Power BI

DASHBOARDS AND REPORTS

> Dashboards and reports are both essential tools for data analysis and communication. While they serve similar purposes, they have distinct differences in terms of their structure, presentation, and functionality.

Dashboards

- Dashboards are **visual representations of data** that provide **real-time insights into KPIs and metrics**.
- They are **interactive** and allow users to explore data and make decisions on the fly.
- Dashboards are typically used for **monitoring and tracking** ongoing performance.
- They are typically **ideal for decision-makers** who need a quick overview of critical information.

Reports

- Reports are **structured documents** that present data in a more detailed and organised manner.
- They provide a **comprehensive view of historical data, trends, and analysis**.
- Reports are often used for **in-depth analysis, compliance, and documentation purposes**.
- They are suitable for **stakeholders who require a detailed, structured overview of data**.

The general process of creating a dashboard/report

> Creating a dashboard involves several key steps to **design, develop, and deploy a data visualisation tool** that effectively conveys information to its **intended audience**.

Planning

Clearly **define the purpose** of the dashboard and identify the target audience to tailor the dashboard's content and design to their needs.

Data gathering and preparation

Identify the data sources that will be used for the dashboard, ensuring the **data is accurate, relevant, and up to date**.

Visualisation

Select the dashboarding tool, **design the layout and choose the appropriate charts and graphs** to use.

Interactivity

Enhance the dashboard with **interactive features**, such as filters, slicers, or drill-down options that allow users to explore data in more detail.

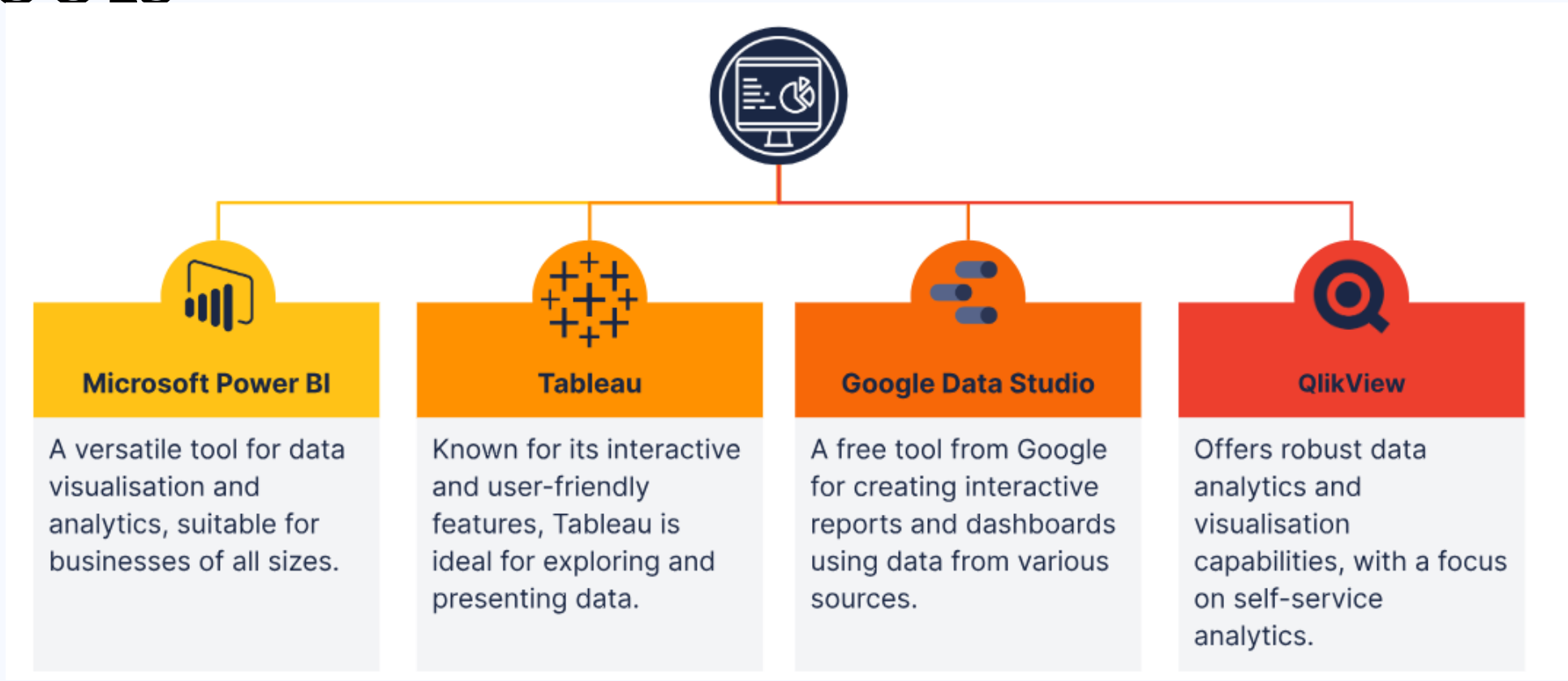
Testing and validation

Test the dashboard for **accuracy** and **functionality**, ensure that data updates correctly, interactive features work as intended, and visuals are error-free.

Deployment and maintenance

Continuously **monitor and maintain** the dashboard to ensure it remains accurate, relevant, and functional.

POPULAR DASH BOARDING AND REPORTING TOOLS



Microsoft Power BI

- Link to download:
- https://aka.ms/pbidesktopstore

Influence of data structure on visualizations

> In Power BI, the structure of our data can determine the ease and type of visualisations we can create.

Pivoted data

This is a data structure where related elements are **grouped** or **pivoted** into columns representing a particular category.
E.g. a dataset on literacy rates would feature separate `Male_literacy_rate` and `Female_literacy_rate` columns, each populated with relevant figures.

Non-pivoted data

With this data structure, related data elements are **stacked in one column** instead of being spread across multiple columns.
E.g. having a single `Indicator` column with rows specifying *Literacy Rate, Male* and *Literacy Rate, Female*, rather than separate columns for each.

Power BI offers a flexible environment to transform and visualise data effectively, despite the underlying data structure. This versatility effectively allows users to **focus more on insights and storytelling**.

Components of a dashboard in power bi

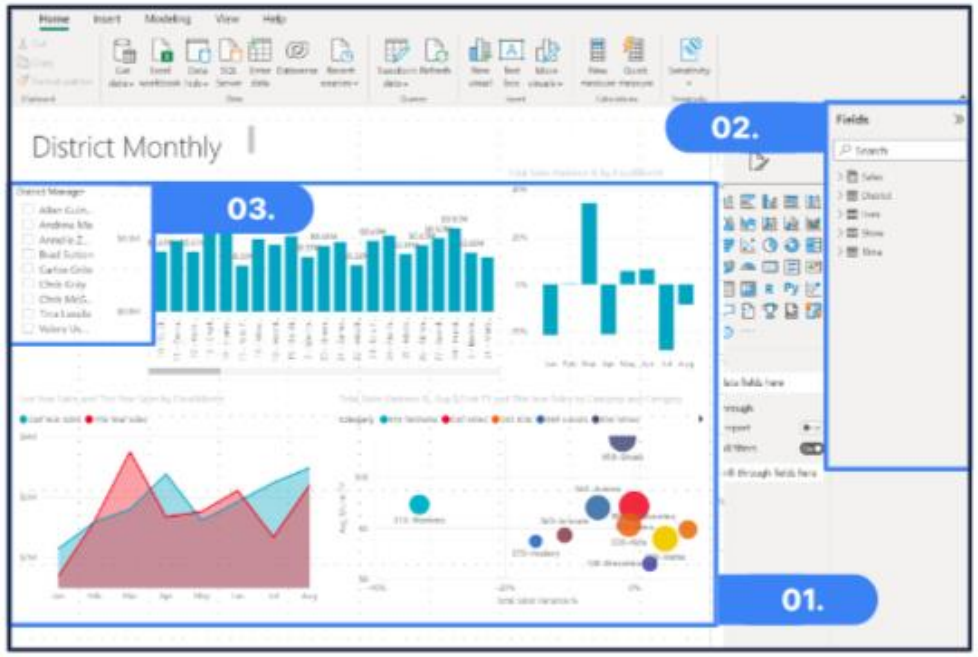
> Dashboards consist of various components, including **widgets and visualisations**, **data sources**, and **filtering elements**. Understanding how these components relate to each other is essential for creating effective dashboards.

Components of a dashboard:

01. **Widgets and visualisations:** Dashboards typically feature widgets such as charts, graphs, and tables that visualise data in a meaningful way.

02. **Data sources:** Dashboards rely on one or more data sources, which can be databases, spreadsheets, or real-time feeds, to provide up-to-date information.

03. **Filters:** Dashboards can't be filtered or sliced. However, we can filter a dashboard tile in focus mode, but we can't save the filter.



power BI overview

> Power BI has **evolved** since its launch, with the latest versions having **key features** to facilitate the processing and analysis of data, and delivering key insights from the process.

Brief history

- It **launched** in 2014 as a business analytics service.
- It has **evolved** over the years to become more user-friendly.
- There have since been regular **updates with a growing community**, with a lot more adoption in various industries.

