Work With Power BI Visuals
Add Visualization to Your Report

Visuals allow you to
present the important information and insights that you discovered in the data in a compelling and insightful way

Report consumers rely on these visualization as **a gateway to the underlying data**.

Each visual is **represented by an icon** in the **Visualization pane**

The **type of visuals** include:

- Charts
- Maps
- Cards
- A table
- A matrix
- Many more..

An example scenario:
You want to **add a visualization to the report** that **displays the sales data by category name**
=> You do this by first, **selecting the Category and Revenue fields** in the **Fields pane**,
=> Power BI then **automatically selects a visualization for you**, depending on the **data type of the fields that you selected**

NOTE: You can change the visual by **selecting the visual**, and then **selecting a different visualization** from the **Visualization pane**

Choose an Effective Visualization

Power BI **offers a range of out-of-the-box visualization options that are available directly** from the **Visualizations pane**

You can experiment with other visualizations to determine **which visual best fits your need**.

If you **CANNOT find one that meets your needs**
=> **Download other visuals from Microsoft AppSource**
=> **Import your own custom visual**

It is important that you **select an effective visualization** that **displays the data in the best way possible,** the following section outlines the different types of visualization that are available:

Table and Matrix Visualization

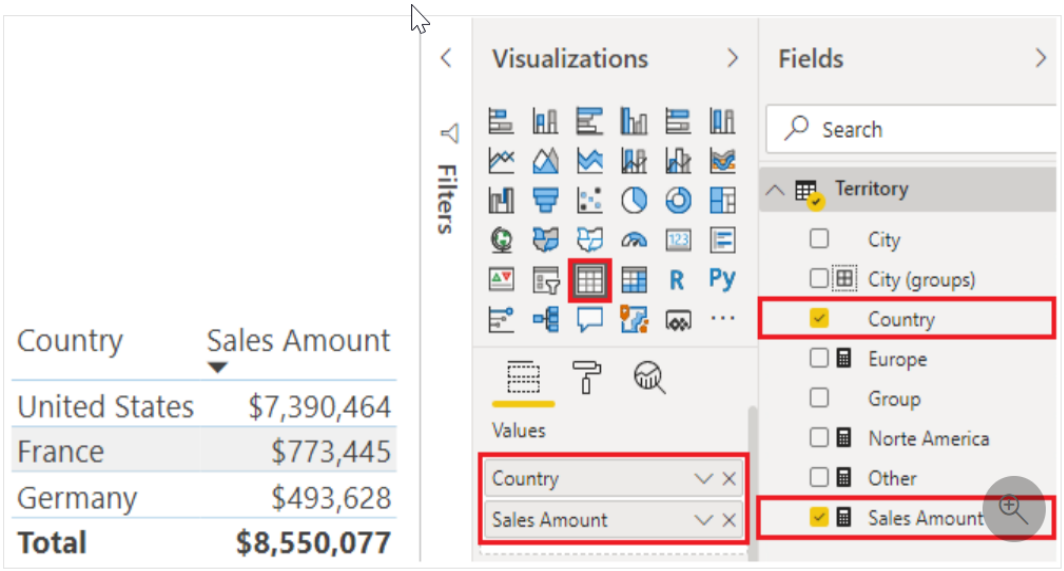
Table

A grid that **contains related data in a logical series of rows and columns**

Supports **two dimensions**

Can contain headers and a row for totals

An example is shown below:

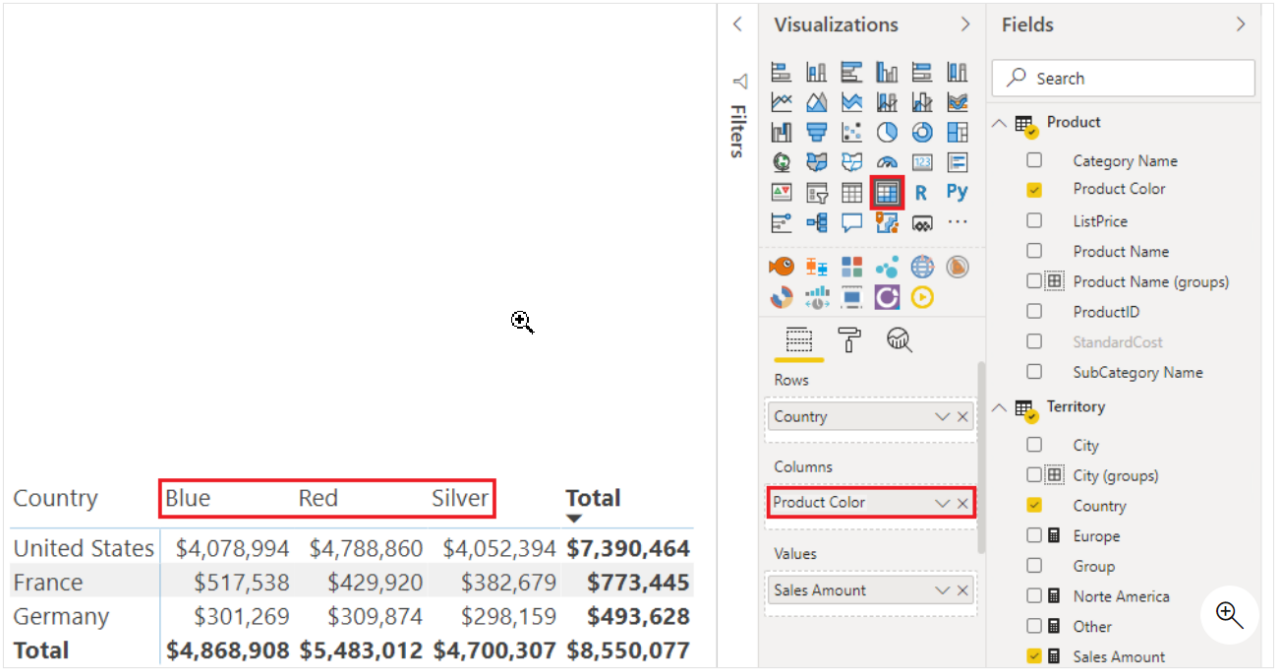


Matrix

The **Matrix visualization** looks **similar to the table visualization**

However, it **allows you to select one or more elements (rows, columns, values)** in the matrix to **cross-highlight other visuals on the report page**

An example is shown below

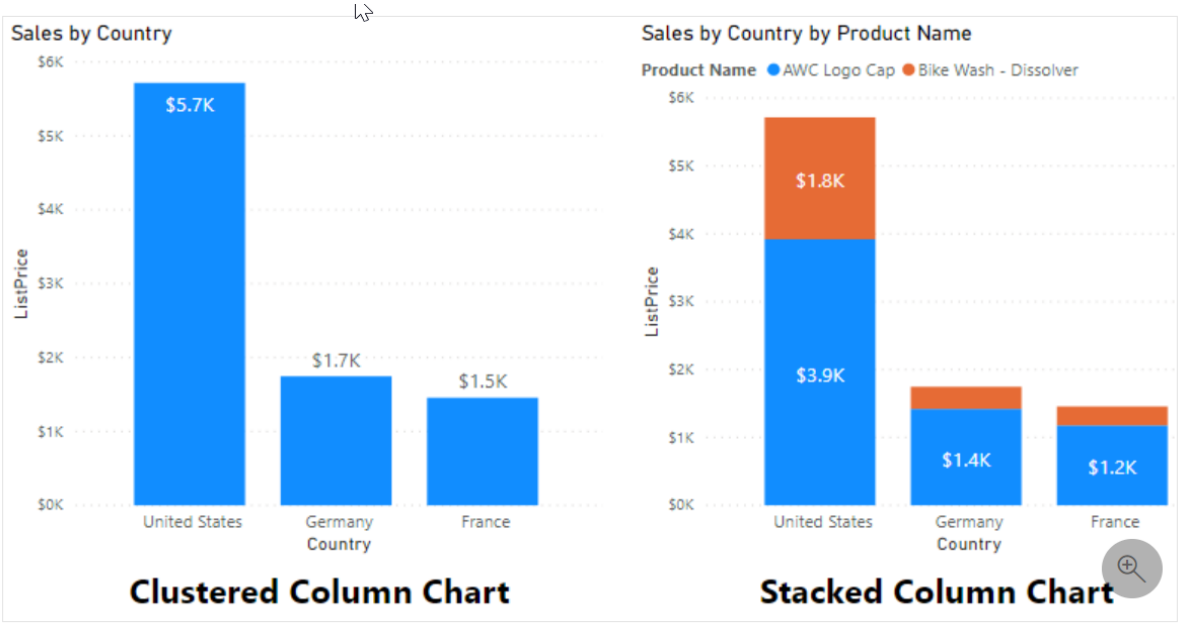


Bar and Column Charts

used to **present specific data across different categories in a stacked or clustered format**

The **stacked format** will **stack the information items on top of each other**

An example is shown below:



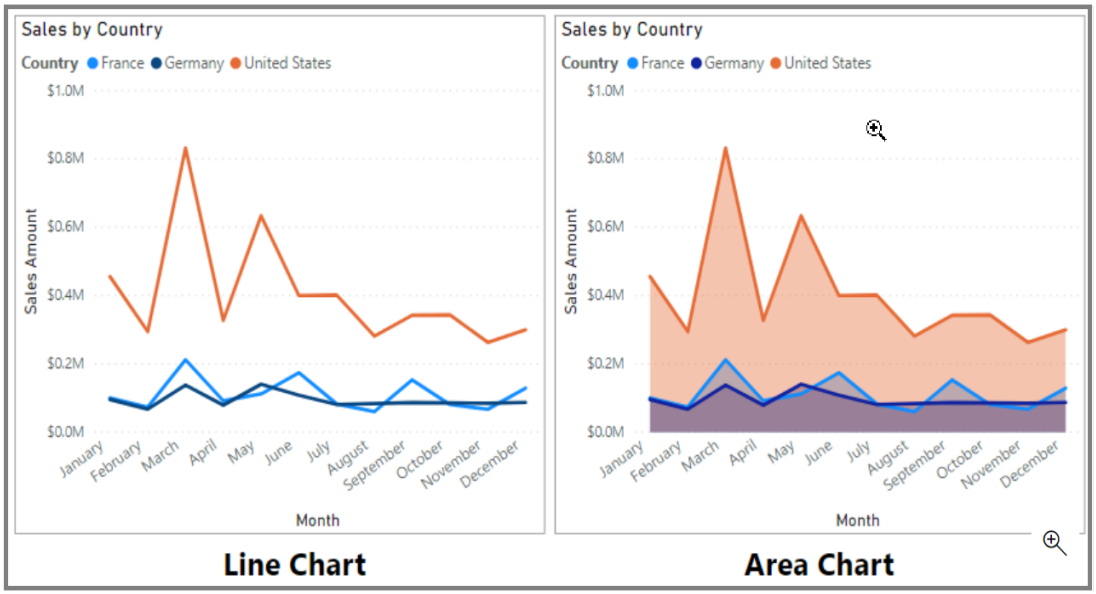
Line and Area Charts

The **line chart** and **area chart** visualization are **beneficial in helping you present trends over time**

The **main difference** these two chart types is that:

- **the area chart highlights the magnitude of change over time** – **with the area between axis and line filled in**

An example is shown below:



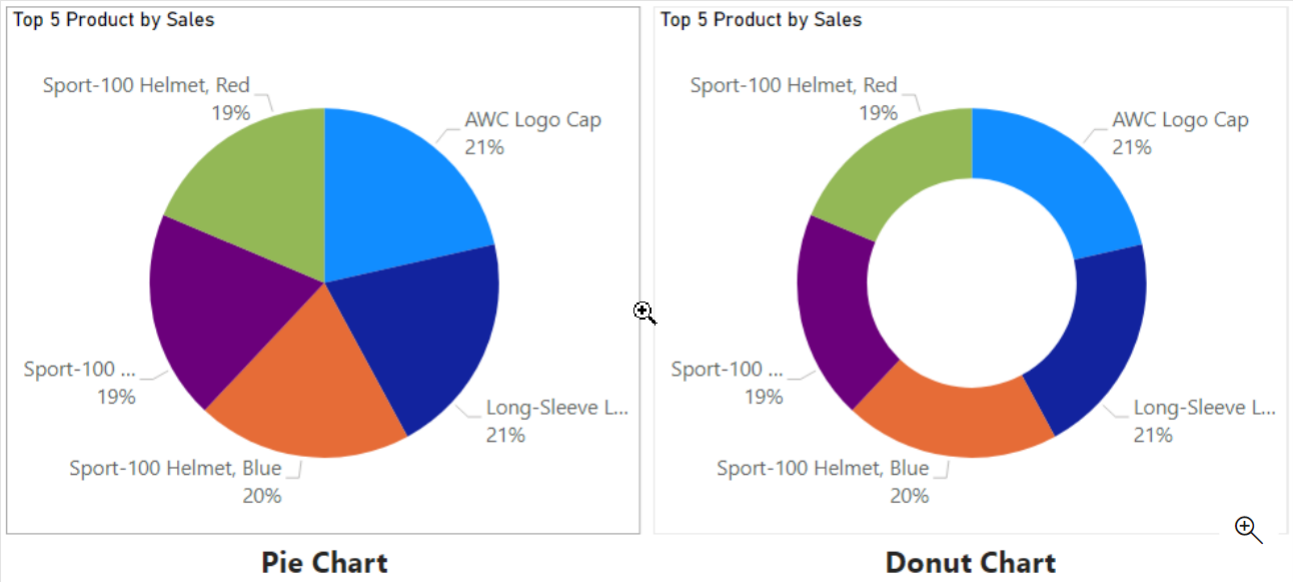
Pie Chart, Donut Chart, and Treemaps

these visualization **shows you the relationship of parts to the whole by dividing the data into segments**

From a data analysis perspective, **these charts are not useful** because **interpreting the data that they present can be difficult**

These charts are **best suited** for **illustrating percentages**
such as, **top five sales by product or country, or any other available categories**

An example of a **pie chart** and a **donut chart** is shown below:



Pie charts and donut charts present data by **dividing it into slices**,
Too many categories and **it results in thin slices (or rectangles**) that **provide no added value to the user**

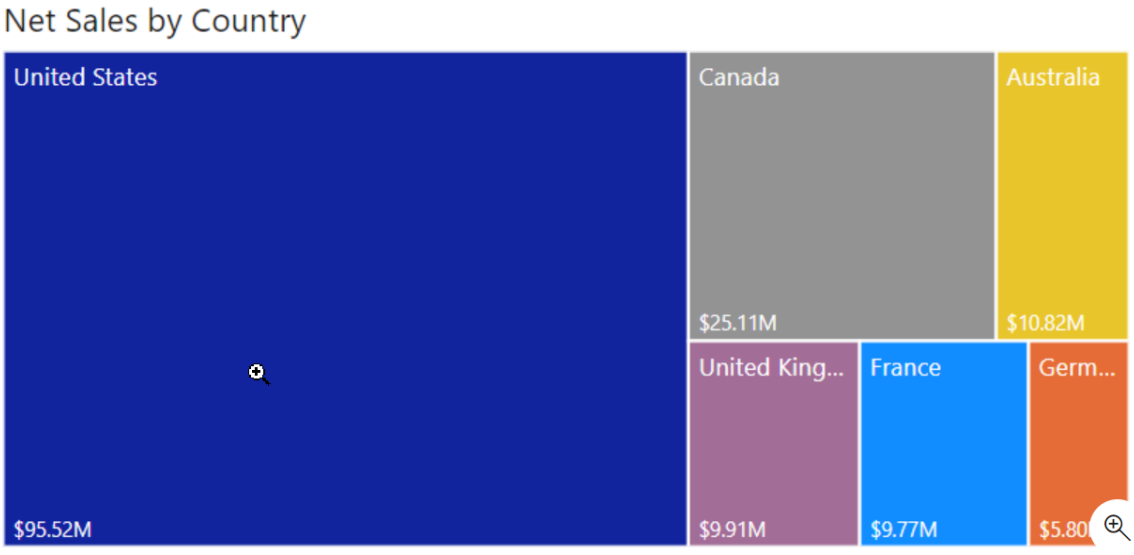
Treemap

displays **data as a set of nested rectangles**

Each level of the hierarchy is represented by a **coloured rectangle (branch)** containing **smaller rectangles (leaves)**

The **space inside each rectangle is allocated based on the value that is being measured**

The rectangles are **arranged in size** from **top left (largest)** to **bottom-right (smallest)**



A tree-map is **ideal to visualize:**

- **Large amounts of hierarchical data** when a **bar chart can't effectively handle the large number of values**
- **Proportions between each part** and **the whole**
- The **distribution pattern of the measure** across **each level of categories in the hierarchy**
- **Attributes**, by **using size and colour coding**
- **Spot patterns, outliers, most-important contributors,** and **exceptions**

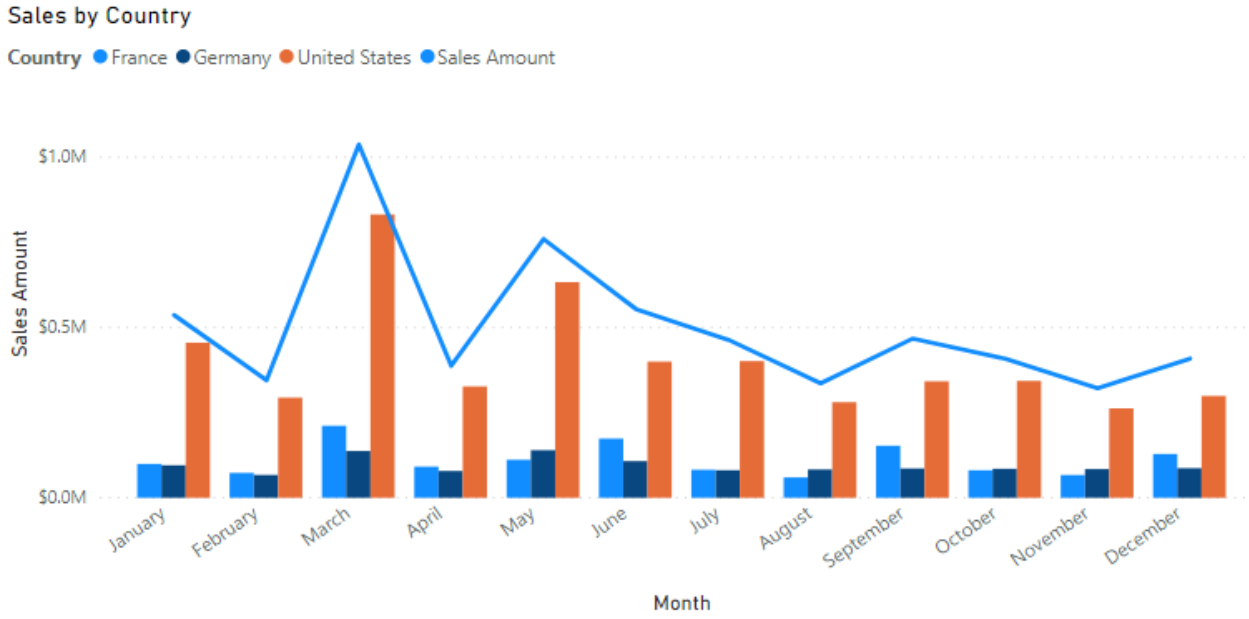
Combo Charts

A **combination of a column chart and a line chart** that **can have one or two Y axes**

