



Part of the Power BI
Bootcamp Series

Microsoft Power BI Bootcamp

Introduction to Business Intelligence & PBI

Instructors:

Nicolás Lagreste Zucchini

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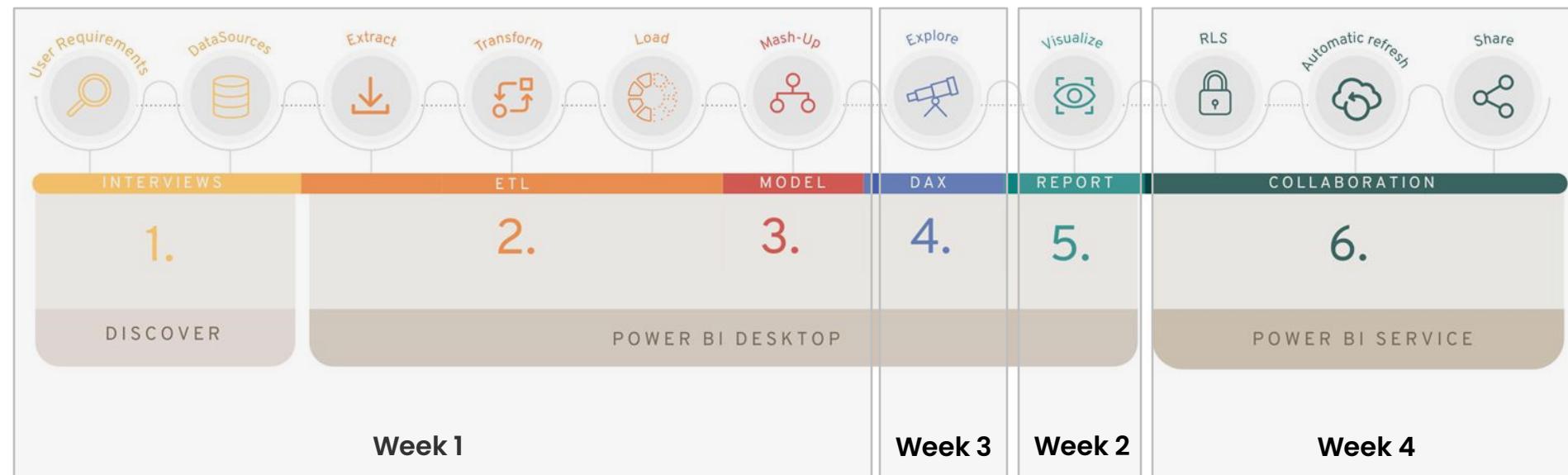


Course Agenda

- **Week 1:** Introduction to Business Intelligence, Power BI and Power Query.
- **Week 2:** Advanced and Interactive Visuals.
- **Week 3:** Calculated measures, columns & custom tables with Power BI Programming Language (DAX).
- **Week 4:** Ways to collaborate and share in Power BI.



Our Method: Flow of Report Development





Our Method on each topic:

Demo example, followed by exercises to practice!

- DEMO – Flor & Nico



- EXERCISE – Your turn!



*Students should have the latest version of **Power BI Desktop installed.**





Instructors

Follow us on LinkedIn:



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Let's Collaborate: Interested in a personalized mentorship or consulting session? Contact us:

- nico@analyticmood.com
- flor@analyticmood.com

Visit Our Website:

- www.analyticmood.com for resources, upcoming events, and blog articles.

analytic mood



Exercise 0.0 – Initial set up

- ✓ To get started, download all the files from:

www.analyticmood.com/resources

- ✓ Ensure all files are downloaded before proceeding.



NOTE: use the latest version of Power BI Desktop.



WEEK 01

Introduction to
Business Intelligence,
Power BI and Power
Query





Week 1: Introduction to Business Intelligence, Power BI and Power Query

- What is Business Intelligence and Power BI; What do we mean by Business Intelligence? A brief explanation of what is the maturity cycle of Business Intelligence & Data Science. Understanding that Power BI is a collection of software, services, apps, and connectors.
- What is an ETL and how to build a powerful ETL solution with no code. Defining and creating a Star Schema Model, and translation of all this into visual graphics.
- Brief explanation of the difference between Power BI Desktop and Service. Understand what the main features of each tool or service are.