Core capabilities

- Power BI offers a wide range of **visualisation** options.
- It also ensures the creation and sharing of detailed **reports.**
- Reports can be enhanced with **interactive and dynamic** visualisations to show important data points and insights.

Importance to data practitioners

- This platform enables data professionals to **communicate findings effectively.**
- Its features facilitate the **development of insights** through interactive visualisations and reports.
- This all **supports decision-making** processes through their clear and valuable data insights.

Power BI interface (toolbar)

01. Ribbon

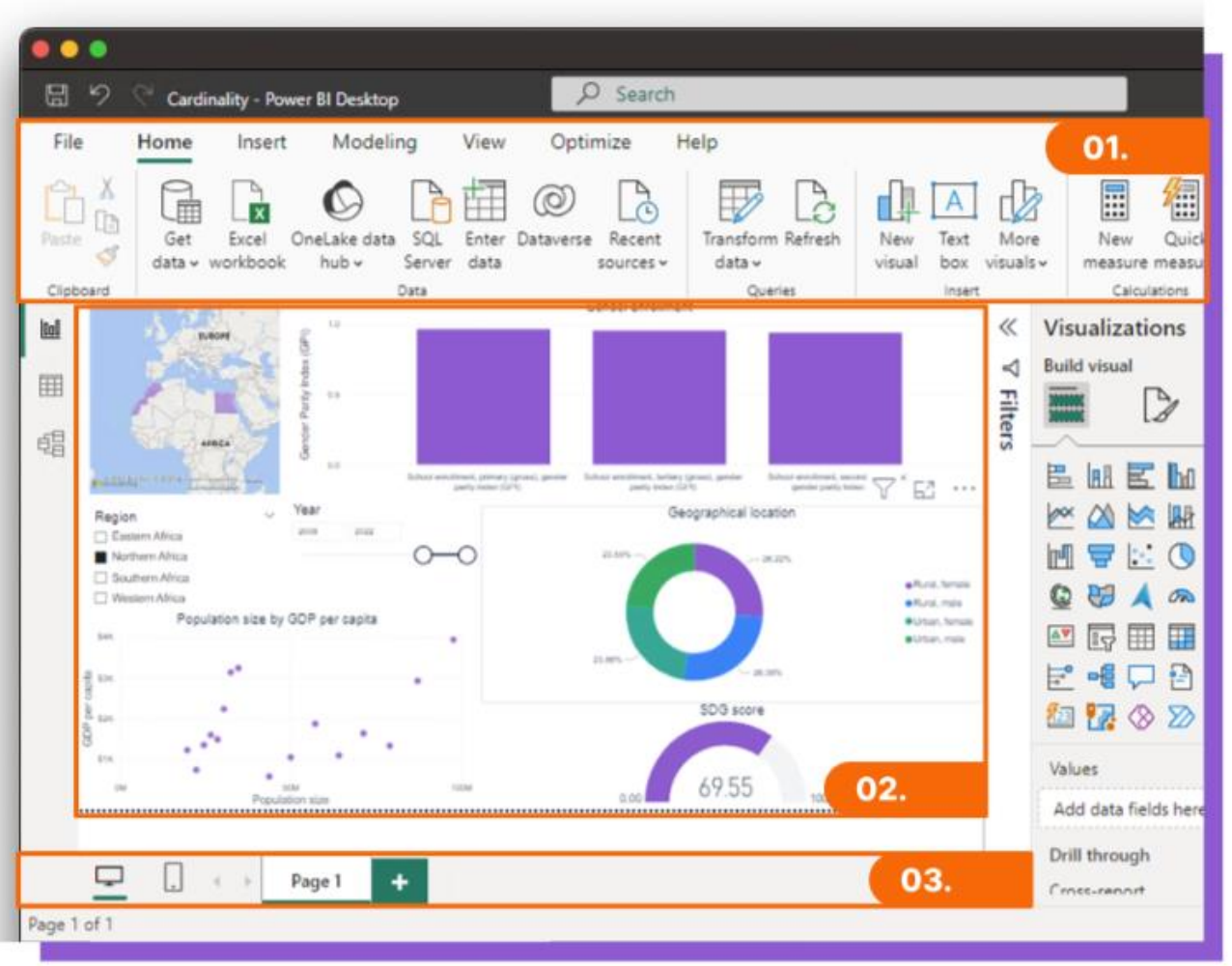
Similar to the **interface** of Microsoft Office, the ribbon has a variety of tabs filled with commands and **tools** essential for developing reports.

02. Canvas

Almost functioning as a 'central workspace', the canvas is where we **develop and edit data visualisations**.

03. Page tabs

The page tabs help with **navigating different pages** of a report, supporting the organisation and accessibility of various visualisations.



Power BI interface (navigation pane)

04. Filter pane

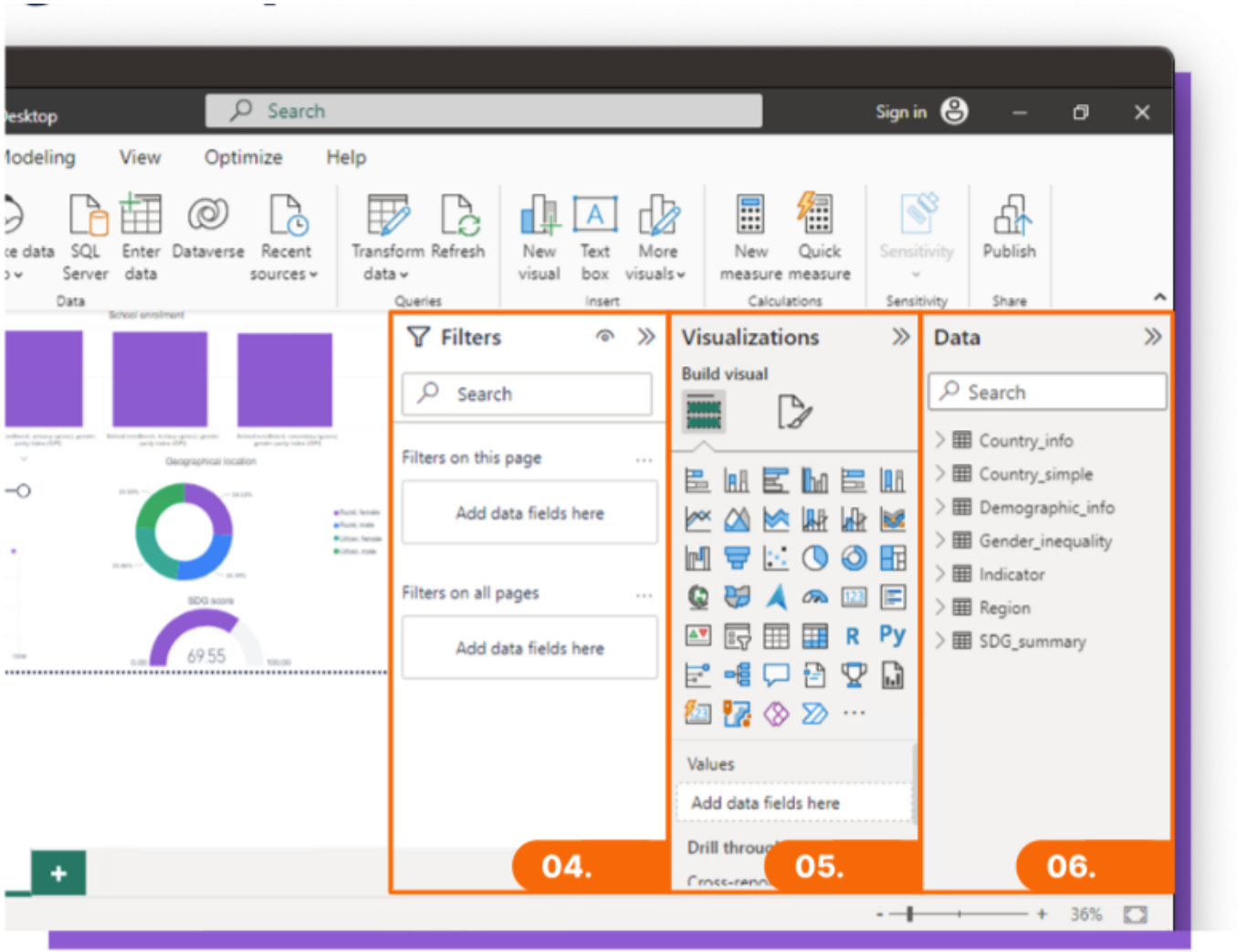
The filter pane is a dynamic tool to **select** which **visualisation** we'd like to display, to focus and tailor the data analysis.

05. Visualisation pane

This pane allows us to select and **modify visual elements**, allowing us to customise our reports to best communicate our findings.

