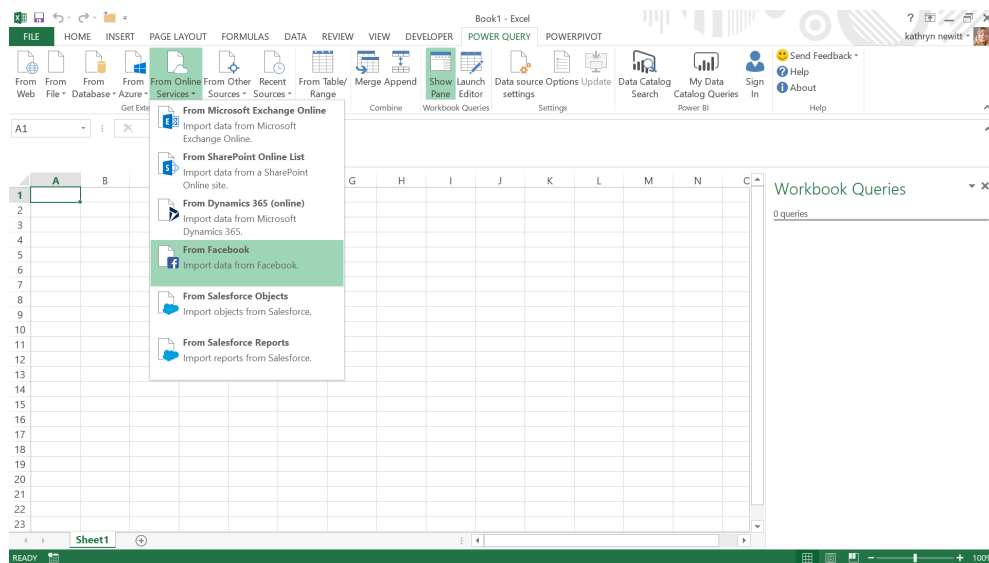
More *Power Pivot Principles* next month.

Power Query Pointers

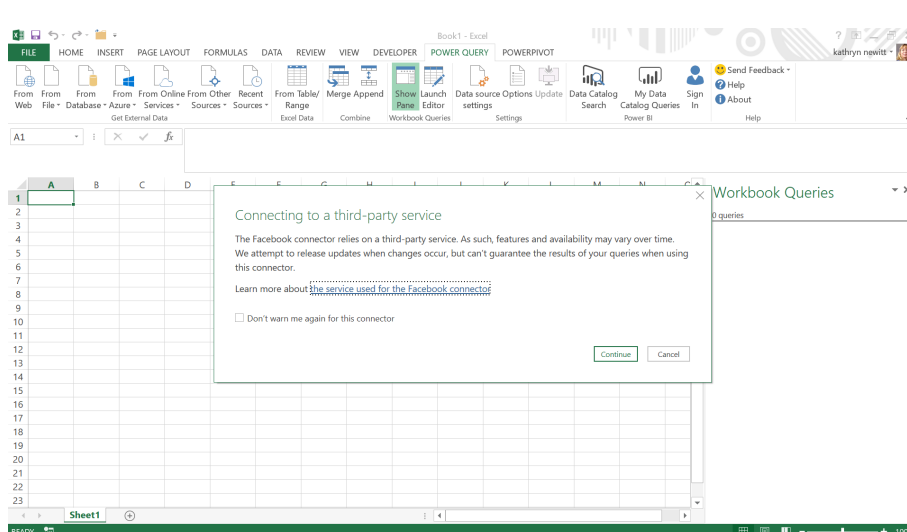
Each month we'll reproduce one of our articles on Power Query (Excel 2010 and 2013) / Get & Transform (Office 365, Excel 2016 and 2019) from www.sumproduct.com/blog. If you wish to read more in the meantime, simply check out our Blog section each Wednesday. This month, we look at importing data from one of the available online services you might have heard of, Facebook.

Whilst much of the data we deal with comes from workbooks and databases, it can be useful to pull in data from other sources. There are a number of sites traditionally associated with business, but social media

sites like Facebook are becoming more accepted business channels due to their high usage and range of users. The screen below shows the online services which can be accessed from Power Query (2013):

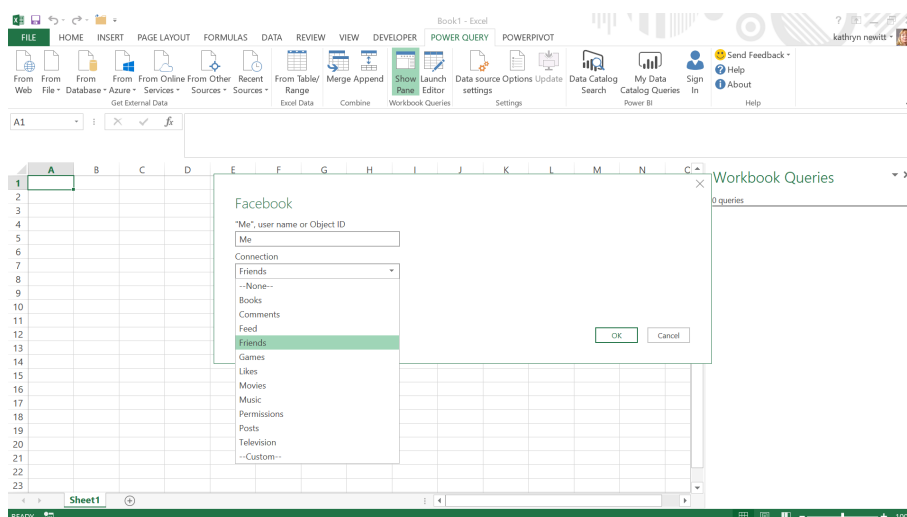


The first thing to notice when you choose to connect to Facebook, is that a warning screen appears. Whilst it is always good practice to be wary of internet sites that may not be kept up to date or maintained efficiently, this is not the only concern. Since Facebook is a separate company, the connector is effectively beyond the control of Microsoft and we need to acknowledge this before we may continue.



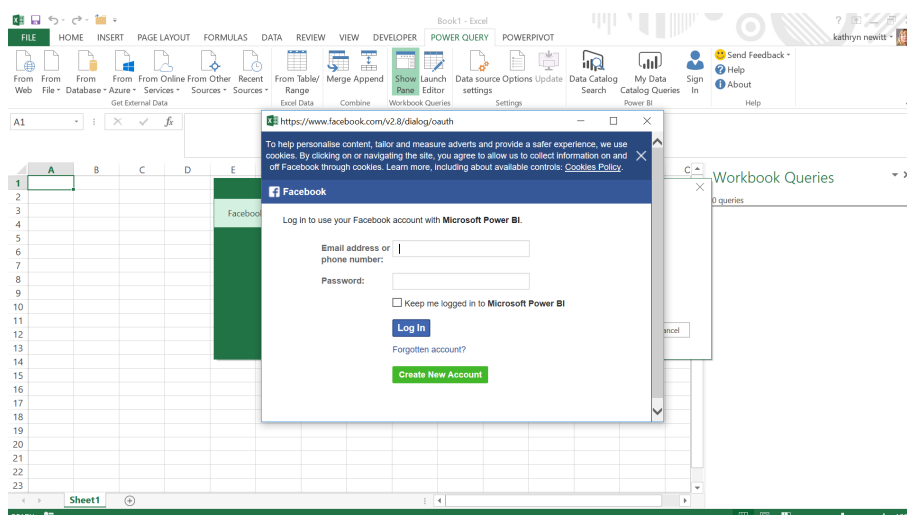
The option to 'Learn more about the service...' simply takes us to the Microsoft help pages, where we may use the search facility to get a basic overview about connecting to Facebook.

Let's choose to 'Continue'.

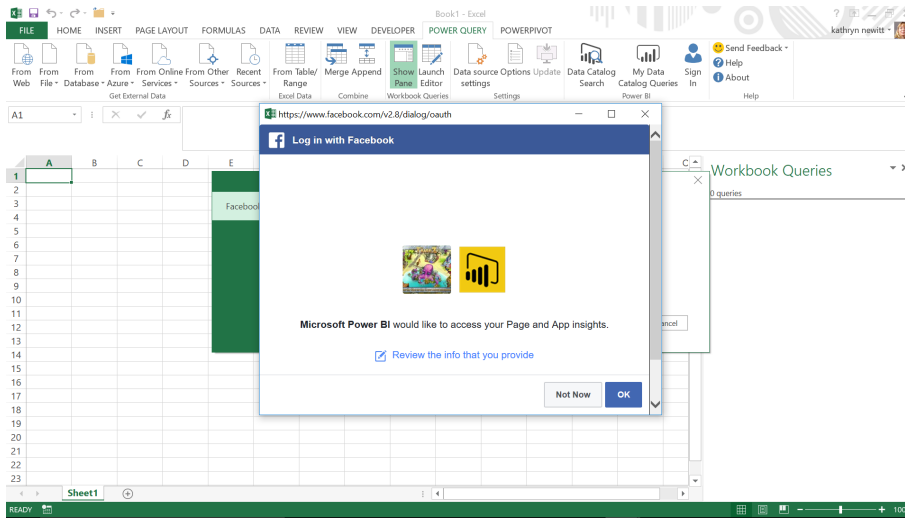


The options that are already set up are shown in the screen above. Also, we have the option of setting up a 'Custom' connection if we are aware of the name of a list on the Facebook profile which does not already appear on the dropdown. A note of caution though: since the connector is not controlled by Microsoft, these options may not always pull back

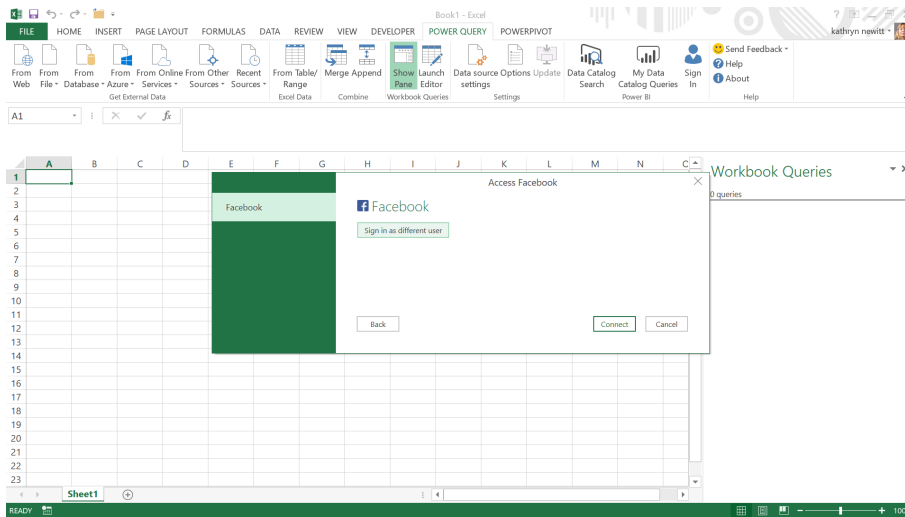
data – but it is an interesting experiment. Let's choose 'Permissions', since friends would probably not appreciate us importing any data that would have them appear on this blog! Clicking 'OK' takes me to the Facebook login, which actually uses Power BI:



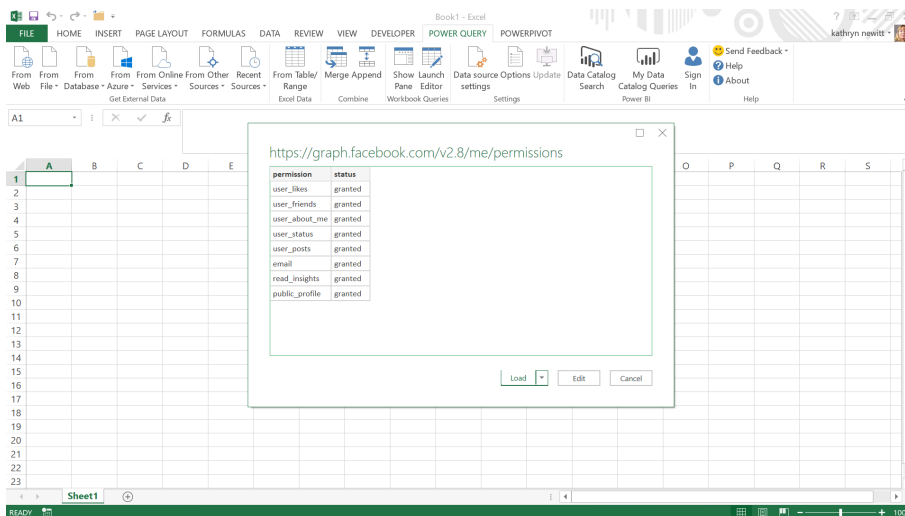
Having (secretly!) entered the login information, we are presented with another screen which will allow Power BI access to the account.