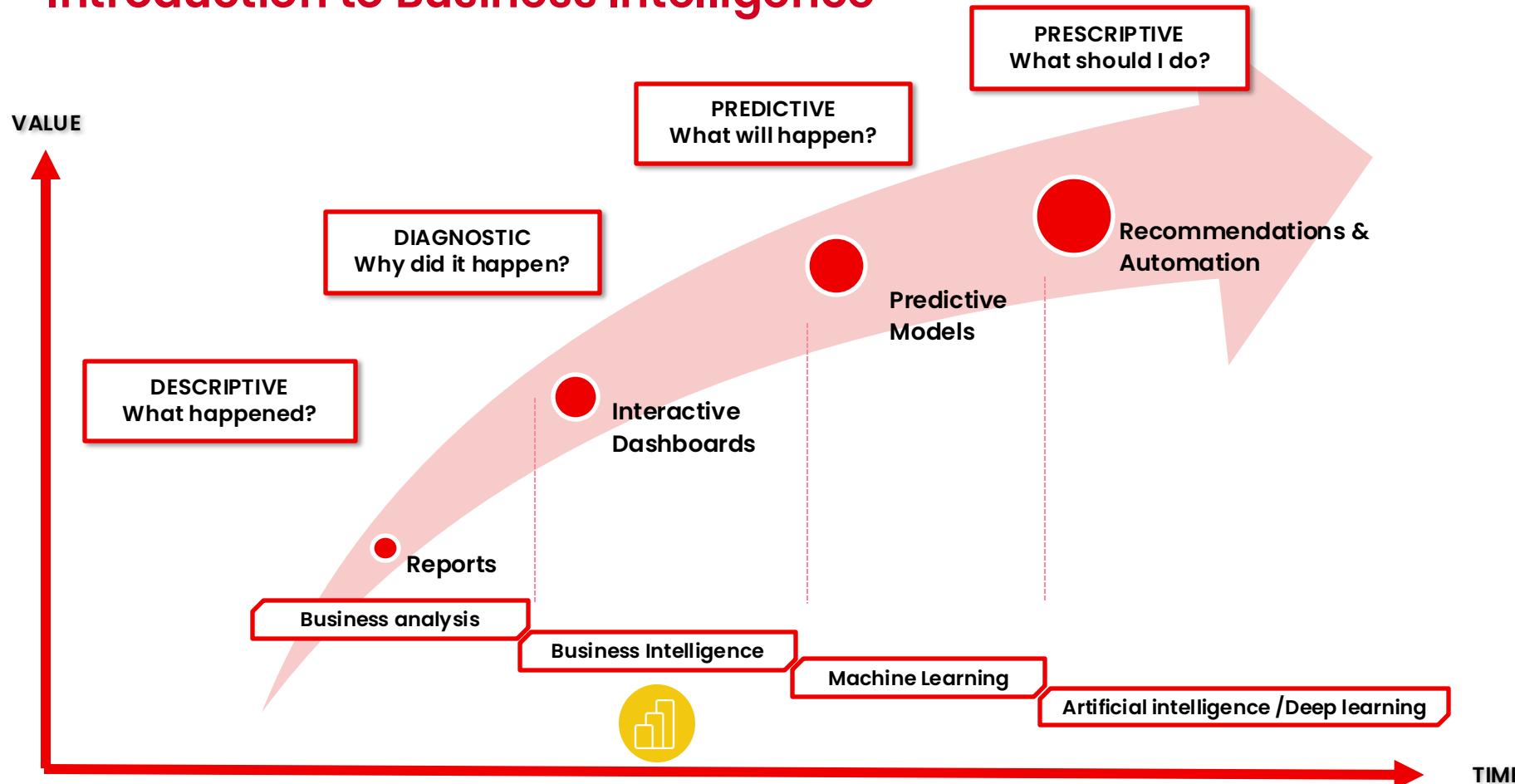


Introduction to Business Intelligence and Power BI

- Introduction to Business Intelligence and Power BI Platform.
- Maturity cycle of Business Intelligence & Data Science.
- Working with Power BI projects step by step – Full architecture.
- Exercise: Setting Up Power BI Desktop
- Q&A

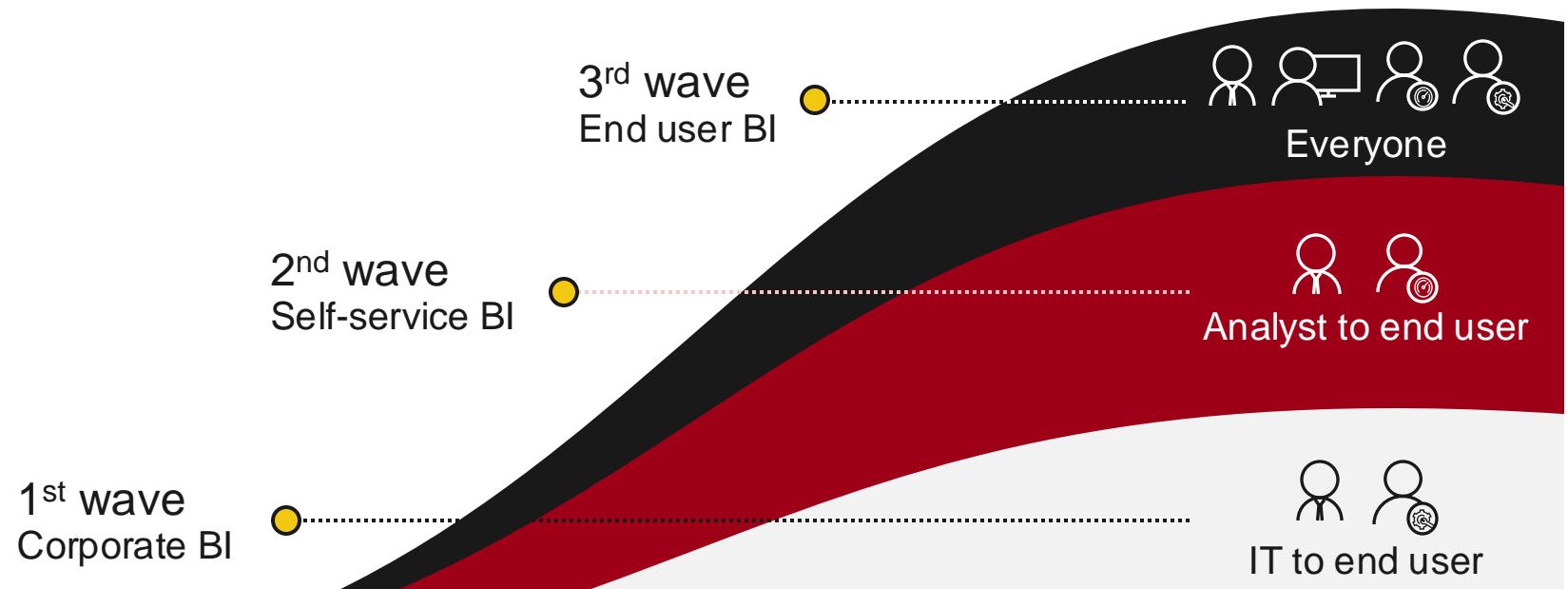


Introduction to Business Intelligence





Evolution of BI





Microsoft Power Platform

Give everyone the power to innovate:

Empower everyone at your organization with an intuitive, collaborative, and extensible platform of low-code tools that makes it easy to create efficient and flexible solutions.

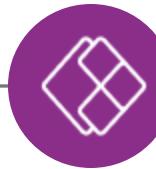
Power BI



Analyze:

Discover intelligent insights in diverse data

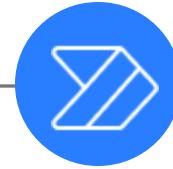
Power Apps



Act:

Build low-code solutions to business challenges.

Power Automate



Automate

Streamline processes with no-code automation.