06. Data pane

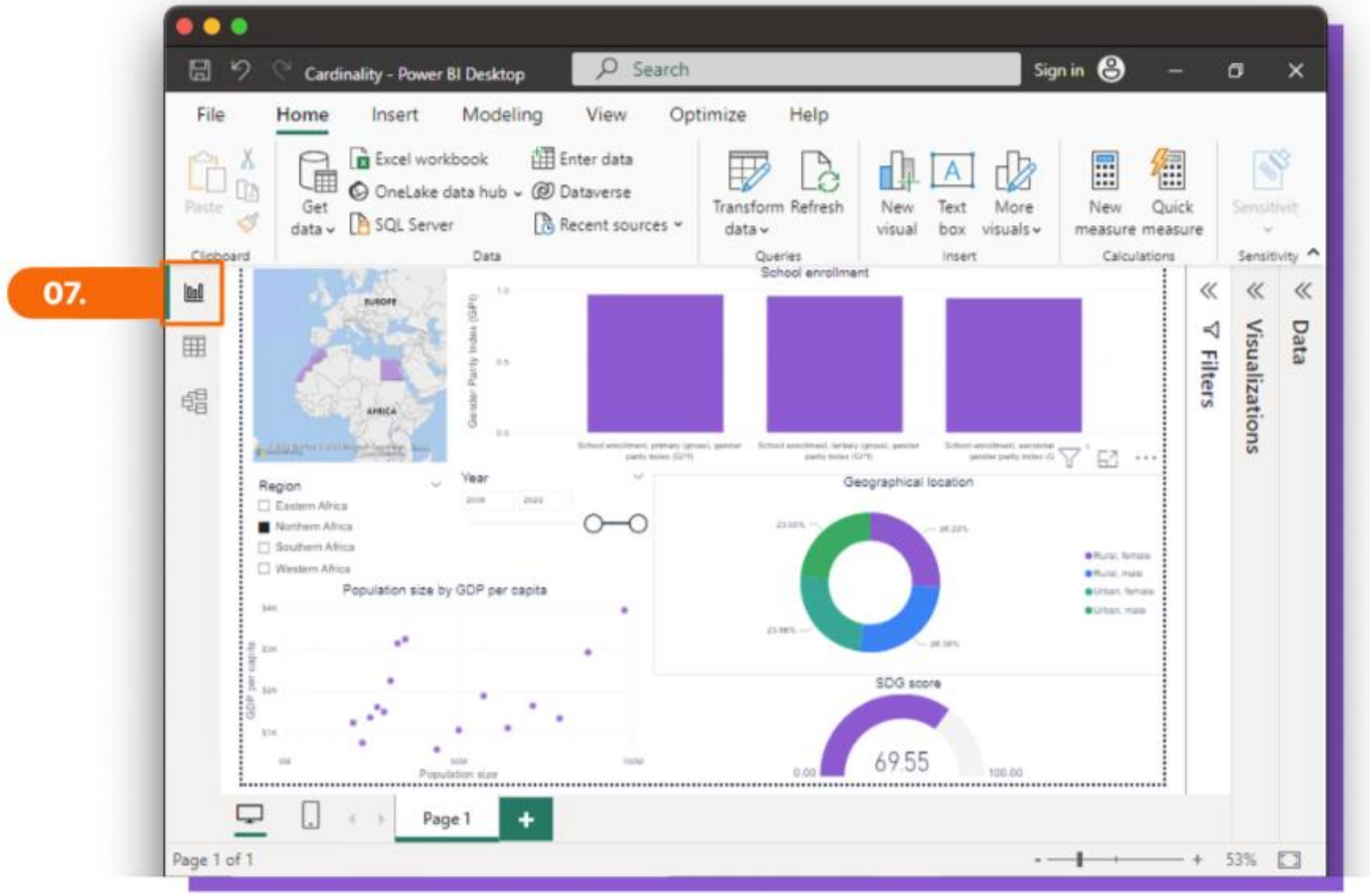
The data pane displays the available tables, columns, and measures of the **connected data sources**.



Power BI interface (workspace)

07. Report view

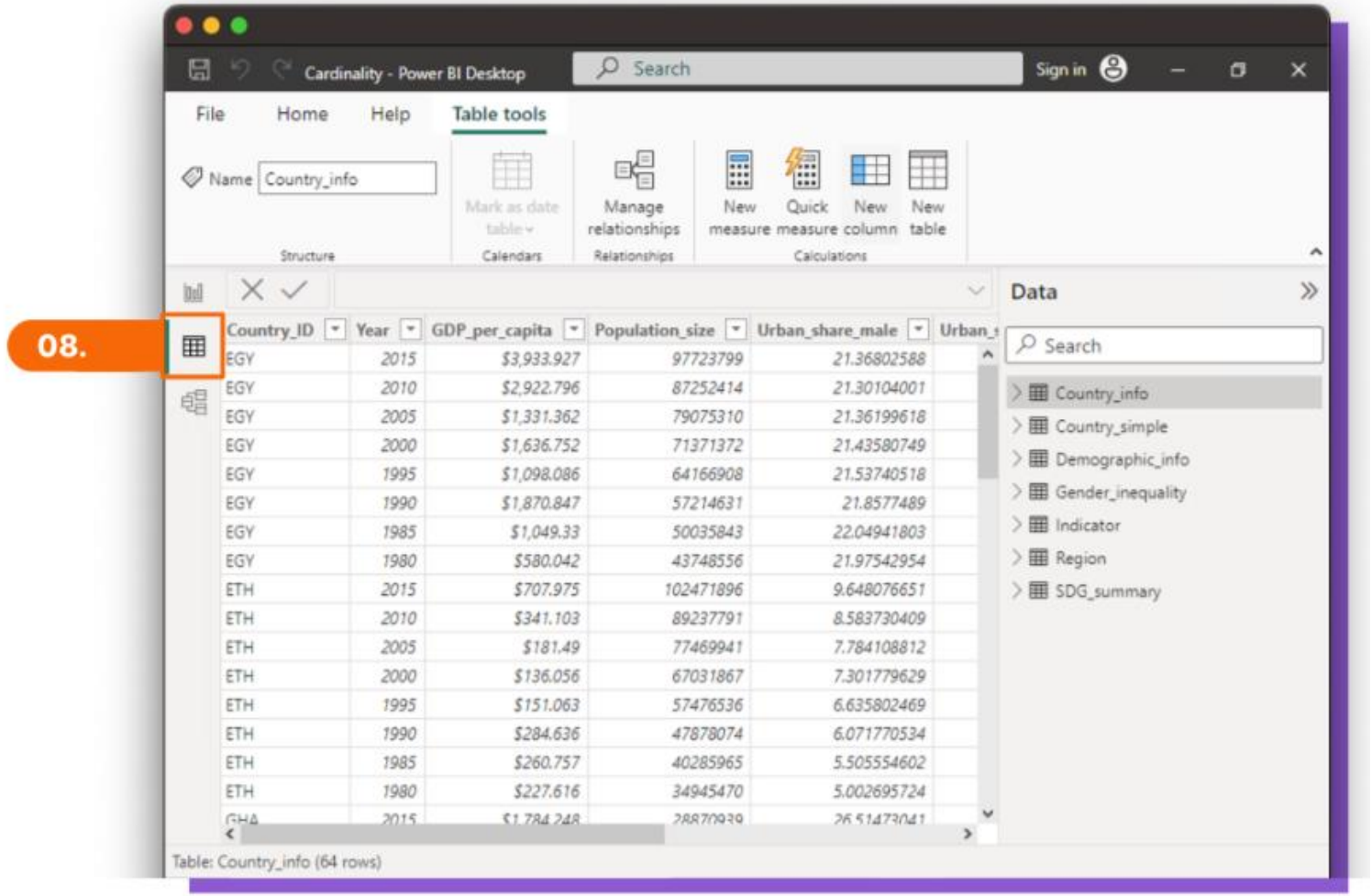
In the report view, we can **design and develop detailed reports**, using tools and features to create comprehensive and clear **visualisations**.



Power BI interface (workspace)

08. Data view

The data view provides a detailed look at the report's **underlying data**, with tools to **inspect and refine this data**.

