DATA ANALYSIS WITH POWER BI

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2023-2024

"Believe you can and you're halfway there." - Theodore Roosevelt

POWER BI : Download course

https://frenchtechacademie.fr/powerbi

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POWER BI : Download course material

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POWER BI : Download the correction files

https://frenchtechacademie.fr/Correction/

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POWER BI : Prerequisites

1. You need a computer with at least 4 GB RAM
2. An internet connection is required
3. **You also need a professional or student email account** (no gmail, no yahoo, no outlook email account)
4. Please download the POWER BI Desktop Application: use the following links :
   a. https://aka.ms/pbiSingleInstaller (Manual monthly update)
   b. Download from Microsoft Store: https://aka.ms/pbidesktopstore (automatic download and installation of monthly updates)
5. Familiarize yourself with the interfaces

POWER BI : Mac Users

1. Pour les utilisateurs MAC, vous pour installer la **version d'essai de Parallels**, ce qui vous permet **d'utiliser de Power BI Desktop pendant 15 jours**.

1. Voici un tutoriel qui vous montre comment procéder : *https://www.youtube.com/watch?v=w1W1cuqn4lA*

POWER BI : Plan

Session 1 : Introduction and presentation of the Power BI Solution

Session 2 : Managing data in Power BI

Session 3 : Molding and combining data

Session 4 : Modeling data

Session 5 : Data visualization

Session 6 : Setup interactions

Session 7 : DAX language

Session 8 : Publish and share report

POWER BI : Roadmap

Date	Sessions	Workshops	Examen
15-04	Session1 – Session4	Workshops 1-4 and correction	
17-04	Session5 – Session6	Workshops 5-6 and correction	Prepare Oral and practical group presentation (50%) on sessions 1, 2, 3, 4
24-04	**Group presentation (50%)**		
25-04	Session7 – Session8	Workshops 7-8 and correction	
27-05		Workshops 7-8 and correction (continued)	
28-05	Final exam preparation	Final exam preparation	
29-05	Final exam preparation	Final exam preparation	
30-05			**Final exam (02h): The test will cover the entire program (50%)**

POWER BI

Session 1 : Introduction and Presentation of the Power BI Solution

POWER BI

OBJECTIVES

By the end of this session, you'll be able to :

1. Handle Power BI Desktop
2. Play with Power BI Service
3. Familairize yourself with the Power Bi workflow

1. What is the Power BI Desktop ?

1. Power BI Desktop connects you to your data
2. Transform and cleanse data to create a data model
3. Create visuals, such as graphs, which provide a visual representation of the data
4. Create reports corresponding to collections of visuals, on one or more report pages
5. Share reports with other users using the Power BI service.
6. Power BI Desktop lets you create Power BI mobile applications for Windows, iOS and Android devices.

1. What is the Power BI Service ?

1. **The Microsoft Power BI service** (app.powerbi.com), sometimes referred to as Power BI Online, is the SaaS (software as a service) part of Power BI.
2. In the Power BI service, **dashboards** let you take the pulse of your business at any time.
3. Dashboards contain **bookmarks** that you can select to open more detailed reports.
4. Dashboards and reports connect to **datasets** that bring together all relevant data in one place.

1. Power BI Workflow

1. Data source connection
2. Define and send query
3. Data preparation and enrichment
4. Visual design
5. Settings and interactions
6. Publish document

1. Power BI Setup

1. Download: https://aka.ms/pbiSingleInstaller (Manual monthly update)
2. Download from Microsoft Store: https://aka.ms/pbidesktopstore (automatic download and installation of monthly updates)

Workshop 1 : Presentation

1. The workshop files are in the folder : “Module 1 – Presentation”
2. Open Word file “Module1.docx” and follow the instructions

POWER BI

Session 2 : Managing Data in Power BI

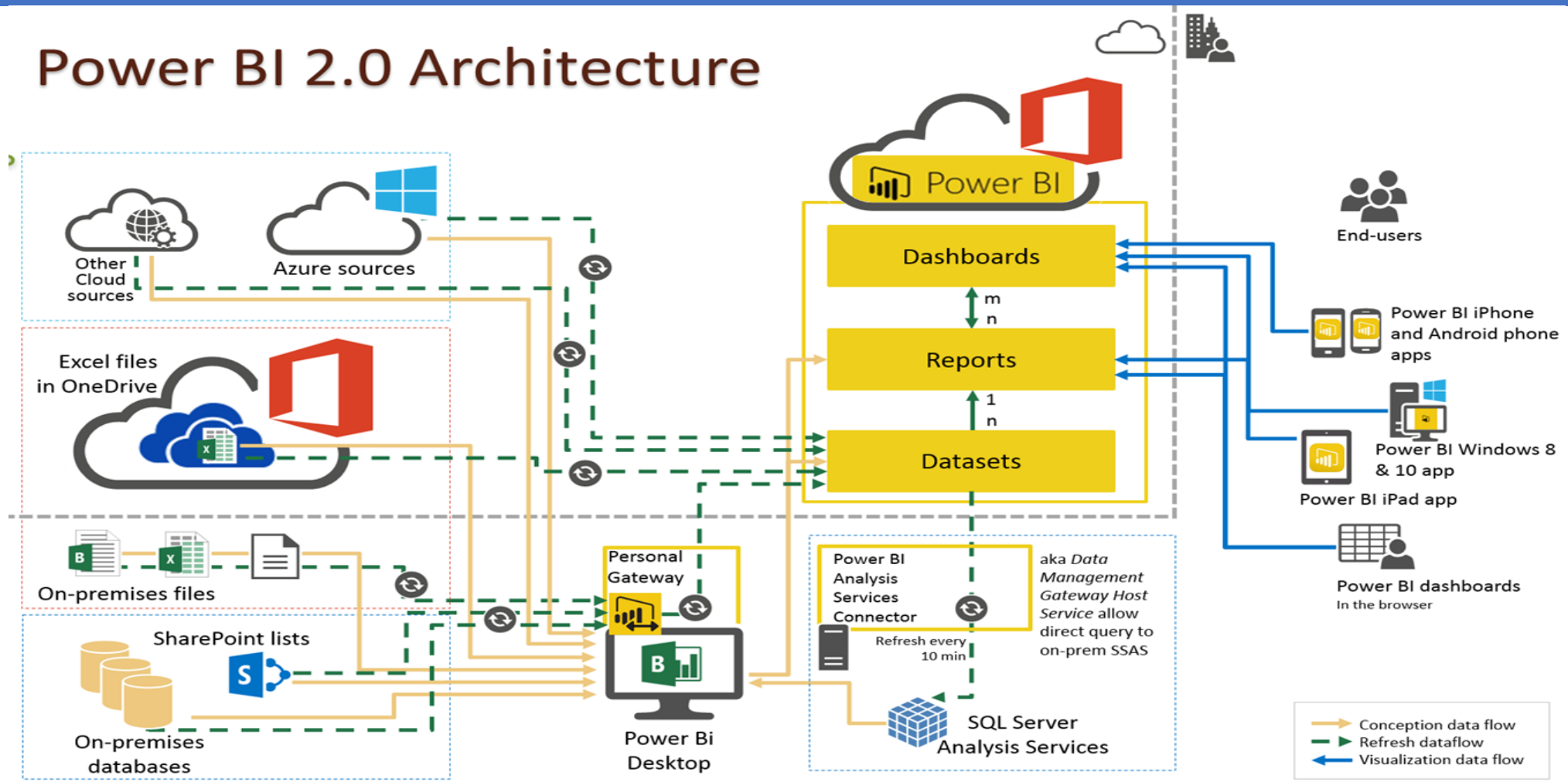
POWER BI

OBJECTIVES

By the end of this session, you'll be able to :

1. Get an overview of Power BI Architecture
2. Use Power BI Refresh Tool
3. Distinguish between data connection types

2. Power BI 2.0 Architecture



2. Data Refresh

1. Connection with **data import** into **Power BI Desktop**, updating is done exclusively with the **Refresh tool**
2. **Direct connection** to the data source, updating in **Power BI Desktop** takes place **each time a visual is clicked on**
3. With Power BI Service (Saas), updating can be **immediate** (manual), **automatic** (especially if the source file is stored in SharePoint or OneDrive) or **programmed** (scheduled)
4. Set up a **gateway** between the **Power BI server** and the **database server**, or the **source files**, so that updating can take place.

2. Types of connection

1. **Import connection**
2. **real-time connection**

2. Types of connection : Import

1. **Import data**: once the query has been launched, Power BI retrieves and stores all data locally.
2. **The advantage**: Power BI's performance when creating reports, modeling possibilities and responsiveness to user filtering actions.
3. **The drawback**: PC must have sufficient power, in terms of RAM (for data storage) and CPU (for calculations).
4. **Another possible drawback** is the **file size limit**: 1 GB for the standard version, 10 GB for the Pro and Premium versions.
5. Manual or scheduled data updating - as opposed to real-time data visualization.

2. Types of connection : real time

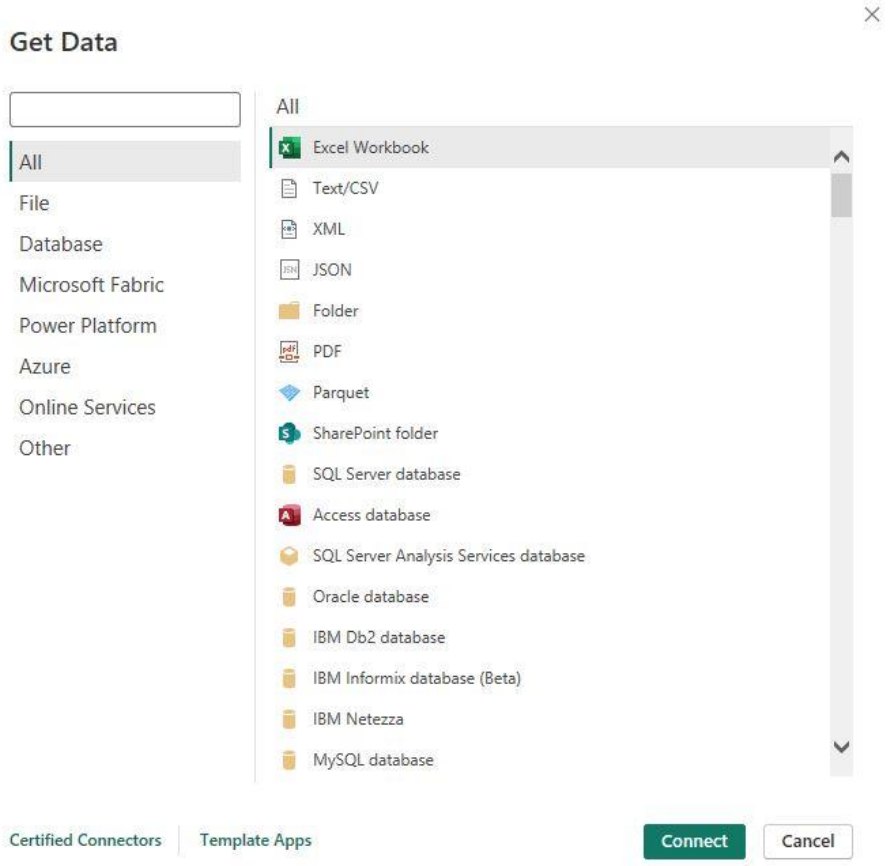
1. **Directly** to certain sources (mainly databases).
2. The **advantage** here is that you **always have up-to-date reports**, without having to update the data. A simple action (filter or selection in the display) is all it takes to update the data. What's more, substation power is no longer a limiting criterion.
3. **Disadvantage**: the source must be **powerful enough** to accept a direct connection. This can affect application performance.
4. Furthermore, **not all sources are available**.
5. **Data modeling** possibilities are **limited** (since they have already been defined in the source).
6. **Restriction**: some **transformation and formula creation functions** (notably Time Intelligence functions) **are not available**.

2. Real time connection : 2 options

1. **DirectQuery** connection: more general, but also less efficient.
2. **Direct** connection: exclusively for SSAS (SQL Server Analysis Services (SSAS) multidimensional models), Azure or Power BI Service - more efficient, as the data is already stored on the model used by Power BI.

2. Connection types

1. Connect to a flat file
2. Connect to a database
3. Connect to a folder
4. Connect to a website
5. Etc...



Workshop 2 : Managing Data in Power Bi

1. The workshop files are in the folder : “Module 2 – Managing data”
2. Open Word file “Module2.docx” and follow the instructions