The combination allows you to:

- **compare multiple measure with different value ranges**
- **illustrate the correlation** between **two measures in one visual**
- **identify** whether **one measure meets the target that is defined by another measure**
- **conserve space on your report page**

An example is shown below:



Card Visualization

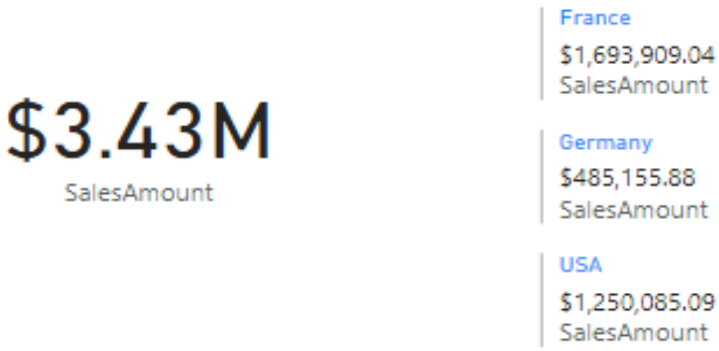
displays a single value: a single data point

ideal for **visualizing important statistics** that you want to track on your Power BI dashboard, or report, e.g.,

total value
YTD sales
year-over-year change

The **multi-row card visualization** displays **one or more data points**, with **one data point for each row**

An example is shown below:



Funnel Visualization

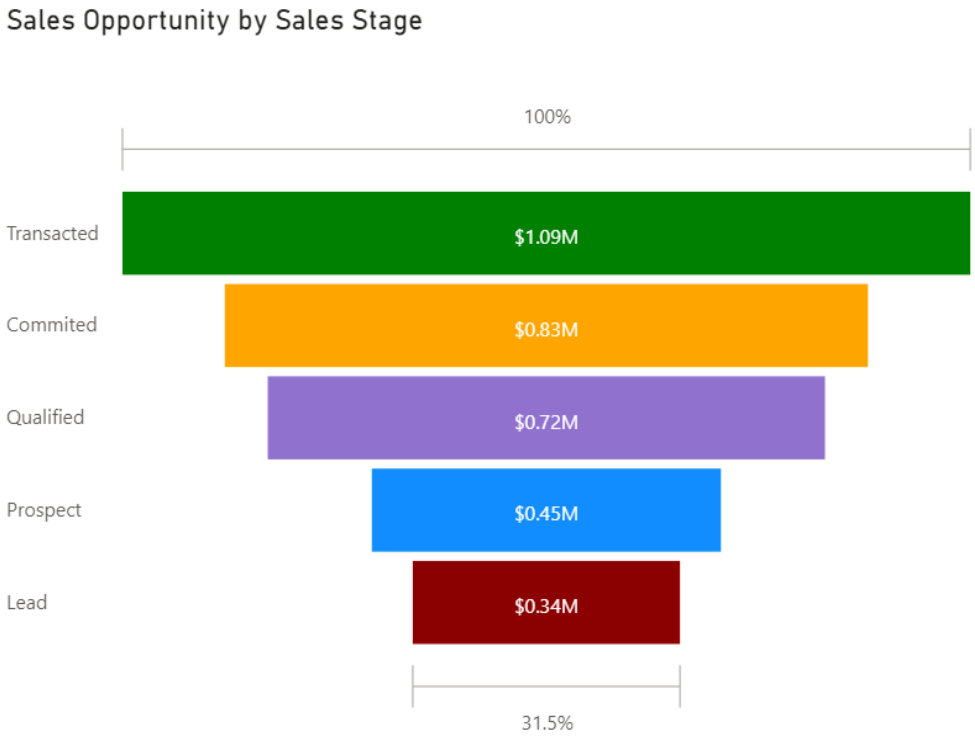
Displays a **linear process** that **has sequential connected stages**, where **items flow sequentially from one stage to the next**

Most often seen in **business or sales context**

For example:

they are **useful for representing a workflow**, such as **moving from a sales lead to a prospect, through to a proposal and sale**

An example is shown below:



Funnel charts are **great options** in the following context:

- When **data is sequential** and **moves through at least four stages**
- When the **number of items in the first stage** is **expected to be greater** than **the number of items in the final stage**
- To **calculate a potential outcome (revenue, sales, deals, and so on) by stages**

- To **calculate** and **track conversion** and **retention rates**
- To **reveal bottlenecks in a linear process**

Gauge Chart

A gauge chart has a **circular arc** and **displays a single value that measures progress towards a goal or target**

The **value at the end of the arc** represents **the defaulted maximum value**, which will always be **double the actual value**

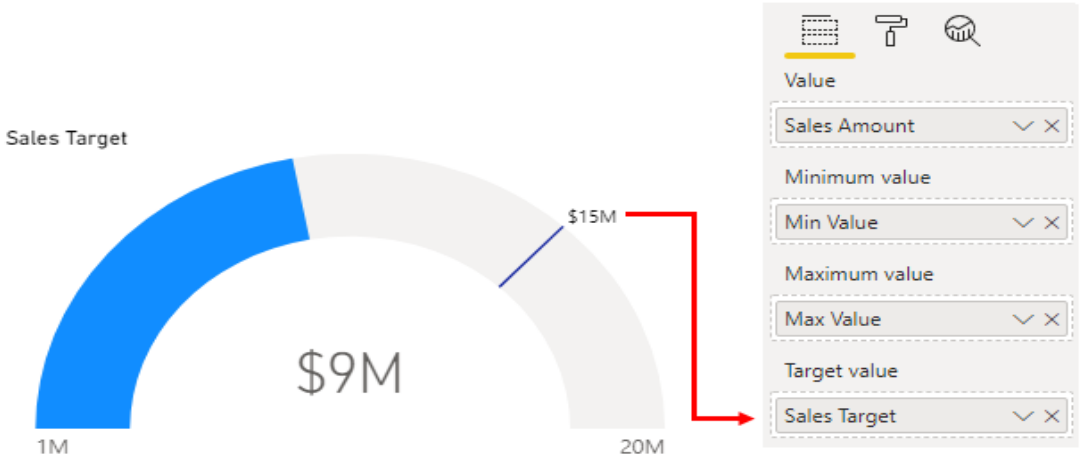
In order to create a realistic visual, you should always specify each of the values.

This can be done by dropping to the correct fields:

- **Target value**
- **Minimum value**
- **Maximum value**

into the **Visualization pane**

An example is shown below:



Radial gauges can be **used to show the progress that is being made towards a goal or target**, or they can **show the health of a single measure**

However radial gauges take up a lot of space, it is **more effective to use a pair of gauges with a spark line** so **users can see the trend and know what to do about it**

Waterfall Visualization

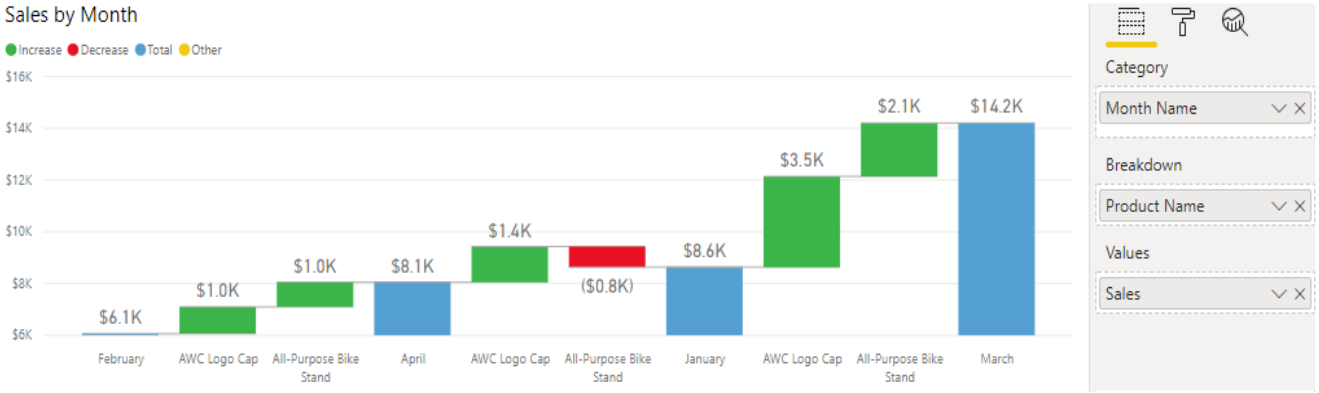
Also known as a bridge chart

shows a running total as **values are added or subtracted**

Useful for **displaying a series of positive and negative changes**

Chart consists of **colour-coded columns** so you can **quickly identify increases and decreases**