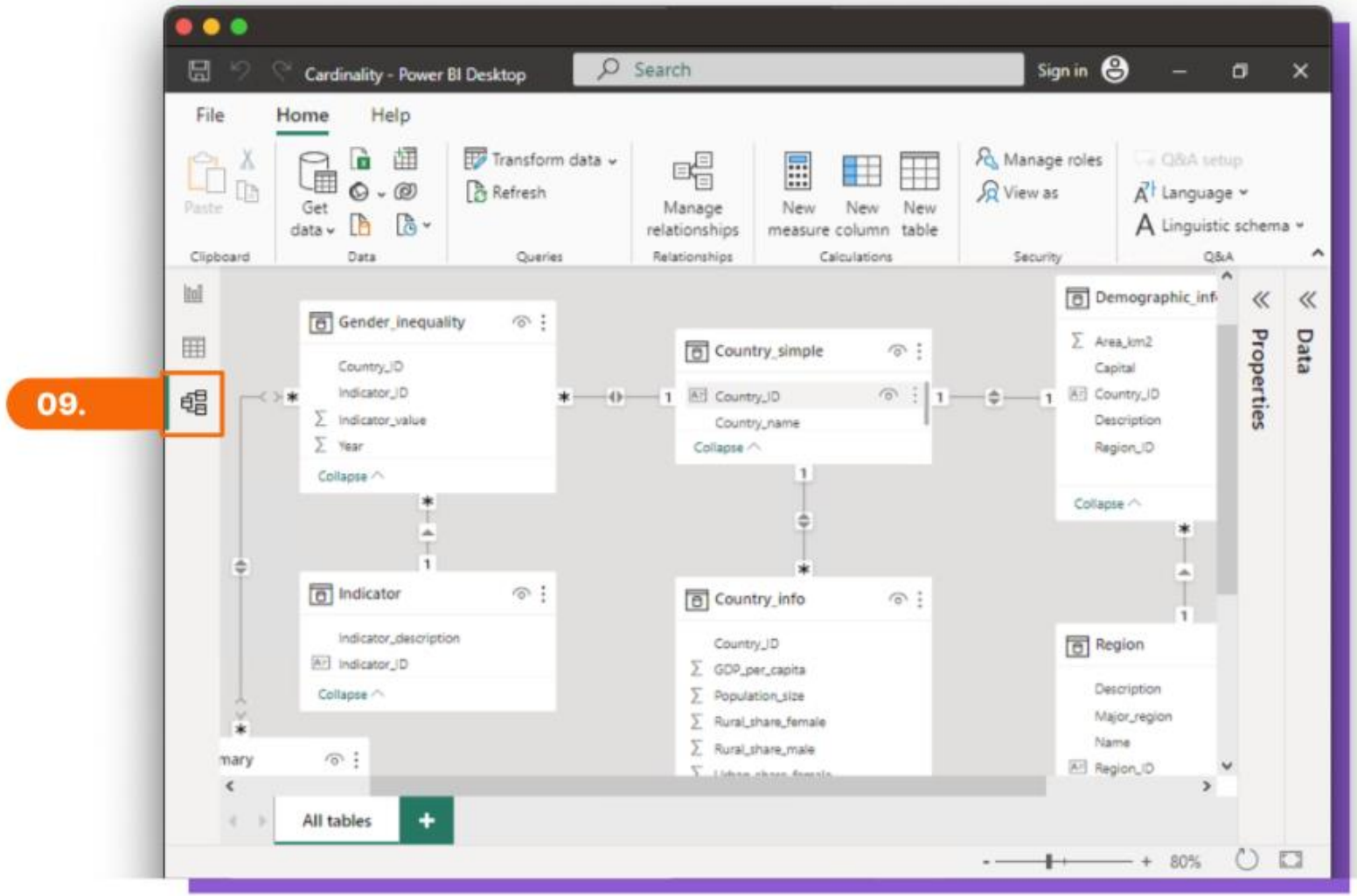


Country_ID	Year	GDP_per_capita	Population_size	Urban_share_male
EGY	2015	$3,933.927	97723799	21.36802588
EGY	2010	$2,922.796	87252414	21.30104001
EGY	2005	$1,331.362	79075310	21.36199618
EGY	2000	$1,636.752	71371372	21.43580749
EGY	1995	$1,098.086	64166908	21.53740518
EGY	1990	$1,870.847	57214631	21.8577489
EGY	1985	$1,049.33	50035843	22.04941803
EGY	1980	$580.042	43748556	21.97542954
ETH	2015	$707.975	102471896	9.648076651
ETH	2010	$341.103	89237791	8.583730409
ETH	2005	$181.49	77469941	7.784108812
ETH	2000	$136.056	67031867	7.301779629
ETH	1995	$151.063	57476536	6.635802469
ETH	1990	$284.636	47878074	6.071770534
ETH	1985	$260.757	40285965	5.505554602
ETH	1980	$227.616	34945470	5.002695724
GHA	2015	$1,784.248	28870939	26.51473041

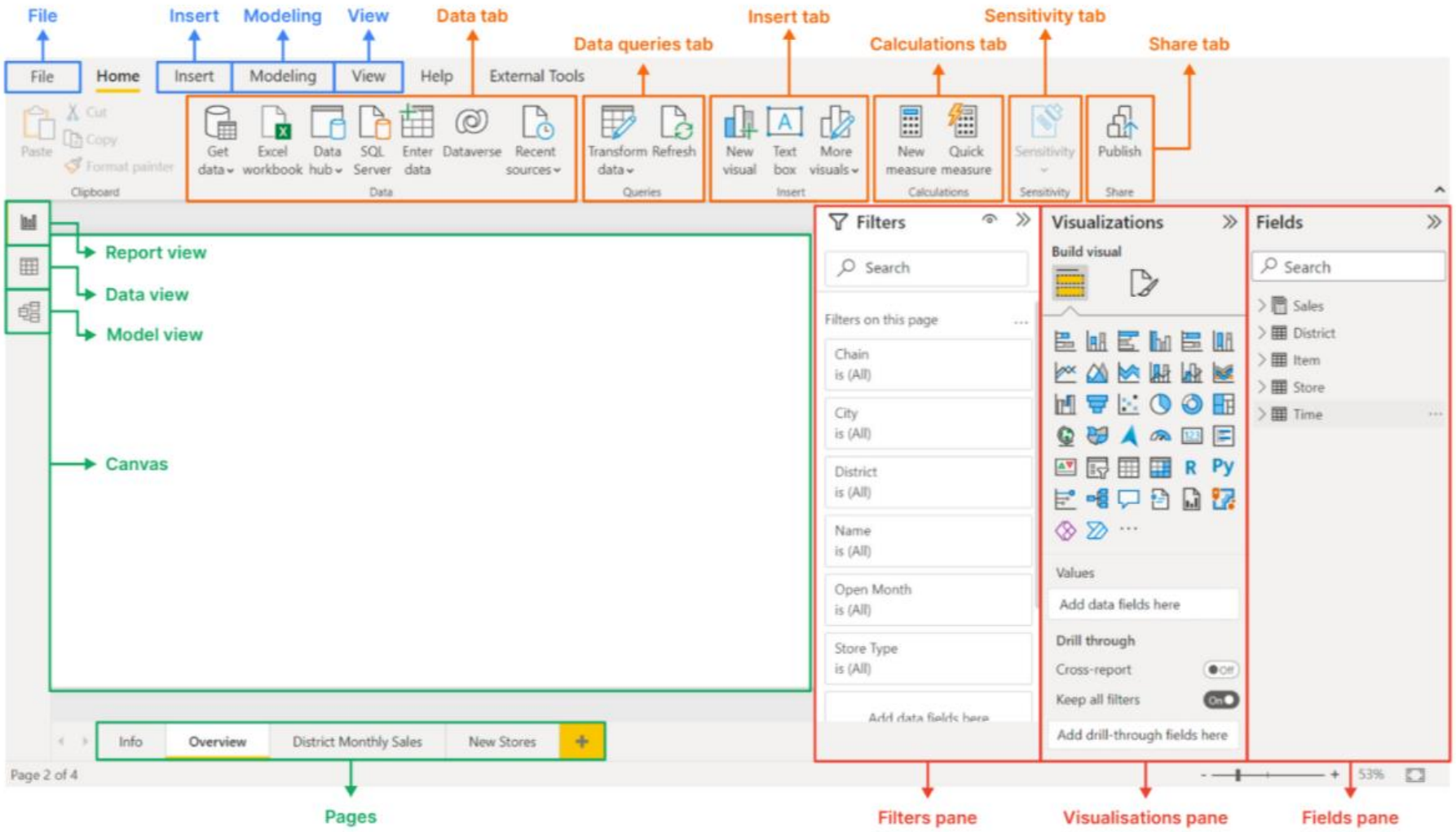
Power BI interface (workspace)