POWER BI

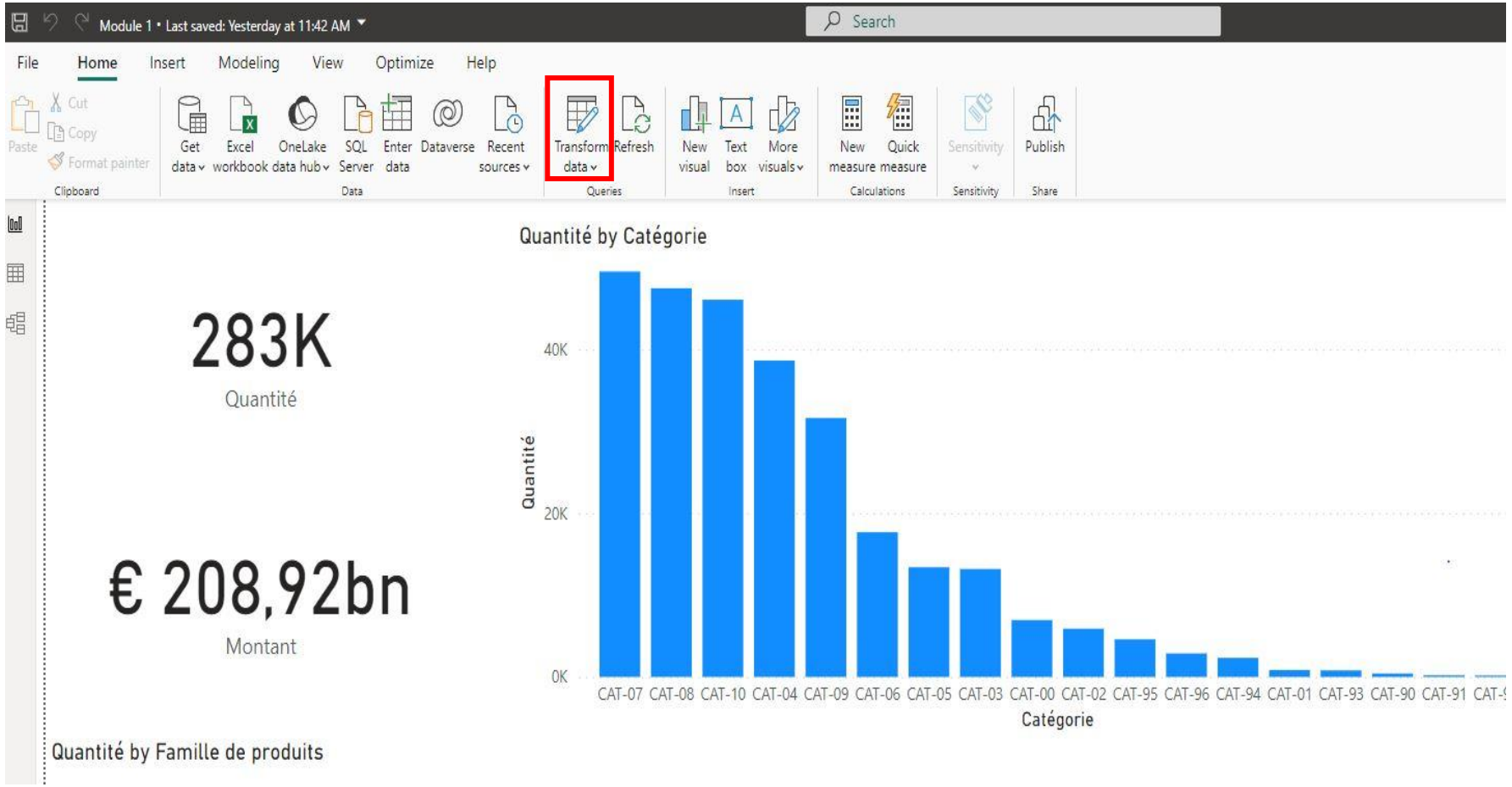
Session 3 : Molding and Combining Data

OBJECTIVES

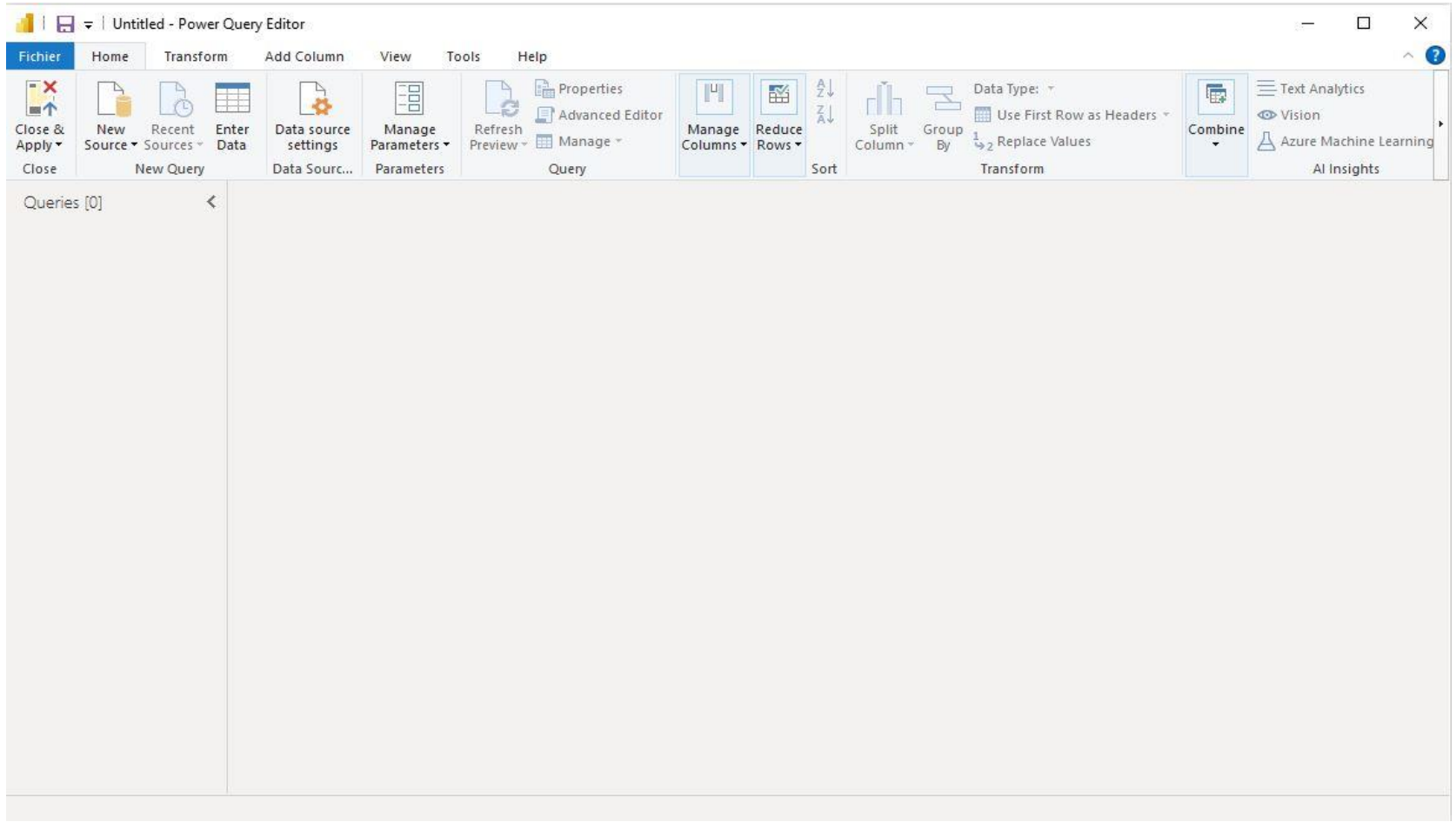
By the end of this session, you'll be able to :

1. Handle Power Query Editor
2. Perform some data preprocessing operations
3. Manipulate a Data Model in Model View

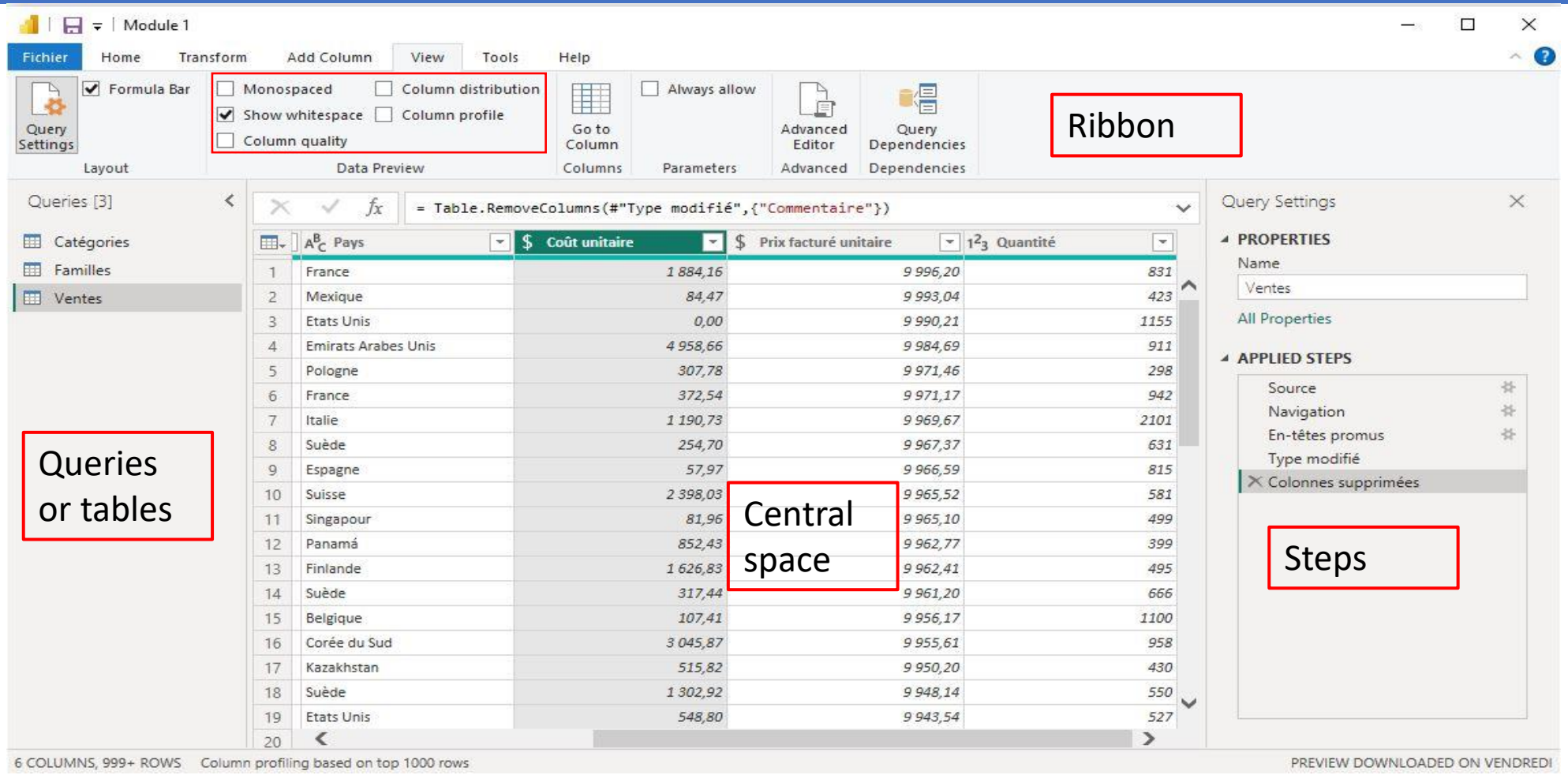
3.1 POWER QUERY EDITOR



3.1 POWER QUERY EDITOR

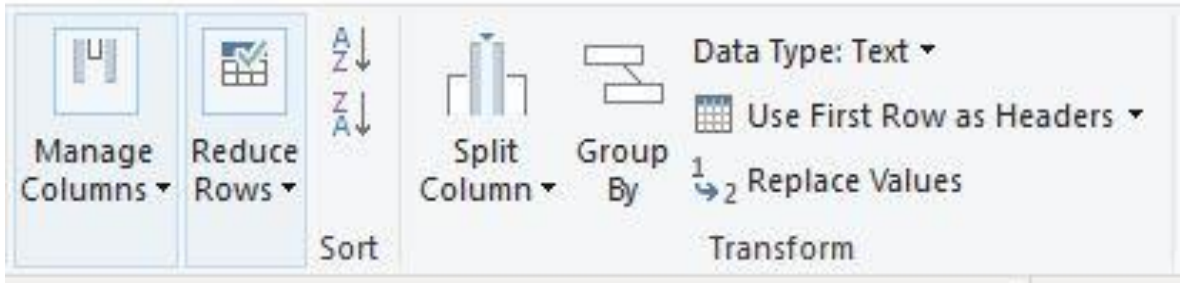


3.1 POWER QUERY EDITOR

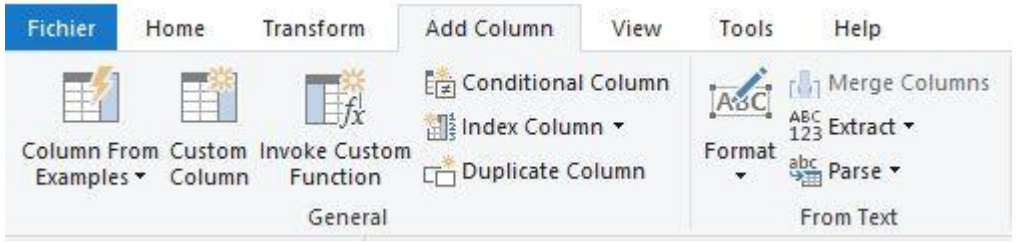


3.1 Power Query : Data Cleaning

1. Select (or delete) columns
2. Reduce rows
3. Use header row
4. Rename a column
5. Change column type
6. Filter source data
7. Replace values
8. Using the Format tool

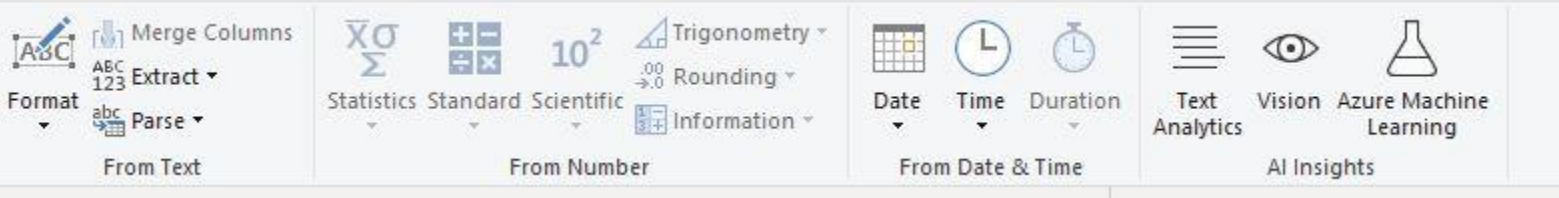


3.1 Power Query : Add Column



1. Create a column from examples
2. Create a custom column
3. Duplicate a column: operations on numbers, dates, etc.
4. Split a column
5. Add a conditional column

3.1 Power Query : Others Transformations



1. Depivot a pivot table
2. Combine rows from several tables with the same structure
3. Grouping
4. Replace values
5. Fill
6. Duplicate
7. …Etc

3.2 Power Query : Query Management Tools

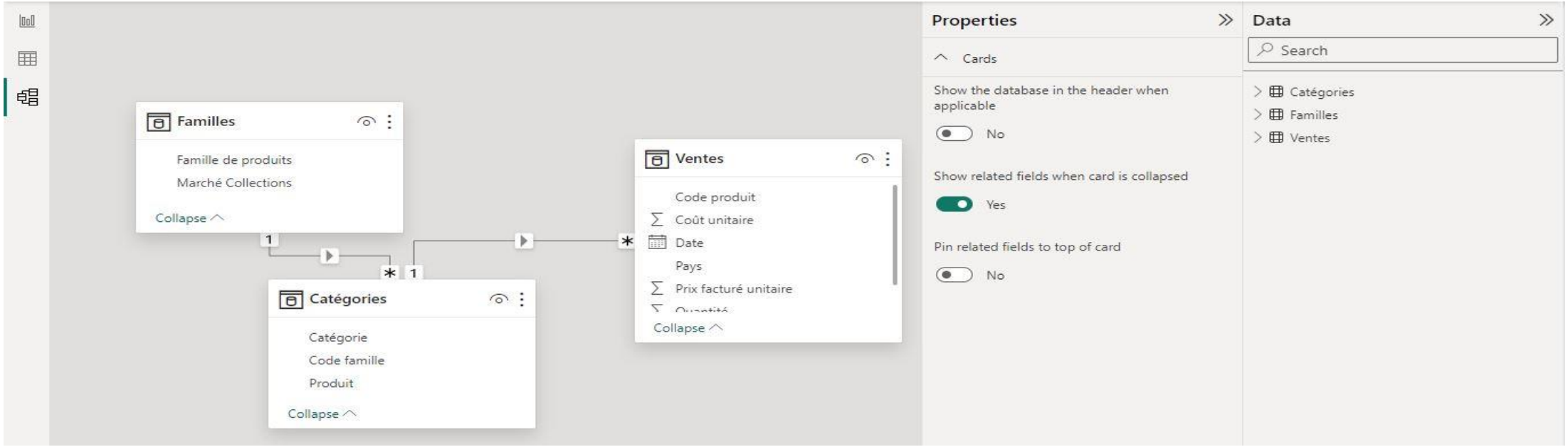
1. Add a new source
2. Rename, duplicate, delete a query
3. Query properties
4. Change source

Workshop 3.1 : Power Query Editor

1. The workshop files are in the folder : “Module 3.1 - Power Query editor”
2. Open Word file “Module 3_1.docx” and follow the instructions

3.2 Data Model

1. The **Model View** is accessible in Power BI, after clicking on **Close & Apply** in **Power Query**.
2. Allows you to **check relationships** between tables, and if necessary, create, modify or delete relationships.
3. Enables you to **enhance** the data model, notably **by grouping** fields into **folders**, and performing **transformation** operations on several fields at the same time (format).