Power Virtual Agents

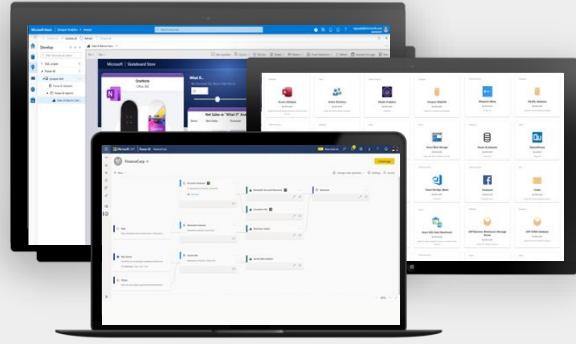


Assist

Handle routine inquiries at scale with conversational AI.



Microsoft Power BI



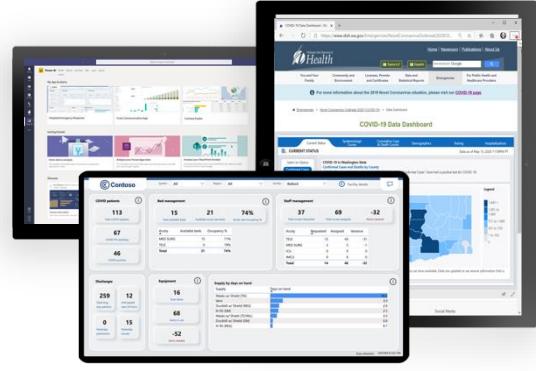
All Data

Break down data silos and enrich your data with intelligence



For Everyone

Create rich-interactive data experiences with AI infused insights



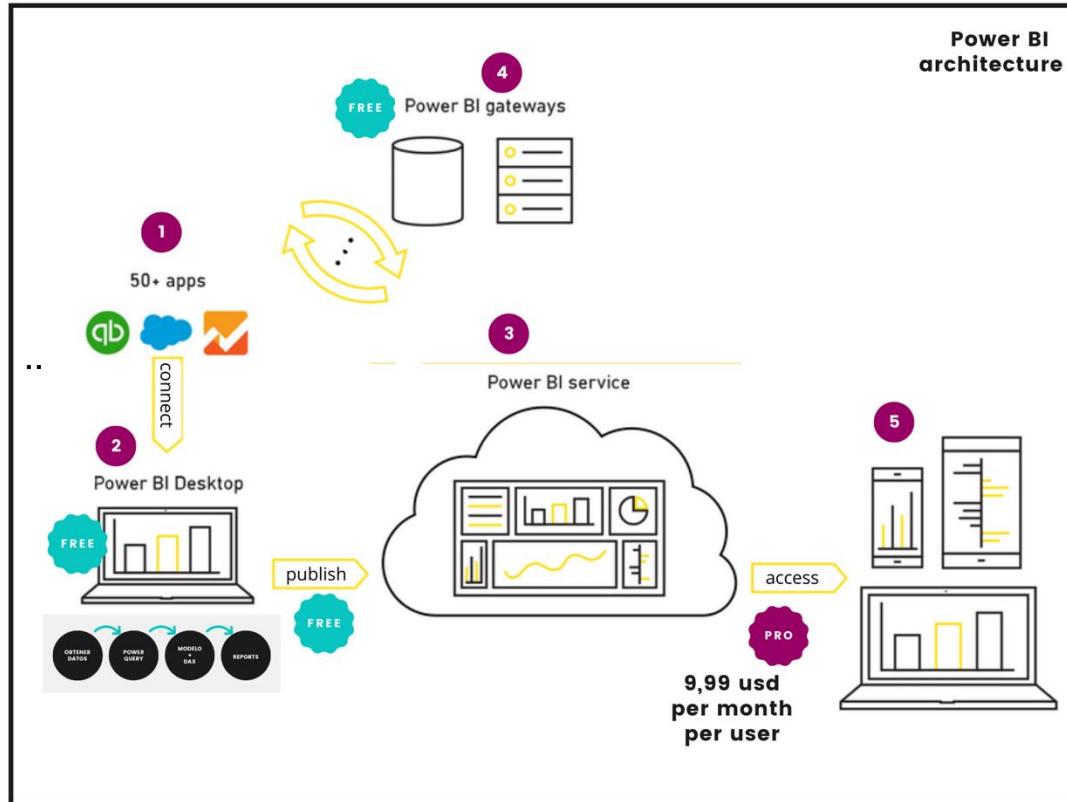
For Every Decision

Integrate trusted and secure BI into the fabric of your organization and apps

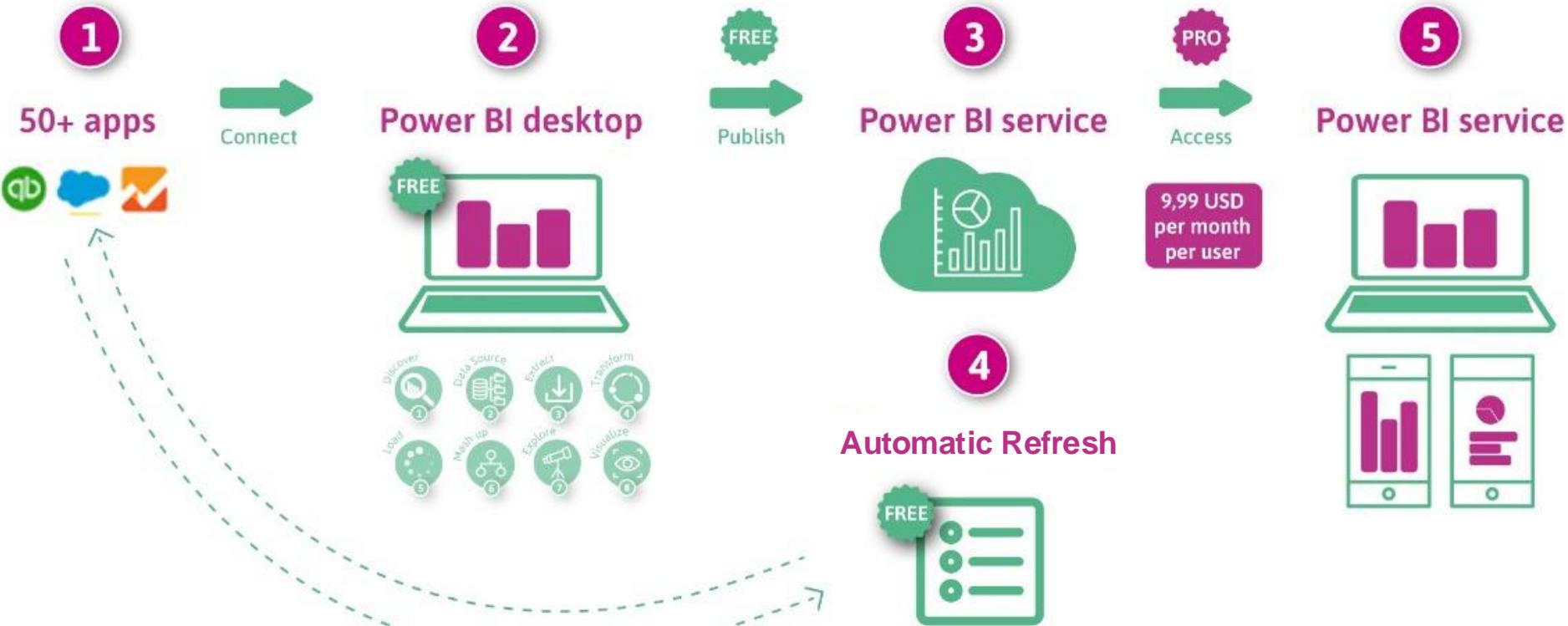
Power BI drives a data culture for everyone and every decision