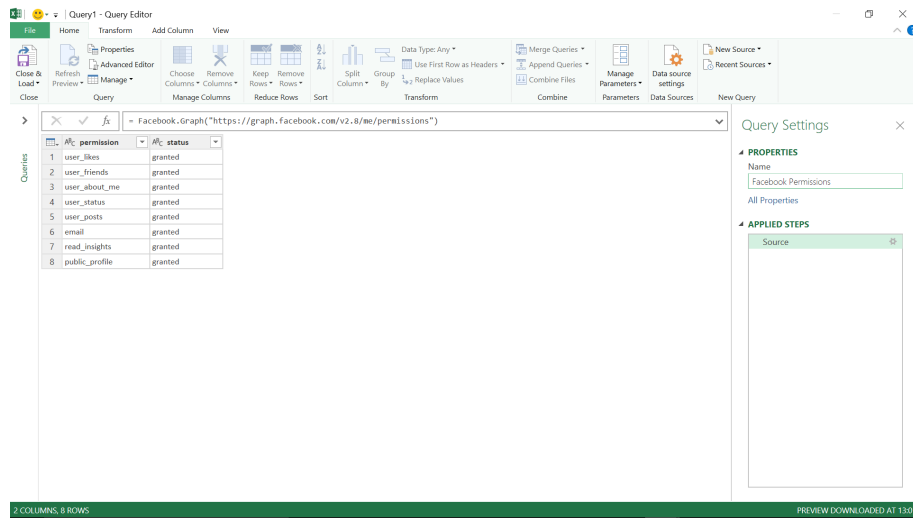
If we choose to 'Review the info...', we currently have some basic options like preventing friends' lists from being accessed. As we are fine with allowing access for the account, we'll choose 'OK'.



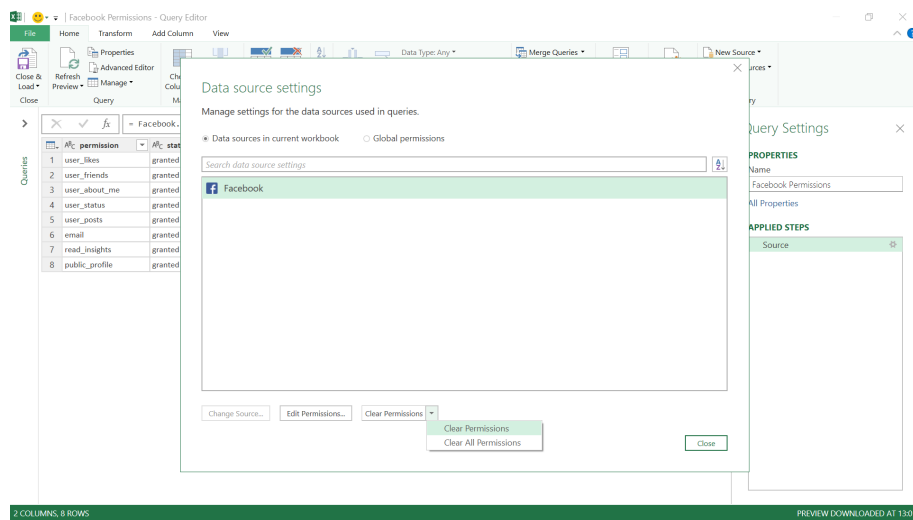
Now we have selected the account and accepted access, we'll choose to 'Connect':



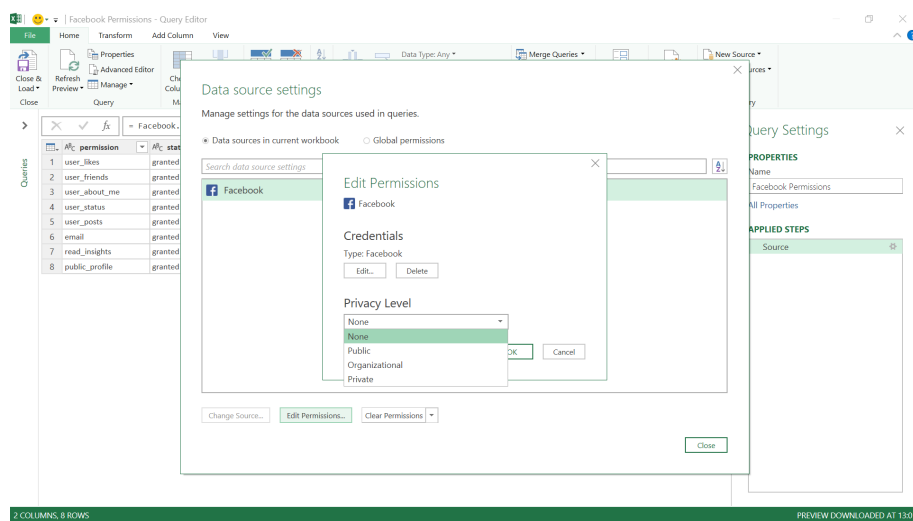
A table has been extracted, and we could choose to 'Load' or 'Load To...' immediately, but, as always, let's think the safest option is to 'Edit':



The data from the Facebook connection appears. If you want to edit or remove the connection to Facebook, go to the 'Data source settings' in the 'Data Source' section on the 'Home' tab. We may also access data sources from the 'POWERQUERY' tab in the Excel worksheet too.

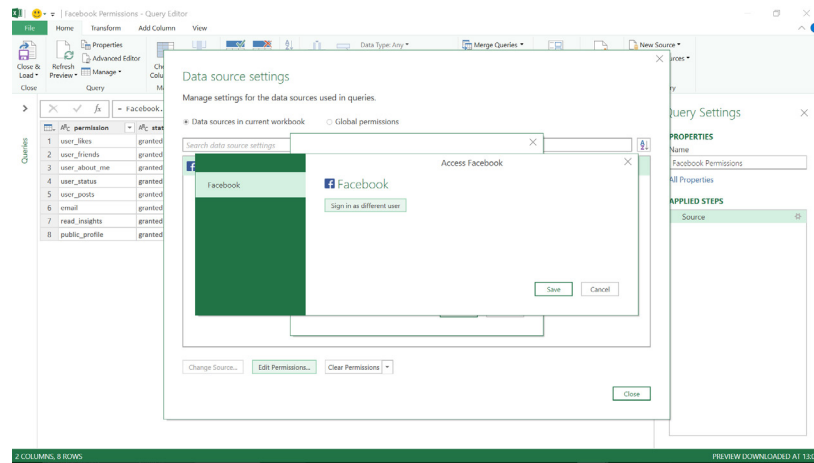


We may choose to 'Clear Permissions' ('All' would apply if we had other connections in the workbook), or we may choose to 'Edit Permissions'. Clearing permissions removes this source from the list, so we'll choose the latter.



Here, we may set the privacy level of the extracted data, and we can choose to 'Delete' or 'Edit' login permissions:

- 'Delete' performs the same function as the 'Clear Permissions' button on the main 'Data source settings' screen and removes this data source
- Choosing to 'Edit' allows us to change user.



Obviously, given the nature of social media, and the external status of the connector, connecting to Facebook to access data is not without its risks. However, in an increasingly connected world, it's an interesting tool to have, as long as it is used carefully!

More next month!

Power BI Desktop Update for February

There were no published updates for January, but February came back with a bang. The latest updates introduced incremental refresh for Power BI Pro and an hierarchical slicer. Additionally, Microsoft added some improvements to the new Ribbon combined with several new DAX functions.

However, before you rush into the update, you might want to know the following. There is a known issue that results in the following error:

“We weren’t able to restore the saved database to the model”.

Here’s the complete list of February updates:

Dataset Management

- Incremental refresh is now Generally Available

Reporting

- Hierarchical slicer (Preview)
- Updates to the new Ribbon (Preview):
 - o Title bar updates
 - o Keytips
 - o Accessibility

Modelling

- New **DAX** Functions
 - o **FIRSTNONBLANKVALUE**
 - o **LASTNONBLANKVALUE**

Visualisations

- Funnel and pyramid chart by xViz
- OEE Dashboard by 3AG Systems
- Organization chart by MAQ Software
- PI VIZpack by PQ Systems
 - o Histogram
 - o Individuals control chart
 - o Individuals and moving range control chart
 - o Multi-group individuals chart
 - o X-bar control chart
 - o X-bar and range control chart
 - o P-chart
 - o U-chart
- Updates to Zebra BI tables and charts

This issue is caused by a mismatch in the regional settings of your locale and your application. Microsoft has gone on record to “...apologize for any inconvenience this may have caused, and we plan to have a fix for it in the next couple of days...”.

Additionally, there is an update imminent which addresses a different issue where DirectQuery models with no credentials could not be opened. This will be available from the Download Center shortly (version number for the fixed version is 2.78.5740.841 onwards).

Template Applications

- Microsoft 365 usage analytics
- NFL analytics by P3
- Acterys for Quickbooks, Xero and WorkflowMax

Data Preparation

- Non-administrative support for query diagnostics

Data Connectivity

- MicroStrategy connector is now Generally Available
- FHIR connector is now Generally Available
- Factset connector
- TIBCO connector
- Jamf Pro connector
- Asana connector.

Let’s take a look at each in turn.

Incremental refresh is now Generally Available

Incremental refresh is now Generally Available and is now supported for Power BI Pro licensing, meaning it is no longer a Premium only feature. This has been strongly requested by the community. In addition to this new support in Pro, incremental refresh operations also now observe the time zone specified in the dataset settings page.

4,937
votes

incremental refresh for Power BI Pro

Enable Incremental Refresh for Power BI Pro users, not just Premium.

Vote

111 comments

Incremental refresh enables very large datasets in the Power BI service with the following benefits:

- **Refreshes are faster:** only data that has changed needs to be refreshed. For example, refresh only the last five days of a ten-year dataset
- **Refreshes are more reliable:** it's no longer necessary to maintain long-running connections to volatile source systems
- **Resource consumption is reduced:** less data to refresh reduces overall consumption of memory and other resources.

Hierarchical slicer (Preview)

OK, so there has been an hierarchy slicer available on AppSource for a number of years, but there's still a lot of demand for the built-in slicer visual to support hierarchies, viz

1,670
votes

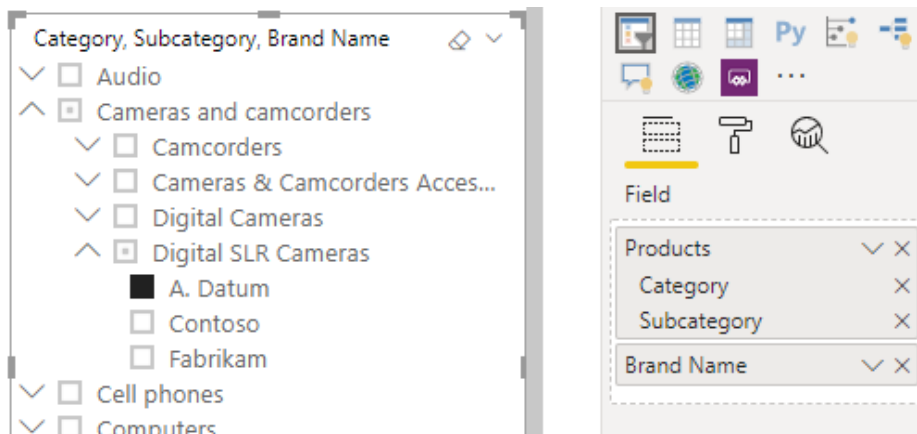
Slicer Hierarchy

Dragging a hierarchy into a report and change it to slicer... can we get a slicer with hierarchy (collapsible/expandable)?