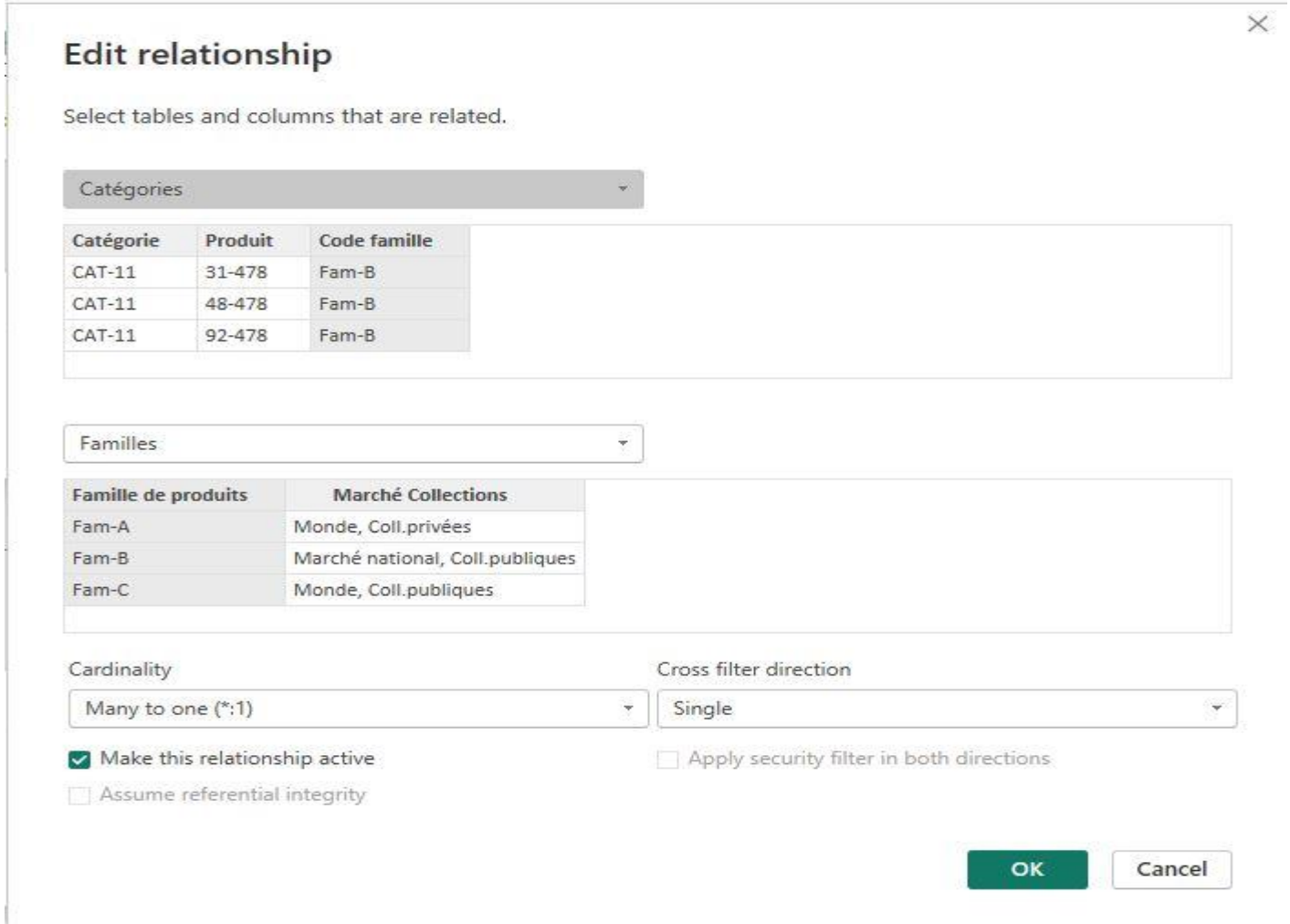


3.2 Data Model : Cardinalities

1. **Cardinality** indicates the nature of the relationship between two tables.
2. The most common relationship is called **1-to-N** (or one-to-many): a row in the table on side 1 of the relationship corresponds to one or more rows in the table on side N.
3. Of course, the opposite relationship also exists: the **N-to-1** relationship (several values in the table on side N correspond to one row on side 1). This time, the direction is from N to 1.
4. A third, rarer type of relationship can occur: the **1-to-1** relationship, where a value in the first table has one equivalent and only one in the second.
5. Finally, the fourth type of relationship is more complex, and usually requires a revision and transformation of the model: the **N-to-N** relationship, where a row in the first table is linked to several rows in the second, and conversely, a row in the second is linked to several rows in the first.

3.2 Data Model : Using the Model Window

1. Modifying a relationship
2. Create a relationship manually
3. Group fields in a table



Workshop 3.2 : Data Model

1. The workshop files are in the folder : “Module 3.2 – Data model”
2. Open Word file “Module3.2.docx” and follow the instructions

POWER BI

Session 4 : Modeling Data

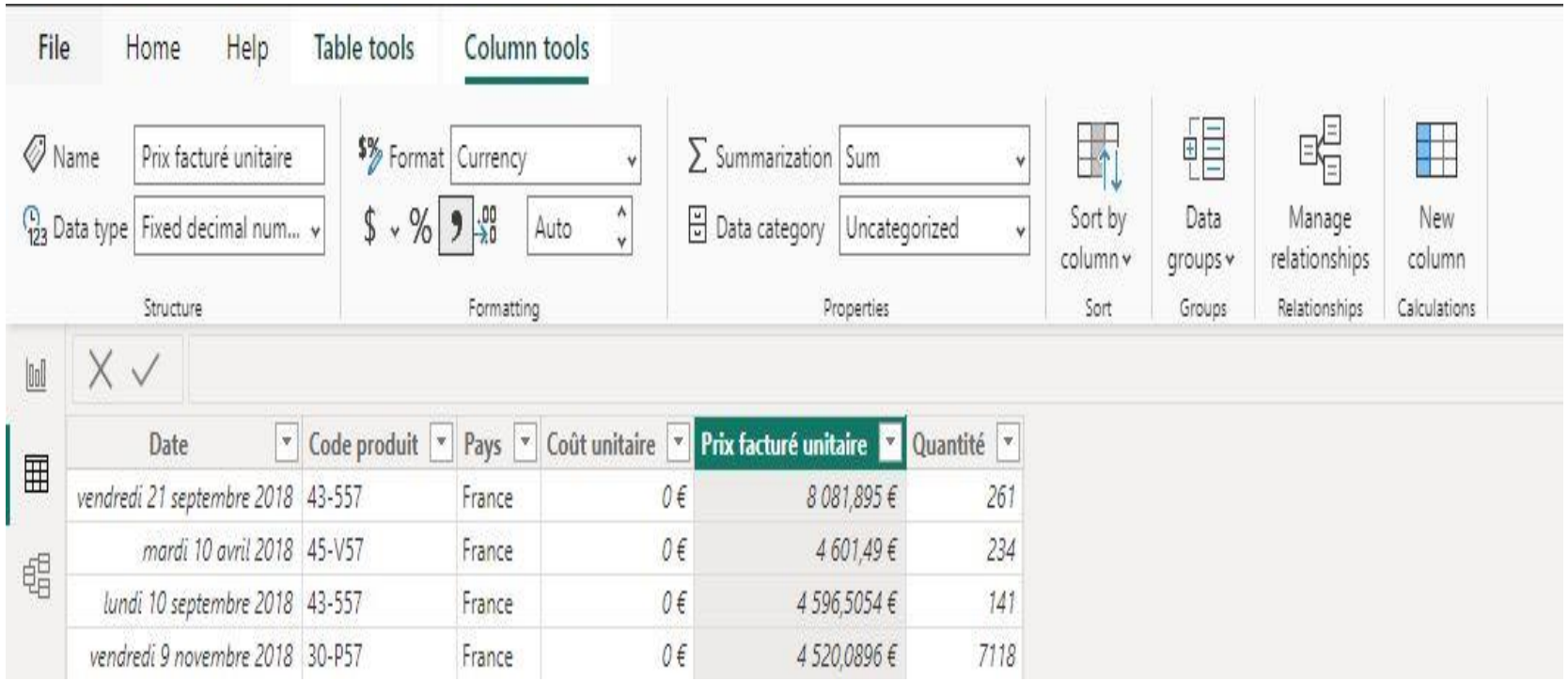
OBJECTIVES

By the end of this session, you'll be able to :

1. Format data
2. Create Indicators table (Measures table)
3. Create Time and Update Tables

4. Data formatting

1. Default format for numeric fields
2. Change default totalization of fields
3. Define column data category: geographic fields
4. Sort one column by another
5. Create hierarchies
6. Rename columns
7. Hide or delete tables and columns



Date	Code produit	Pays	Coût unitaire	Prix facturé unitaire	Quantité
vendredi 21 septembre 2018	43-557	France	0 €	8 081,895 €	261
mardi 10 avril 2018	45-V57	France	0 €	4 601,49 €	234
lundi 10 septembre 2018	43-557	France	0 €	4 596,5054 €	141
vendredi 9 novembre 2018	30-P57	France	0 €	4 520,0896 €	7118

4. Data formatting

1. Create an **Indicators table** to group measurements (More later)
2. Create a simple **Time table** (Create a new table + insert DAX code below)

```
Table Dates =
-- ce script crée une table de temps du 1er janvier 2018 à aujourd'hui
ADDCOLUMNS (CALENDAR (DATE (2018;1;1);TODAY());
  "Année";YEAR([Date]);
  "Mois";MONTH([Date]);
  "Nom du mois";FORMAT([Date];"MMM YY);
  "Nom du jour";FORMAT([Date];"DDD d MMM YY"))
```

3. Create an **Update table** (Contains the date on which report data was updated)

Workshop 4 : Data formatting

1. The workshop files are in the folder : “Module 4 – Data formatting”
2. Open Word file “Module 4.docx” and follow the instructions

POWER BI

Session 5 : Data Visualization

OBJECTIVES

By the end of this session, you'll be able to :

1. Build Visuals (Graphs, Simple tables, Crosstabs, Maps, Segments)
2. Use Graphic objects, Visuals interactions and Bookmarks
3. Apply ergonomic rules
4. Use Marketplace
5. Handle Tooltips

5.1. Data Visualization : Key Concepts

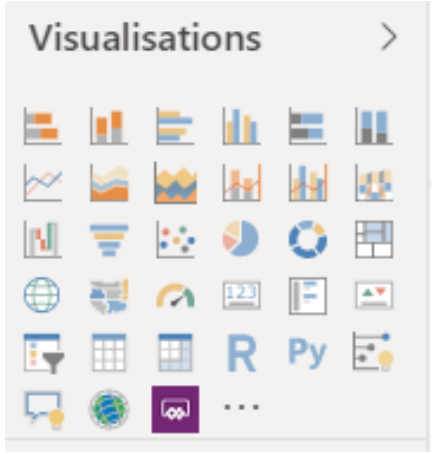
1. File, report, visual, interaction and bookmark
2. The file generated by Power BI has the **.PBIX** extension: it is made up of a set of tabs, or Pages, on which you build your reports by assembling visuals.
3. There are four main types of **visuals**:
   a) **Graphs** (histograms, geographical maps, for example)
   b) **Simple tables** or **crosstabs** (called matrices)
   c) **Maps** (displaying highly summarized data, such as a global amount)
   d) **Segments** (graphic filters - checkboxes, lists - that the report user can vary)

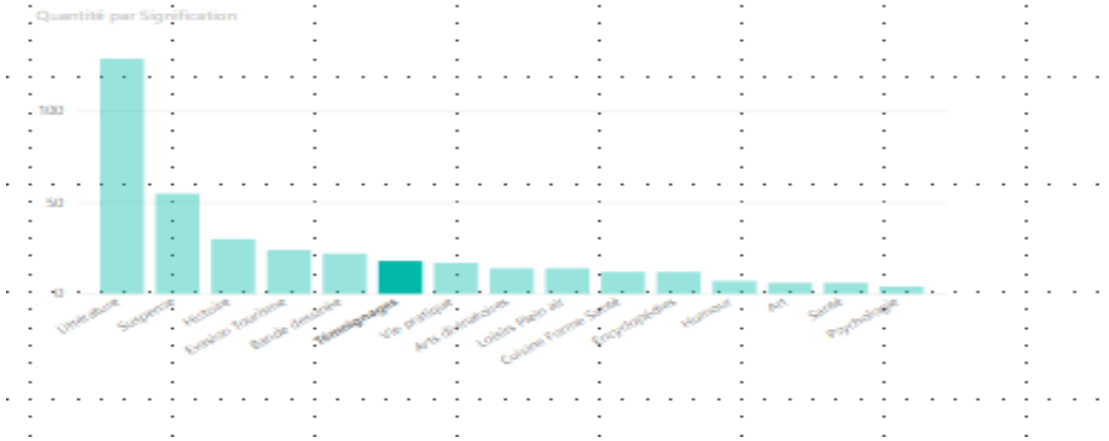
5.1. Data Visualization : Key Concepts

1. **Graphic objects** (lines, frames, images, text zones) are used to complete and enhance the report.
2. **Visuals interact** with each other: generally, one visual can filter or highlight all or part of the others.
3. Different states of a report or different reports can form a series of snapshots - **bookmarks**

5.1. Data Visualization : Setting up the first visual

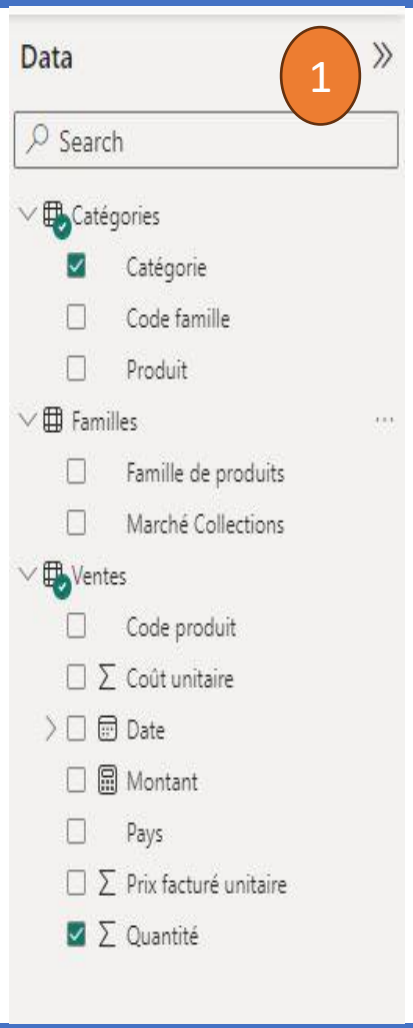
1. Show **relevant** and **accurate data**, based on the **fields selected** and **filters applied**, and preceding the adjustment stage, where modification of the visual properties enables you to define its exact format.
2. **Get rid** of information that doesn't add anything: if the data is directly visible on the chart, **chart axes** or **legends** may be **unnecessary**, as may colors and labels.
3. The range of visuals is **vast**, and the ways in which they can be used vary, but they all follow the **same common rules**.