Full Architecture

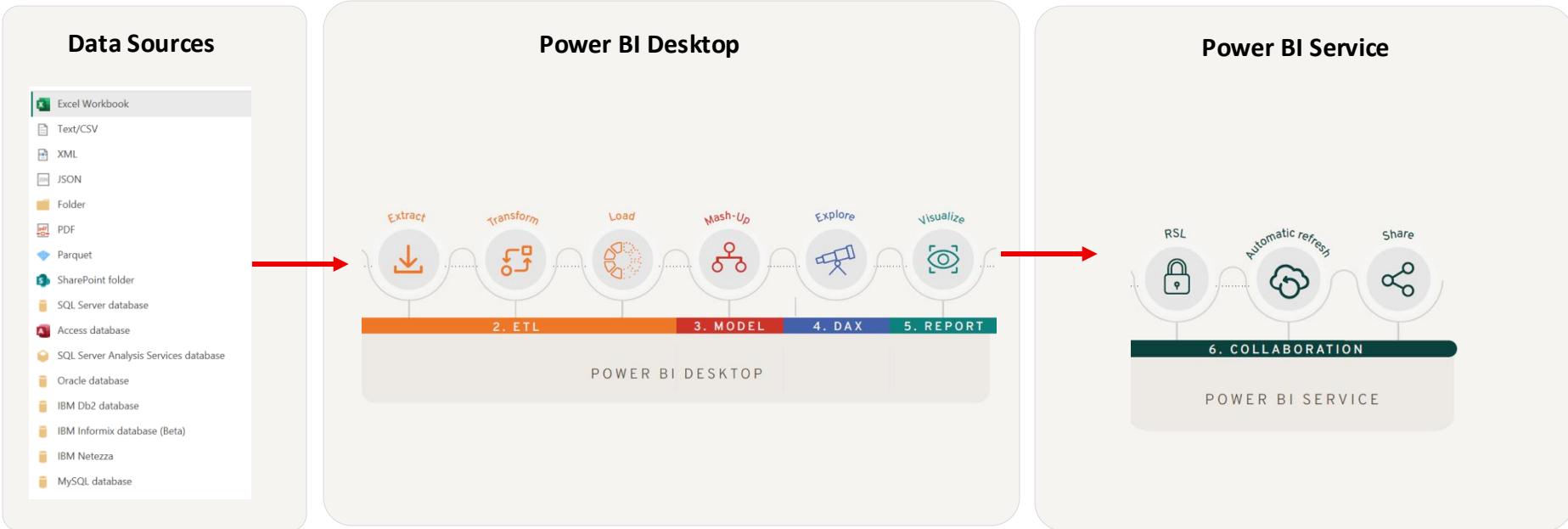


Power BI architecture





Full Architecture





Why use Power BI?

Microsoft | Skateboard Store

Last Refresh: Jun 30th, 2019 / Chicago, IL, USA

What If...
We Decrease Our Return Rate (% to): 25

Net Sales (Forecast) \$30,772
Extra Profit \$0 0.0% Profit Increase

Net Sales vs "What If" Analysis

Store	Net Sales	Forecast	Extra Profit
Abbas	\$2,646	\$2,646	\$0
Aliqui	\$3,724	\$3,724	\$0
Barba	\$1,568	\$1,568	\$0
Contoso	\$2,842	\$2,842	\$0
Fama	\$3,626	\$3,626	\$0
Leo	\$1,764	\$1,764	\$0
Natura	\$1,274	\$1,274	\$0
Palma	\$0	\$0	\$0
Pirum	\$2,744	\$2,744	\$0
Pomum	\$1,372	\$1,372	\$0
Quibus	\$2,940	\$2,940	\$0
Salvus	\$2,646	\$2,646	\$0
VanArdel	\$2,548	\$2,548	\$0
Victoria	\$1,078	\$1,078	\$0
Total	\$30,772	\$30,772	\$0

"What If" Analysis Forecast

Predicted Net Sales Forecast

Return Rate

24%

Feb 2019 Mar 2019 Apr 2019 May 2019 Jun 2019

Net Sales Returns Return Rate Market Basket Analysis

Net Sales Tooltip Returns Tooltip CategoryBreakdown KeyInfluencers StoreBreakdown NetSales

File Home Insert Modeling View Help External Tools Table tools

Clipboard Cut Copy Format painter Get data Excel Power BI datasets Power BI Server Enter data Recent sources Data Transform Refresh data New visual Text box More visual Insert Queries Calculations New quick measure measure New measure Share

Visualizations Fields

Analysis DAX

- Last 2 Month...
- Last 2 Month...
- Net Sales
- Net Sales V...
- Net Sales V...
- Profit Differ...
- Return Rate
- Returns
- Returns PM
- Returns Vari...
- Returns Vari...
- Total Return...
- Units Return...
- Units Return...
- Units Return...
- Units Sold
- Units Sold ...
- Units Sold ...
- WIF Adjust...
- WIF Adjust...
- WIF Adjust...
- WIF Forecast
- WIF Price p...
- WIF Profit
- WIF Profit ...
- WIF Sales

Filters

Add data fields here

Drill through

Cross-report

Off

Keep all filters

Off

Product is OneNote

Power BI Desktop is free



Why use Power BI?