An example is shown below:



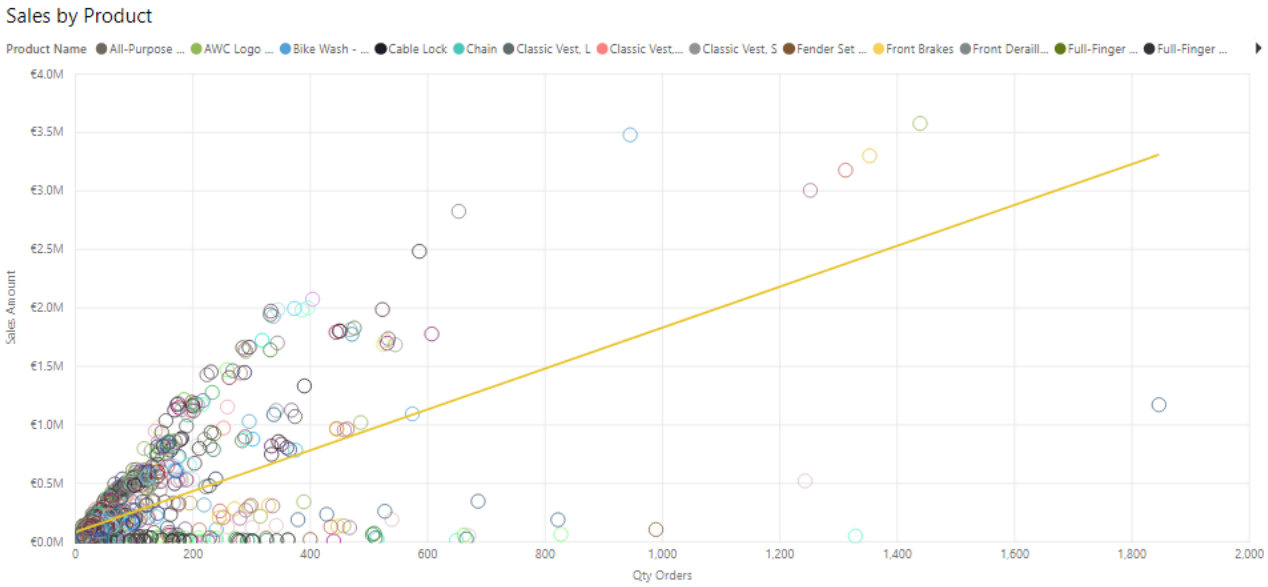
Waterfall charts can **be used to**:

- Visualize **changes over time** or **across different categories**
- **Audit the major changes** that **contribute to the real value**
- **Plot your organization's annual profit** by **showing various sources of revenue** to **help determine the total profit**
- Illustrate the **beginning and ending** headcount for your organization in a year
- Visualize **how much money you earn** and **spend each month** and the **running balance for your account**

Scatter Chart

effective when you are **comparing large numbers of data point without regard to time**

An example is shown below:



The above scatter chart displays **outliers (anomalies)** with a **trendline going up**.
The chart shows that **most products were sold at the same quantity**, and **only some products were sold in larger quantities**.

The **charts displays points at the intersection of an X and Y numerical value**, and combining these **values into a single data point**

Scatter charts allow you to:

- Show **relationships between two numerical values**
- Plot **two groups of numbers as one series of x and y coordinates**

- Turn the **horizontal axis into a logarithmic scale**
- Display **worksheet data** that **includes pairs or grouped sets of values**
- Show **patterns in large sets of data**, e.g., by showing **linear** or **non-linear trends, clusters and outliers**
- Compare **large numbers of data points** without **regard to time**.
    - **THE MORE data you include in a scatter chart**, the **better the comparisons you can make**

Maps

Power BI **integrates with Bing maps** to **provide default map coordinates (a process called geocoding)**

A **basic map** is used to **associate categorical and quantitative information with spatial locations**

A **fill map** uses **shading, tinting**, or **patterns** to **display how a value differs in proportion across a geographical region**.

A **shape map** uses **colours to display relative comparisons of geographical regions**

You can also use **ArcGIS map** to **display graphical information in a more interactive way**

Slicer Visualization

A **stand-alone chart** that can be **used to filter the other visuals on the page**.

Slicers provide a more advanced and **customized way** of **filtering**, in comparison to the **Filters pane**, which is **suited to more basic filtering operations**

Slicers come in many **different formats**:

- **list**
- **drop-down**
- **buttons**

They can be **formatted to allow the selection of only one, many, or all available values**

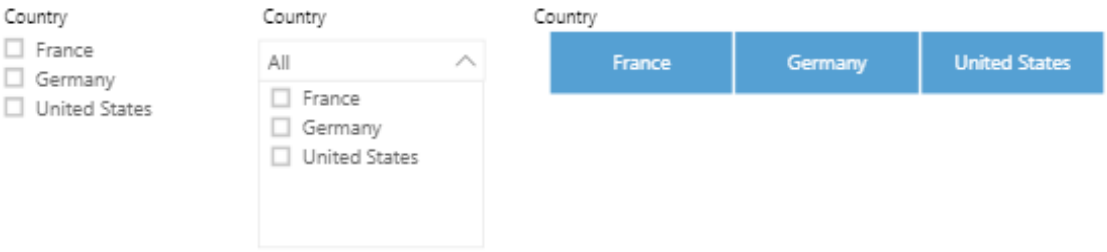
Slicers are **ideal to**:

- Visualize **commonly used or important filters** on the **report canvas** for **easier access**.
- Simplify your **ability to see the current filtered state** without **having to open a drop-down list**
- Filter by **columns** that are **unneeded** and **hidden in the data tables**
- Create more **focused reports by putting slicers next to important visuals**

GIANT NOTE:

Using a **slicer** that is **set to a drop-down format** will **defer the queries that are being sent to the database** and can **help performance**

An example of a **list, drop-down, and button** Slicer is shown below:



Q&A Visualization

Allows you to **ask natural language questions** and **get answers in the form of a visual.**

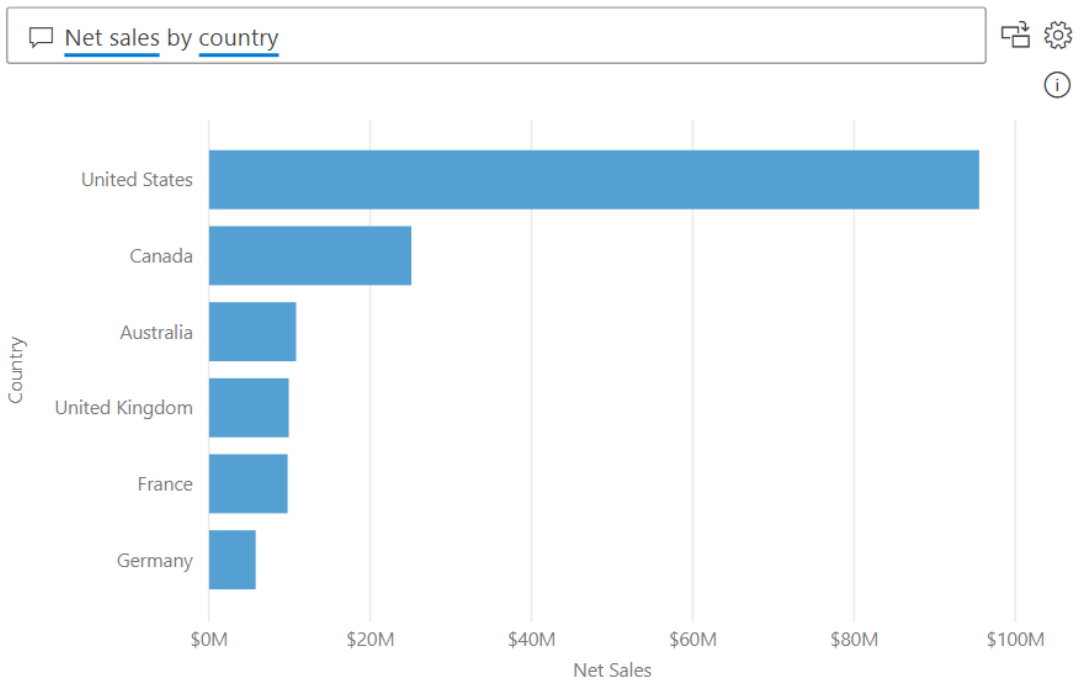
This **ability to ask questions** is **valuable to consumers and you**

This visualization type can **help you create visuals in the report** and it can also be **used as a tool for consumers to get answers quickly**

The **Q&A visualization** consists of the following **four components**:

- **question box**
  - where **users enter their question** and are **shown suggestions to help them complete the question**
- A **pre-populated list of suggested questions**
- An icon that **users can select to convert the Q&A visual into a standard visual**
- An icon that **users can select to open Q&A tooling**
  - which **allows designers to configure the underlying natural language engine**

The following example illustrates how to implement **Net Sales by Country** through a **Q&A visualization**:



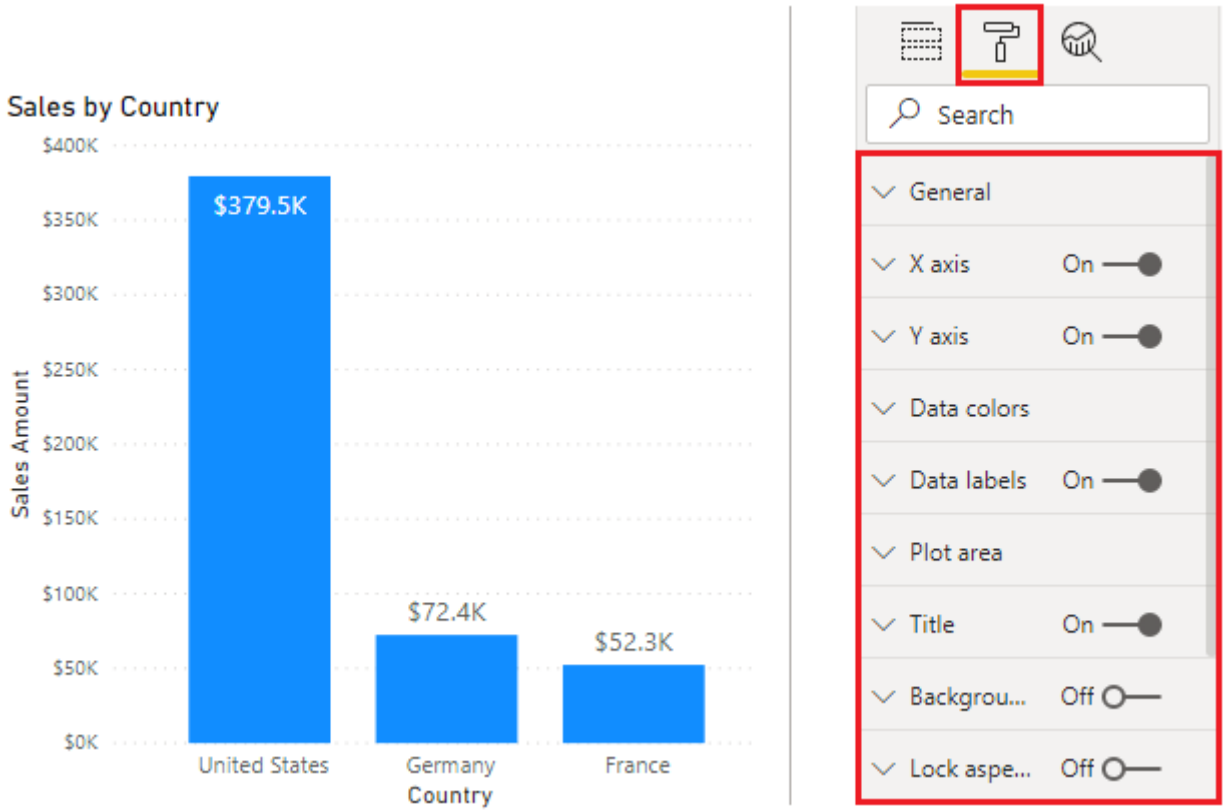
Format and Configure Visualizations

Power BI gives you a **variety of options for customizing how your selected visualization looks**

e.g., **colours and format of the text they contain**

We can **format the visualization** by **selecting the visualization** on the **Canvas**
=> then select the **Format button (paint roller icon)**
=> Power BI then **displays the Format pane**

An example is shown below:



Common formatting options include:

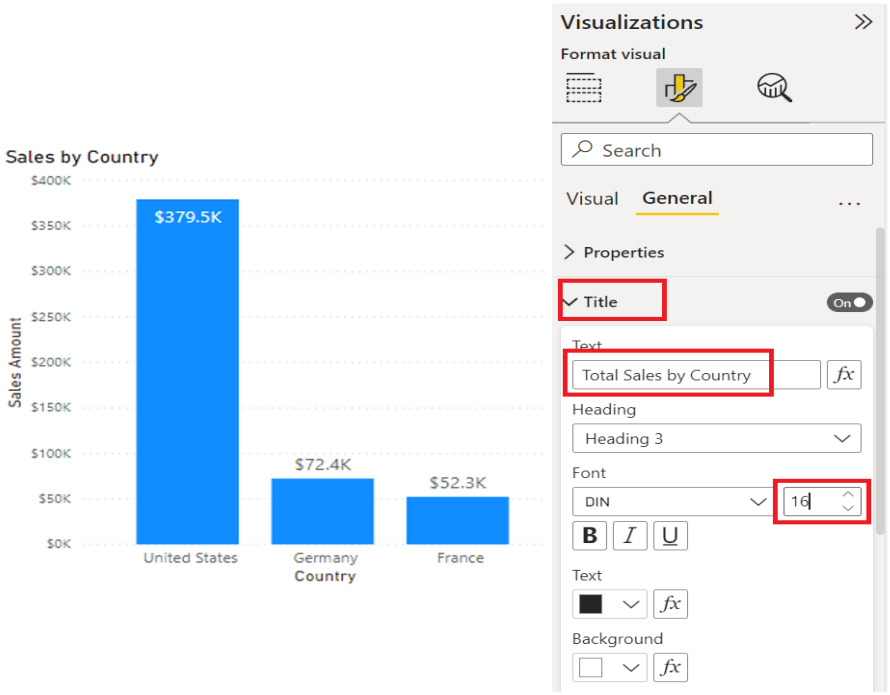
- **Title**
- **Background**
- **Border**

Title

In this section, you can:

- **add a title to the visual**
- **edit the title**
- **format the title – changing the text, text size, font, colour, background, and alignment**

the example below depicts a visual **having its title changed, and the font size increased to 16 points**

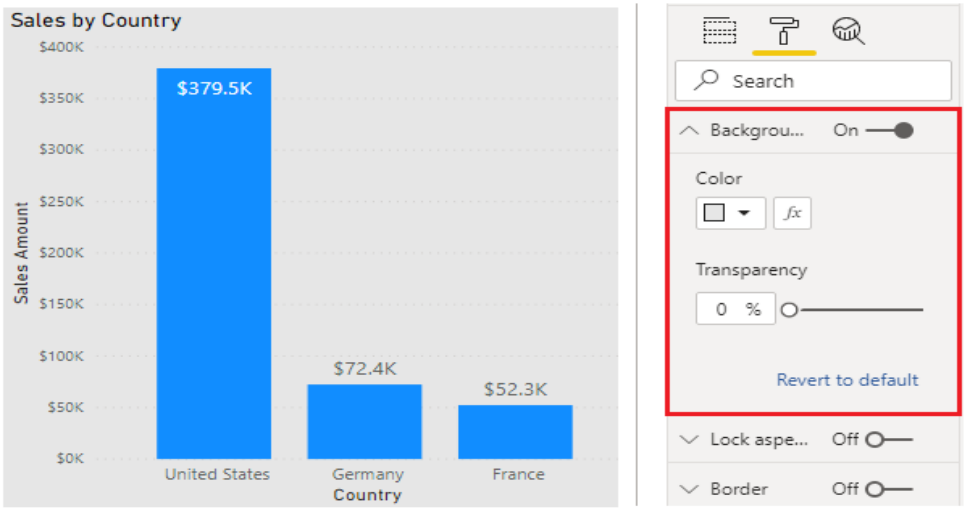


Background

In this section, you can:

- **set any colour or image as the background for the visual**
  - If an image is being selected, **avoid images with lines or shapes** as it might make it difficult for users to read the data
  - best to **keep a white background**, so that the **presented data can be seen easily**

The below example is a **depiction of a visual having its background colour changed to light grey**



Border

In this section, you can:

- **Set a border around the visual to isolate the visual from other elements on the Canvas**
- **Change the border colour and radius to be consistent with your colour scheme**

General

If this section is available, you can:

- **set the precise size and place for your visual on the Canvas**
- **useful to ensure that you have aligned specific visuals consistently**

Data Colours

In this section, you can:

- **format the colours and labels for specific data**
- **set the colours** that **you want to use for the data values in the visual**
  - NOTE: you should **stick to the general colour scheme throughout the report**
- **change fonts, size, and colours for all labels in the visual**
- try to use **solid colours** so that the **labels are clearly visible**