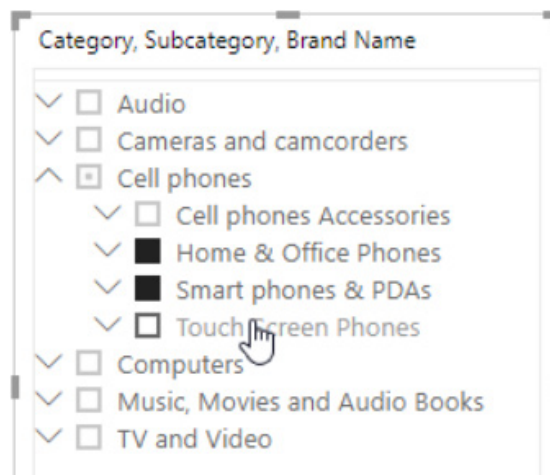
Vote

89 comments

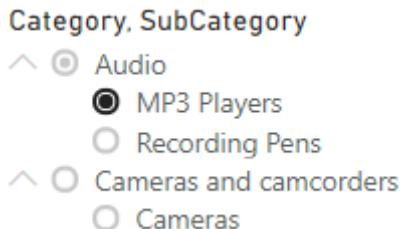
When you add multiple fields to the slicer, it'll appear with a chevron next to the items that can be expanded to show the items in the next level:



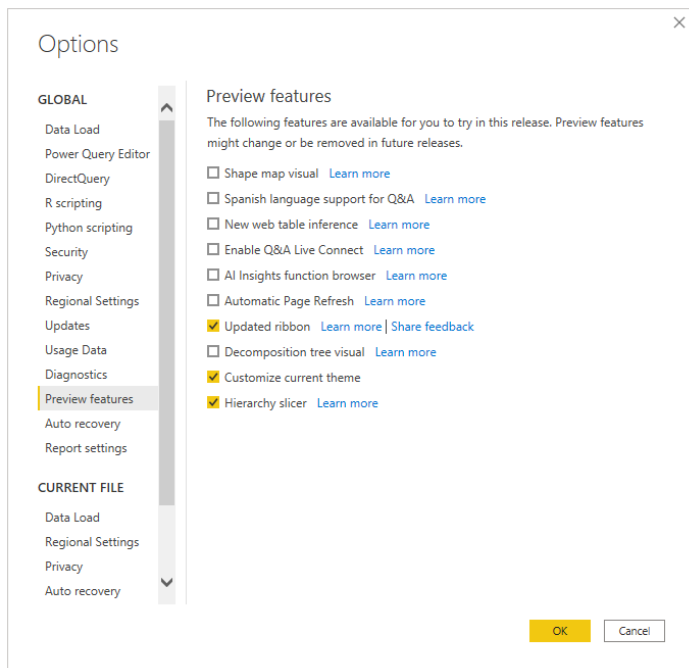
You may still swap between a list and dropdown, and you can also style your slicer however you wish:



You can use the single-select mode, and you will see a semi-selected radio icon for items that have children selected (for example):



To enable this feature for your report, you must go to the Preview features section of the Options dialog and make sure 'Hierarchy slicer' is checked:



Updates to the new Ribbon (Preview)

February saw a few improvements to the new Ribbon, albeit in Preview mode:

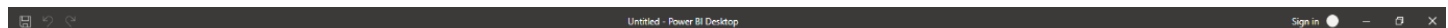
- Updates to the Title bar
- New keytips functionality
- Accessibility update.

Let's go through them.

TITLE BAR UPDATES

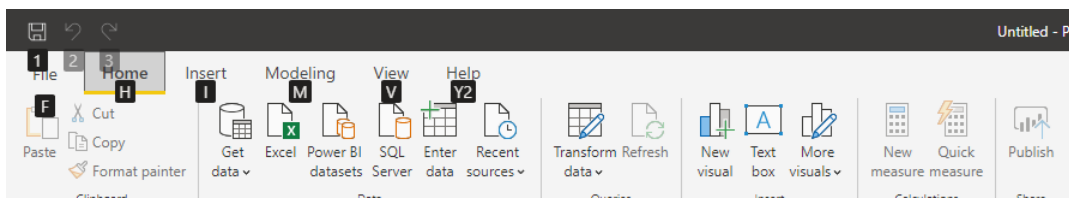
The Title bar in the Ribbon has a new look, and there are some updates to its functionality. Many users have requested the save, undo, and redo buttons to be brought back. These may now be found on the left side of the Title bar. The sign-in feature has also been added to the

right side of the Title bar too. These updates have been included so that users may access these actions quickly, as well as adding to the "usual" Office familiarity.



KEYTIPS

You can now use keytips to navigate and select buttons in the Ribbon and the Title bar. To activate keytips, press **ALT + Windows Key**. Once keytips are activated, you may press the shown keys to navigate by using your keyboard.



ACCESSIBILITY

The Title bar, Ribbon and File menu are now fully accessible. You can use **CTRL + F6** to navigate to the Ribbon section. Once you are on the Ribbon, you can use **TAB** to move between the top and bottom bars, and use the arrow keys to move between various elements.

New DAX Functions

There are two new DAX functions contained within this update:

1. **FIRSTNONBLANKVALUE**
2. **LASTNONBLANKVALUE**.

These functions evaluate an expression filtered by the sorted values of a column and return the first or last value of the expression that is not blank.

FIRSTNONBLANKVALUE

If you are familiar with the **FIRSTNONBLANK** function, **FIRSTNONBLANKVALUE** is similar, except that it will return the first measure value that is not blank.

LASTNONBLANKVALUE

Similarly, if you are familiar with the **LASTNONBLANK** function, **LASTNONBLANKVALUE** is similar except it will return the last measure value that is not blank.

Funnel and pyramid chart by xViz

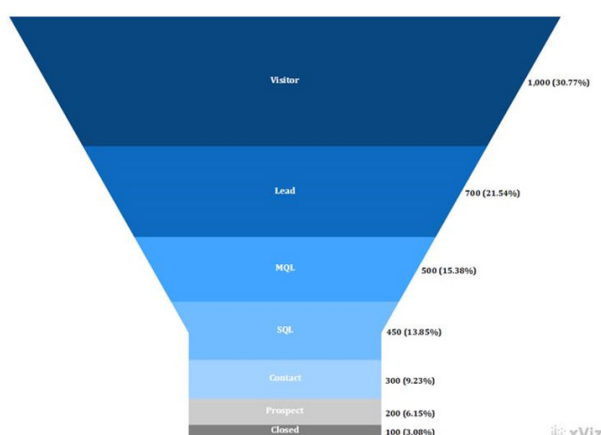
The xViz Funnel and pyramid chart acts as a two-in-one visual. It functions in two different visualisation modes: default and 3D mode. It is customisable, with an extensive deck of properties for configuring the visual.



Key features include:

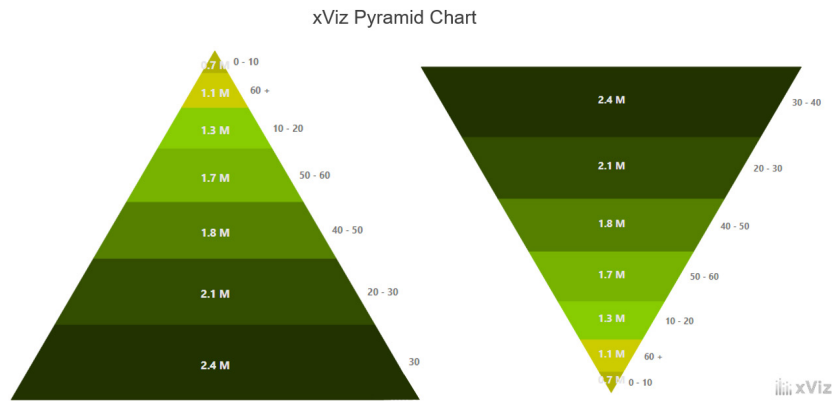
- advanced conditional formatting options with configurable properties
- number formatting options to customise values based on various business scenarios
- data labels may be customised for categories and values individually
- swap between default and 3D mode with a single click
- visualise data in either a funnel or pyramid, using the same custom visual.

xViz Funnel Chart



It doesn't take much imagination to think where you might use this, e.g.

- Customer lead conversion process for sales analysis
- Efficient SEO analysis using the Funnel chart
- Hierarchical visualisation in order to analyse business data across various geographies
- Organisational hierarchy may be depicted in an interactive manner using a Pyramid chart.



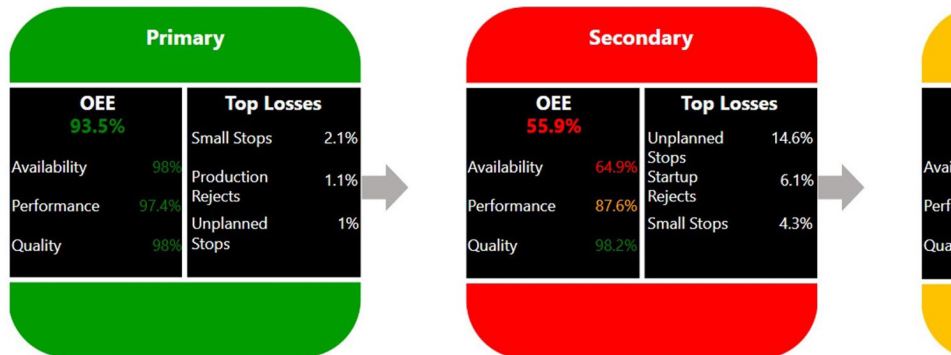
OEE Dashboard by 3AG Systems

Specifically designed for the manufacturing and mining industries, the OEE Dashboard from 3AG Systems allows operations teams to display Overall Equipment Effectiveness (OEE) and associated sub-components. It is meant as a tool for companies to measure production efficiency across different machines on a factory floor.

There are a few ways to calculate OEE:

- $OEE = \text{time spent producing good product} \div \text{shift length}$
- $OEE = \text{good product made} \div \text{the amount of product that could have been made}$
- $OEE = \text{Availability} \times \text{Performance} \times \text{Quality}$.

The above approach used will depend on what you or your end user produces.



In addition to OEE, you can use this visual to track the following Key Performance Indicators (KPIs):

- availability
- performance
- quality.

Furthermore, you may also enter percentage values, number of incidents and total duration of incidents for the following sub-components:

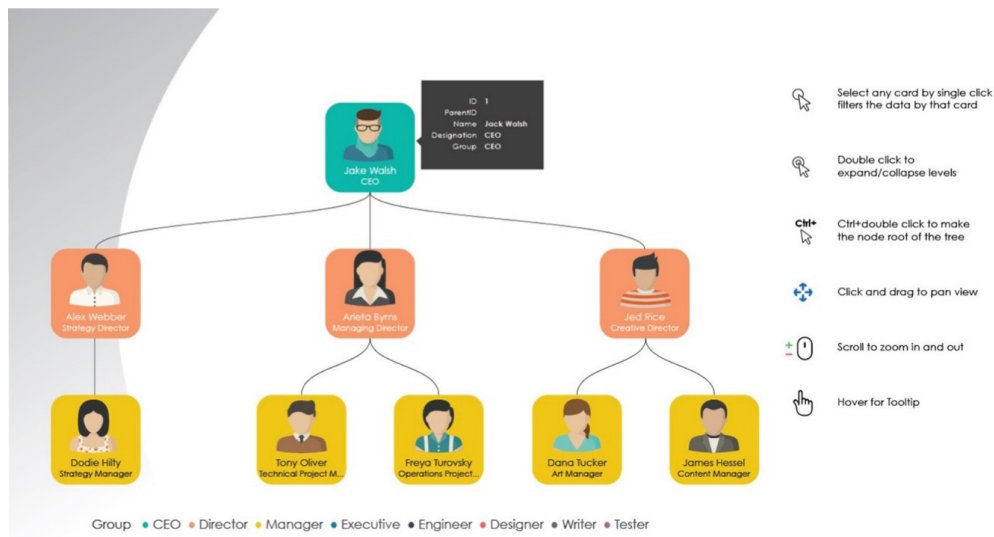
- slow cycles
- planned stops
- small stops
- unplanned stops
- start-up rejects
- production rejects.

Organization chart by MAQ Software

The Organization chart by MAQ Software is a way to display hierarchical information and relationships between different entities. While visuals such as KPI grid by MAQ Software can represent numerical hierarchical information, the Organization chart supports displaying images at each node.

Business uses may include:

- **Sales:** display sales structure along with territory responsibilities and actual sales. Group field may be used to visually indicate if a salesperson is below, on or ahead of the target
- **Marketing:** display various marketing campaigns at the highest level. Illustrate various tactics and activities, including information such as cost and other marketing KPIs measuring the impact of the campaigns, tactics and activities
- **Organisation:** structure human resources according to respective departments and hierarchies
- **IT:** display organisational IT assets, showing various asset categories and their availability volumes, which may be broken down into specific assets
- **Operations:** display a manufacturing process with a breakdown of the components or ingredients to produce the product along with their respective quantities in an hierarchical format
- **Finance:** display budget allocation by divisions or projects, breaking them down into subdivisions or subprojects and colour coding the components, based upon a group-by field to distinguish those which are on budget, over budget or within budget.