The screenshot shows a Power BI dashboard titled "Factory Floor Status". The dashboard features a navigation bar at the top with icons for Home, Shared with me, Factory Floor Status, and Help. Below the navigation bar are several cards and a video feed.

- Battery Current (mA) CURRENT VALUE:** A line chart showing battery current over time from 5:28:45 PM to 5:29:30 PM. The current fluctuates between approximately 70 and 90 mA. The current value is 75.6.
- Temperature (K) OVER TIME:** A line chart showing temperature over time from 5:28:45 PM to 5:29:30 PM. The temperature fluctuates between approximately 10 and 25 K. The current value is 17.0.
- Radio Luminosity (W/Hz) OVER TIME:** A line chart showing radio luminosity over time from 5:28:45 PM to 5:29:30 PM. The luminosity fluctuates between approximately 600 and 900 W/Hz. The current value is 807.
- Radiation Level (mSV) OVER TIME:** A line chart showing radiation level over time from 5:28:45 PM to 5:29:30 PM. The radiation level fluctuates between approximately 100 and 200 mSV. The current value is 199.
- Battery Current (mA) CURRENT VALUE:** A large card displaying the current value of 75.6. To its right is a video feed showing a factory floor with several yellow robotic arms or conveyor belt systems.
- Temperature (K) CURRENT VALUE:** A large card displaying the current value of 17.0.
- Radio Luminosity (W/Hz) CURRENT VALUE:** A large card displaying the current value of 807.
- Engine Output (kN) CURRENT VALUE:** A gauge chart showing engine output. The current value is 200.00. The minimum value is 22.01 and the maximum value is 856.79.
- Radiation Level (mSV) CURRENT VALUE:** A large card displaying the current value of 199.

Real time dashboards and interactive reports



Why use Power BI?

The screenshot shows the Power BI desktop interface with three visualizations:

- Number of games by publisher**: A donut chart showing the distribution of games by publisher. The data is as follows:

Publisher	Count	Percentage
Microsoft	809	23.79%
Sony	700	20.59%
Ubisoft	645	18.97%
Nintendo	627	18.44%
Electronic Arts	619	18.21%
- Sentiment by platform**: A bar chart showing sentiment scores for different platforms. The data is as follows:

Platform	Sentiment
PS2	0.63
D5	0.63
Wii	0.61
PS3	0.56
X360	0.56
- Show total global sales by genre**: A bar chart showing global sales by game genre. The data is as follows:

Genre	Global_Sales
Action	~1800
Sports	~1500
Shooter	~1200
Role-Playing	~1000
Platform	~800
Misc	~600
Racing	~500
Fighting	~400
Simulation	~300
Adventure	~200
Puzzle	~150
Strategy	~100
Action-Adventure	~50
Music	~20
Sandbox	~10
Party	~5
MMO	~2
Visual Novel	~1
Board Game	~1

The ribbon at the top includes tabs for File, Home, Insert, Modeling, View, Help, Format, Data / Drill, Data, Queries, Insert, Calculations, and Share.

Natural Language query & AI insights



Why use Power BI?

The screenshot displays the Microsoft Power BI desktop application. The ribbon menu includes: Undo, Paste, Cut, Copy, Format painter, Clipboard, Get data (Excel, Power BI datasets, SQL Server, Recent sources), Transform Refresh data, New visual, Text box, More visuals, New measure, Quick measure, Publish, Calculations, and Share. The main workspace shows a dashboard for "Microsoft | Skateboard Store" last refreshed on Jun 30th, 2019, in Chicago, IL, USA. Key metrics include Net Sales (\$387.1K) and Units Sold (7,868). The dashboard features three main cards: "Category Breakdown" (Product vs. Net Sales), "Store Breakdown" (Store vs. Net Sales), and a stacked column chart titled "Net Sales vs net sales PM by date as stacked column chart". A "Key Influencers" section and a "Decomposition Tree" section are also present. The bottom navigation bar includes Visual and Tabular tabs.

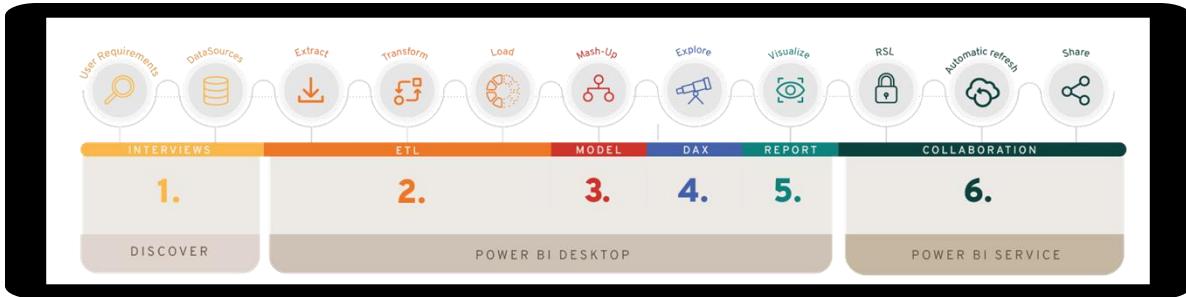
250+ Custom
visuals

A collection of Power BI custom visual components displayed in a grid. The components include:

- Values
- Drillthrough
- Cross-report
- Keep all filters
- Add drillthrough fields here
- Deviation tree
- Clustering
- Correlation plot
- Splitter
- August 2000
- \$5.13bn
- 100% (Blank)
- 16% 3 - High
- 13% 0 - Unsigned
- 7% 1 - Low
- 7% 2 - Medium
- 67%



Why use Power BI?