09. Data view

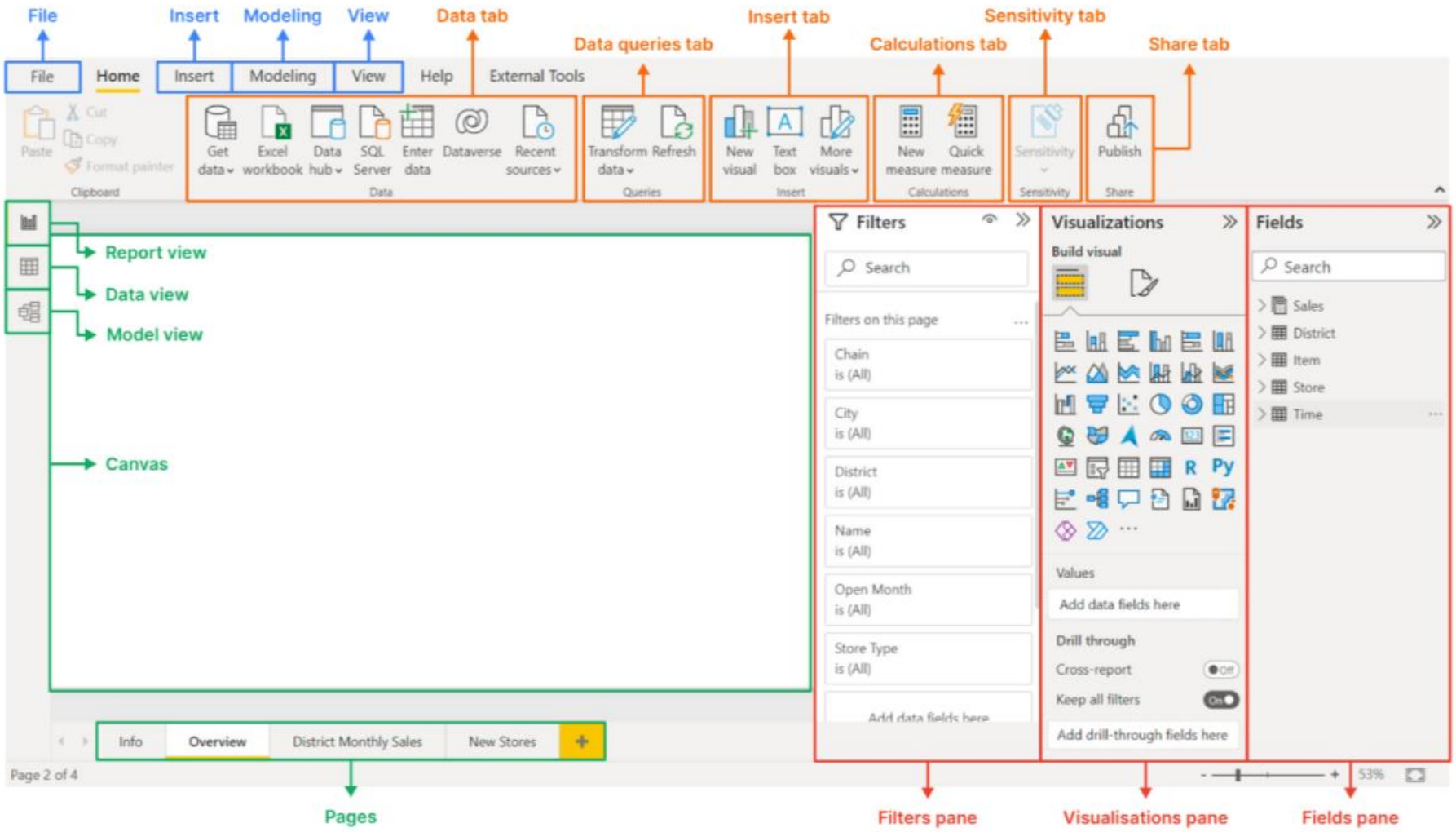
The model view allows us to **observe and manage the data model** used in the reports, showing the **structure and organisation of the data**.



Power BI interface (workspace)



Power BI interface



Power BI interface

File

Add or change data. Allows users to insert visual elements and do computations. Includes the option to publish reports to the Power BI Service.

Insert

Add items to reports, such as new pages, buttons, shapes, and images.

Modeling

Manage data relationships, calculations and parameter queries.

View

Allows side pane activation, mobile view, report colour and style selection.

Power BI interface

Data tab	
Import data to build visualisations for a dashboard:	
Get data	Gives us a **list of sources** where we can import data from.
Excel workbook	**Import** an Excel workbook.
Data hub	Allows us to find, study, and use **pre-existing datasets** and **reports** in our organisational account. It contains information about the datasets as well as reports created with those datasets.
SQL server	Allows us to **connect to** and **import data** from a SQL server.
Enter data	Allows us to manually enter data into Power BI to **create visualisations** for a dashboard.
Dataverse	Microsoft Dataverse is the data backbone that allows us to **dynamically store** our data in a **scalable** and **secure environment**. The Dataverse menu option enables us to **produce reports** and **publish** them to Power BI straight from our Dataverse data.
Recent sources	Allows us to see the **most recent sources** from which we imported data.

Data queries tab	
Transform data	Access the **Power Query Editor** which enables us to connect to our data sources, shape and transform the data to meet our needs, then load that data model into Power BI.
Refresh	**Update the data** in the Power BI imported dataset with the **most recent changes** made to the data source.

Insert tab

Add visuals to our dashboard.

Calculations tab

Create a **Data Analysis Expressions (DAX)** formula that will define a column's calculated values to be used in a visualisation.

Sensitivity tab

Label data using sensitivity labels ensuring that only **authorised individuals** can access the **dashboard** and **data**.

Share tab

Publish data and **reports** to the Power BI service, including visualisations, queries, and custom measures, so that subscribers to our workspace or end-users can view them.

Power BI interface

Report view

Create **multiple report pages** with visualisations. It allows for visualisation manipulation, copying, and merging, while also allowing query and data modelling for better insights.

Canvas

A single page that uses **visuals** to convey a story. These visualisations are known as **tiles**, and they are pinned to a certain dashboard based on a given dataset (or datasets).

Data view

Inspect and interpret data by displaying the rows and columns. This feature is useful for **identifying data types** or **categories** and **displaying data** at the row level.

Pages

Divide visualisations into **numerous sheets**, each of which contains **different visualisations** that coherently reflect **different categories** or topics of **data**.

Model view

Work with complex datasets with multiple tables and relationships. Allows users to **create data model diagrams**, **add related tables**, and **create** and **edit relationships**.

Filters pane

Categorise data based on **predefined criteria**. We can select certain columns or values within the data and examine only the data associated with those selections.

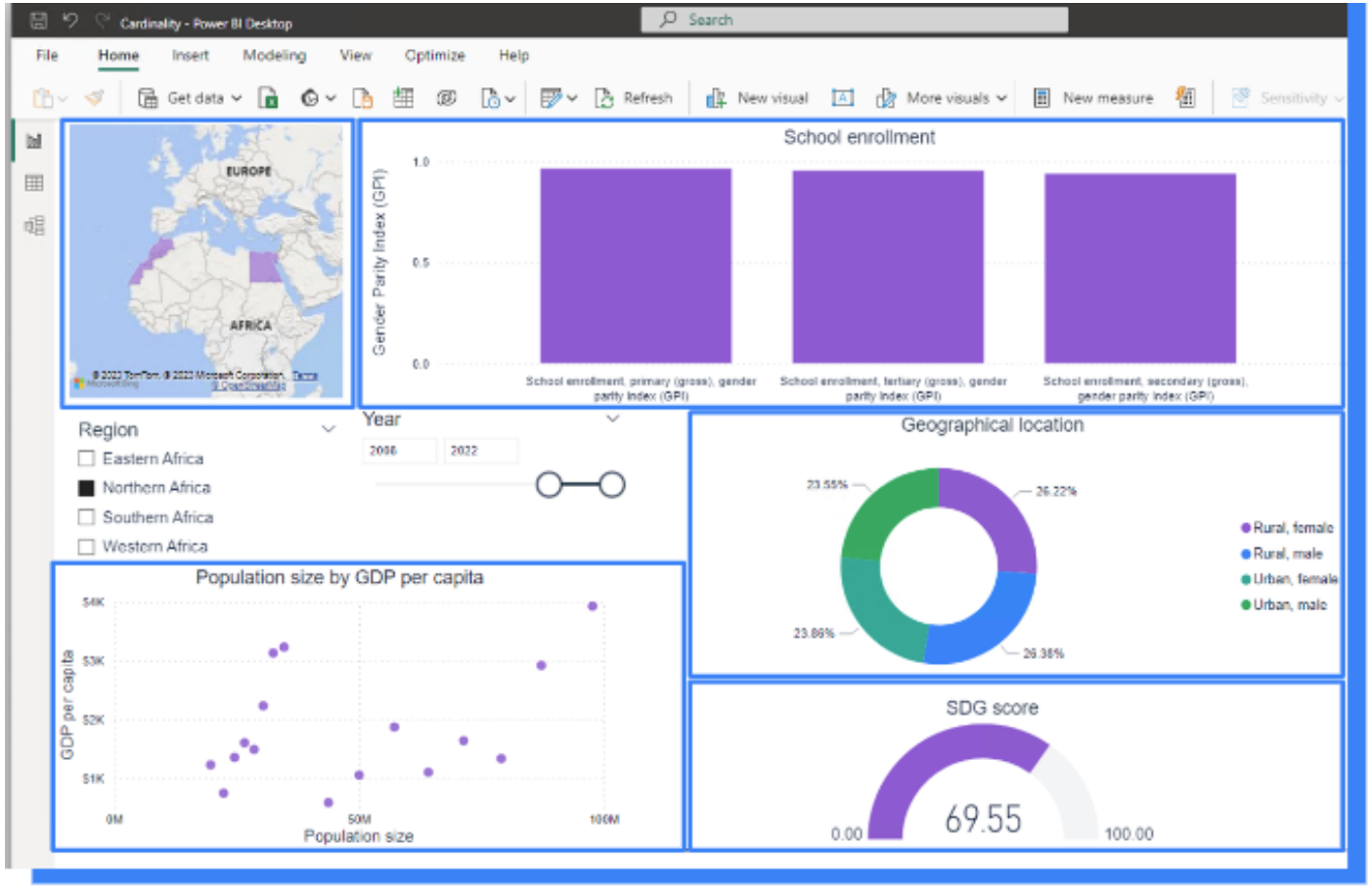
Fields pane

Display a **list** of **all the tables** in the data model. We can see all the fields in a table when we expand it. A **green check mark** next to a field indicates that at least **one field** from that table is **included** in a visualisation.

Visualisations pane

Select the **types of visualisations** we want to display in our dashboard based on the story we want to tell and the data. Here we can **choose the visual** and the **values** that should be displayed in it as well as **format it** according to our needs.