Key features include:

- an optional image column to show images
- ability to modify the look of the connector links
- colour the cards based on a legend column
- ability to customise the card dimension, border and corner radius
- interactivity with the cards to expand or collapse levels and cross-filter other visuals
- font formatting for labels and sub-labels
- ability to zoom and drag the position of the visual
- configurable legend position and formatting
- support for context menu.

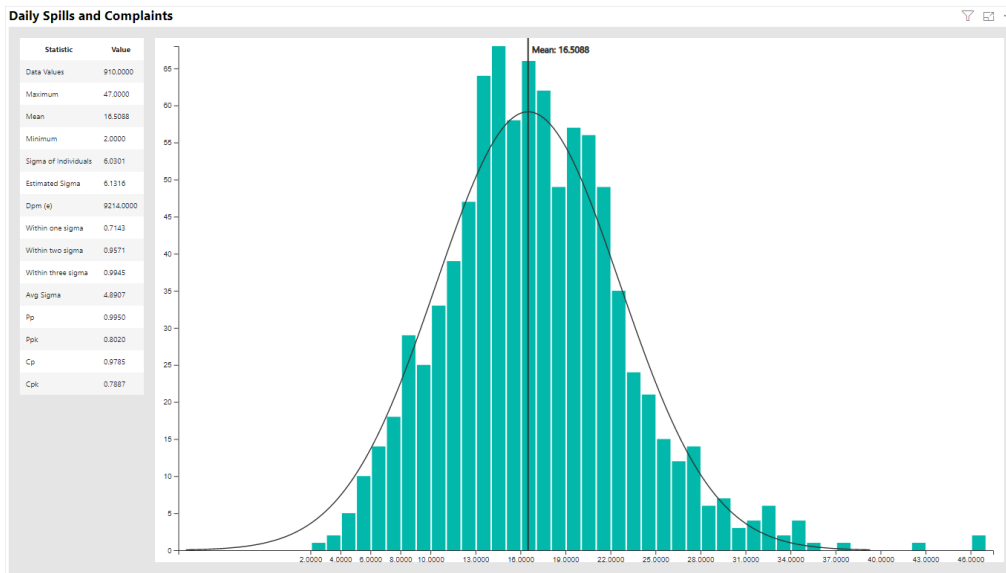
PI VIZpack by PQ Systems

PI VIZpack by PQ Systems is a collection of eight process improvement charts that provide a straightforward way to visualise and evaluate process behaviour and performance.

HISTOGRAM

As regular / informed readers will know, a Histogram is a bar chart that represents the frequency distribution of data. The height of each bar corresponds to the number of items in the class or cell. The width of each bar represents a measurement interval. The histogram shows basic information such as central location, shape and spread of the data being

examined. The bars give a visual indication of central location (mean), width of spread (range or sigma) and shape. Histograms are traditionally displayed with some collection of statistics. These are often called descriptive statistics because they describe the population of data being charted.

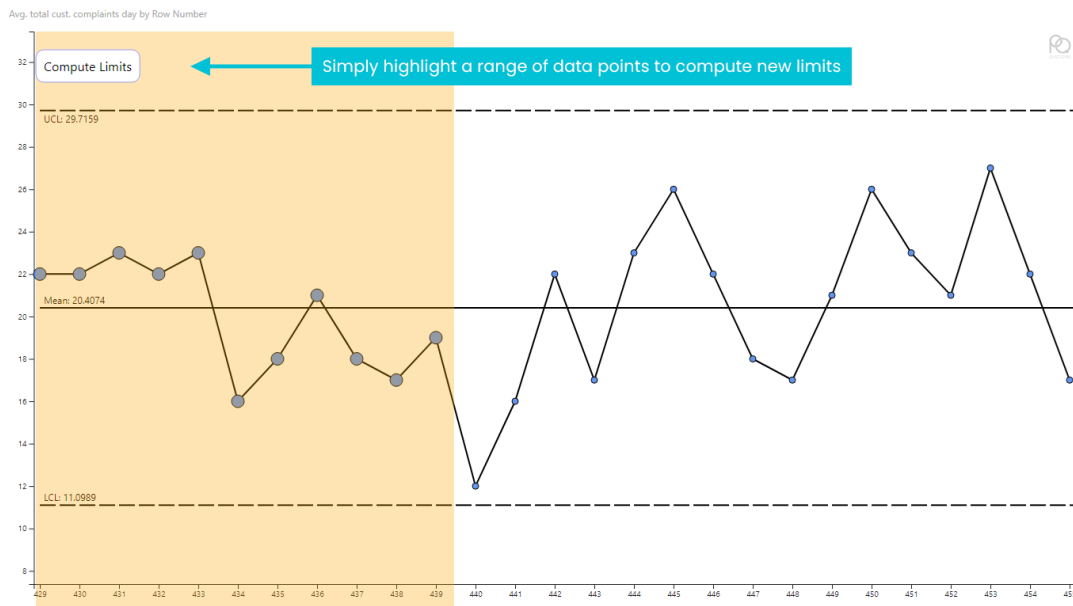


This may be used:

- when you want to visualise the central location, spread and shape of a data set
- when the process is stable and you want to predict capability indices
- when you want to study the capability of some process to meet customer requirements.

INDIVIDUALS CONTROL CHART

You can use the Individuals control chart when you want to analyse process stability where the sample size is one. An Individuals chart is used to determine if a process is stable and predictable; it creates a picture of how the system changes over time. These charts are also used to monitor the effects of process improvement theories.



In general, control charts are designed to help to understand and reduce variation in a process over time. More specifically, they are designed to minimise two common mistakes:

- adjusting a process when it would be better to leave it alone
- not adjusting a process when an adjustment is likely to be required.

If a reasonable number of data points all show as in-control on a control chart, you can make a useful prediction about your process. Unless the process is changed in some way, it will continue to produce results centred on this mean and varying within these control limits.

If the control chart shows data points that are outside the limits or trends or runs above or below the mean, this does not allow you to make a useful prediction about your process. This process is neither stable nor

predictable. Unless something is changed, you cannot be certain about the mean or the dispersion of data resulting from this process.

This predictive nature of control charts and their ability to minimise the mistakes described above are what makes them such useful business tools.

This chart may be used:

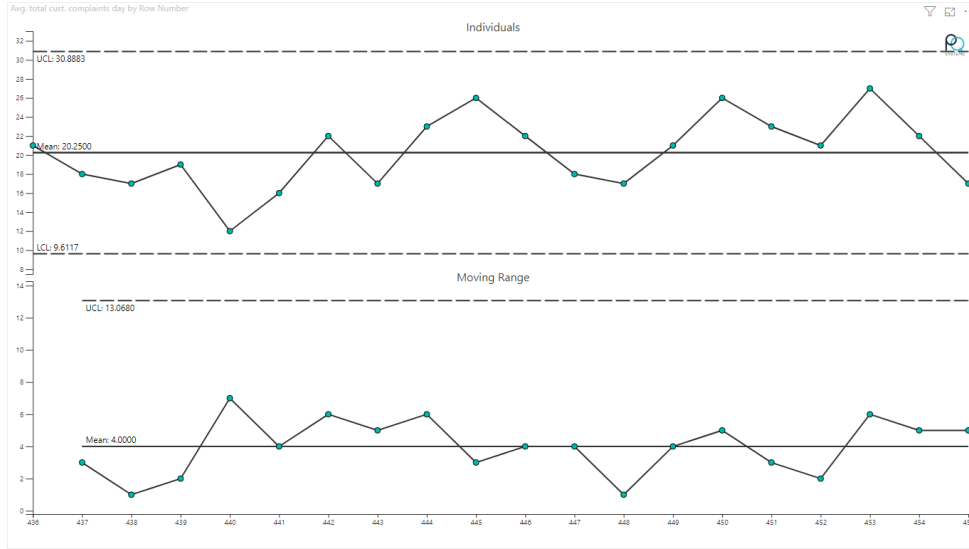
- when you want to see if your process is stable and predictable
- when you want to see how planned change affects a process
- when the time order of the data values is preserved
- when you have collected data in subgroups of one (one value at a time).

INDIVIDUALS AND MOVING RANGE CONTROL CHART

You can use the Individuals and moving range chart when you want to analyse process stability where the sample size is one.

An Individuals and moving range chart is used to determine if a process is stable and predictable; it creates a picture of how the system changes

over time. The individual chart displays individual measurement while the moving range chart shows variability between one sample and the next. Individuals and moving range charts are also used to monitor the effects of process improvement theories.



The moving range chart creates range values to plot by finding differences between consecutive samples.

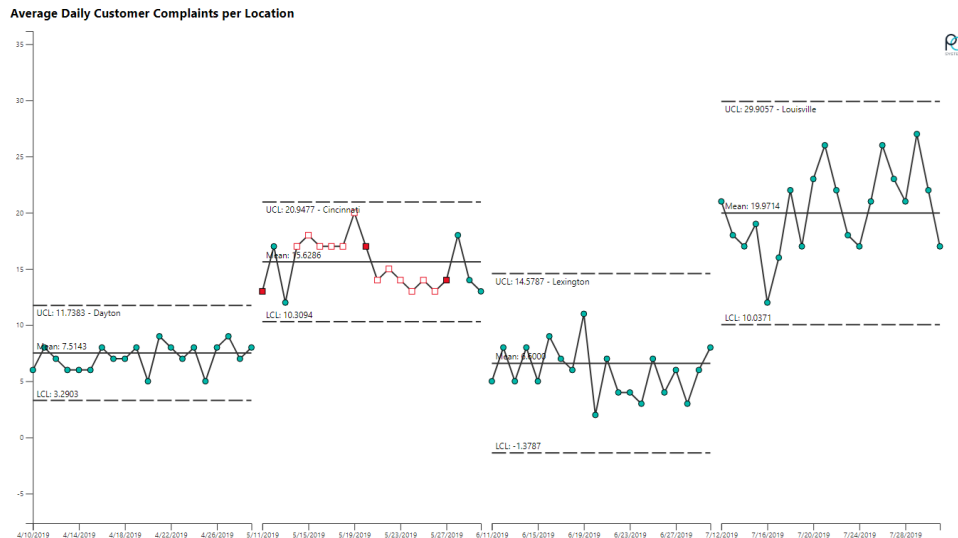
This chart may be used:

- when you want to see if your process is stable and predictable
- when you want to see how planned change affects a process
- when the time order of the data values is preserved
- when you have collected data in subgroups of one (one value at a time).

MULTI-GROUP INDIVIDUALS CHART

You can use a Multi-group Individuals chart when you want to analyse data in segments that highlight sources of variation and instability. The Multi-group Individuals chart has the same specialties that a basic individuals chart does, but it is particularly helpful when your individuals data has specific identifiers that may be used to segment the data to several subprocesses. Example identifiers could be shifts, line numbers

or locations. After the segment is made in the individuals' data, it makes it easy to see if certain segments output results that differ in amounts of variation (distance between limits), central tendency (centre line) or process instability (runs that continually rise or fall on one side of the mean line). This type of analysis can help shine a spotlight on environments upstream that should be considered first for process improvement.



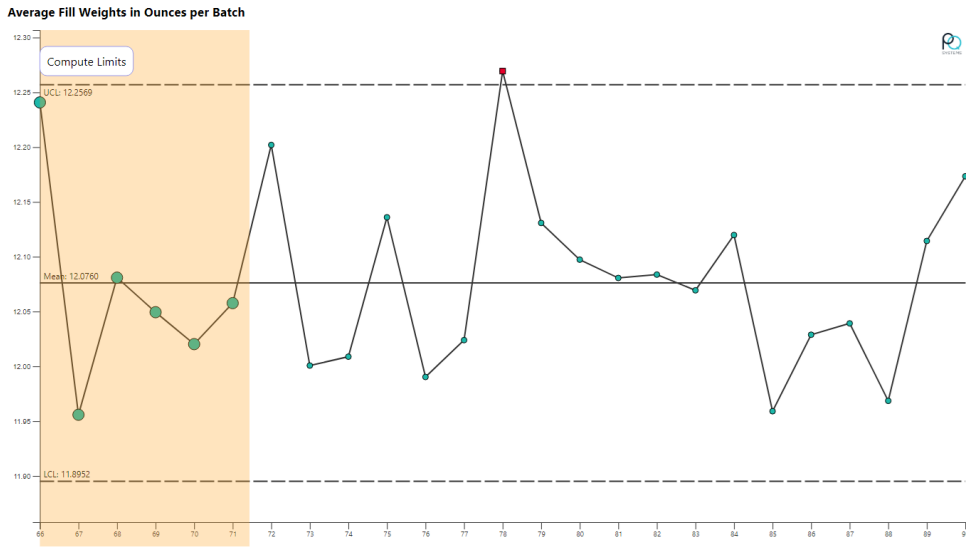
This chart may be used:

- when your process has data which allows segmentation on properties like locations, shifts, material types, etc.
- when you want to see if your process is stable and predictable
- when you want to see how planned change affects a process
- when the time order of the data values is preserved.