All Business Intelligence process in one

The screenshot shows the Power BI desktop interface with the following components:

- Left Panel:** Shows the "Choose data" pane with a tree view of available data sources and tables.
- Relationships View:** Displays the data model structure with entities like Customer, Sales, and Product.
- Modeling Tab:** Active tab, showing options for Manage Relationships, New Measure, New Column, New Table, Sort By Column, and Data Type (set to Decimal Number).
- Calculations View:** Shows DAX code for calculating sales proportions:

```
% Ventas Producto =  
var SalesAmountTotal = sum(FactSales[SalesAmount])  
return  
FactSales[SalesAmount] / SalesAmountTotal
```
- Properties View:** Shows the properties for the selected Customer entity.



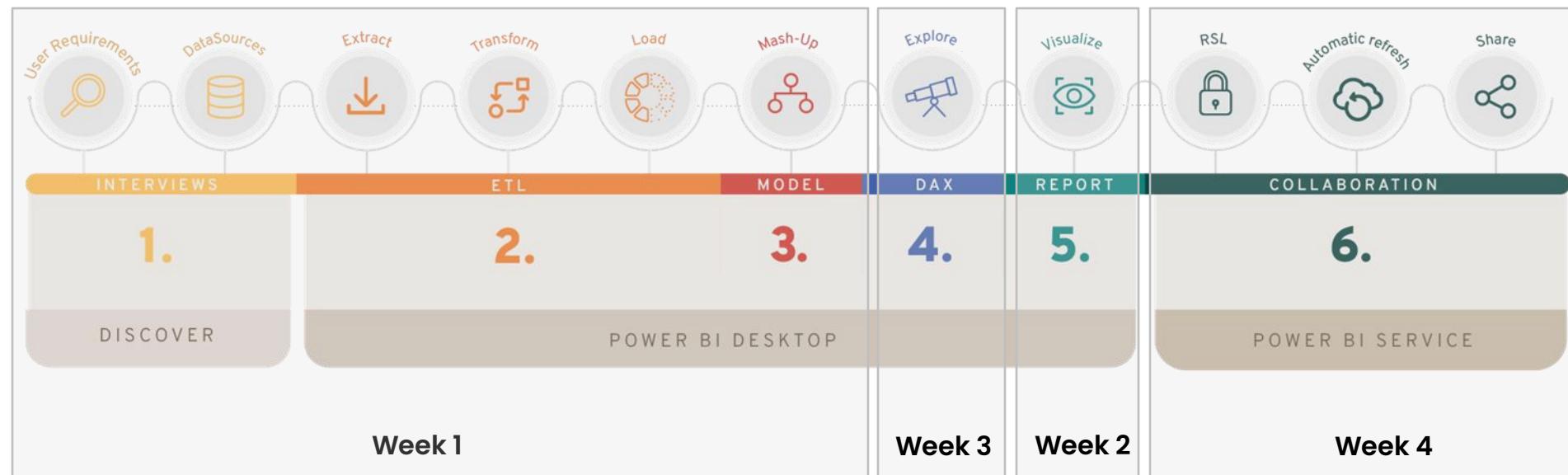
Why use Power BI?



Gartner Magic Quadrant
for “Analytics and
Business Intelligence
Platforms”