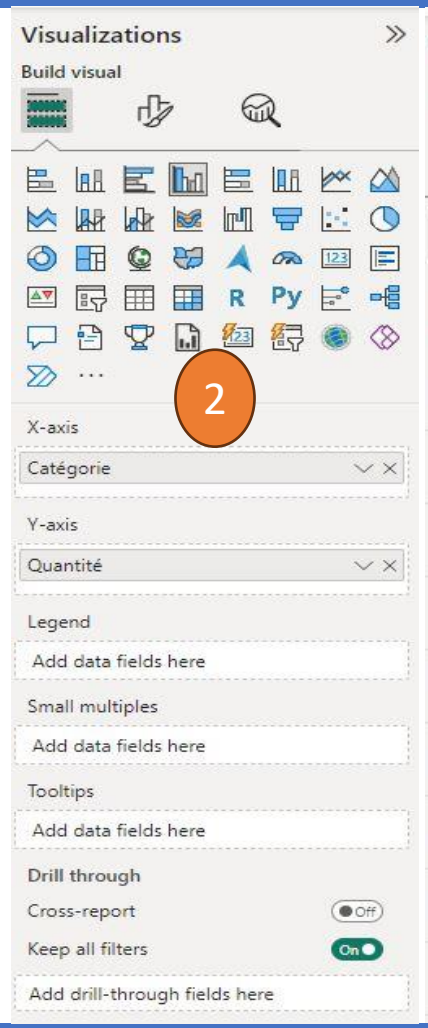


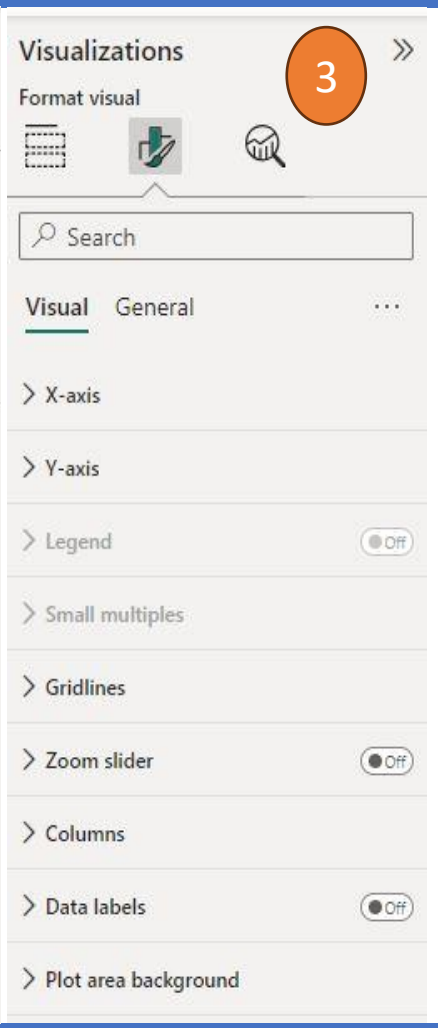


5.1. Data Visualization : Setting up the first visual

1. Select fields
2. Add fields to the corresponding axis
3. Define format precisely
4. Add an analysis line







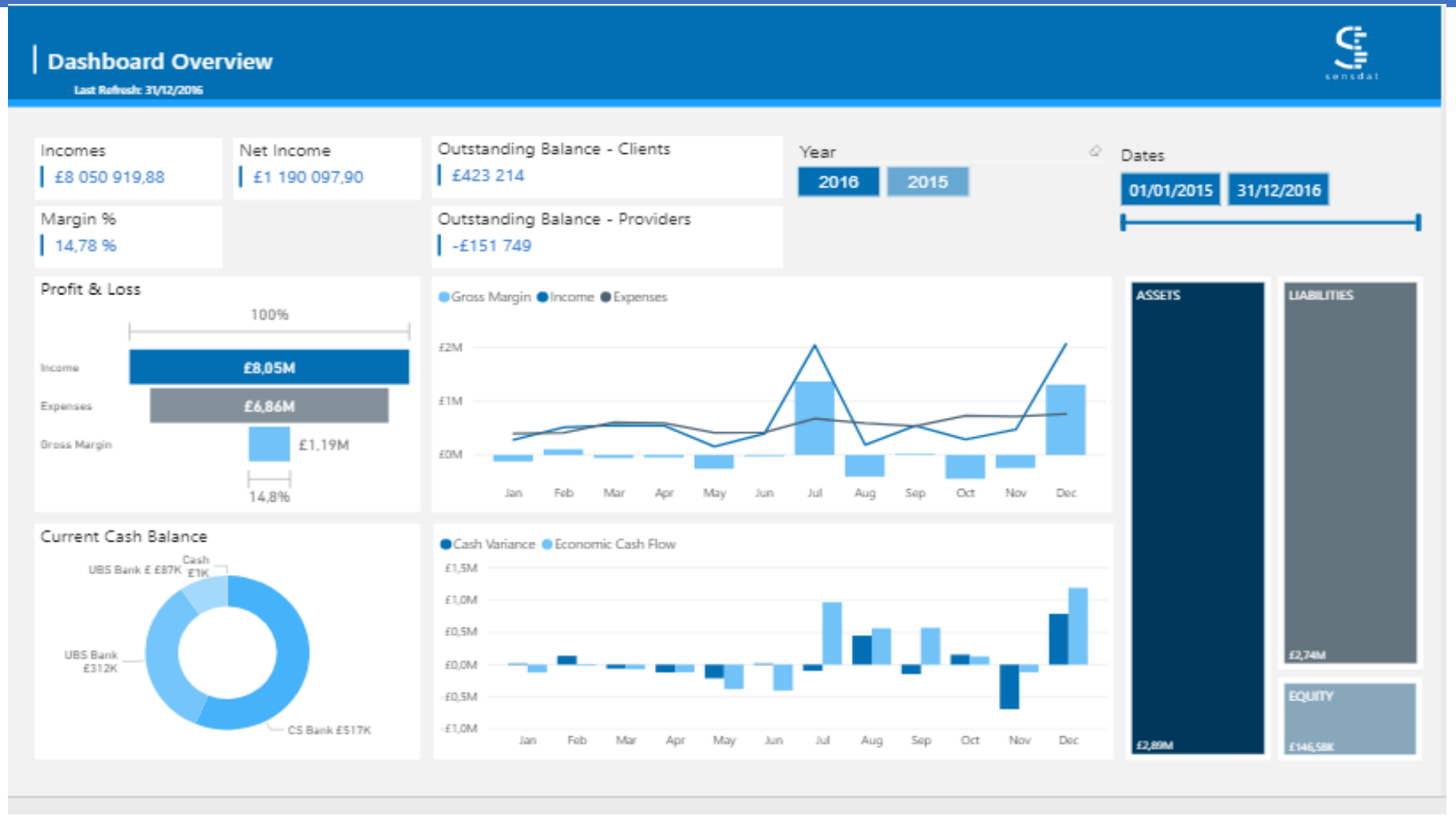
5.1. Data Visualization : Analysis of need and general objective

1. **Who** is the report for ?
2. What **decisions** should be made on the basis of the report ?
3. What are the **key indicators**, and their calculation rules ?
4. Will the user be able to **interact** with the report ?
5. **How often** and how will the report be **updated** ?
6. **How** will the report be **consulted** ?

5.1. Data Visualization : Ergonomic rules

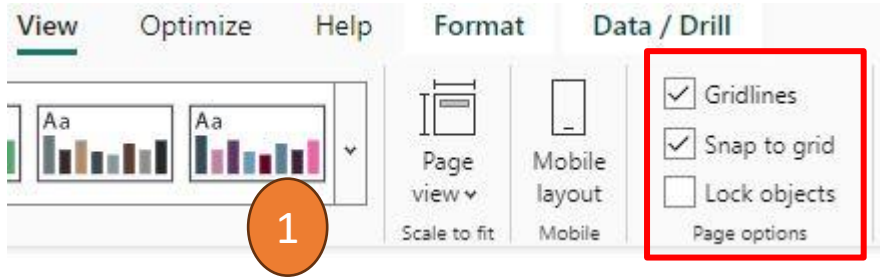
1. **Clearly** label what is shown
2. Position visuals according to **reading direction**
3. **Align** them with each other, do **not multiply** the types of visuals
4. **Avoid** tables with **too many lines**
5. **Simplify** figures into millions or thousands wherever possible
6. **Eliminate** all redundant information
7. **Use colors sparingly**, and only when they make **sense** (special category, alert, threshold).
8. **Group and position interaction** tools to one side

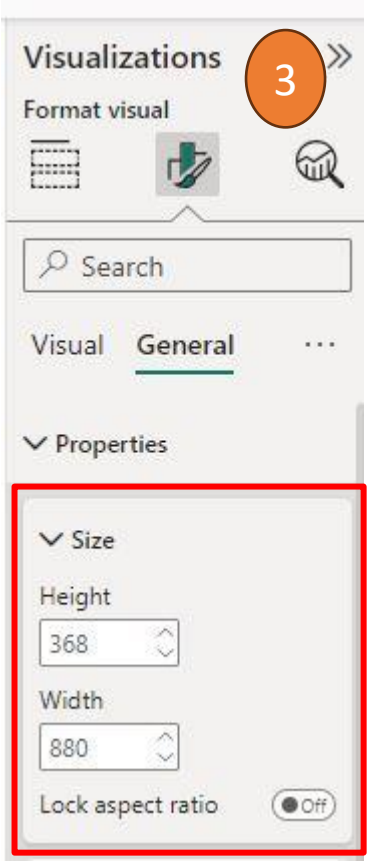
5.1. Data Visualization

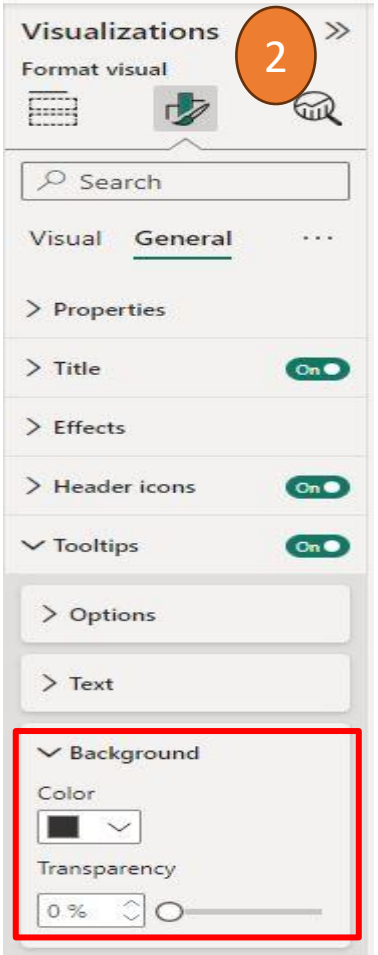


5.1. Data Visualization : Setting-up

1. Set page size
2. Choose page background
3. Use grid to align visuals







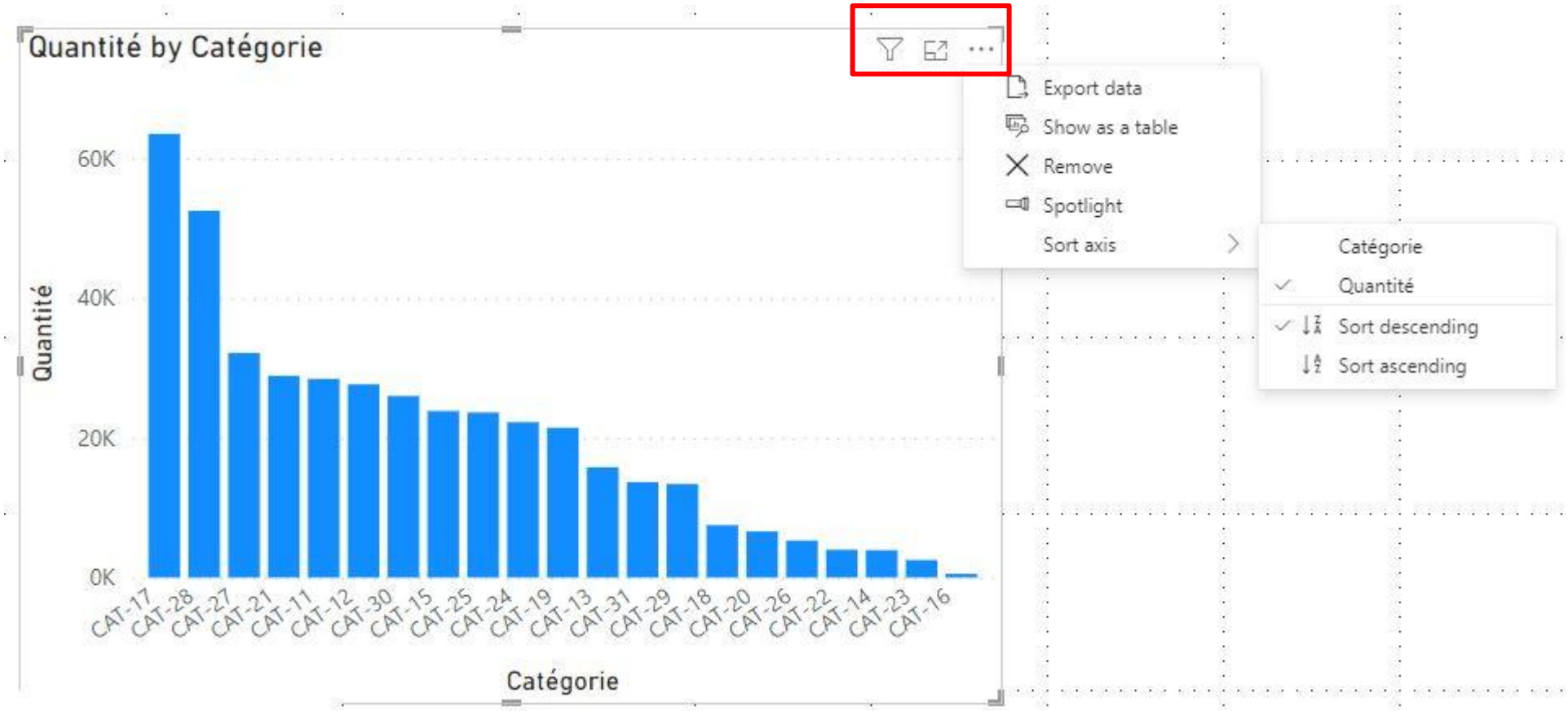
5.1. Data Visualization : Choosing the type of visual

Comparison	Grouped bar charts, Grouped histograms
Evolution over time	Curve graphics
Ranking	Grouped bar charts, Grouped histograms
Geographical representation	Map, Choropleth map
Contribution	Grouped bar charts, Grouped histograms
Individual data	Map, Multi-line map and Key performance indicator

Workshop 5.1 : Data Visualization

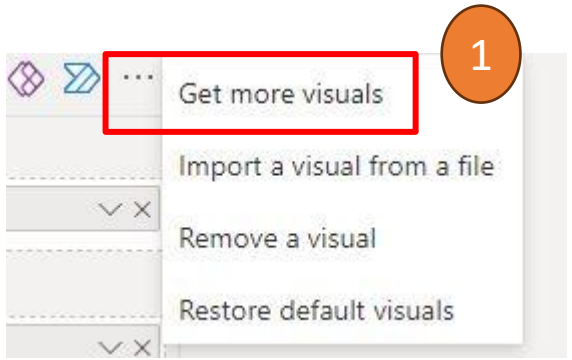
1. The workshop files are in the folder : “Module 5.1 – Data viz”
2. Open Word file “Module 5_1.docx” and follow the instructions