X-BAR CONTROL CHART

You can use the X-bar control chart when you want to analyse process stability of data containing multiple measurements per subgroup. This chart type is used for sub-grouped data, where each subgroup is made up of two or more values. Points plotted on this chart are the average

(\bar{x} -bar) of the subgroup data. This chart shows an indication of central tendency (where the charted data is centered). X-bar charts can give an understanding about the variation between subgroups.

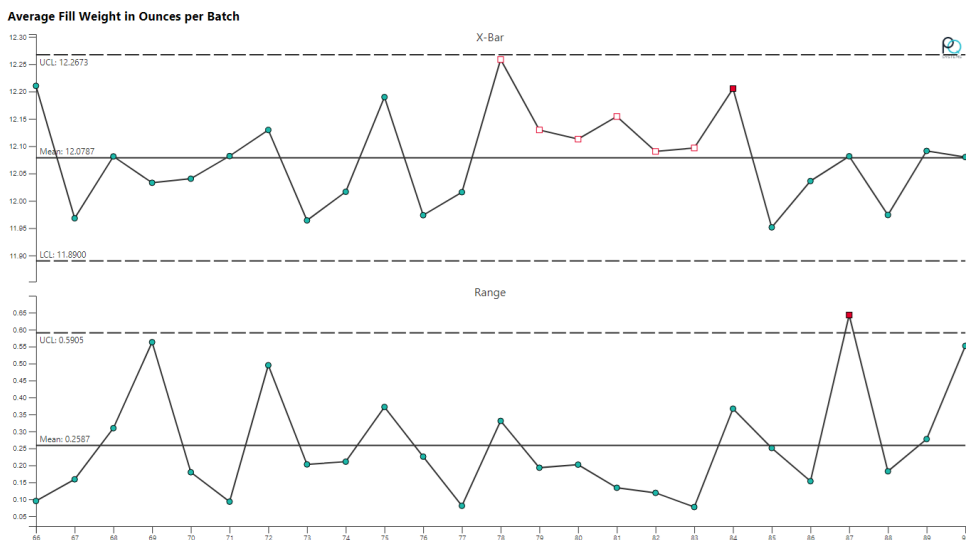


This chart may be used:

- when you want to see if your process is stable and predictable
- when you want to see how planned change affects a process
- when the time order of the data values is preserved
- when you have collected data in subgroups of two or more.

X-BAR AND RANGE CONTROL CHART

You can use the X-bar and range control chart when you want to analyse process stability and variability of data with many values per subgroup. This chart type is used for sub-grouped data, where each subgroup is made up of two or more values.



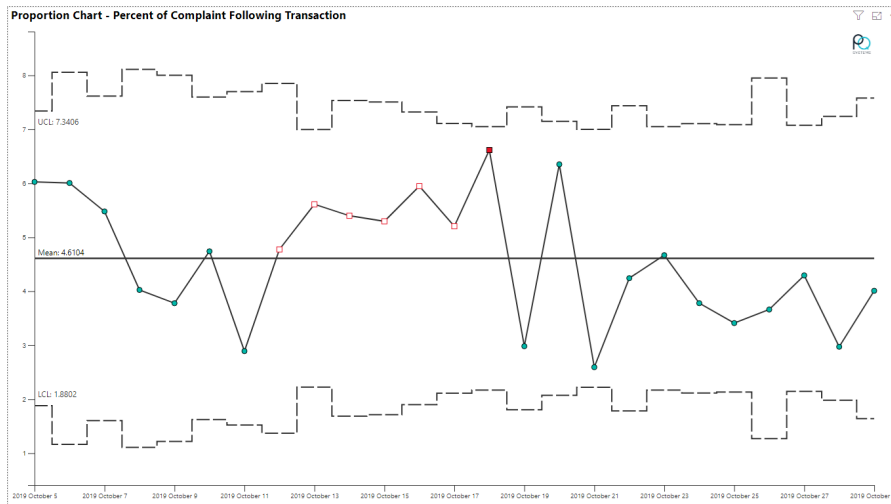
This chart may be used:

- when you want to see if your process is stable and predictable
- when you want to see how planned change affects a process
- when the time order of the data values is preserved
- when you have collected data in subgroups of two or more.

P-CHART

You can use a P-chart when you want to analyse process behaviour over time for data collected in proportions or percentages. A P-chart is an attributes control chart used with data collected in subgroups of varying sizes. Because the subgroup size can vary, it shows a proportion on nonconforming items rather than the actual count. The process attribute (or characteristic) is always described in a pass or fail form. For example,

you can use a p-chart to plot the proportion of incomplete insurance claim forms received weekly. The subgroup would vary, depending upon the total number of claims each week. P-charts are used to determine if the process is stable and predictable and to monitor the effects of process improvement theories.



A P-chart should be used instead of a U-chart (*see below*) when the result is expressed in a proportion. For example, the number of items found to be defective during an inspection.

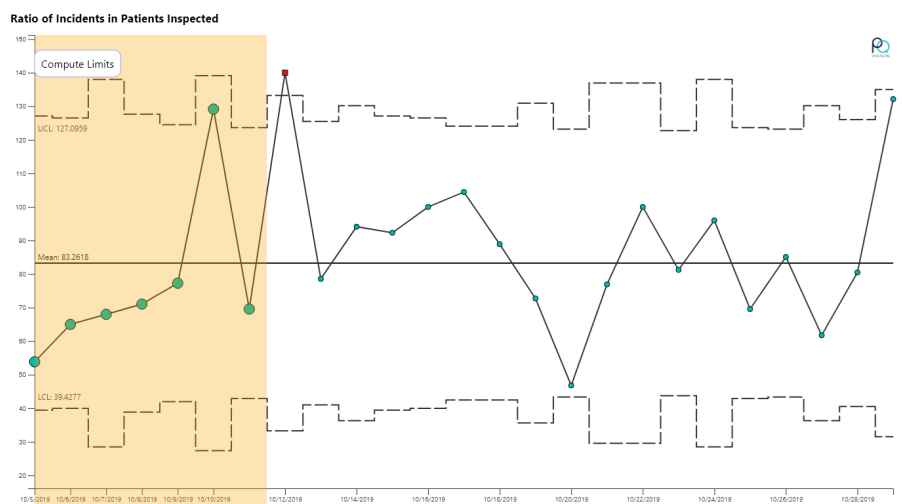
A U-chart shows process changes over time by looking at the number of nonconformities produced by the process. The plotted values represent a ratio. The subgroup size can vary, so control limits can adjust to reflect this, just as P-charts do.

This chart may be used:

- when you want to see if your process is stable and predictable
- when you want to see how a planned change affects the process
- when the data you are examining represents counts of some type
- when the time order of the data is preserved.

U-CHART

You can use the U-chart when you want to analyse process behaviour of data with nonconformities of events per unit. A U-chart is an attributes control chart used with data collected in subgroups of varying sizes. U-charts show how the process (measured by the number of nonconformities per item or group of items) changes over time. Nonconformities are defects or occurrences found in the sampled subgroup. They can be described as any characteristic that is present but should not be or any characteristic that is not present but should be. For example, a scratch, dent, bubble, blemish, missing button and a tear are all nonconformities. U-charts are used to determine if the process is stable and predictable and to monitor the effects of process improvement theories.



A U-chart shows process changes over time by looking at the number of nonconformities produced by the process. The plotted values represent a ratio. The subgroup size may vary, so control limits can adjust to reflect this, just as P-charts do.

U-charts should be used over P-charts when the number that is being counted can be larger than the number you inspected. For example, if each stain is counted on an individual item of clothing, there is a possibility that the total number of stains counted can be larger than the number of items inspected.

This chart may be used:

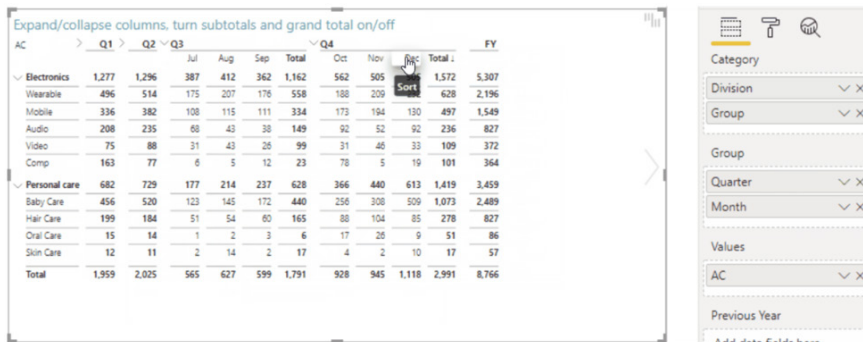
- when you want to see if your process is stable and predictable
- when you want to see how a planned change affects the process
- when the data you are examining represents counts of some type
- when the time order of the data is preserved.

Updates to Zebra BI tables and charts

Zebra BI has released a new version (version 4.0.2) of their tables visual. This updated version provides new features that will further enhance the flexibility of table-based and matrix-based reporting. This time, the Zebra BI team has tackled the important challenge of column structures in tables by allowing users to easily manage:

- column grand totals
- column subtotals
- expand or collapse groups of columns
- renaming any column in a table (including subtotals and grand totals)
- sorting by any column or total in a single click
- displaying any column (including the totals) as a table or a chart.

Both the grand totals and the subtotals can be renamed, shown or hidden directly on the visual, which makes the user experience fast and easy. In addition, the user may sort the tables by any column, subtotal or grand total with a single click:

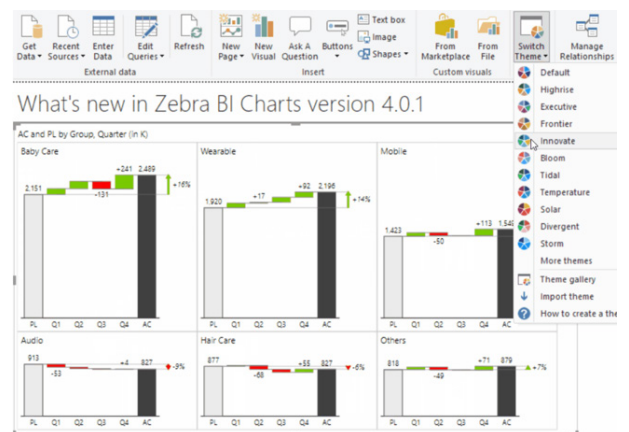


For instance, you may add an additional measure for previous year's data to a given visual, creating a flexible variance table or matrix:



Further, this latest version of Zebra BI charts (actually, from version 4.0.1) now fully supports custom themes provided in the JSON format. This allows users to set up their preferred theme or style to align their Power BI reports and dashboards with their company's corporate design.