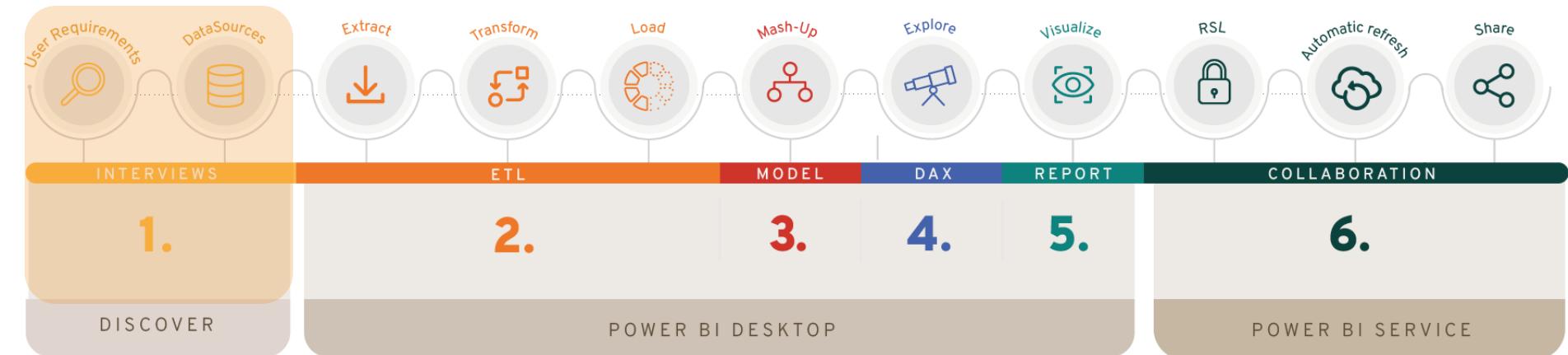


Our Method: Flow of Report Development





Our Method: Flow of Report Development





Interviews

Understand processes, needs and data sources

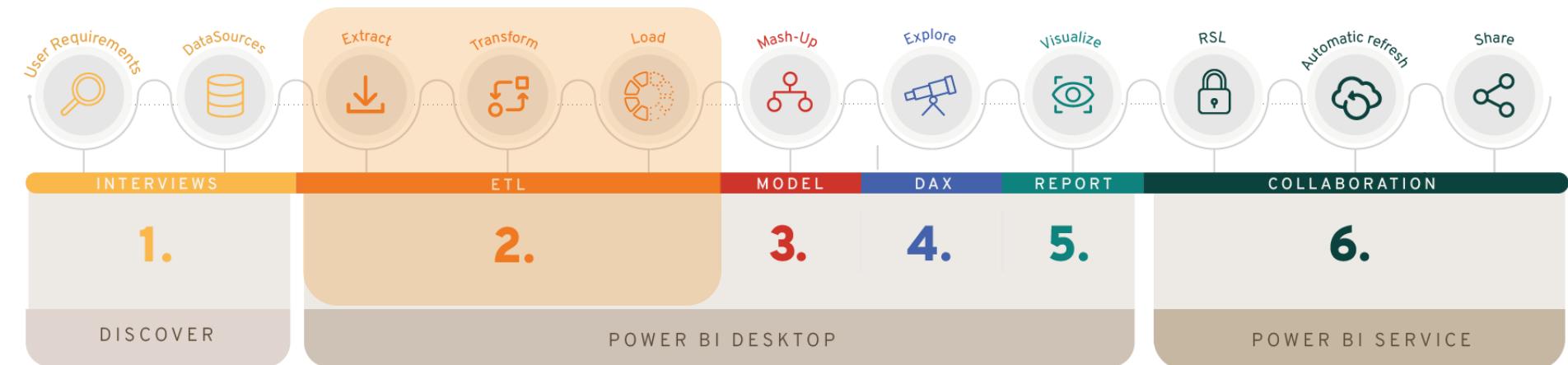


DataSources

	Excel Workbook
	Text/CSV
	XML
	JSON
	Folder
	PDF
	Parquet
	SharePoint folder
	SQL Server database
	Access database
	SQL Server Analysis Services database
	Oracle database
	IBM Db2 database
	IBM Informix database (Beta)
	IBM Netezza
	MySQL database



Our Method: Flow of Report Development

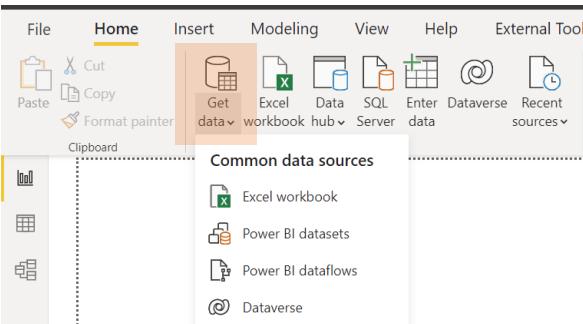




Power BI Desktop: Power Query

Clean and transform data sources

Extract

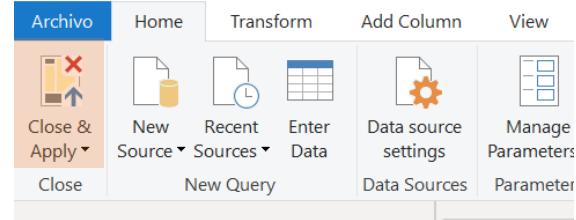


The screenshot shows the Power BI Desktop application with the Power Query Editor open. The ribbon at the top has the 'Home' tab selected. In the main area, there is a table with the following data:

	SalesKey	DateKey	channelkey	StoreKey	ProductKey
1	339161	04/07/2019 0:00:00	1	247	
2	339508	04/07/2019 0:00:00	1	52	
3	3392414	15/05/2019 0:00:00	1	40	
4	3388423	27/06/2019 0:00:00	1	67	
5	3383823	20/10/2019 0:00:00	1	70	
6	3382789	12/07/2019 0:00:00	1	238	
7	3378463	26/10/2019 0:00:00	1	282	
8	3371111	23/05/2019 0:00:00	1	21	
9	3369889	29/04/2019 0:00:00	1	167	
10	3365947	25/05/2019 0:00:00	1	48	
11	3351918	29/04/2019 0:00:00	1	194	
12	3349671	30/06/2019 0:00:00	1	8	
13	3346418	02/05/2019 0:00:00	1	102	
14	3329410	29/10/2019 0:00:00	1	146	
15	3327925	04/06/2019 0:00:00	1	93	

The 'Applied Steps' pane on the right shows the following steps:

- Source
- Navigation
- Promoted Headers
- Changed Type

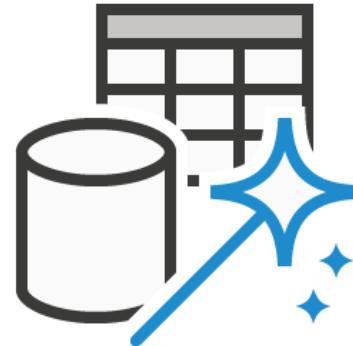




What is Power Query?

A powerful tool for **data connection, cleaning, and transformation**.

- Built-in interface with advanced capabilities using M language.
- Works seamlessly with multiple data sources.
- Ideal for automating repetitive data tasks.