Building Blocks of Power BI



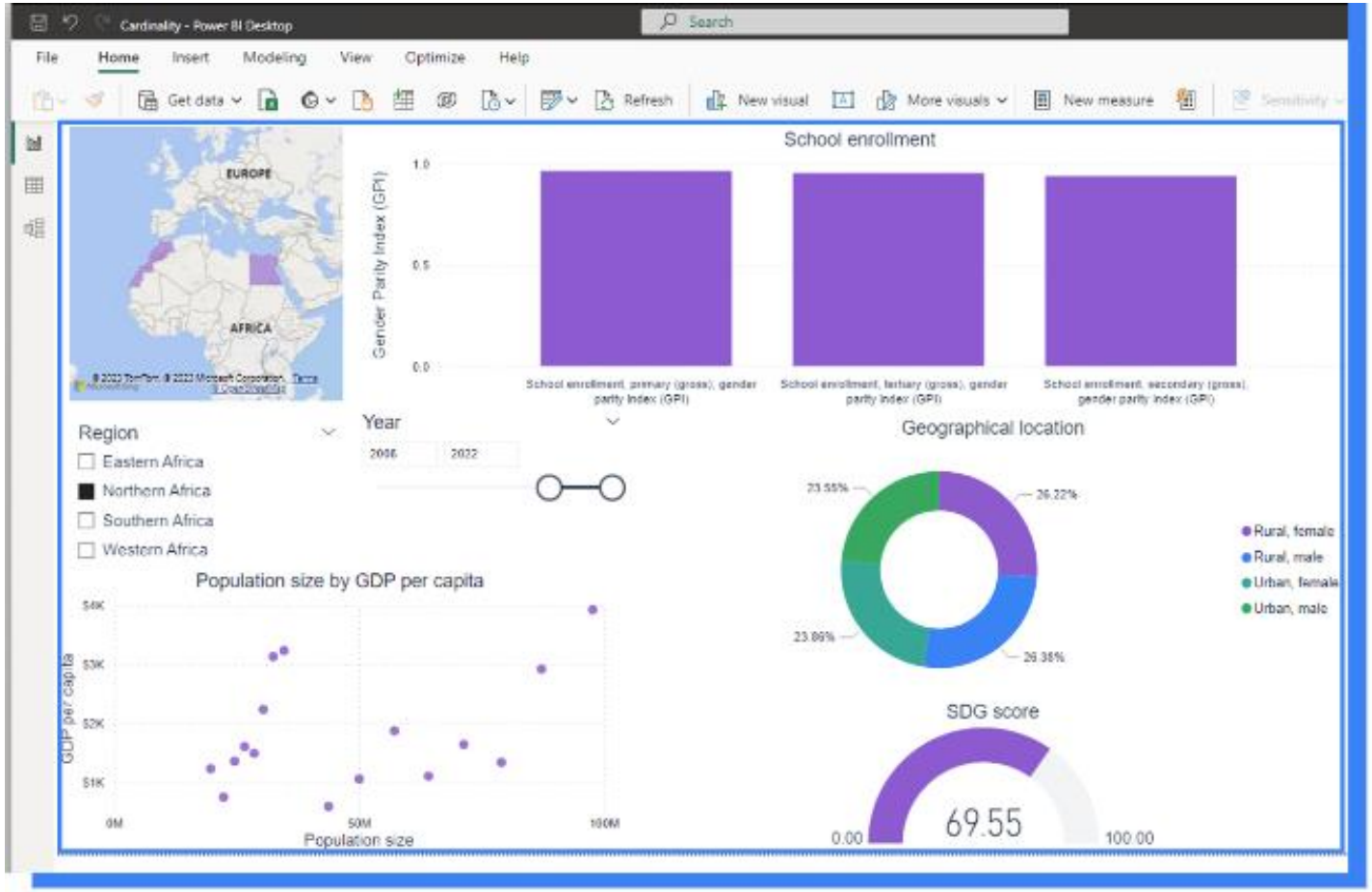
Visualisations

A **visual representation of the data** such as graphs and plots of the data, including charts and maps. These provide clear and concise insights of the data.

Tiles

Tiles are individual clickable elements that act as a focused view of a particular insight. **A single visualisation in a report or dashboard is a tile.**

Building Blocks of Power BI



Reports

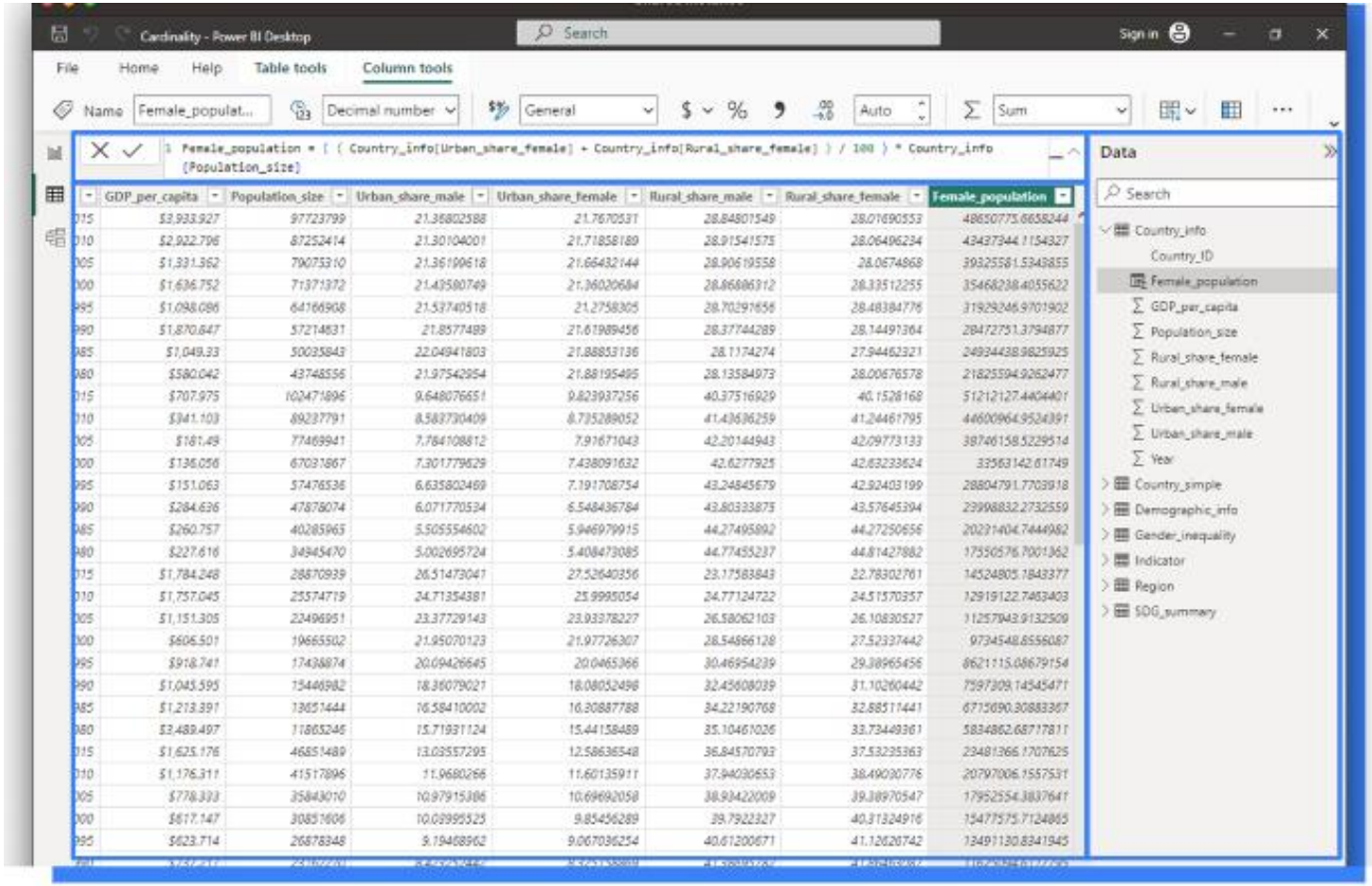
A Power BI report is a very distinct and clear view of the dataset through visualisation, providing **in-depth findings and insights**.

Dashboards

Dashboards are used for **high-level insights and monitoring**. It often has less interactivity than reports.

These terms are frequently used interchangeably.

Building Blocks of Power BI



Datasets

Collections of the **data we use to create visualisations**, reports, and dashboards.

Queries

The instructions or requests we use to **process data**. We can craft them to **filter**, **shape**, and **aggregate** data to extract insights for visualisations.

Publishing in power BI

> In order to understand the process of publishing and sharing dashboards and reports in Power BI, we first need to understand the key differences between **Power BI Desktop** and the **Power BI service**.