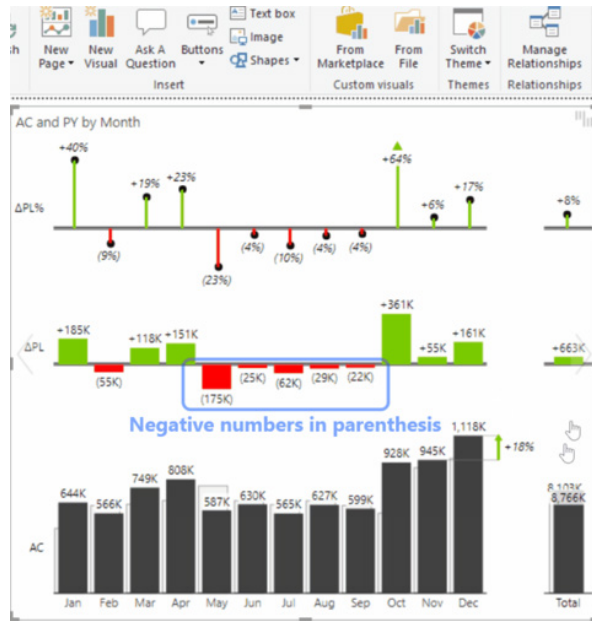
Once you create a custom theme (JSON file) you can import it by using the standard Power BI Import theme command. The theme covers all design settings and options for all Zebra BI charts in one place:



A custom theme can now control any setting available in Zebra BI charts (as well as Zebra BI tables). This enables extensive and detailed corporate governance over all reporting aspects in Zebra BI for Power BI.

in both Zebra BI visuals to parenthesis instead of being presented with a leading minus (-) sign, and sets the policy of displaying axis labels to rotate instead of trim in cases where space is limited:

In the example below, a custom theme enforces grand totals in Zebra BI charts by default, switches the data label format for negative numbers

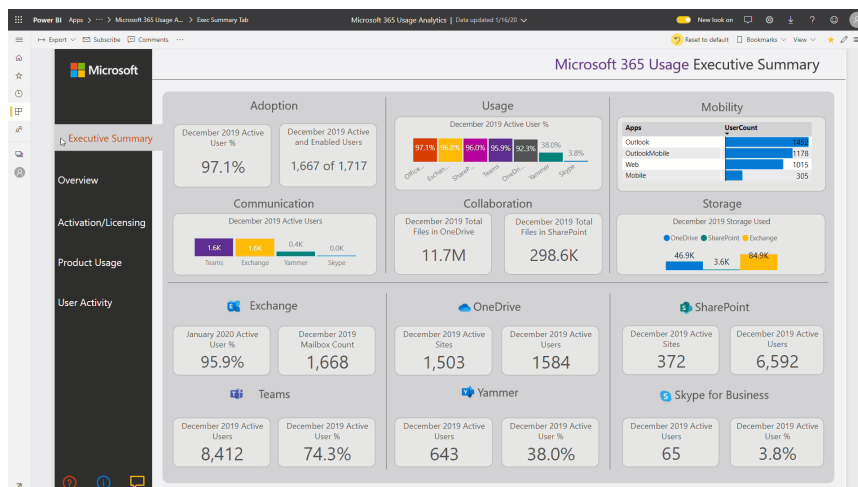


Microsoft 365 usage analytics

The latest update provides a new template application for Microsoft 365 usage analytics. This app helps you better understand how your organisation is adopting the many services within Microsoft 365 through cross-product reports, showing usage information over the last 12 months. The app also uses metadata from Azure Active Directory to help you better understand usage based on the location, department and organisation.

The Microsoft 365 usage analytics app shows you information through five reports:

- Executive Summary:** a high-level, at-a-glance view of Microsoft 365 adoption and usage
- Overview:** shows you detailed views of your adoption and usage information, along with views into what solutions people are using to communicate, collaborate and store information
- Activation and Licensing:** helps you understand service plan activations in your organisation, the types of licenses you own and how many users are assigned to each license type
- Product Usage:** product-level reports for Exchange, Office 365 groups, OneDrive, SharePoint, Skype, Teams and Yammer that measure total enabled vs. total active users, counts of entities such as mailboxes, sites, groups, and accounts, as well as other measurements of activity
- User Activity:** user-level detailed usage data joined with Active Directory attributes that cover the last completed month.



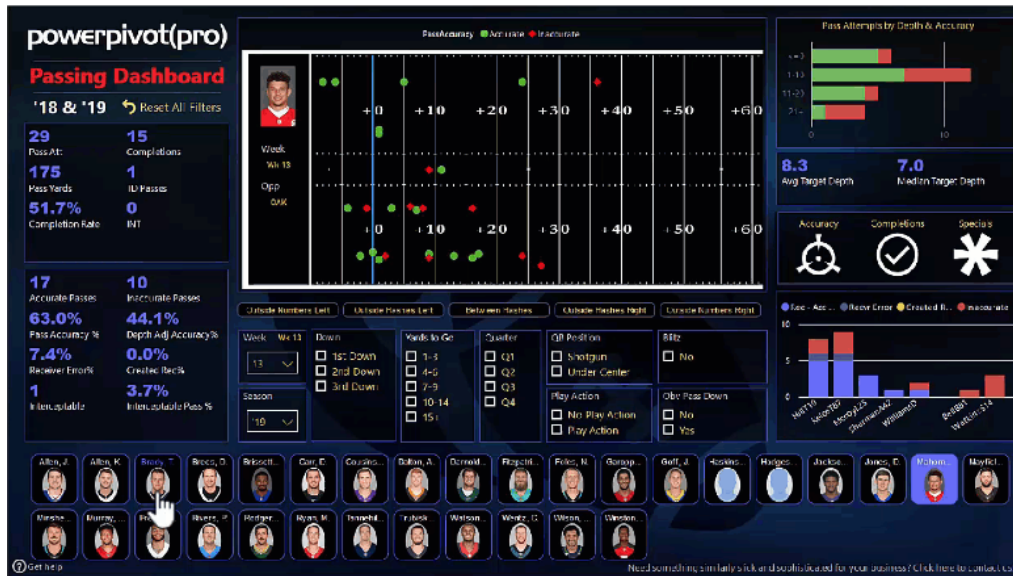
This Usage Analytics for Microsoft 365 template app will replace the existing Microsoft 365 usage analytics content pack. The data used for the content pack is the same data used in the template application. The biggest change you will see is the new user interface. If your organisation

is currently using the content pack, you can continue to use it, but it's recommended that you start to use the template app as it will be supported and updated moving forward, where no such guarantees may be provided for the former app.

NFL analytics by P3

Third party P3 has partnered with professional US football statisticians (not the real football!) to show the power of Power BI in a fun, entertaining way. This NFL analytics app is powered by approximately 1,500 hours of detailed film review blended with sophisticated calculations and visuals courtesy of Power BI.

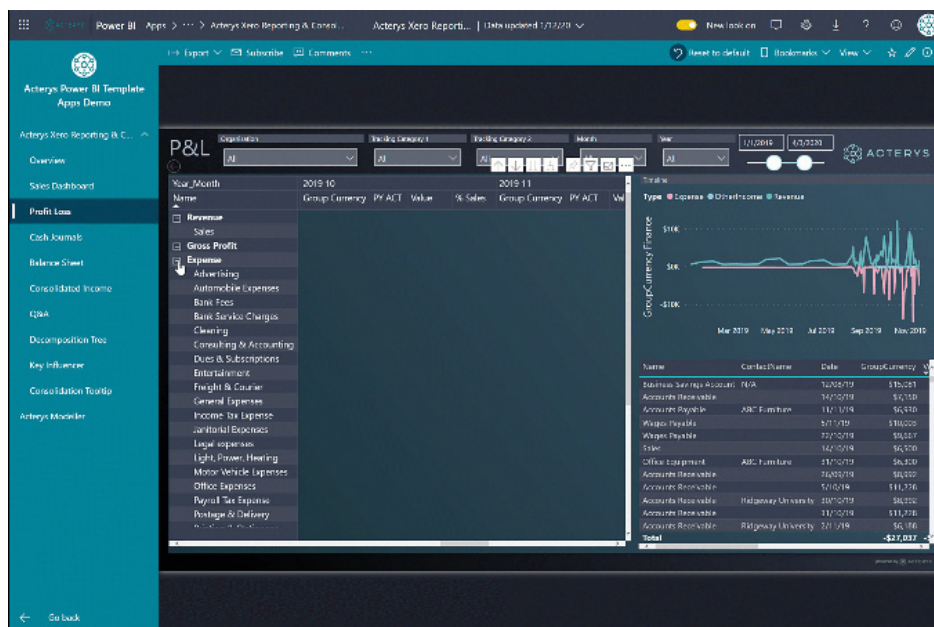
Every quarterback, every game and every pass is delivered with unprecedented detail. Take this to cricket and we'll be talking!



Acterys for Quickbooks, Xero and WorkflowMax

The new Power BI Template App for QuickBooks, Xero and WorkflowMax provides you with a professional data model and editable Power BI dashboards and reports that integrate accounting, SaaS data and other sources.

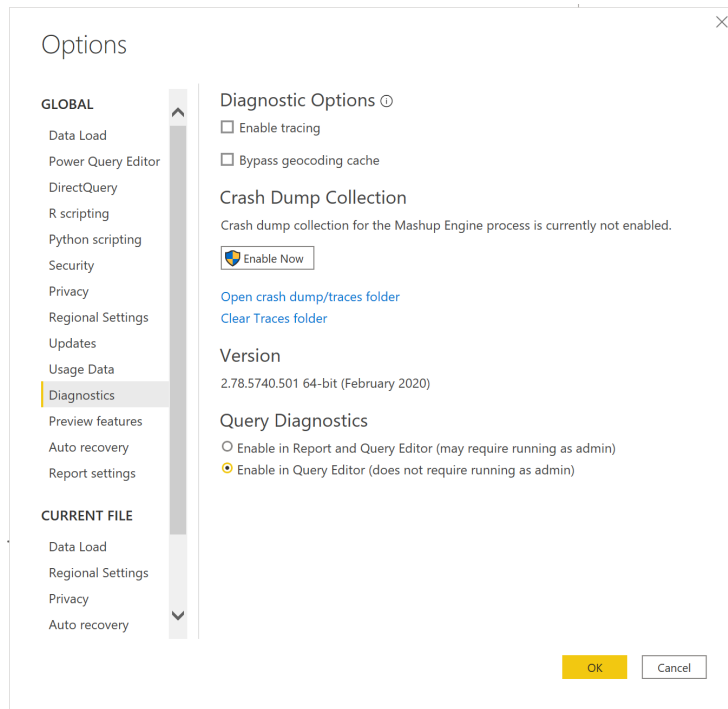
It can connect to your ERP or accounting system and profit from immediate insights with financial reports, sales analytics and comprehensive consolidation for multiple entities. Additionally, users may unlock more insights using the latest Power BI advanced analytics like natural language query, key influencer, and decomposition tree analysis, which are all optimally configured for immediate use.



Non-administrative support for query diagnostics

With the initial release of query diagnostics, some users of the Microsoft Store version were unable to run diagnostics if they didn't have administrator rights. With this release, you have the option to support non-administrator tracing. You can find this setting in the Diagnostics

section of the Options dialog. This will allow tracing in the Query Editor only, and it does not support capturing traces from refreshes in the Report section of Power BI Desktop.



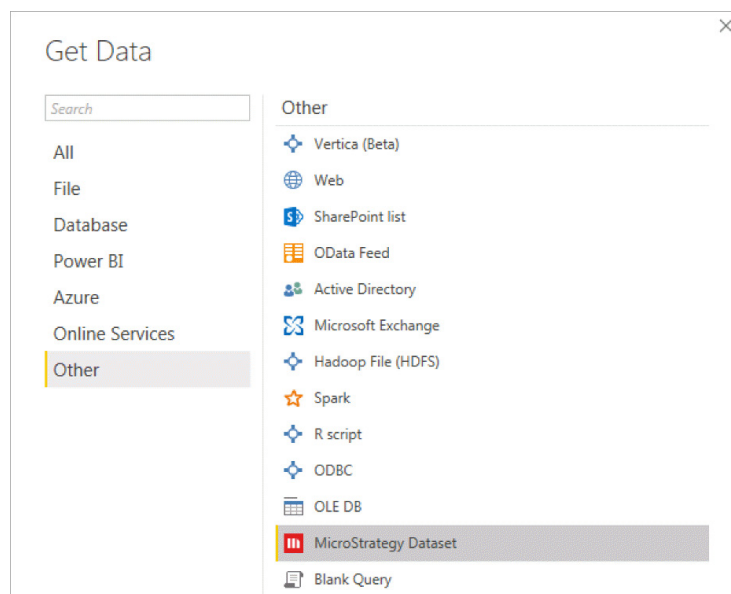
MicroStrategy connector is now Generally Available

This update also sees the MicroStrategy connector Generally Available. This MicroStrategy Dataset Connector for Power BI allows users to fetch data from reports or cubes that reside in MicroStrategy project and import them into Power BI Desktop.

The connector supports several additional features:

- MicroStrategy Standard and LDAP authentication
- import of multiple datasets at once
- multi-form attributes.

This connector can be found in the Other category of the 'Get Data' dialog:



FHIR connector is now Generally Available

The Fast Healthcare Interoperability Resources (FHIR®) connector is also now Generally Available.