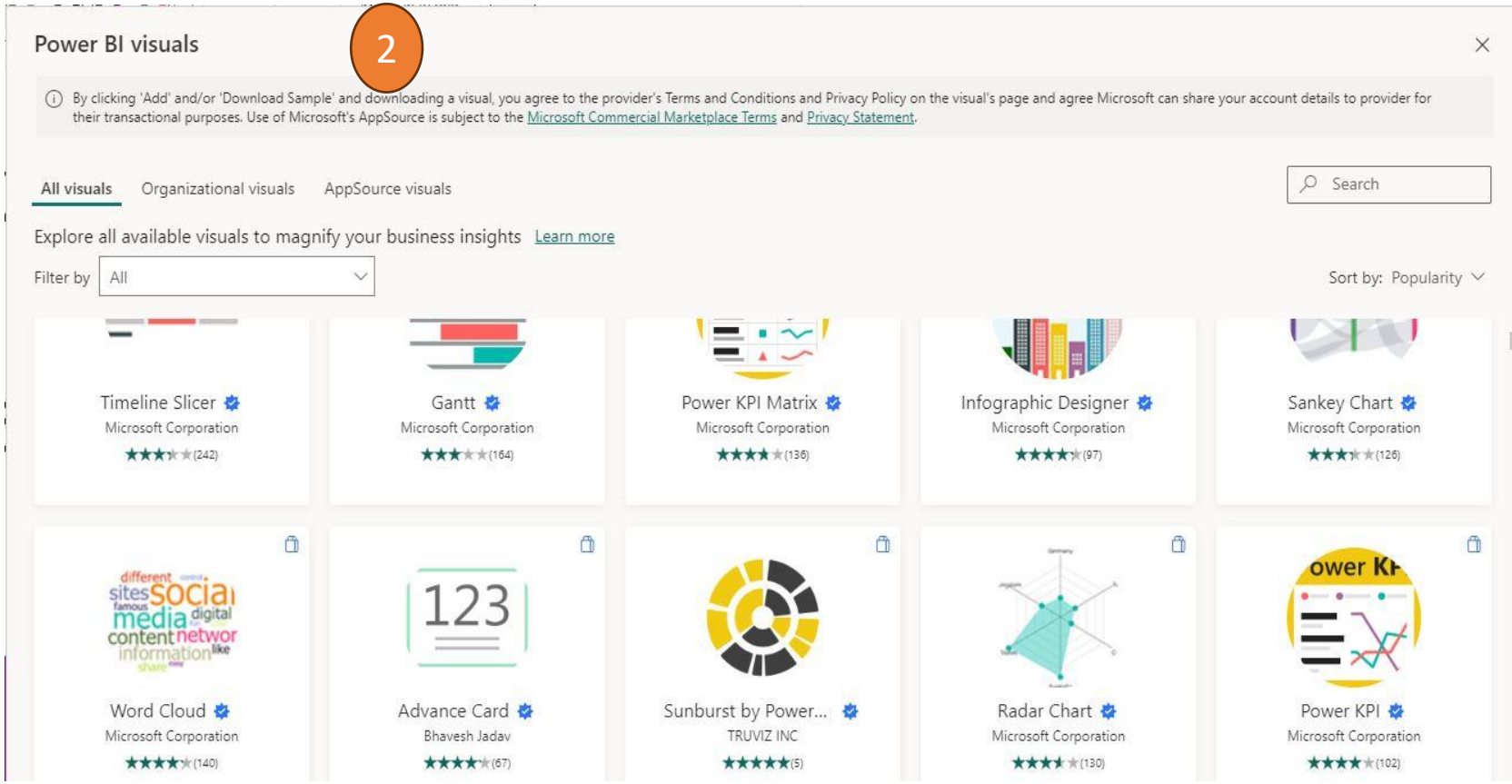
5.2. Data Visualization : Visuals features



5.2. Data Visualization : Marketplace

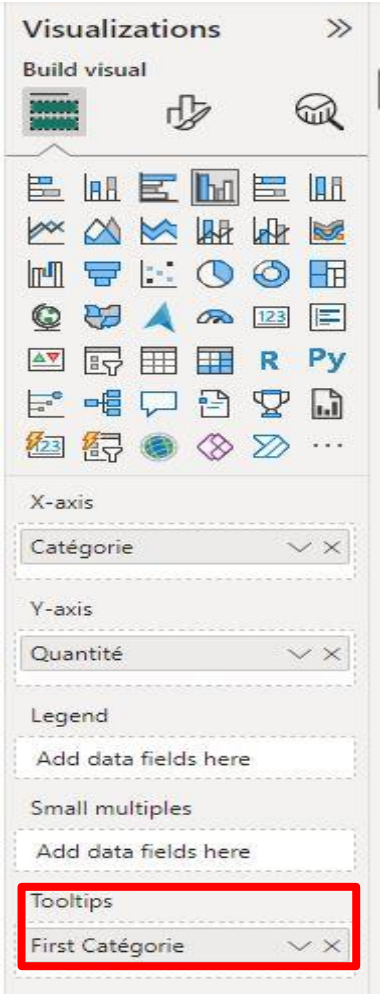
1. Add visuals from marketplace





5.2. Data Visualization : Tooltips

1. Modify standard tooltip



5.2. Data Visualization : Tooltips

1. **To create a tooltip page** :
    a. Create a new page in the report
    b. In the **VIEW pane - Format** this page, in the **Page information section**, activate the **Tooltip option**.
    c. In the **Page size section**, change the type to **Tooltip**
    d. This assigns the page a size suitable for tooltips (which cannot be too large). You can fine-tune this size once the visual has been created.
    e. To better perceive the size of this tooltip, we recommend displaying the **actual size**: in the **View tab**, click on the **Page Mode** button and choose **Actual size**.
2. **Assign the tooltip page** to the visual
    a. Go back to the initial visual, and in the **VIEW - Format pane**, scroll down to the **Tooltip heading**.
    b. The type is set to **Report page**, and the drop-down menu in the **Page heading** now offers you, in addition to Automatic, **the tooltip page you've created**.

Workshop 5.2 : Data Visualization

1. The workshop files are in the folder : “Module 5.2 – More on data viz”
2. Open Word file “Module 5_2.docx” and follow the instructions

POWER BI

Session 6 : SETUP INTERACTIONS

OBJECTIVES

By the end of this session, you'll be able to :

1. Handle different types of interactions
2. Create data hierarchy
3. Use extraction filters
4. Control interactions between the visuals
5. Handle segments and synchronization

6. Setup Interactions : Overview

1. Within a visual, the **first type of interaction** consists in **exploring the data**: moving from a general level to a more detailed one, according to the fields present in the visual, or moving from one page to another, more detailed, with extraction filters.
2. The **second type of interaction** takes place **between the different visuals**, which automatically filter each other (filtering or highlighting, depending on the visual).
3. the **third type of interaction** takes place **between the user and the report**, through a particular visual, **the segment**

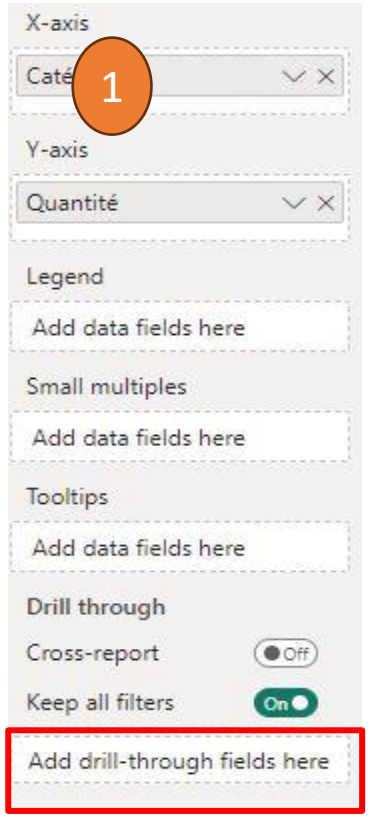
6. Setup Interactions : Explore data

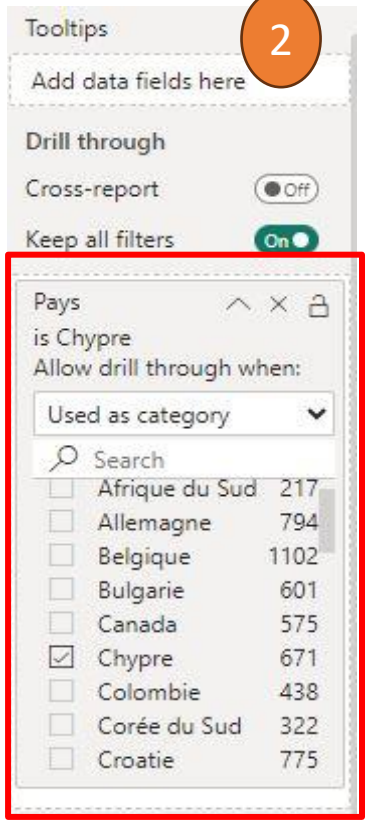
1. Data exploration is made possible, depending on the visual, by the presence of several category fields in the same field. These fields **may or may not be associated in a hierarchy**.

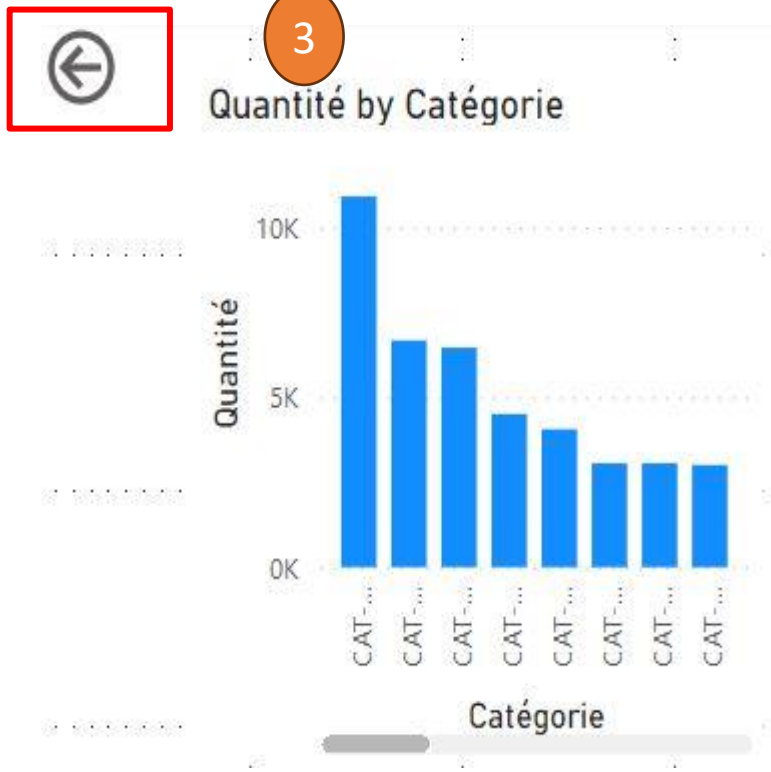
6. Setup Interactions : Explore data with extraction filters

1. The **field** placed in the **Extract page well** displays this page, filtered, from any other visual in the report. A **navigation button** on the filtered page allows you to **return to the start page**.

On a new page, create a visual and put in the Extraction well the field on which extraction will be triggered on another page.



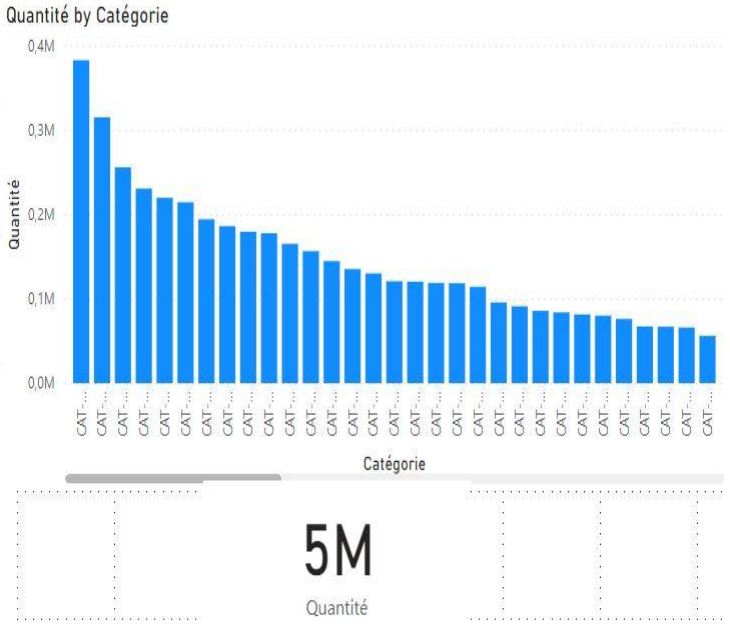




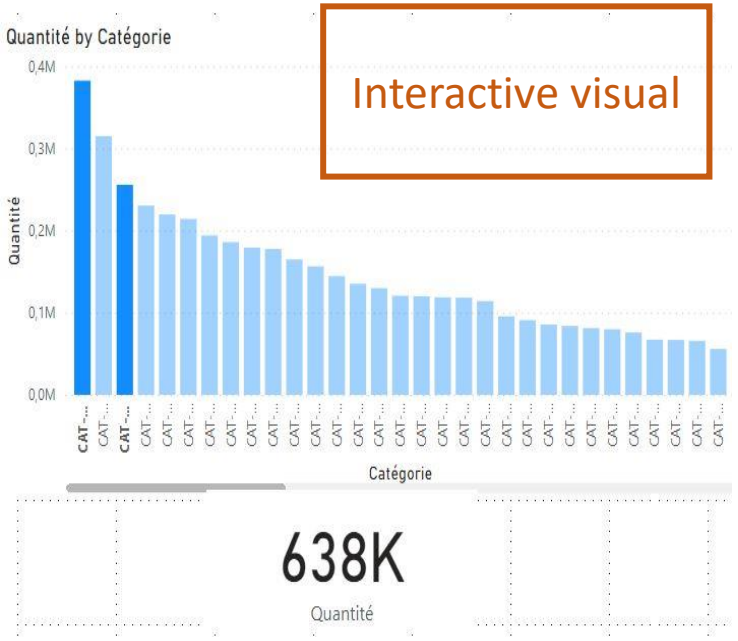
6. Setup Interactions : Between visuals

1. **Interaction** occurs **automatically** for most visuals: **clicking on a part** (bar, line, sector) of a visual **affects the other visuals** on the same page.
2. Most of the time, you'll need **to control** how these interactions occur, as **not all of them are justified**, depending **on the purpose** of your report

Non-interactive visual

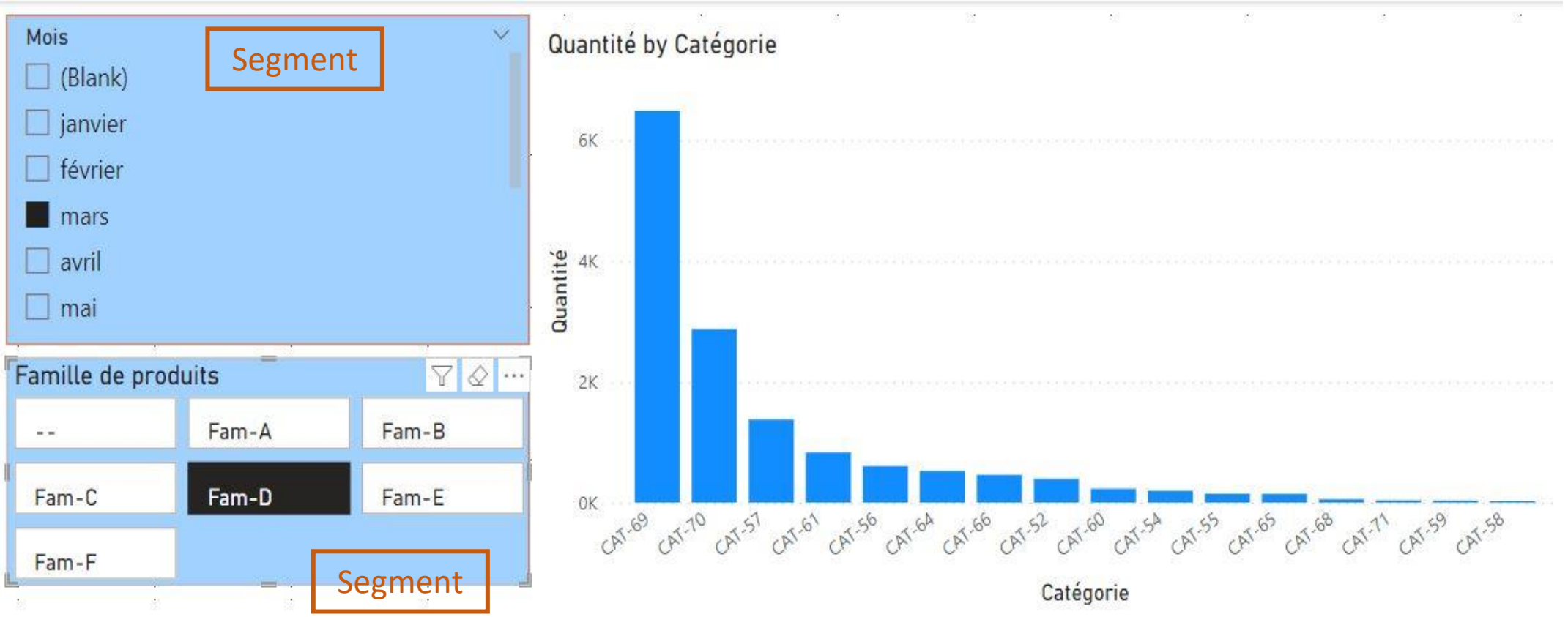


Interactive visual



6. Setup Interactions : Segments

1. Power BI offers a **visual segment**. Setting it up involves selecting the field to be used, usually a **text or date field**.