Power BI Desktop

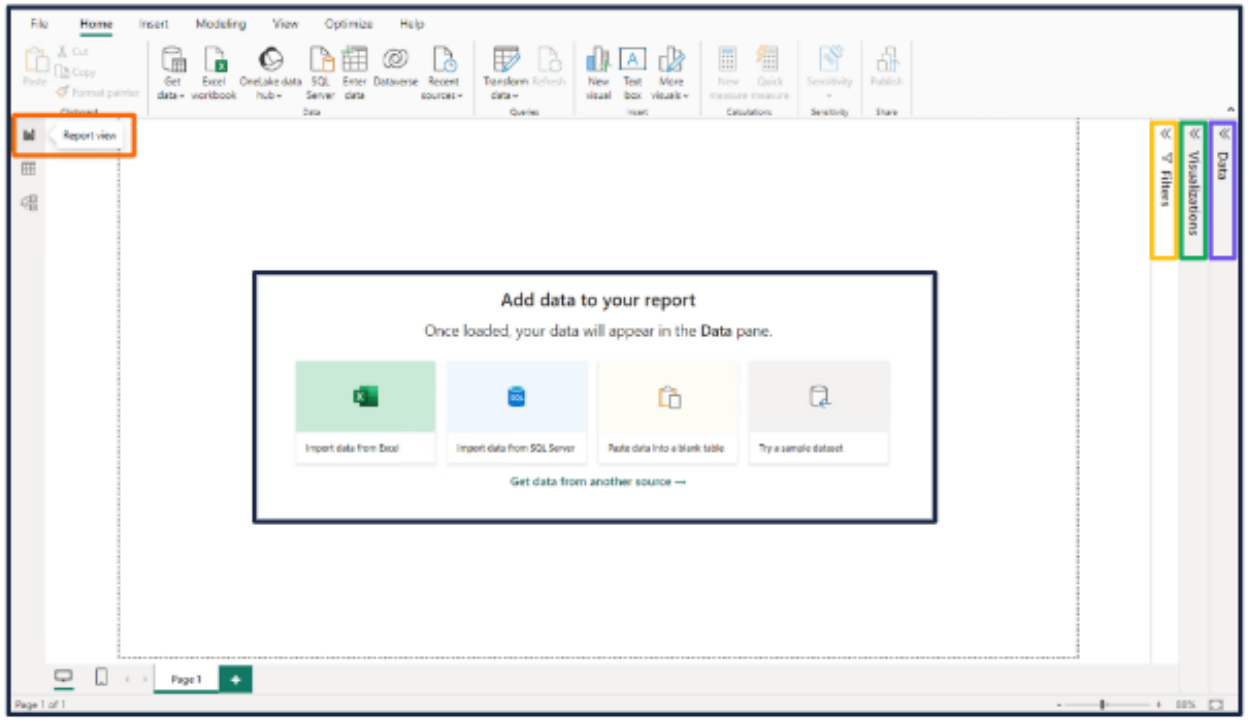
- Power BI Desktop is a Windows application designed for **creating, designing, and authoring Power BI reports** and dashboards and is primarily used for report development, data modelling, and data transformation.
- It is an **offline tool** that is installed on a local computer. We can **work on reports and dashboards without an internet connection**.
- Reports and dashboards are **saved as .pbix files**, which are native to Power BI Desktop and can only be opened and edited within Power BI Desktop.

Power BI service

- The Power BI service, also known as Power BI online, is a cloud-based platform where we can **publish, share, collaborate on, and consume Power BI reports** and dashboards created in Power BI Desktop.
- The Power BI service is entirely **web-based**. It operates in the cloud, making it **accessible from anywhere with an internet connection.**
- Users are provided with a **link** to the dashboards in the Power BI service, where they can collaborate and access them via a **web browser**.

Both platforms offer a similar view of the reports, with Power BI Desktop emphasising features for importing, transforming, and modelling data to produce dashboards, whilst the Power BI service focuses on sharing and collaborating on already-built dashboards. These two components **work together to create a complete end-to-end solution for data analysis and reporting**.

Power BI panes introduction



1. Import the **`Gender_Egypt`** dataset into Power BI.

To create visualisations, we need to be in the **Report view**. This is the default view where we'll see various panes like;

1. **Data**
2. **Visualizations**
3. **Filters**

When we first launch Power BI, we encounter the **Report view** with a blank canvas that provides **links** to assist in **adding data to a report**.

Data pane

It is crucial to understand our data before visualising it.
The **Data pane** lets us explore the tables we've imported into Power BI.

A table can be expanded by clicking on the **arrow** next to the table's name.

This will provide access to all the **fields** in that table.

Visualization Pane

Power BI provides a diverse range of **visualisation types**, enabling users to create **visually engaging and interactive** dashboards and reports.

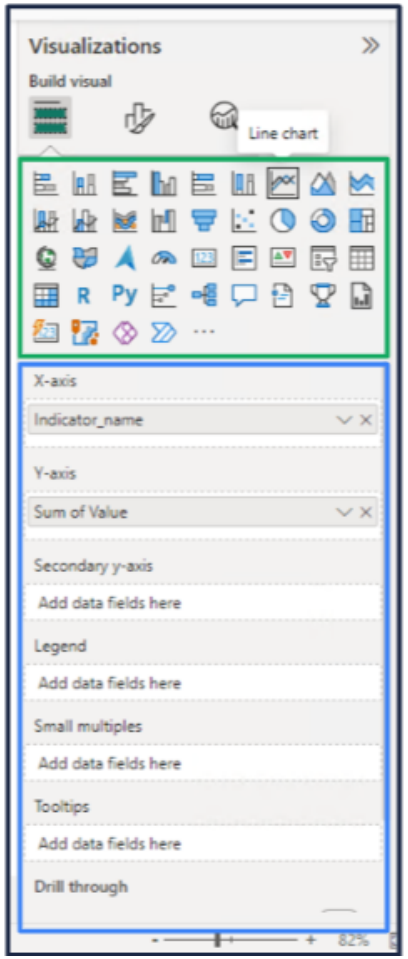
The **Visualizations pane** provides the **primary interface for creating and formatting visuals**.

It includes three tabs:

- **Build visual**
- **Format**
- **Analytics**

1. **Identify the type of visualisation** in the image above.
2. **Identify this visualisation's icon** on the Build visual sub-pane.

Visualization Pane : Build visual tab



The Build visual tab is divided into two sections:

The **upper section** is where the visualisation type is chosen. If we start building a visualisation by selecting fields without selecting a visualisation type first, Power BI picks the visualisation type for us. We can keep Power BI's selection or change the type by selecting a different icon.

The **lower section** holds **buckets/wells** which vary depending on the type of visualisation selected. For example, if we've selected a **Line chart**, we see *Y-axis*, *X-axis*, *Legend*, etc. Some buckets are limited to certain types of data. For example, *Values* don't accept non-numeric fields.

1. Convert the visual into a **line chart**.
2. Add the **Year** field to the **Secondary y-axis** well.

HINT: Data can be added by dropping it on the page, visualisation, or on a specific well.

Visualization Pane : Format visual tab

Once we've decided on a type of visual, we need to ensure that it **communicates effectively**, and much of this is achieved through formatting. Proper formatting ensures that visuals are not just **informative** but also **engaging and aligned** with the intended narrative or branding.

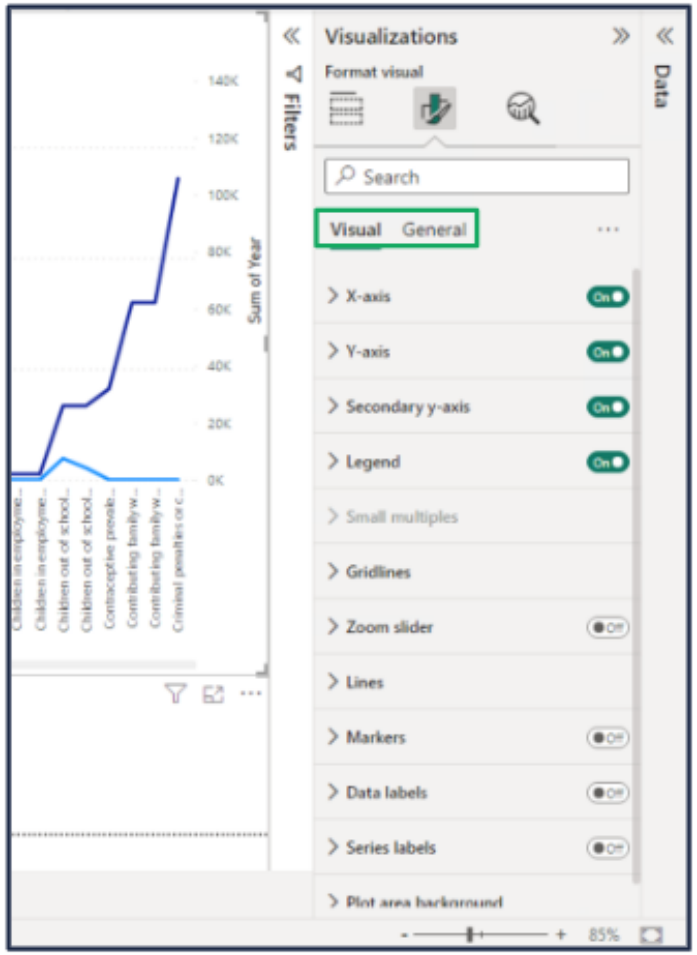
Formatting options can be divided into two main categories:

Visual

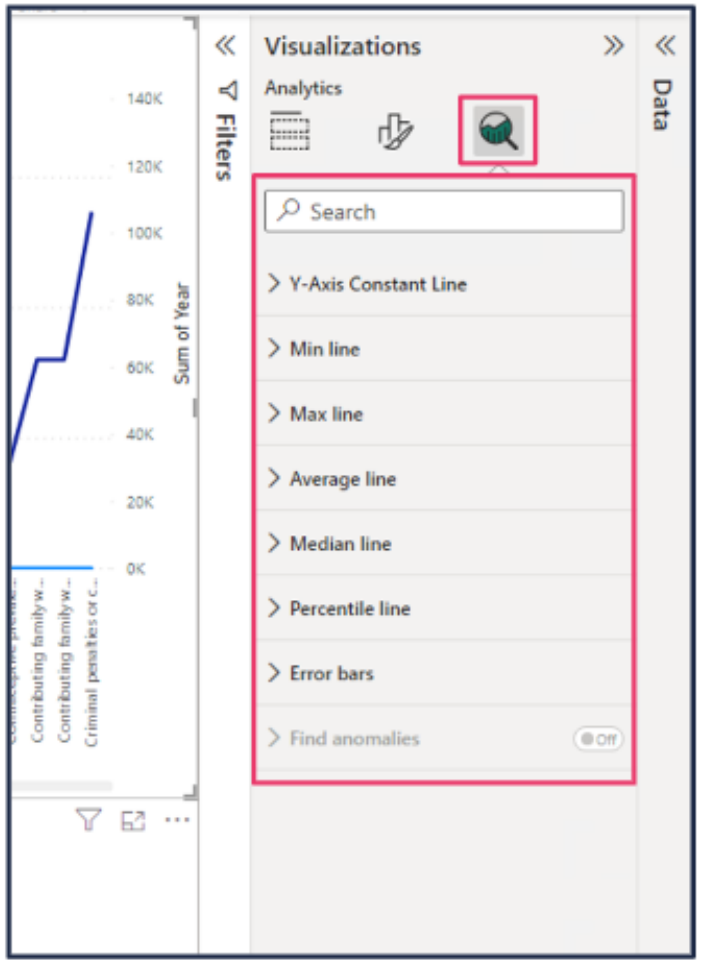
This section pertains to a **specific visual**. Each visual type has its unique set of formatting options tailored to its design and function.

General

These options are more about the **general appearance and behaviour** of the visual within the Power BI report canvas, and they apply consistently across different visual types.



Visualization Pane : Analytics tab



The **Analytics tab** offers additional ways to **add analytical layers over our basic visualisations**. These tools provide added elements that give more context or insight without having to change the core data points. For example, we can:

1. Enhance charts by **inserting lines** that show statistical benchmarks like averages or extremes.
2. Visualise common ranges or deviations by **drawing bands** between two statistical values.
3. **Project future trends** from time-series data for insights into areas such as sales or inventory.
4. Uncover hidden data patterns or segments through **clustering**, enhancing interpretation and strategy.

The **options available in the Analytics tab depend on the type of visualisation we're working with**, as some analytical enhancements only make sense with certain types of data representations.

Filters Pane

> The Filters pane allows us to **limit the data displayed based on specific criteria**. This makes it easier to get insights since we can focus on a specific portion of data. There are two types of filters:

Filters on visuals

These are filters that are applied directly to **a single visual** on your report. They allow for a micro view, affecting only the data represented in one visual element.

Filters on pages

These are filters that affect **all the visuals** present on a single report page. They are more macro-oriented, offering a broader data-filtering scope.

Create a filter for **Sum of Year** such that our line chart only displays data from 2014 to 2017, inclusive.

Filters Pane: Filter option

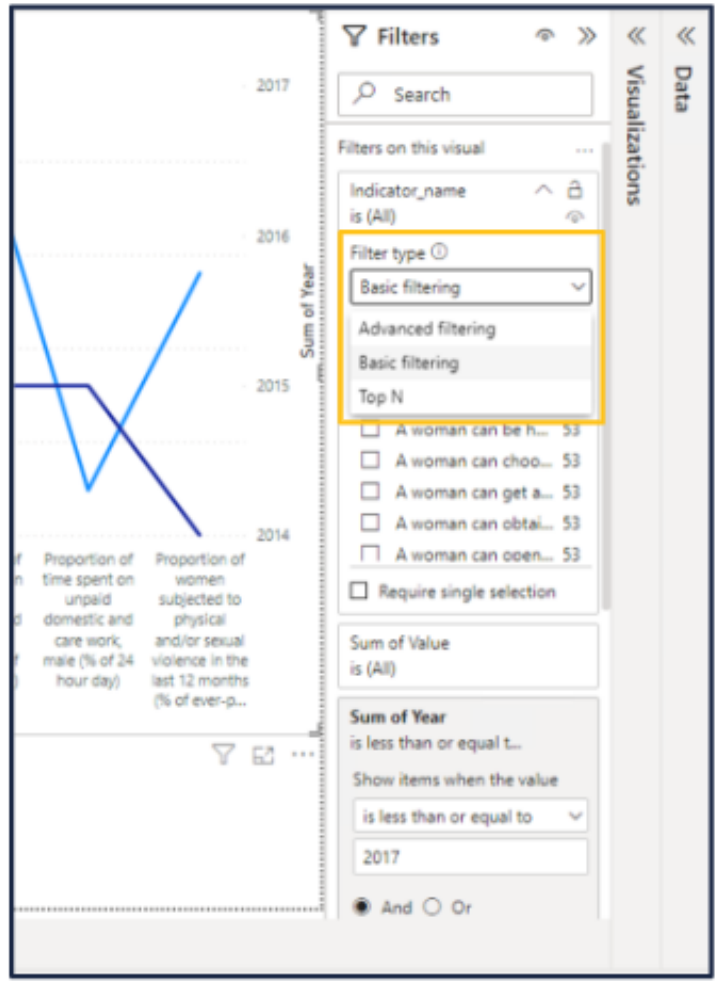
The Filters pane provides **various options** to help control and refine the data that appear in reports. Here's a breakdown of the primary filter options available:

Basic filters:
Often checkbox-based, these allow us to select which values to include or exclude.

Top N filters:
These limit the data to the top 'N' items based on a specific metric, which is useful in rankings and leaderboards.

Advanced filters (conditions):
These apply conditions to refine results, essential for precise numerical data filtering.

Relative filters:
For date/time data, these filters show data relative to the current date (for example, last 7 days, next 3 months, etc.).



Visualizations' types: Tree Map

> Treemaps **display data in nested rectangles**. Each level of this layout hierarchy is represented by a coloured rectangle (**branch**) containing other rectangles (**leaves**). They are useful for viewing proportions and hierarchies.

Well options:

Category: A rectangle of relative size is created for each value in this field.

Details: Used to drill down into more specific elements within a broader category.

Values

Tooltips

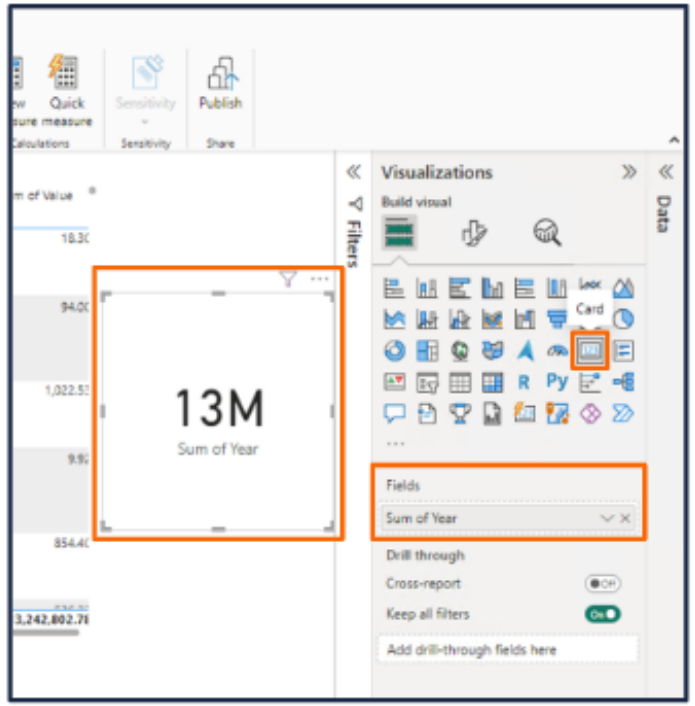
Visualizations’ types:Card

Functionality: Cards display **a single value** in a large font and are often used to **highlight a key figure**, like total sales or average cost. They are **less detailed** but excellent for drawing attention to priority data.

Simplicity and focus: Unlike tables, cards are **not for complex representation**. Instead, they draw **focus to one particular element**, ensuring that this insight doesn't get lost amidst more complex data.

Well options:

Fields: The data field to be showcased.



1. On a blank canvas, create a table that **displays all the data in the `Gender_Egypt`** dataset.
2. Create a card that displays the value of **Sum of Year.**

- **Creating visuals in Power BI**
- **Additional Resources**: The links provided contain additional information from external resources.
- Visualization types in Power BI
  Official Microsoft Power BI articles on the various visualizations available in Power BI.
- Custom Power BI visualizations
  The official Microsoft application store is where you can find custom Power BI visualizations you can import and use.
- Create shape map visualizations in Power BI Desktop
  Additional information on creating and using maps in Power BI.