Fast Healthcare Interoperability Resources (FHIR®) is a standards framework for healthcare data. Microsoft offers a fully managed Azure API for FHIR service, which is a turn-key solution for storing, searching and exchanging clinical information. Data from FHIR servers can now be integrated with Power BI using the FHIR Power Query. The connector

supports all FHIR resources in FHIR versions DSTU2, STU3 and R4. In addition to full schema coverage in all versions, the connector also translates Power Query expressions into FHIR search queries, which allows efficient data imports and reporting on large FHIR datasets.

Again, this connector can be found in the Other category of the 'Get Data' dialog.

Factset connector

FactSet provides integrated software and data solutions for investment professionals. The FactSet Analytics connector for Power BI brings FactSet's portfolio analytics, vault performance and "Style, Performance and Risk" reports into Power BI through the FactSet calculation engine APIs. Time series, snapshot and multi-portfolio reports are available,

and may be customised with portfolio, benchmark, date range and other parameter overrides. Functions to look up available resources (portfolios, benchmarks, and others) are included as well.

This connector can be found in the 'Online Services' category of the 'Get Data' dialog.

TIBCO connector

Data bottlenecks may be reduced throughout the organisation with TIBCO. This enable you to combine multiple data sources into a single virtual data layer on-demand without copying or moving data. TIBCO's data virtualisation capabilities provide you the agility to adapt to new data sources and technology.

This connector can also be found in the Other category of the 'Get Data' dialog.

Jamf Pro connector

Reporting capabilities may be extended with Jamf Pro and captured within your Power BI architecture to quickly share across your organisation. Using the Jamf Pro instances API, Power BI can collect computer and mobile devices details, installed applications, extension attributes and their group relationships.

This connector can be found in the Other category of the 'Get Data' dialog too.

Asana connector

Asana customers can also bring their Asana work data into Power BI with a simple copy and paste. With the Asana connector for Power BI, customers can build custom, actionable dashboards based on Asana inputs such as custom fields. This allows customers to visualise their work and extract real-time insights into projects and workflows using known tools.

This connector can be found in the Online Services category of the Get Data dialog.

More soon, we're sure!

MVP Summit

Due to Non-Disclosure Agreements being in place the Microsoft Most Valuable Professional (MVP) Summit may not be "summit we can talk about" in general. However, March heralds the 2020 annual get-together of Most Valuable Professionals (MVPs) [as accredited by Microsoft] to network and discuss the latest developments in their area of expertise – in our case, Excel. SumProduct has two MVPs in its rank

presently – Tim Heng and Liam Bastick – and we are both heading to the wild, wild west this year.

Coronavirus notwithstanding, it's scheduled for mid-March at Redmond, where we will also get a chance to ask our questions to the developers. Therefore, if you have a question you'd like us to ask, drop us a line at contact@sumproduct.com.



Yes, this is the photo we always pull out at this time of year and yes, we always make the same joke too...

The A to Z of Excel Functions: DURATION

The Macaulay Duration is a concept developed and named after Frederick Macaulay. It is measure of weighted average maturity of cash flows. Each cash flow weight can be found by dividing the present value of the cash flow by the price. The concept is commonly used by portfolio managers. Its formula is as follows:

$$\text{MacaulayDuration} = \frac{\sum_{t=1}^n \frac{t \cdot C}{(1+y)^t} + \frac{n \cdot M}{(1+y)^n}}{\text{Current Bond Price}}$$

where:

- **t** = respective time period
- **C** = periodic coupon payment
- **y** = periodic yield
- **n** = total number of periods
- **M** = maturity value
- **Current Bond Price** = present value of cash flows (time value of money).

This function returns the Macaulay duration for an assumed par value of \$100. The duration is defined as the weighted average of the present value of the cash flows and is used as a measure of a bond price's response to changes in yield.

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

DURATION(settlement, maturity, coupon, yield, frequency, [basis])

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

- **settlement**: this is required and 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 also required. This is the security's maturity date. The maturity date is the date when the security expires
- **coupon**: this is required. This is the security's annual coupon rate
- **yield**: again, this is required. This is the security's annual yield
- **frequency**: this is required and represents the number of coupon payments per year. For annual payments, frequency = 1; for semiannual, frequency = 2; for quarterly, frequency = 4
- **basis**: this is optional. The type of day count basis to use, viz.

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, 2020 is serial number 43831 because it is 43,830 days after January 1, 1900
- 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, which is 30 years after the January 1, 2008, issue date
- **settlement**, **maturity**, **frequency**, and **basis** are truncated to integers
- if **settlement** or **maturity** is not a valid date, **DURATION** returns the #VALUE! error value
- if **coupon** < 0 or if **yield** < 0, **DURATION** returns the #NUM! error value
- if **frequency** is any number other than 1, 2 or 4, **DURATION** returns the #NUM! error value
- if **basis** < 0 or if **basis** > 4, **DURATION** returns the #NUM! error value
- if **settlement** ≥ **maturity**, **DURATION** returns the #NUM! error value.

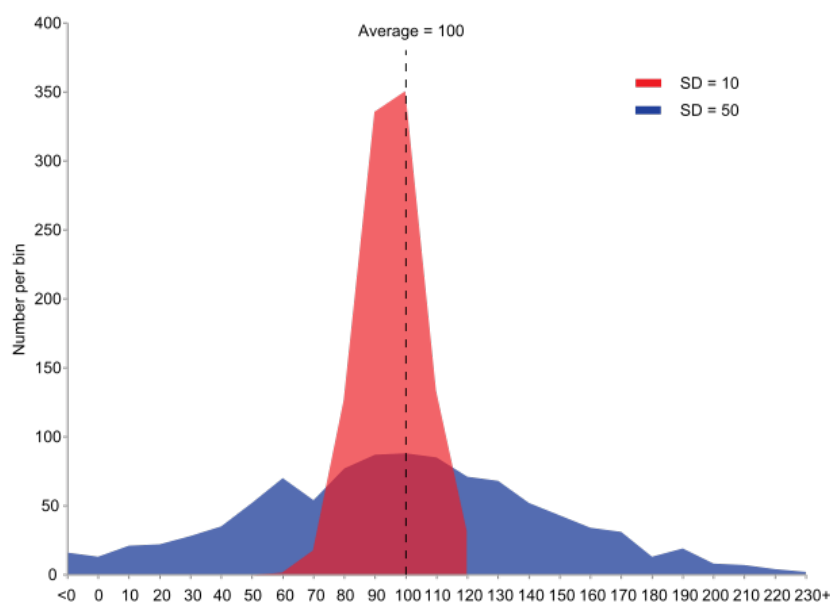
Please see our example below:

	A	B	C
1	Data	Description	
2	01 January 2020	Settlement date	
3	01 January 2024	Maturity date	
4	3%	Percent coupon	
5	4%	Percent yield	
6	2	Frequency is semi-annual	
7	1	Actual / actual basis	
8			
9			
10	Formula	Description	Result
11	=DURATION(A2,A3,A4,A5,A6,A7)	The duration for the bond, with the terms cited above.	3.79
12			

The A to Z of Excel Functions: DVAR

This function estimates the variance of a population based on a sample by using the numbers in a **field** (column) of records in a list or database that match conditions that you specify. The variance of a random variable **X** is the expected value (the average) of the squared deviation from the mean of the range of values of **X**, $\mu = E[X]$, i.e.

$$\text{Var}(X) = E[(X - \mu)^2].$$



Two distributions with the same mean, but different

Given that the standard deviation (σ) is given by:

$$\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \mu)^2}$$

It is clear that the variance is the square of the standard deviation and hence is related accordingly with the **DSTDEV** function covered last month.

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

DVAR(database, field, criteria)

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

- **database:** this is required and represents the range of cells that makes up the list or database. A **database** is a list of related data in which rows of related information are records and columns of data are fields. The first row of the list contains labels for each column
- **field:** indicates which column is used in the function. Make sure you enter the column label enclosed between inverted commas (double quotation marks), e.g. "Age" or "Yield", or a number (without quotation marks) that represents the position of the column within the list, that is, 1 for the first column, 2 for the second column, and so on. Microsoft's documentation states that this argument is required. We're not convinced. If **field** is omitted, **DVAR** identifies the sum of all of the records in the table that match the criteria
- **criteria:** is the range of cells that contains the conditions you specify. You can use any range for the **criteria** argument, as long as it includes at least one column label and at least one cell below the column label in which you specify a condition for the column.

It should be further noted that:

- you can use any range for the **criteria** argument, as long as it includes at least one column label and at least one cell below the column label for specifying the condition, e.g. if the range **G1:G2** contains the column label Income in **G1** and the amount 10,000 in **G2**, you could define the range as **MatchIncome** and use that name as the criteria argument in the database functions (although do note that in the Excel web application, you cannot define named ranges yet)
- although the **criteria** range can be located anywhere on the worksheet, do not place the **criteria** range below the list. If you add more information to the list, the new information is added to the first row below the list. If the row below the list is not blank, Excel cannot add the new information
- make sure that the **criteria** range does not overlap the list
- to perform an operation on an entire column in a **database**, enter a blank line below the column labels in the **criteria** range.

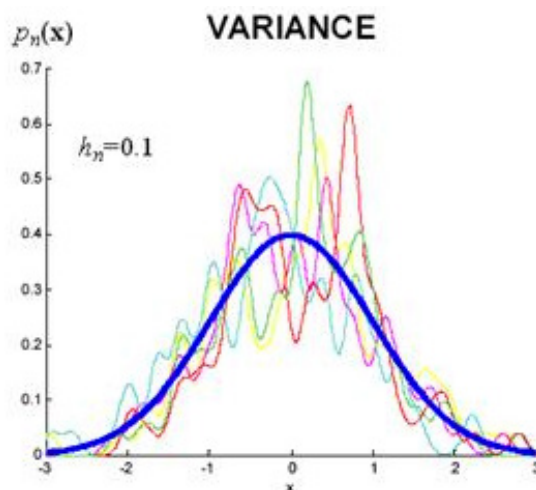
Please see an example below:

	A	B	C	D	E
1	Tree	Height	Height		
2	Apple	>3	<=4		
3	Pear				
4					
5	Tree	Height	Age	Yield	Profit
6	Apple	6	20	14	105
7	Apple	4	12	10	96
8	Cherry	4.2	14	9	105
9	Apple	4.7	15	10	75
10	Pear	3	8	8	16.8
11	Apple	2.7	9	6	45
12					
13	Formula	Description	Result		
14	=DVAR(A5:E11,"Yield",A1:C3)	The estimated variance in the yield of apple and pear trees (with apple trees height restricted) if the data in the database is only a sample of the total orchard population.	2.00		
15					

The A to Z of Excel Functions: DVARP

This function estimates the variance of a population based on the entire population by using the numbers in a **field** (column) of records in a list or database that match conditions that you specify. The variance of a random variable **X** is the expected value (the average) of the squared deviation from the mean of the range of values of **X**, $\mu = E[X]$, i.e.

$$\text{Var}(X) = E[(X - \mu)^2].$$



In case you have forgotten what was written above (!), given that the standard deviation (σ) is given by:

$$\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^N (x_i - \mu)^2}$$

it is clear that the variance is the square of the standard deviation and hence is related accordingly with the **DSTDEVP** function – again, covered last month.

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

DVARP(database, field, criteria)

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

- **database:** this is required and represents the range of cells that makes up the list or **database**. A database is a list of related data in which rows of related information are records and columns of data are fields. The first row of the list contains labels for each column
- **field:** indicates which column is used in the function. Make sure you enter the column label enclosed between inverted commas (double quotation marks), *e.g.* "Age" or "Yield", or a number (without quotation marks) that represents the position of the column within the list, that is, 1 for the first column, 2 for the second column, and so on. Microsoft's documentation states that this argument is required. We're not convinced. If **field** is omitted, **DVARP** identifies the sum of all of the records in the table that match the criteria
- **criteria:** is the range of cells that contains the conditions you specify. You can use any range for the criteria argument, as long as it includes at least one column label and at least one cell below the column label in which you specify a condition for the column.

It should be further noted that:

- you can use any range for the **criteria** argument, as long as it includes at least one column label and at least one cell below the column label for specifying the condition, *e.g.* if the range **G1:G2** contains the column label Income in **G1** and the amount 10,000 in **G2**, you could define the range as **MatchIncome** and use that name as the criteria argument in the database functions (although do note that in the Excel web application, you cannot define named ranges yet)
- although the **criteria** range can be located anywhere on the worksheet, do not place the **criteria** range below the list. If you add more information to the list, the new information is added to the first row below the list. If the row below the list is not blank, Excel cannot add the new information
- make sure that the **criteria** range does not overlap the list
- to perform an operation on an entire column in a **database**, enter a blank line below the column labels in the **criteria** range.