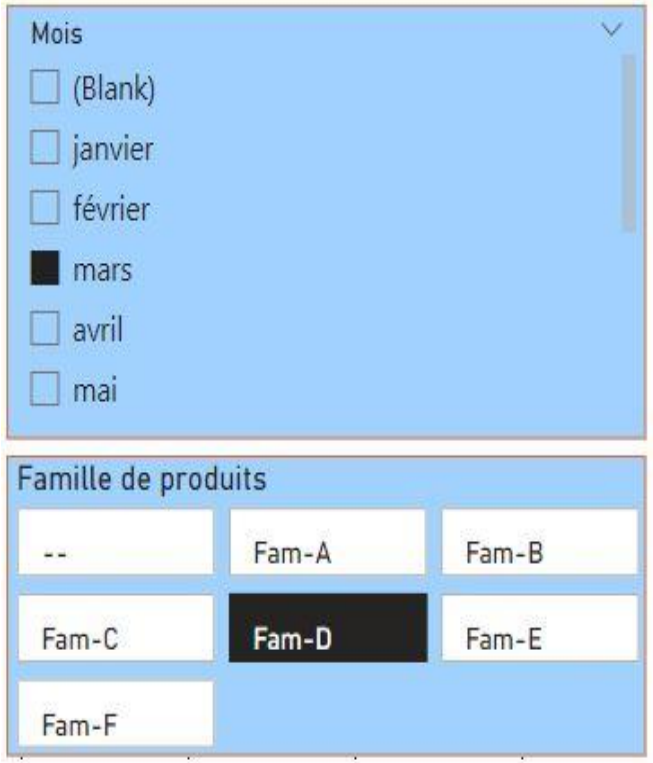


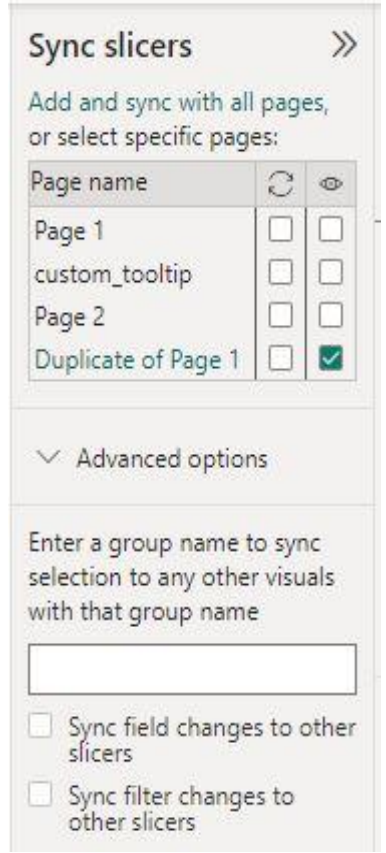
6. Setup Interactions : Going further with segments and Synchronization

1. By default, the **segment** only filters visuals on the same page
2. it is possible **to extend the effect of the segment to other pages** of the report: this is called **synchronization** and is controlled from the **Synchronize Segments pane**.
3. To display the pane, check the **SYNCHRONIZE SEGMENTS** box in the **View tab**.
4. **Select** segment
5. You can **extend** the effect of **the segment to other pages** of the report (first column of checkboxes).
6. You can make **the segment visible** on **other pages** (second column).
7. You can extend the effect of the segment to **all pages** (Add and synchronize with all pages).

6. Setup Interactions : Going further with segments and Synchronization

1. **Advanced options** allow segments to be grouped together, keeping them synchronized.
2. By extending the use of synchronization, it is therefore possible **to imagine one page of the report - the first, for example - containing only segments**, while the effects of these segments can be extended to all pages of the report through synchronization. This provides the user with a **home page** that enables him to **filter the data** displayed **throughout the entire report**.

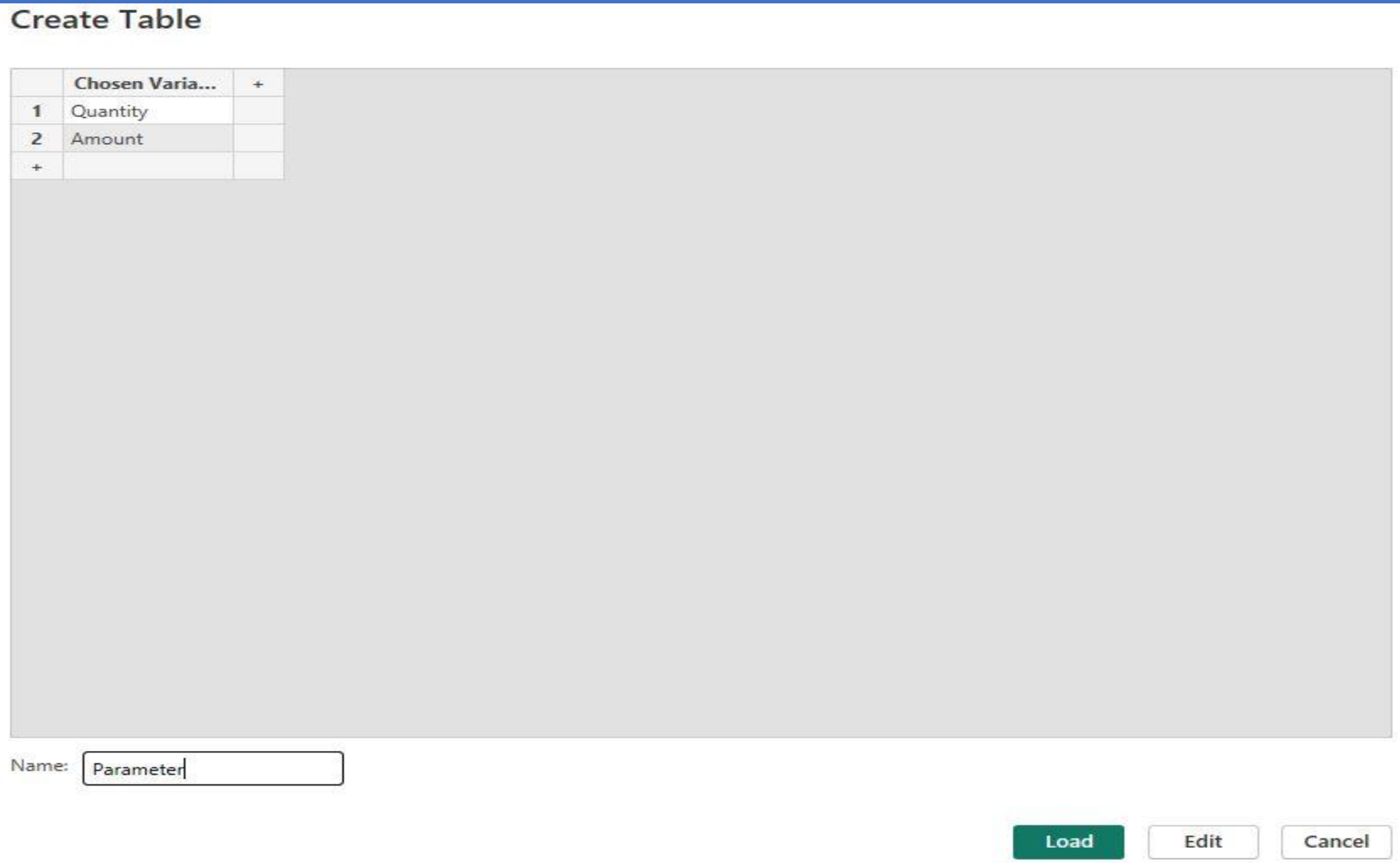




6. Setup Interactions : Segments, to define the report

1. First, **create a parameter table** (this will allow the user to display either the quantity or the amount).
2. Create the Parameter table: in the **Home tab,** click on **Enter data**.
3. Double-click on the word Column to rename to "**chosen Variable"** column.
4. In the **first line**, enter **Quantity**.
5. Click on the Variable column in the **second row** and enter **Amount**.
6. Rename the "**Parameter"** table in the Name field.
7. Click on **Load** to create the table.

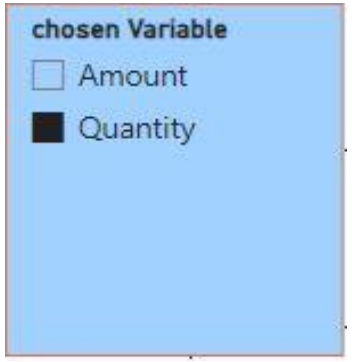
6. Setup Interactions : Segments, to define the report

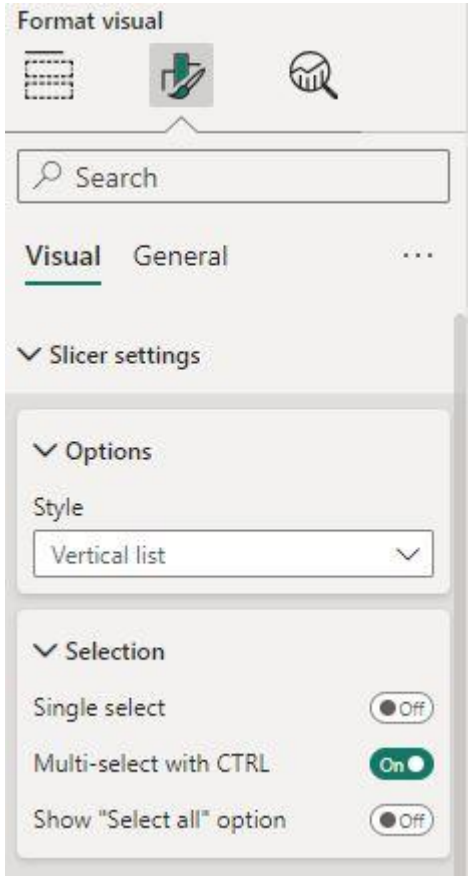


6. Setup Interactions : Segments, to define the report

1. Next, **create a segment from this table**
2. In the **FIELDS pane**, select the **chosen Variable** field in the **Parameter table**, and click on the **Segment icon** in the VIEW pane.
3. **Change the Orientation property** in the General section of the segment format to **horizontal**.
4. In the **Selection commands** section, **activate Simple selection** (allowing only one choice at a time).
5. Finally, **create a measure** that will retrieve and use the value selected in the segment

6. Setup Interactions : Segments, to define the report

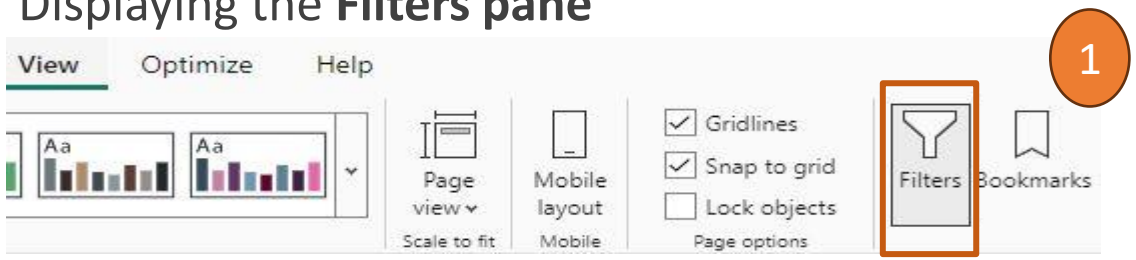





```
chosen Measures =
    SWITCH (
        SELECTEDVALUE ( 'Parameter'[chosen Variable] ),
        "Amount", 'Ventes'[Montant],
        "Quantity", SUM ( 'Ventes'[Quantité] ),
        BLANK () // Valeur par défaut si aucune condition n'est satisfaite
    )
```

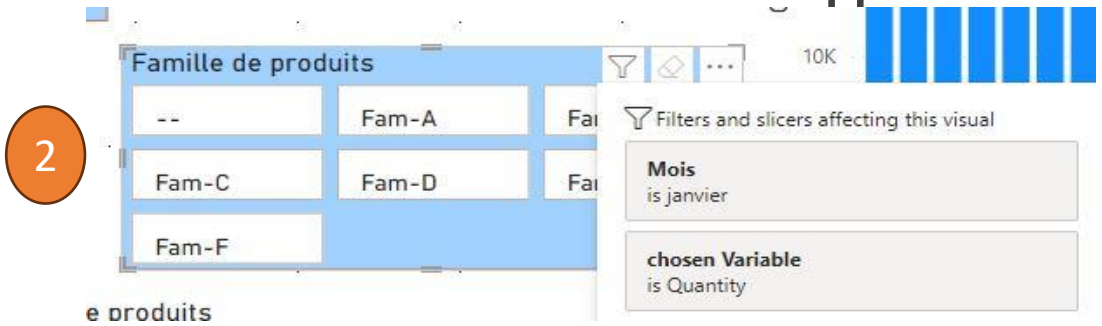
6. Setup Interactions : Use Filters Pane

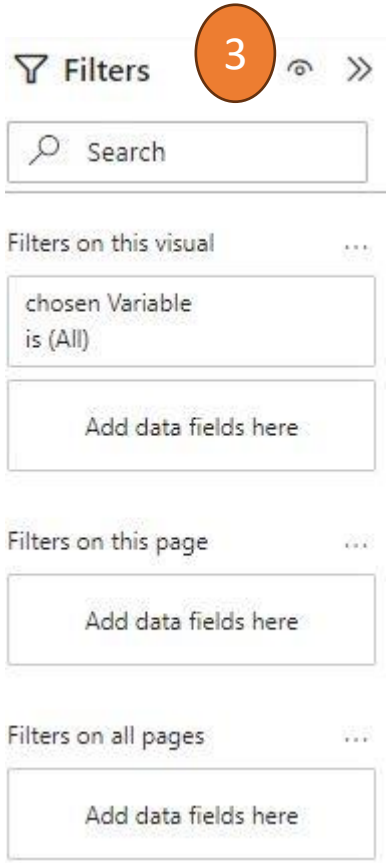
1. Displaying the **Filters pane**



2. The display properties of the **Filters pane** (background color, font, etc.) **can be modified** in the Filter pane section of the **VIEW - Format** pane.