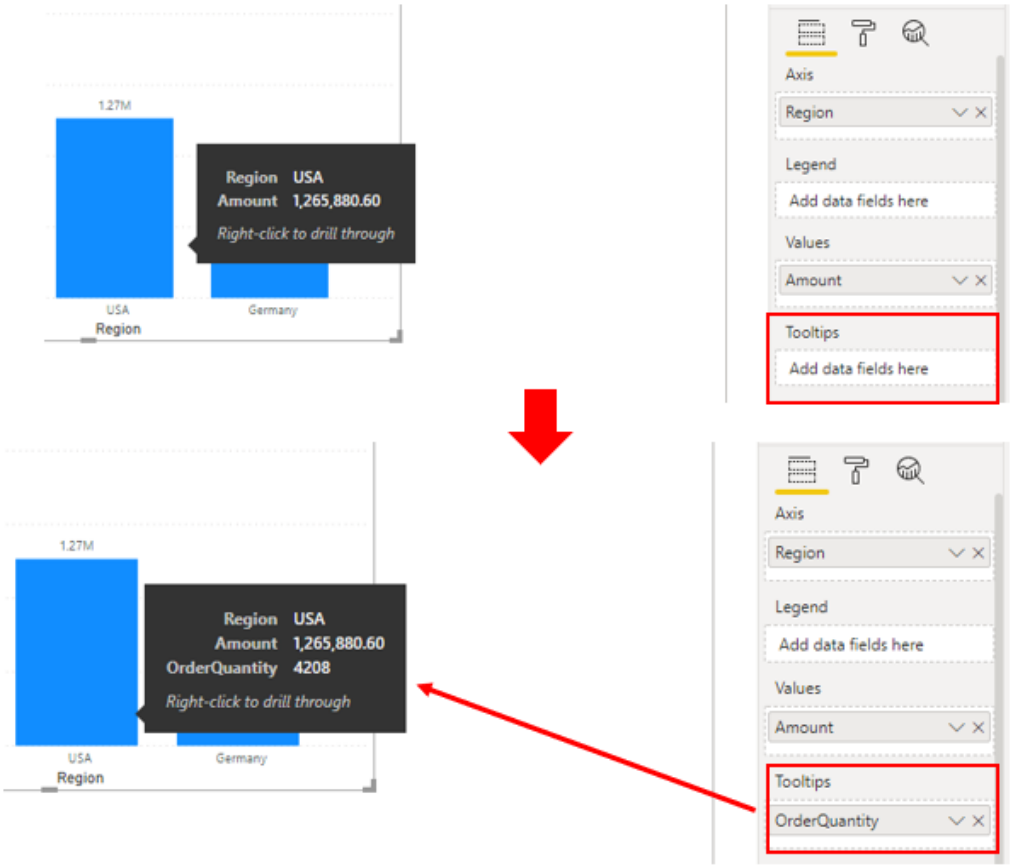
Tooltips

In this section, you can:

- **add a customized tooltip** that **appears when you hover over the visual, based on the report pages**
  - **Tooltip** is a **great feature** as it **provides more contextual information** and **detail to data points on a visual**
  - The default tooltip **displays the data point's value and category**, but your **custom tooltips** can **include visuals, images, and any other collection of items** that you create

You can also **drag columns and additional data points into the tooltips**

This allows **user to see the value when they HOVER OVER THE VISUALIZATION**

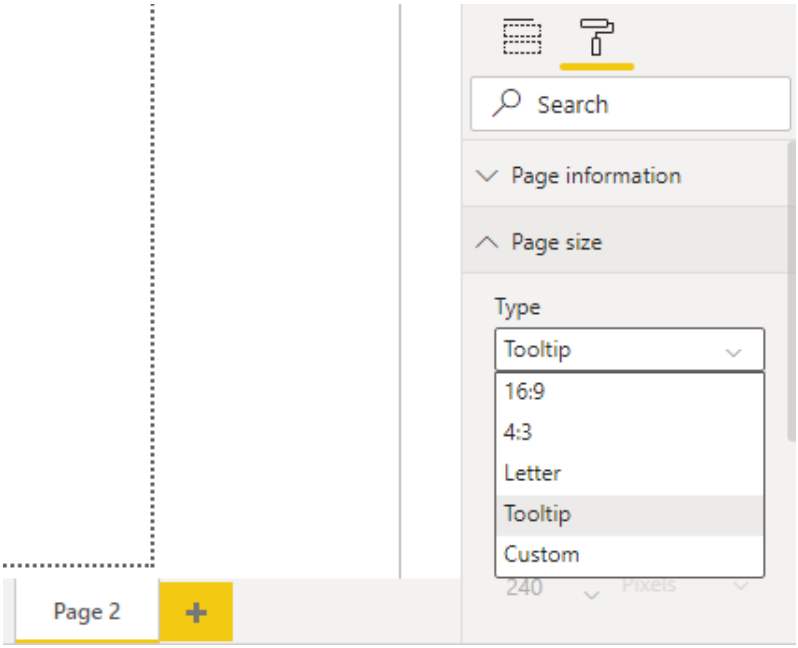


*****Another method** of using **tooltips** is to **display graphical information**

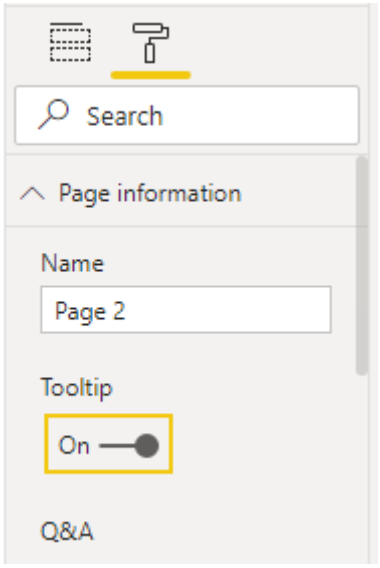
YOU SHOULD LEARN THIS SECTION

Begin by, **creating a new page in the report**
=> Open the new page and then, **open the Format pane**
=> Expand the **PAGE SIZE section**, and then select **Tooltip** from the **Type list**

The steps are illustrated below:



In the **Page information section**, turn the **Tooltip** slider to **On** so that **Power BI registers this page as a tooltip page**, this is illustrated below

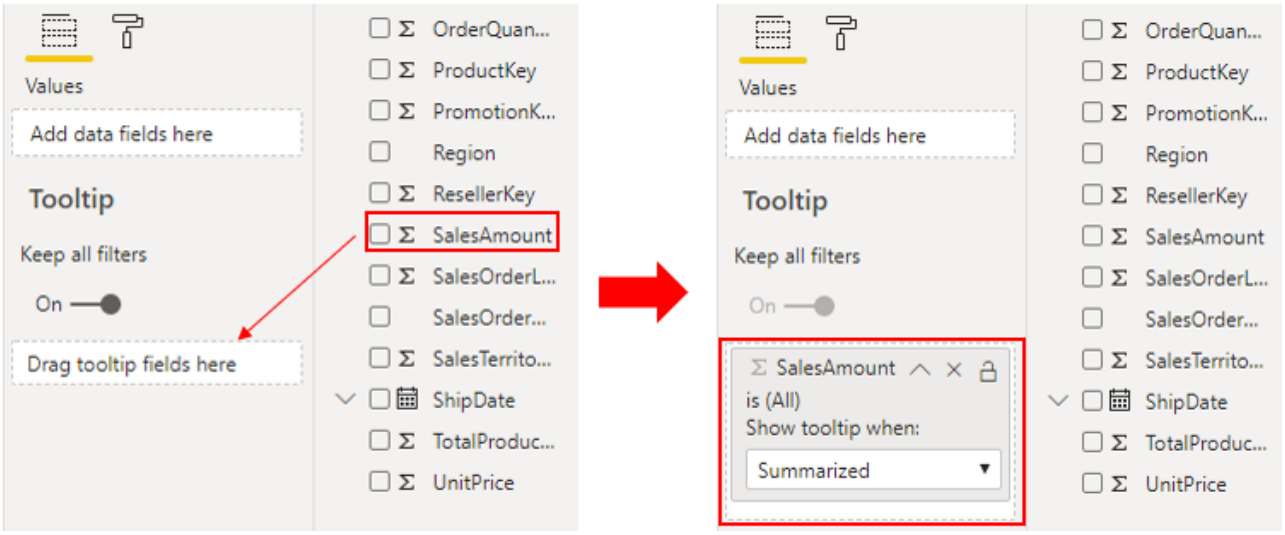


Tooltips have **limited canvas space**, to **ensure that your visuals appear in the tooltip**, on the **View tab (top ribbon of the page)**, set the **Page view option** to **Actual size**

Next, **add one or more visuals IN THE TOOLTIP PAGE**
=> Next, specify the fields for which you want the tooltip to display
=> **Select the tooltip page** and then **select the Values** tab in the **Visualizations pane**.

=> **Drag the fields** from **the Fields pane** into the **Tooltip bucket**

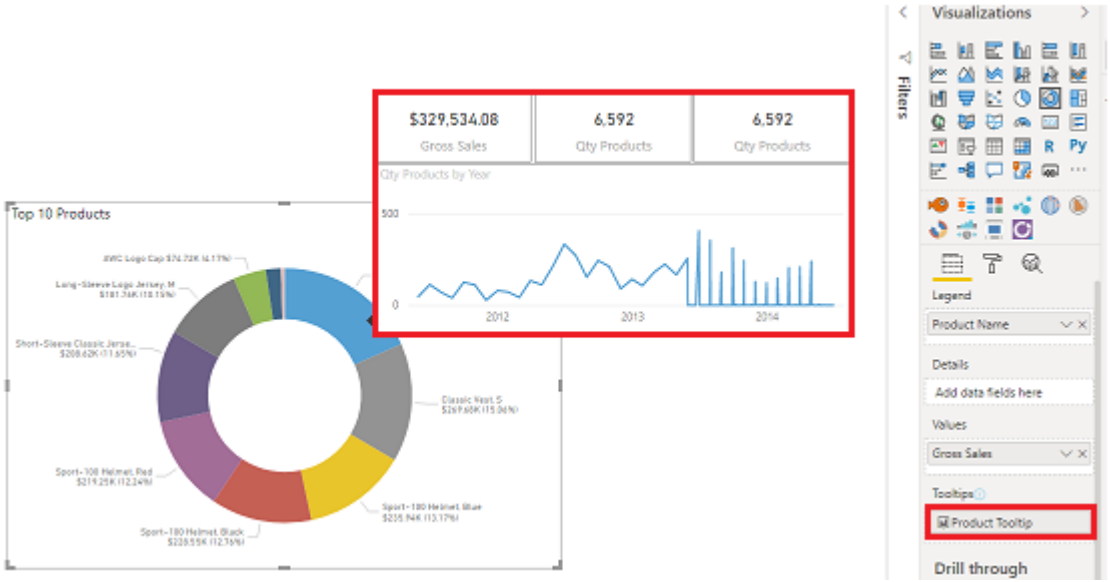
an example is shown below:



Return to the **report page**, and then **apply the tooltip to one or more visuals on that page**.