Please see an example below:

	A	B	C	D	E
1	Tree	Height	Height		
2	Apple	>3	<=4		
3	Pear				
4					
5	Tree	Height	Age	Yield	Profit
6	Apple	6	20	14	105
7	Apple	4	12	10	96
8	Cherry	4.2	14	9	105
9	Apple	4.7	15	10	75
10	Pear	3	8	8	16.8
11	Apple	2.7	9	6	45
12					
13	Formula	Description	Result		
14	=DVARP(A5:E11,"Yield",A1:C3)	The estimated variance in the yield of apple and pear trees (with apple trees height restricted) if the data in the database is the entire orchard population.	1.00		
15					

Criteria Examples

Typing an equal sign in a cell indicates you want to enter a formula. To display text that includes an equal sign, surround the text and the equal sign with double quotes, like so:

"=Liam"

You also do that if you're entering an expression (a combination of formulas, operators, and text) and you want to display the equal sign instead of have Excel use it in a calculation. For example:

="= entry "

Where entry is the text or value you want to find. For example:

What you type in the cell	What Excel evaluates and displays
<code>= "Liam"</code>	<code>=Liam</code>
<code>= ">=1"</code>	<code>>=1</code>

- When filtering text data, Excel does not distinguish between uppercase and lowercase characters. However, you can use a formula to perform a case-sensitive search (see below).

The following sections provide examples of complex criteria.

Multiple criteria in one column

Boolean logic: (Salesperson = "Tim" OR Salesperson = "Kathryn")

To find rows that meet multiple criteria for one column, type the criteria directly below each other in separate rows of the criteria range.

e.g. In the following data range (A5:C9), the criteria range (B1:B3) displays the rows that contain either "Tim" or "Kathryn" in the **Salesperson** column (B5:B9).

	A	B	C
1	Service	Salesperson	Sales
2		=Tim	
3		Kathryn	
4			
5	Service	Salesperson	Sales
6	Consulting	Kathryn	\$ 1,744
7	Training	Tim	\$ 9,183
8	Auditing	Kathryn	\$ 2,599
9	auditing	Cecile	\$ 1,117
10			

Multiple criteria in multiple columns where all criteria must be true

Boolean logic: (Service = "Auditing" AND Sales > 1500)

To find rows that meet multiple criteria in multiple columns, type all of the criteria in the same row of the criteria range.

In the following data range (A5:C9), the criteria range (A1:C2) displays all rows that contain "Auditing" in the Service column and a value greater than \$1,500 in the Sales column (C5:C9).

	A	B	C
1	Service	Salesperson	Sales
2	=Auditing		>1500
3			
4			
5	Service	Salesperson	Sales
6	Consulting	Kathryn	\$ 1,744
7	Training	Tim	\$ 9,183
8	Auditing	Kathryn	\$ 2,599
9	auditing	Cecile	\$ 1,117
10			

Multiple criteria in multiple columns where any criteria can be true

Boolean logic: (Service = "Auditing" OR Salesperson = "Kathryn")

To find rows that meet multiple criteria in multiple columns, where any criteria can be true, type the criteria in different rows of the criteria range.

In the following data range (A5:C9), the criteria range (A1:B3) displays all rows that contain "Auditing" in the **Service** column (C5:C9) or "Kathryn" in the **Salesperson** column (B5:B9).

	A	B	C
1	Service	Salesperson	Sales
2	=Auditing		
3		Kathryn	
4			
5	Service	Salesperson	Sales
6	Consulting	Kathryn	\$ 1,744
7	Training	Tim	\$ 9,183
8	Auditing	Kathryn	\$ 2,599
9	auditing	Cecile	\$ 1,117
10			

Multiple sets of criteria where each set includes criteria for multiple columns

Boolean logic: ((Salesperson = "Kathryn" AND Sales >2000) OR (Salesperson = "Tim" AND Sales > 1500))

To find rows that meet multiple sets of criteria, where each set includes criteria for multiple columns, type each set of criteria in separate rows.

In the following data range (A5:C9), the criteria range (B1:C3) displays the rows that contain both "Kathryn" in the **Salesperson** column and a value greater than \$2,000 in the **Sales** column, or displays the rows that contain "Tim" in the **Salesperson** column (B5:B9) and a value greater than \$1,500 in the **Sales** column (C5:C9).

	A	B	C
1	Service	Salesperson	Sales
2		=Kathryn	>2000
3		Tim	>1500
4			
5	Service	Salesperson	Sales
6	Consulting	Kathryn	\$ 1,744
7	Training	Tim	\$ 9,183
8	Auditing	Kathryn	\$ 2,599
9	auditing	Cecile	\$ 1,117
10			

Multiple sets of criteria where each set includes criteria for one column

Boolean logic: ((Sales > 2000 AND Sales <= 3000) OR (Sales < 1500))

To find rows that meet multiple sets of criteria, where each set includes criteria for one column, include multiple columns with the same column heading.

In the following data range (A5:C9), the criteria range (C1:D3) displays rows that contain values between 2,000 and 3,000 and values less than 1,500 in the Sales column (C5:C9).

	A	B	C	D
1	Service	Salesperson	Sales	Sales
2			>2000	<=3000
3			<1500	
4				
5	Service	Salesperson	Sales	
6	Consulting	Kathryn	\$ 1,744	
7	Training	Tim	\$ 9,183	
8	Auditing	Kathryn	\$ 2,599	
9	auditing	Cecile	\$ 1,117	
10				

Criteria to find text values that share some characters but not others

To find text values that share some characters but not others, do one or more of the following:

- type one or more characters without an equal sign (=) to find rows with a text value in a column that begin with those characters. For example, if you type the text **Lia** as a criterion, Excel finds "Liam", "Liar" and "Lianne"
- use a wildcard character.

The following wildcard characters can be used as comparison criteria:

Use	To Find
? (question mark)	Any single character For example, sm?th finds "smith" and "smyth"
* (asterisk)	Any number of characters For example, *east finds "Northeast" and "Southeast"
~ (tilde) followed by ?, * or ~	A question mark, asterisk, or tilde For example, fy91~? finds "fy91?"

In the following data range (A5:C9), the criteria range (A1:B3) displays rows with "Co" as the first characters in the Service column or rows with the second character equal to "i" in the Salesperson column (B5:B9).

	A	B	C
1	Service	Salesperson	Sales
2	Co		
3		=?i*	
4			
5	Service	Salesperson	Sales
6	Consulting	Kathryn	\$ 1,744
7	Training	Tim	\$ 9,183
8	Auditing	Kathryn	\$ 2,599
9	auditing	Cecile	\$ 1,117
10			

Criteria created as the result of a formula

You can use a calculated value that is the result of a formula as your criterion. Remember the following important points:

- the formula must evaluate to TRUE or FALSE
- because you are using a formula, enter the formula as you normally would, and do not type the expression in the following way:
="= entry "
- do not use a column label for criteria labels; either keep the criteria labels blank or use a label that is not a column label in the range (in the examples below, **Calculated Average** and **Exact Match**)
- if you use a column label in the formula instead of a relative cell reference or a range name, Excel displays an error value such as #NAME? or #VALUE! in the cell that contains the criterion. You can ignore this error because it does not affect how the range is filtered
- the formula that you use for criteria must use a relative reference to refer to the corresponding cell in the first row (in the examples below, **C6** and **A6**)
- all other references in the formula must be absolute references.

The following subsections provide specific examples of criteria created as the result of a formula.

Filtering for values greater than the average of all values in the data range

In the following data range (A5:C9), the criteria range (D1:D2) displays rows that have a value in the Sales column greater than the average of all the values (C6:C9). In the formula, "C6" refers to the filtered column (C) of the first row of the data range (6).

	A	B	C	D
1	Service	Salesperson	Sales	Calculated Average
2				=C6>AVERAGE(\$C\$6:\$C\$9)
3				
4				
5	Service	Salesperson	Sales	
6	Consulting	Kathryn	\$ 1,744	
7	Training	Tim	\$ 9,183	
8	Auditing	Kathryn	\$ 2,599	
9	auditing	Cecile	\$ 1,117	
10				

Filtering for text by using a case-sensitive search

In the data range (A5:C9), the criteria range (D1:D2) displays rows that contain "Auditing" in the Service column by using the EXACT function to perform a case-sensitive search (A5:A9). In the formula, "A6" refers to the filtered column (A) of the first row of the data range (6).

	A	B	C	D
1	Service	Salesperson	Sales	Exact Match
2				=EXACT(A6,"Auditing")
3				
4				
5	Service	Salesperson	Sales	
6	Consulting	Kathryn	\$ 1,744	
7	Training	Tim	\$ 9,183	
8	Auditing	Kathryn	\$ 2,599	
9	auditing	Cecile	\$ 1,117	
10				

More Excel Functions next month...

Upcoming SumProduct Training Courses

Location	Course	Date	Duration
Sydney	Excel Tips and Tricks	2 Mar 2020	1 Day
Sydney	Financial Modelling	3 - 4 Mar 2020	2 Days
Melbourne	Power Pivot, Power Query and Power BI	3 - 5 Mar 2020	3 Days
Sydney	Excel Tips and Tricks	6 Apr 2020	1 Day
Sydney	Financial Modelling	7 - 8 Apr 2020	2 Days
Melbourne	Excel Tips and Tricks	7 Apr 2020	1 Day
Melbourne	Financial Modelling	8 - 9 Apr 2020	2 Days
Sydney	Power Pivot, Power Query and Power BI	11 - 13 May 2020	3 Days
Melbourne	Power Pivot, Power Query and Power BI	18 - 20 May 2020	3 Days
Melbourne	Excel Tips and Tricks	25 May 2020	1 Day
Melbourne	Financial Modelling	26 - 27 May 2020	2 Days
Sydney	Power Pivot, Power Query and Power BI	16 - 18 Jun 2020	3 Days
Melbourne	Power Pivot, Power Query and Power BI	22 - 24 Jun 2020	3 Days
Melbourne	Excel Tips and Tricks	6 Jul 2020	1 Day
Melbourne	Financial Modelling	8 - 9 Jul 2020	2 Days
Sydney	Excel Tips and Tricks	14 Jul 2020	1 Day
Sydney	Financial Modelling	15 - 16 Jul 2020	2 Days
Melbourne	Power Pivot, Power Query and Power BI	20 - 22 Jul 2020	3 Days
Sydney	Power Pivot, Power Query and Power BI	27 - 29 Jul 2020	3 Days
Sydney	Excel Tips and Tricks	17 Aug 2020	1 Day
Sydney	Financial Modelling	18 - 19 Aug 2020	2 Days
Melbourne	Excel Tips and Tricks	18 Aug 2020	1 Day
Melbourne	Financial Modelling	19 - 20 Aug 2020	2 Days

Location	Course	Date	Duration
Sydney	Power Pivot, Power Query and Power BI	24 - 26 Aug 2020	3 Days
Melbourne	Power Pivot, Power Query and Power BI	7 - 9 Sep 2020	3 Days
Sydney	Excel Tips and Tricks	21 Sep 2020	1 Day
Sydney	Financial Modelling	22 - 23 Sep 2020	2 Days
Sydney	Power Pivot, Power Query and Power BI	6 - 8 Oct 2020	3 Days
Melbourne	Power Pivot, Power Query and Power BI	9 - 11 Nov 2020	3 Days
Sydney	Excel Tips and Tricks	9 Nov 2020	1 Day
Sydney	Financial Modelling	10 - 11 Nov 2020	2 Days
Melbourne	Excel Tips and Tricks	16 Nov 2020	1 Day
Melbourne	Financial Modelling	17 - 18 Nov 2020	2 Days
Sydney	Power Pivot, Power Query and Power BI	8 - 10 Dec 2020	3 Days
Melbourne	Power Pivot, Power Query and Power BI	14 - 16 Dec 2020	3 Days

Key Strokes

Each newsletter, we'd like to introduce you to useful keystrokes you may or may not be aware of. This month, we thought we would see what may be achieved with add (+) and subtract (-):

Keystroke	What it does
CTRL + ADD (+)	Open Insert Dialog dialog box
SUBTRACT (-)	Extend Selection mode
CTRL + SUBTRACT (-)	Delete cells
SHIFT + SUBTRACT (-)	Add (!) to Selection mode

There are over 540 keyboard shortcuts in Excel. For a comprehensive list, please download our Excel file at 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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Link to Others

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Any Questions?

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