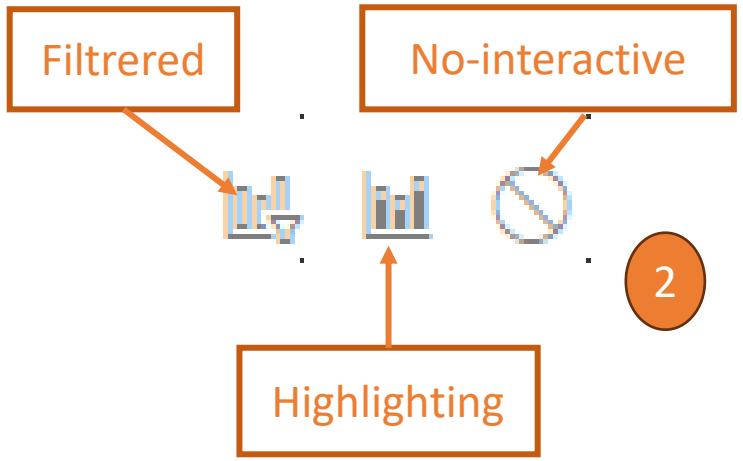
3. Once the **FILTERS pane has been activated**, **move the mouse over the filter icon in the header of the visual to view the filters applied to it**.

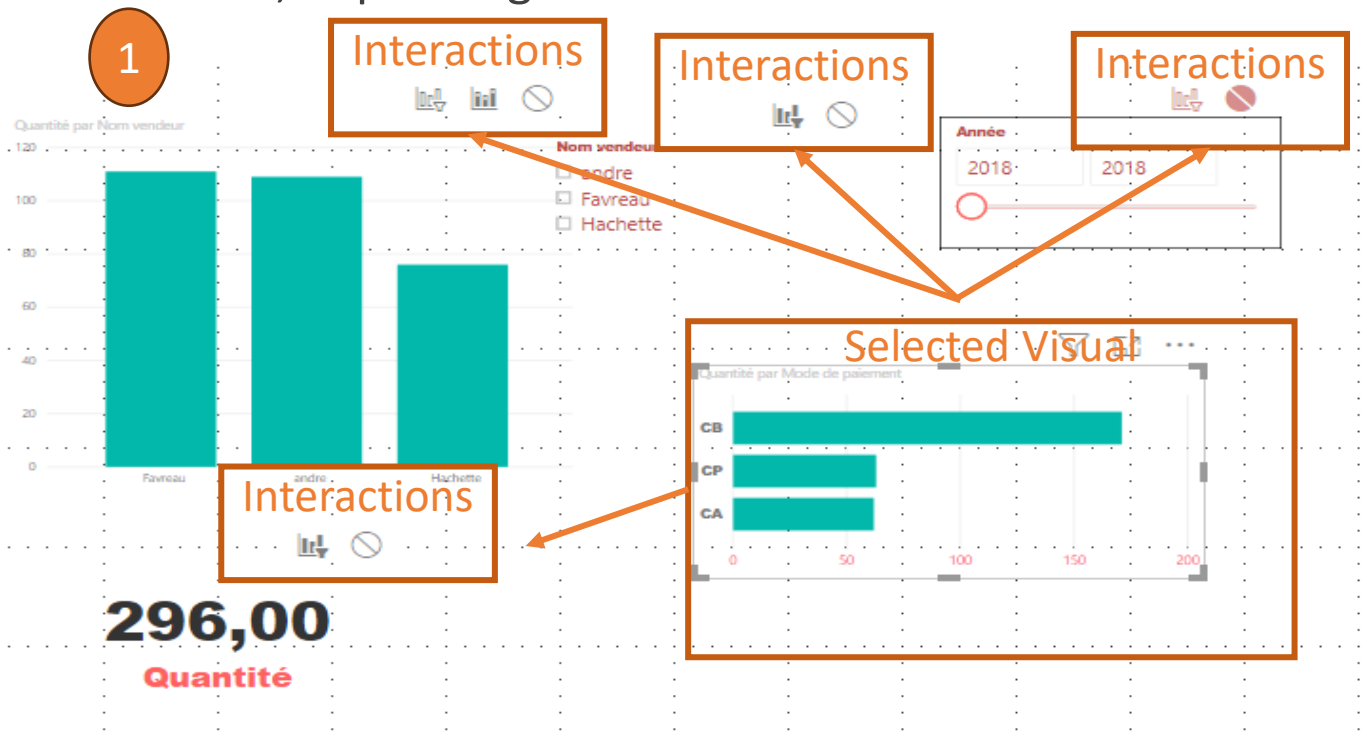




6. Setup Interactions : Configuring interactions between visuals

1. For **each visual**, you need **to specify and configure its role** in relation to each of the other visuals.
2. There are up to **three types of interaction**, depending on the visual selected:





6. Setup Interactions : Note on segment interactions

1. Within segments, especially those with **a hierarchy**, **interactions are usually top-down**, rarely bottom-up.
2. A **Year segment** filters a **Date segment**, but **not vice versa**
3. **Year** filters **months, dates and the table**.
4. **Month** filters **dates and table**, but not years.
5. **Date** filters **table**, but not years or months.

Workshop 6 : Setup Interactions

1. The workshop files are in the folder : “Module 6 – Develop interactions”
2. Open Word file “Module 6.docx” and follow the instructions

POWER BI

Session 7 : Creating Data in DAX

OBJECTIVES

By the end of this session, you'll be able to :

1. Handle measures
2. Play with DAX language
3. Use and create DAX functions or Formulas
4. Manipulate Aggregative and iterative functions

7. Creating Data in DAX : Overview

Measures and columns

1. For the **column**, the **calculation is performed once, at data loading** (or update), when the created column is filled. **The column** is physically stored in the **file**, whose **weight is therefore increased**.
2. For **measures**, the **calculation** is performed **each time the measure is added** to a visual, or **segments are modified** by the report user. Measures don't take up any space but use **processor power** for their calculations.
3. Creating a measure rather than a column **therefore offers three significant advantages**: as the formula is **only calculated at the moment of use**, the **update time is shorter**, and the **file size doesn't increase**.
4. What's more, for the measure, if the formula is used in a filtered display (which is most often the case), the **calculation is only performed for the rows resulting from the filtering**, and therefore for **a reduced set of rows compared to the initial table** (or tables).

7. Creating Data in DAX : Introduction to DAX

1. DAX is a **functional language** for constructing a formula using **functions**, **parameters** and **data**, evaluated **within a context**.
2. The **result** of this formula can be a new **numerical indicator**, a **new text field** or a **new table** in its own right.
3. The **DAX formula editor** is based on **IntelliSense**, a language engine which, as in Excel, **suggests functions, keywords or references** according to the formula and what it allows you to enter.
4. DAX is used in **Power BI**, **Excel**, **SSAS Tabular**, **Azure AS** and more.

7. Creating Data in DAX : Components

1. **Functions** : over 200.
2. **Parameters**, which can be either **single values** or **tables** (sets of values) - **the former are called scalar functions, the latter tabular**.
3. **Parameters** also include the **indications** that enable the formula to function.
4. **Data**, which can be **table names** or **column names**.

7. Creating Data in DAX : Formalism

1. As DAX formulas can quickly become **complex**, it is strongly recommended to follow a certain **formalism** when writing them (**line breaks**, **indentation**, **comments**).
2. **Spaces** and line breaks [Shift][Enter] are encouraged.
3. Comments
    a. With a double hyphen (--): the whole line is a comment.
    b. With a double // : the whole line is a comment.
    c. With /* then */ : all lines between these two signs are comment lines.

7. Creating Data in DAX : Row context

1. Before the **formula is calculated**, it is evaluated in an environment defined essentially by the filters applied to it and the table(s) it calls upon.
2. Row context
    a. Row context only applies when creating a column or using an X function (SUMX, AVERAGEX, COUNTX, etc., as well as the FILTER function).
    b. when creating a column in a table with 100 rows, the calculation will be performed 100 times, with a different row context each time.
    c. **X functions** are also called "**iterators**" in that they are evaluated for each row in the table passed as a parameter.
3. the **FILTER** function generates a table with a reduced number of rows.

```
1 amountPerCollections =
2     SUMX( FILTER(
3         'Ventes',
4         RELATED(Familles[Marché Collections])= "Monde, Coll.privées"
5     ),
6     'Ventes'[Montant]
7 )
```

7. Creating Data in DAX : Row context

1. Before the **formula** is calculated, it is **evaluated** in an environment defined essentially by the **filters applied to it and the table(s)** it calls upon.
2. For each calculation performed (i.e., each cell in a table, or the height of each bar in a histogram), the **filter context** is evaluated and defined implicitly.
3. It can be **affected** by :
    a. Other **data** in the display (e.g., row and column of a matrix, X axis of a histogram),
    b. **segments**,
    c. **Other visuals**,
    d. **Visual, page or report filters**.

```
amountPerCountry =
IF(
    SELECTEDVALUE(Ventes[Pays])="France",
    "n/a",
    SUM(Ventes[Quantité])

    // SELECTEDVALUE function check the presence, in a filter context of the filter Ventes[Pays])="France"
    // on the card where calculation is displayed. In presence of filter, variable return n/a else SUM calculation
)
```

7. Creating Data in DAX : Row context

1. But the **filter context** can also be defined **explicitly**, using DAX functions, as we'll see later, and in particular the **CALCULATE function**.
2. When **both implicit and explicit** filters are applied to the same column, **the explicit filter takes precedence**.
3. The **golden rule** is that the **filter automatically propagates** along relationships from 1 to N, and only **stops when it encounters a relationship in the opposite direction** (N to 1).
4. It is possible to set up **a two-way relationship**, whereby the filter **propagates in both directions**, or its DAX-language equivalent, **the CROSSFILTER function**, which also forces the filter to pass in the N to 1 direction.

```
Nbre de pages par commande =
CALCULATE(
      SUM(Livres[Nbre de pages]);
       CROSSFILTER('Détail des commandes'[Numéro livre];
       Livres[Numéro livre];
       Both
      )
 )
```

7. Creating Data in DAX : Key elements of a function

1. What type of parameter does it receive? A table or a (scalar) value?
2. What does it return? A table or a (scalar) value?
3. How does it deal with contexts? Does it know the line context? Does it detect a context switch?

7. Creating Data in DAX : Examples of function

Function name	Syntax example
SUM	SUM('Global-Superstore'[Sales])
SUMX	SUMX('Global-Superstore' , 'Global-Superstore'[Sales] + 'Global-Superstore'[Profit])
AVERAGE, MIN, MAX	AVERAGE('Global-Superstore'[Profit])
COUNTROWS	COUNTROWS('Global-Superstore')
VALUES	VALUES('Global-Superstore'[Product Name])
CALCULATE	CALCULATE(SUM('Global-Superstore'[Sales]), Filter('Global-Superstore', 'Global-Superstore'[Category]="Furniture"))
FILTER	Filter('Global-Superstore', 'Global-Superstore'[Category]="Furniture"))
ALL	ALL(City)
ALLSELECTED	ALLSELECTED (', 'Global-Superstore'[Category])

7. Creating Data in DAX : Examples of function

Function Name	Syntax Example
DATEADD	DATEADD('Table Dates'[Date] ;-1 ;Quarter)
DATESINPERIOD	DATESINPERIOD ('Table Dates'[Date] ; LastDate('Table Dates'[Date]); -7; DAY)
TOTALQTD, TOTALYTD, TOTALMTD	TOTALQTD([Montant];'Table Dates'[Date])
CALENDAR	CALENDAR (DATE(2018 ;1 ;1) ; TODAY())
CALENDARAUTO	CALENDARAUTO ()
ADDCOLUMNS	ADDCOLUMNS(TableDate2; "Month number"; FORMAT([Date];"YYYYMM"))
FORMAT	FORMAT([Date];"YYYYMM")
RELATED	RELATED ('Table Dates'[Date])
SUMMARIZE	SUMMARIZE(Orders, Orders[Region], Orders[Product Category "Total Sale", SUM(Orders[Sales]))

7. Creating Data in DAX : Examples of function

https://powerbidocs.com/power-bi-dax-functions/

7. Creating Data in DAX : Aggregative and iterative functions (SUM/SUMX)

1. Power BI has inherited several functions from Excel: **SUM**, AVERAGE, MIN, MAX and others. But Power BI also offers the related functions **SUMX, AVERAGEX, MINX** and MAXX. The **former** are **aggregative functions**; the **latter** are **iterative functions**.
2. Function **SUM** needs a parameter specifying a column (e.g. 'Order'[Quantity]), which it sums after considering the filter context.
3. **Function SUMX's parameters** are a **table of one or more columns**, which it sums after considering the filter context.
4. Only SUMX can perform a calculation involving **several columns**.

7. Creating Data in DAX : Difference between Aggregative and iterative functions

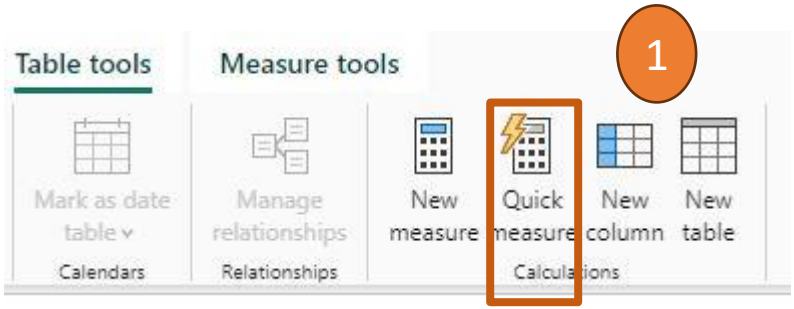
1. Function **SUM** takes **all the rows** in the column and sums them up, after considering the filter context.
2. Function **SUMX traverses each row** of the called table, after considering the filter context, and **for each row, performs the calculation requested by the expression**, and finally ends by summing.