Select a visual and then in the **Format pane**, scroll down to the **Tooltip section**
=> Turn the **tooltip option On** and then **select your tooltip page** from the **Pages list**

When you **hover over the visual, the tooltip will display**, as shown in the illustration below:



Import a Custom Visual

If you have a **specific visual in mind that is NOT AVAILABLE in the current offerings**, then you can **likely find it in the MARKETPLACE**

Power BI also grants you the **ability to build your own visual**

NOTE: **CUSTOM VISUALS MUST BE IMPORTED** From AppSource **EACH TIME YOU START DEVELOPING A NEW REPORT**

Custom visuals are available in Microsoft AppSource

Some of these custom visuals are **certified** and **some are not certified**

Certified Visuals

This status means that the visual **meets the Microsoft Power BI team code requirements**

The visual is **tested to verify that it doesn't access external services or resources** and that **it follows secure coding patterns and guidelines**

Uncertified Visuals

Certification of visuals is **optional**

Therefore an **uncertified visual is not necessarily unsafe to use**

Creating Your Own Visual

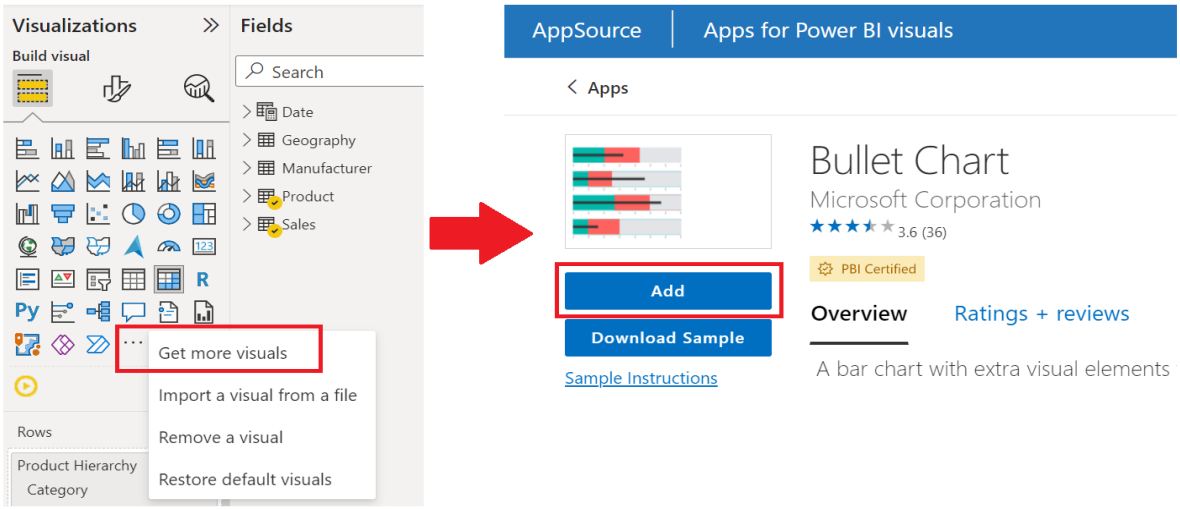
If you want to **create your own custom visual**, you can use the:

- **custom visual software development kit (SDK)**
  - An open-source tool based on NodeJS (JavaScript programming language)
  - Custom visuals are **packaged as a single Power BI visual tools (.pbiviz) file**
  - You can import it into **Power BI desktop**

Importing a Custom Visual From App Source

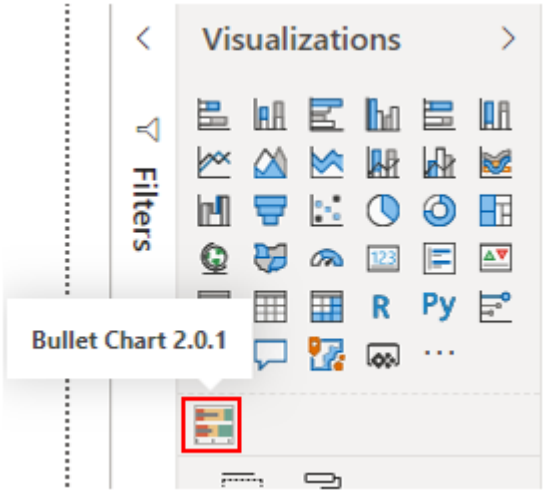
In the **Visualization pane**, select the **Get more visuals** icon and then select **Get more visuals**
=> On the window, **locate, and select the visual that you want to import** and select **Add**

This process is illustrated below:



The **visual will now appear on the Visualization tab pane** along with **every other Visualization**
=> to add the visual to the report, **select its icon**
=> you can then **add fields to visual and customize its formatting**, like every other visual

The process is illustrated below:



Add an R or Python Visual

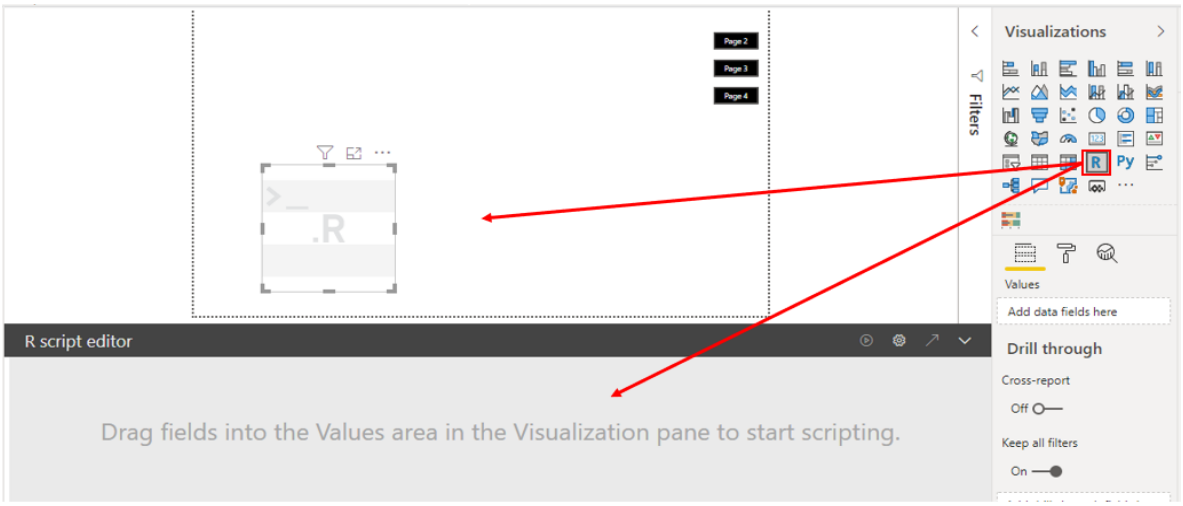
Power BI grants the ability to use **out-of-the-box visualization options** for both **R and Python** that you can **access on the Visualization pane**

Create an R Visual

In order to **create an R visual**, you must have **R installed in your local computer**

Select the **R visual icon** in the **Visualizations pane** and then **select Enable** on the window that displays.
=> You'll then see **a placeholder R visual image on the report canvas**, with the **R script editor underneath**

This process is illustrated below:

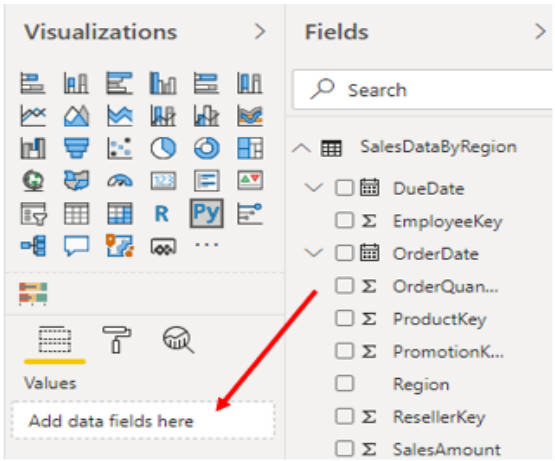


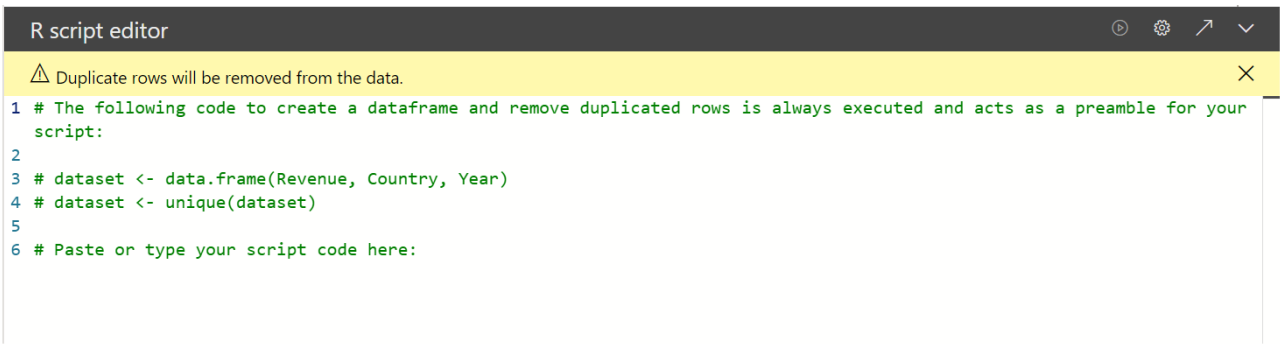
As you **select or remove fields** and **add fields used in the fields** the **supporting code** in the **R script editor** is **automatically generated or removed**. Based on your selections, the **R script editor generates the following binding code**:

- The editor created a dataset data-frame with the fields that you added
- The default aggregation: do not summarize
- Similar to **table visuals**: **fields are grouped and duplicate rows appear only once**

When you have selected the fields, **write the R script** that **results in plotting to the R default device**. When it is completed, select **Run** from the **R script editor title bar**

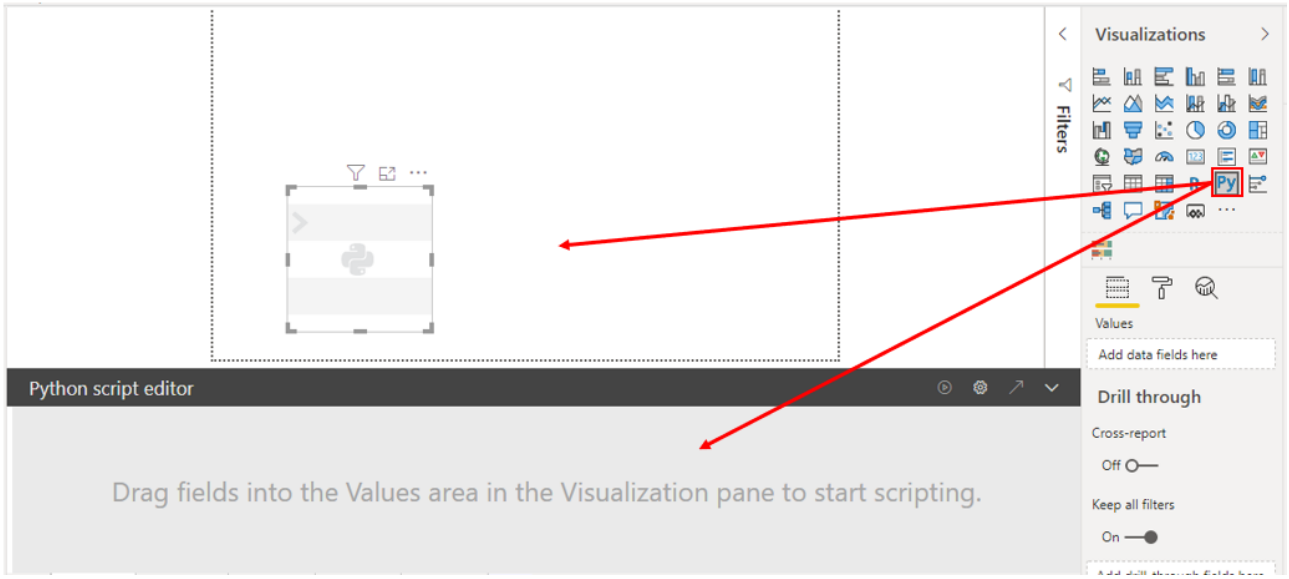
The process is further illustrated below:

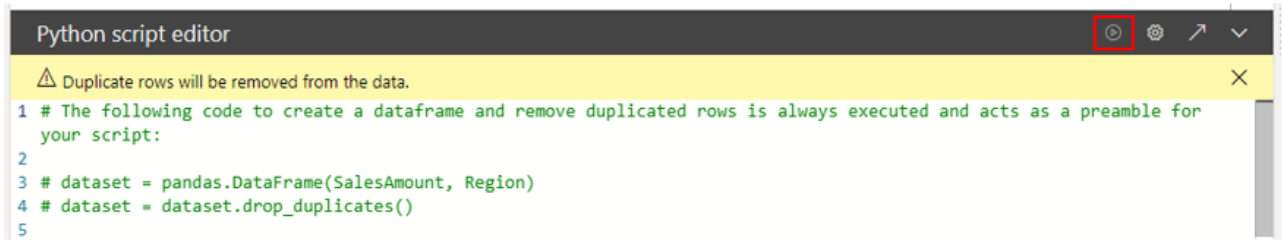




Create a Python Visual

NO PRE-REQUISITES EXISTS for **creating a Python visual**, so you can **start right away** the process is similar to the **R visual** and is best to be illustrated as seen below:

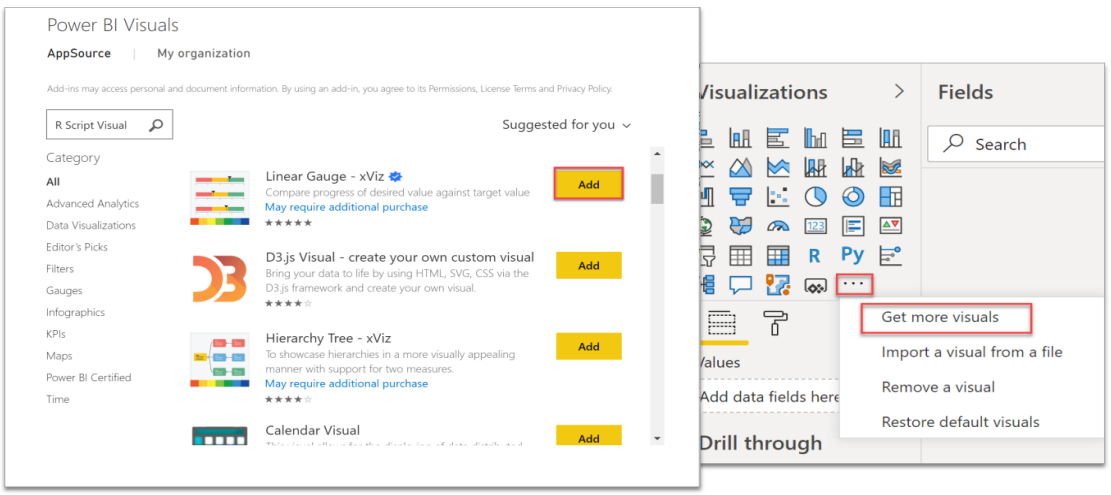




Import an R or Python Visual
To **import an R or Python Visual from AppSource**

Firstly, in the **Visualization pane**, select the **Get more visuals icon** and then select **Get more visuals**
=> On the window that displays, **select the R or Python visual that you want to import** and then **select Add**

The process is illustrated below



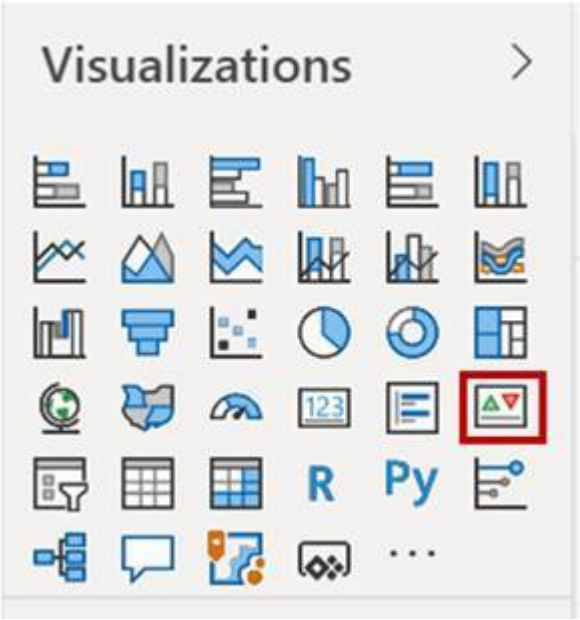
***Work with Key Performance Indicators

Key performance indicators (KPIs) are **excellent in helping you track progress towards a specific goal over time**

In order to use **KPIs**, you need **three pieces of information:**

- A **unit of measurement that you want to track**
  - e.g.,
    - instance total sales
    - number of employee hires
    - number of loans serviced
    - number of students enrolled
- A **goal for the measurement so that you can compare your progress with that goal**
- A **time series, for instance, daily, monthly, or yearly**

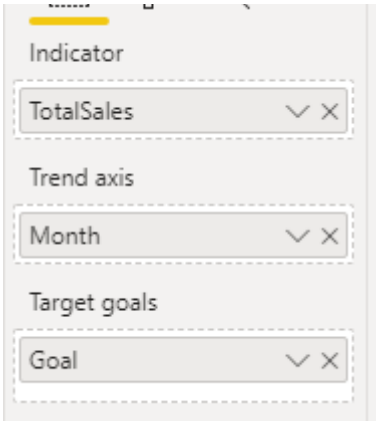
you can select **KPIs** by **clicking the KPI icon** in the **Visualizations pane**, as shown below:



When configuring **KPIs**, enter:

- the **unit of measurement that you are tracking** in the **Indicator prompt**
- the **goal** under **Target goals**
- select the **time series** from the **Trend-axis** drop-down list

This is depicted in the image below:



KPIs work **best in a series**, e.g., **showing the daily, monthly, and yearly goals** in the section of a Power BI report, as shown below.