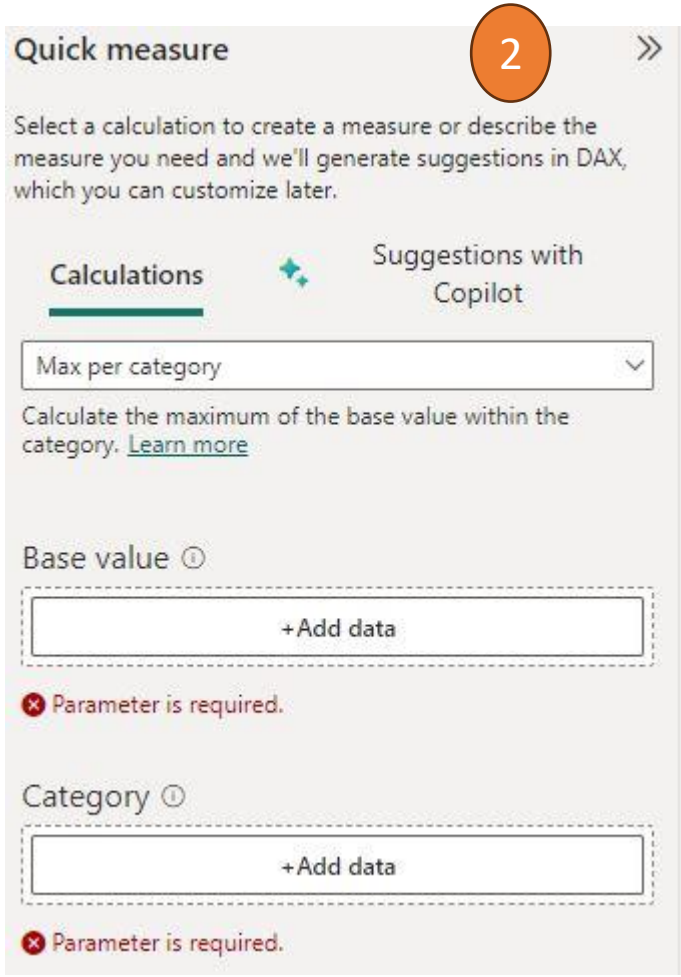
7. Creating Data in DAX : Create Quick measures

1. The advantage of quick measures is that the **wizard** takes care of all **the table relationships**, and all you must do is select the column you're interested in.
2. The **code is generated automatically**, the measure created, and the code can then be consulted.
3. The **disadvantage** of quick measures, apart from the fact that they **don't cover all cases**, is that **they are poorly documented** (especially on the Microsoft site), and sometimes a little complicated to implement.

7. Creating Data in DAX : Create Quick measures

1. To create a quick measurement :





Workshop 7 : Creating Data in DAX

1. The workshop files are in the folder : “Module 7 – Creating data in Dax”
2. Open Word file “Module 7.docx” and follow the instructions

POWER BI

Session 8 : Publish and Share the Report

OBJECTIVES

By the end of this session, you'll be able to :

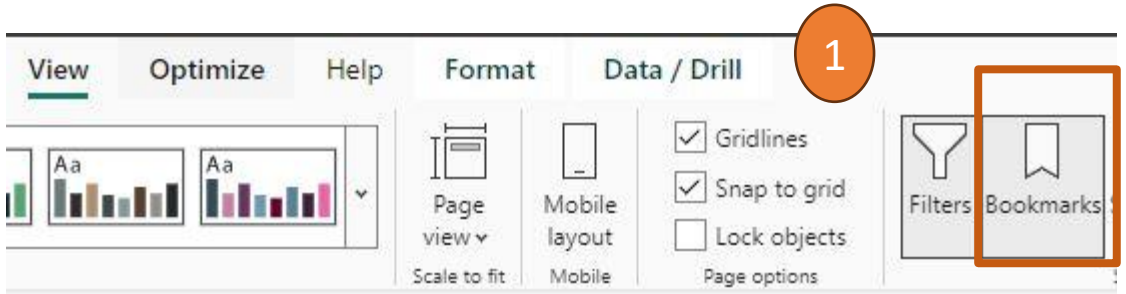
1. Share the report
2. To export the report in different formats (PDF, XLSX, CSV, etc.)
3. Integrate the report (Sharepoint or Web)
4. Add access restrictions
5. Enhance report display

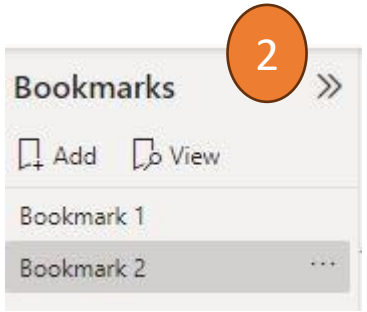
8. Publish and Share the report : Share and distribute without using Power BI Service

1. Share PBIX
2. Export to PDF
    a. Visuals are frozen, with no interaction with the user or between visuals, no tooltips, and PDF creation and distribution remain manual processes for the report owner.
    b. Only visible pages are exported (as a reminder, you can hide a page by right-clicking on its tab and selecting **Hide Page**).
    c. If you have applied wallpaper to the background of your page, this will not be exported: beware of white or light characters on a dark paper background, as they will be illegible in the PDF file.
3. Export to CSV and XLXS

8. Publish and Share the report : Using Bookmarks

1. **Bookmarks** are **photographs of your report pages**, taken at key moments in the analysis.
2. Adding **buttons** to your pages allows you to **manage navigation between pages**.
3. To create bookmarks, View tab, Bookmark option in the Show Flaps group.



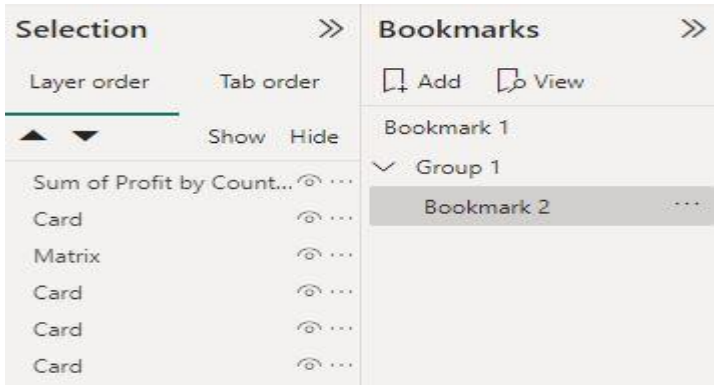


8. Publish and Share the report : Bookmarks options

1. **Update**: in normal mode (i.e., when you create your bookmarks, not when you display them), if you make **a modification** to the page (delete an object, change a size, filter), Update **updates** the bookmark to reflect the changes.
2. **Rename** and **Delete** are self-explanatory.
3. **Group**: you can **group bookmarks** by selecting them with the [Ctrl] key, then right-clicking on Group. When you launch View mode from a group, only the bookmarks in that group scroll. When you launch View mode from a bookmark outside the group, all bookmarks scroll, including those in the group. The group can be renamed with a simple right-click.

8. Publish and Share the report : Using Selection Pane with Bookmarks

1. The **SELECTION pane** is used to indicate whether or not a visual should be visible on the page. In practice, this feature is most useful in connection with bookmarks.
2. For example, if we want to offer a **Home button** to return to the first bookmark from any other (the first bookmark being the page without the filter). Our **concern** may be lack of space: where to put this button in an already busy report?
3. The **solution** is to **hide one of the visuals, display the button instead**, and then update the affected bookmarks.



8. Publish and Share the report : Publish in Power BI Service

1. How can I **be sure** that my report will **not be modified** by other users?
2. How will the **users** for whom **it is intended** be able to **consult it**?
3. How do I **distribute** my report?
4. How do I **prepare my report** for consultation on **a cell phone** (or tablet)?
5. How can I **give outsiders access** to my report?
6. How can I **integrate** my report into a **web page**?

8. Publish and Share the report : Publish in Power BI Service

1. **Publish** a report on **Power BI Service**
2. A **few options** once the **report is open**:
   a. **Print** the report.
   b. Embed it or **publish it on the web** (we'll look at this later).
   c. Embed in **SharePoint**.
   d. Export to **PowerPoint**.
   e. Display the **SIGNETS pane**.
   f. **Modify** report (if authorized)
   g. Update the report: please note that a gateway must be in place for Power BI Service to access the data source.

8. Publish and Share the report : Publish in Power BI Service (continued)

1. Some **options** once the report is open:
    a. Add **personal bookmarks**.
    b. **Subscribe to the report** to receive it by e-mail at a frequency you specify. In the **e-mail** you receive is an **image** (.png) of the page, as well as a **link to the report on Power BI Service**.
2. All **interaction options**, **segments** and **tooltips** are of course available when you open the report in Power BI Service.

8. Publish and Share the report : Notes on security and administration

1. The first **security** perimeter is to **grant authorizations** to a person **in the workspace**. This is managed in Power BI Service using workspace parameters. A group member may have rights as :

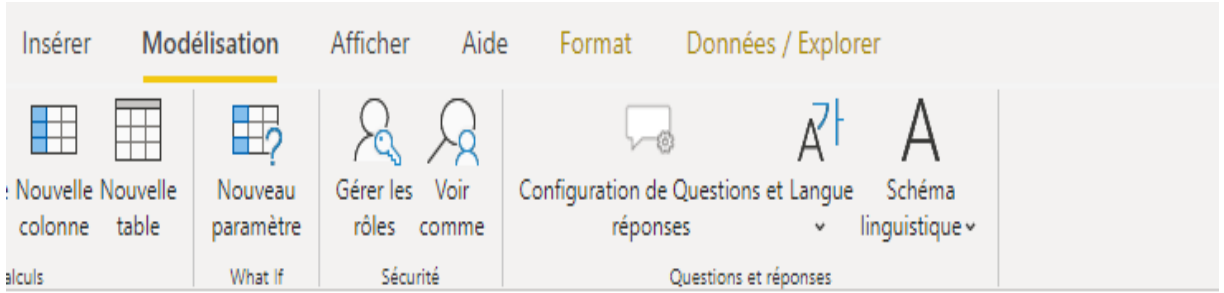
   a. **Contributor**: the contributor **can create, modify and delete content** in the workspace, and **publish** reports.

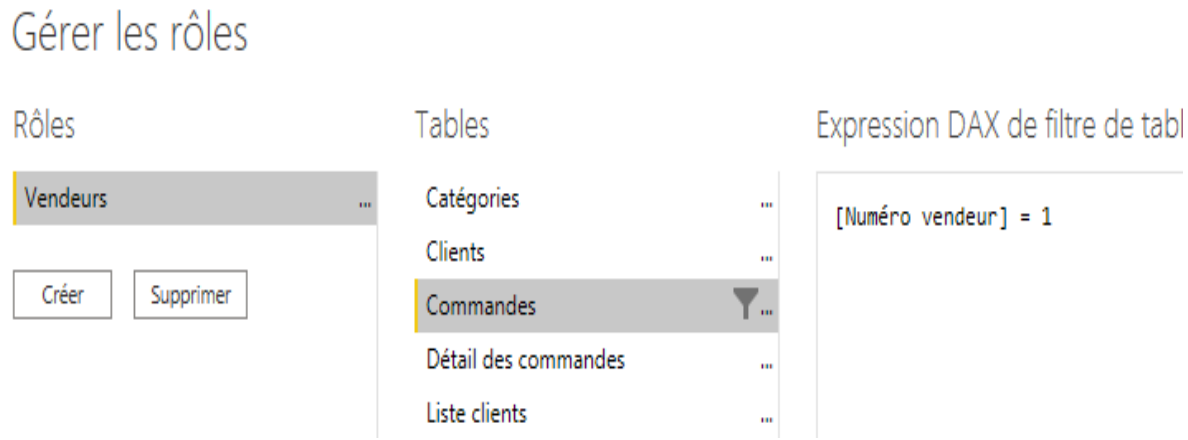
   b. **Member**: the member can **add members or other roles with lower permissions, publish and update** an application, **share an item** or application, and do whatever the contributor does.

   c. **Administrator**: the administrator can **update and delete the workspace**, **add or remove people, including other administrators**, and do whatever the member does.

8. Publish and Share the report : Notes on security and administration

1. The second security perimeter **is limited to the data visible to a user** (a concept that Power BI refers to as Security at Line Level - SNL):
   a. Defined using the **role management** functionality, then published in Power BI Service, where the role is assigned to one or more users.
   b. Once the SNL has been tested, the report is published in Power BI Service, where **security is managed** on the dataset**, using the SECURITY option**. You need to assign **the e-mail addresses** of the users concerned by **the role.**





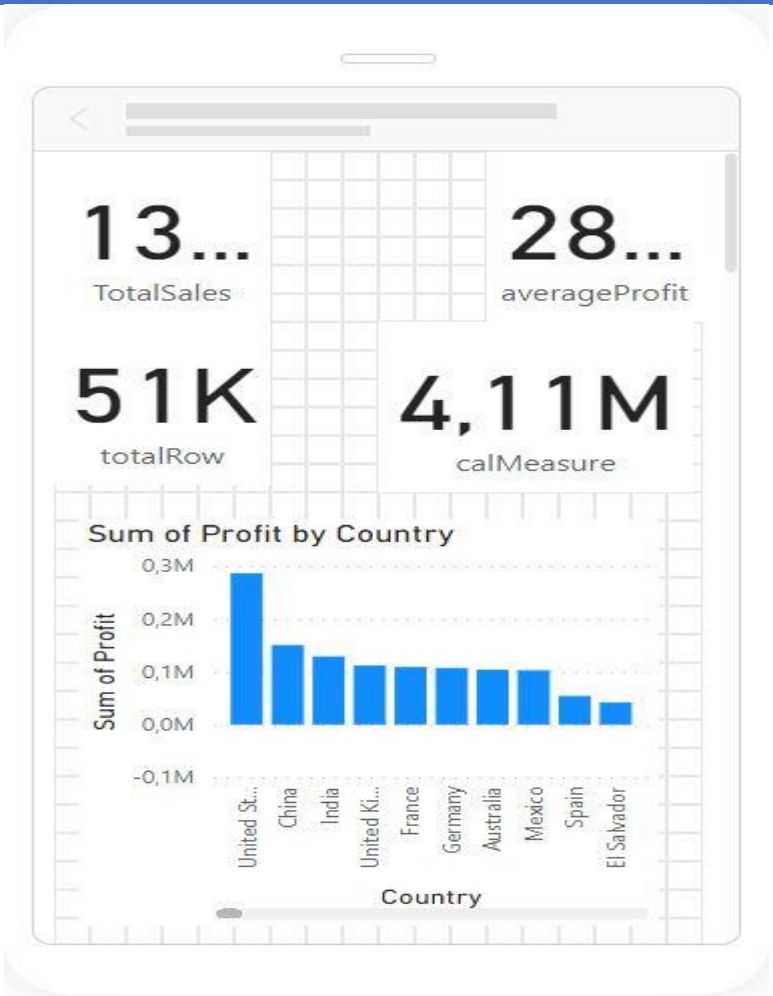
8. Publish and Share the report : Use a content pack (Application) to share reports

1. A content pack is a **set of reports, dashboards and datasets**, directly **linked to a workspace** (one pack = one workspace) and guaranteeing **read-only access to reports**.
2. A content pack created with a **Pro account** can only be **used** by users with a **Pro account**, while a content pack created with a **Premium account** can be **distributed to anyone**, regardless of their account.

8. Publish and Share the report : Publish report on Cell phones

1. **Access to a report** via a **cell phone** is made possible once it has been **published in Power BI Service**.
2. The user will have first **downloaded the Power BI mobile application** (available for Android phones and tablets, iPhone and iPad, and Windows).
3. **Power BI Desktop** offers the option of **preparing the display on a small screen** with different visuals.
4. Users with the **application on their phone**, once **logged into** their account, **find the report and its specific layout**.

8. Publish and Share the report : Publish report on Cell phones



8. Publish and Share the report : Publish to the web

1. Another common use of the report is to integrate it into a web page (intranet, web, blog).
2. **Two types** of integration are possible: **one is secure** (access by identification using a **Pro account**), the other **is public** (direct, unsecured access).
3. The link gives access to the report, which is displayed as **a web page, without a toolbar**, and with the **same capabilities as the report** (tooltips, interactions, etc.).
4. If the integration is secure, the **recipient must log in to Power BI Service and have a Pro account** (unless the report was published with a Premium account).
5. It is possible to **revoke the embedding code** (you wish to cancel the availability of the report), using the **Settings menu** and the Manage embedding codes option in the top right-hand corner of Power BI Service.

Workshop 8 : Publish and Share the report

1. The workshop files are in the folder : “Module 8 – Publish and share report”
2. Open Word file “Module 8.docx” and follow the instructions