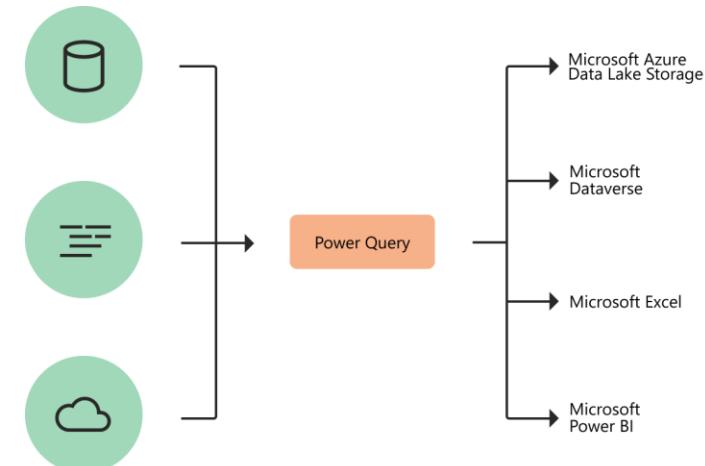




How Power Query helps with data acquisition

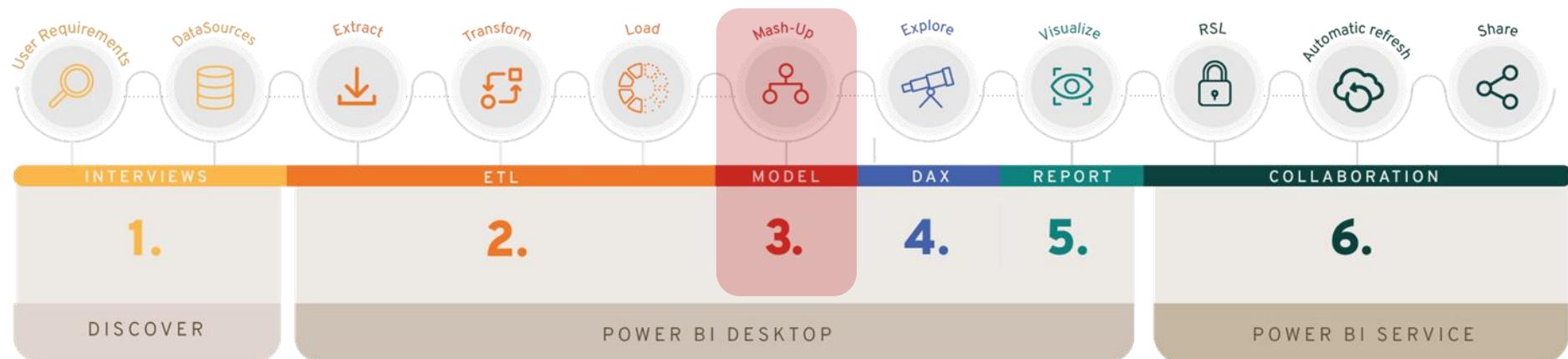
Business users spend up to **80%** of their time preparing data, which slows down analysis and decision-making.

Power Query **streamlines this process**, making it easier to connect, transform, and update data efficiently for faster insights.





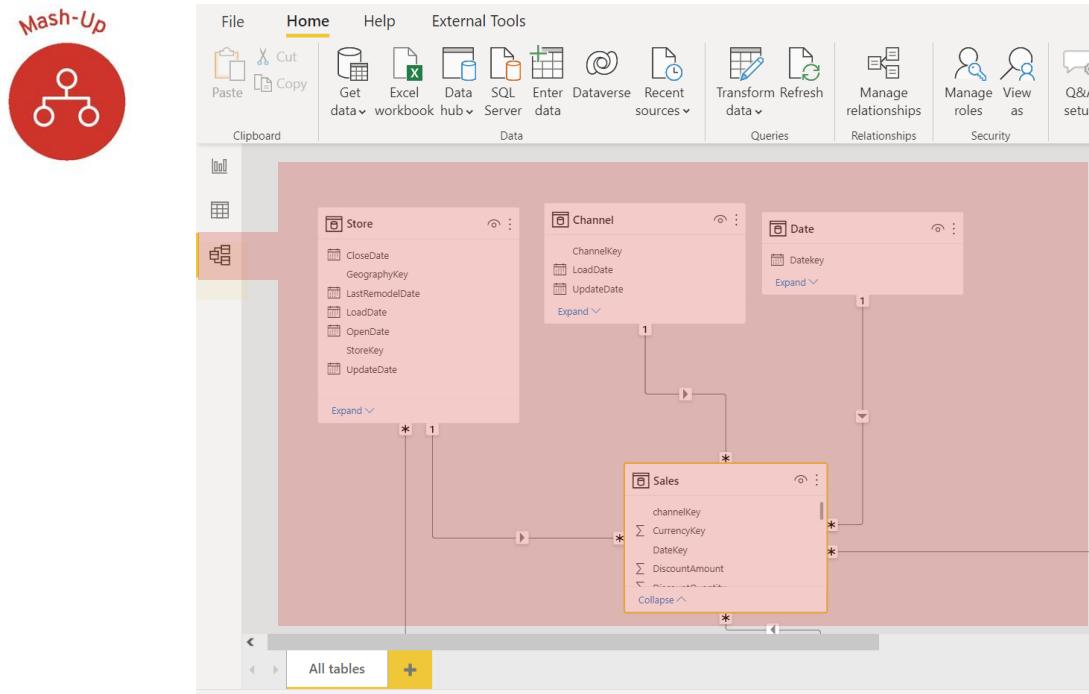
Our Method: Flow of Report Development





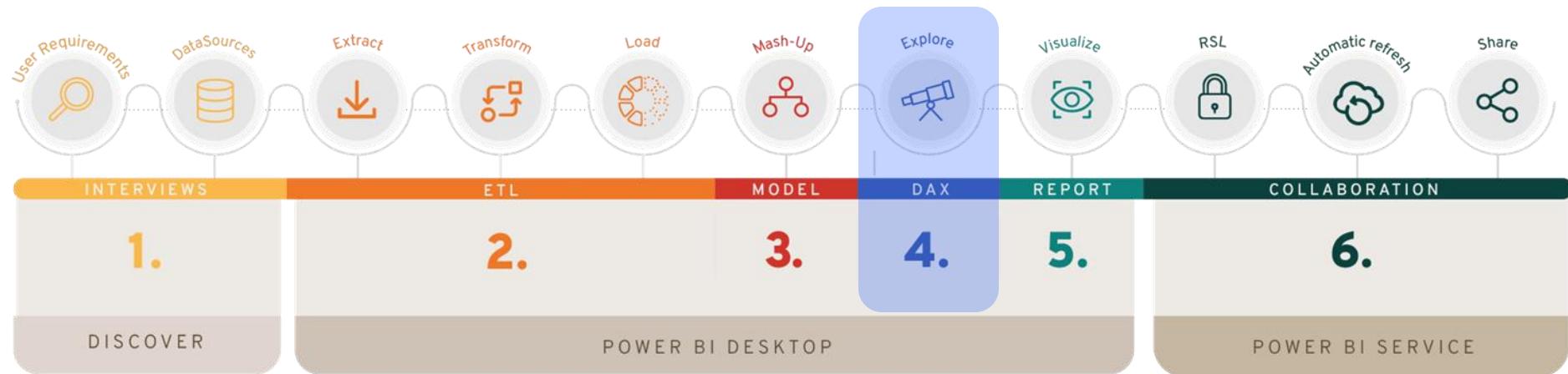
Power BI Desktop: Model

Mash-Up tables to create a model that allows different analysis





Our Method: Flow of Report Development





Power BI Desktop: DAX

KPIs to answer business questions



Explore

Structure | Formatting | Properties | Sort | Groups | Relationships | Calculations |

X ✓

Kind of purchase =
SWITCH(TRUE(),
Sales[SalesQuantity] < 20, "Retail",
"Wholesale")

Quantity	ReturnAmount	DiscountQuantity	DiscountAmount	TotalCost	SalesAmount	ETLLoadID	LoadDate	UpdateDate	Year	Kind of purchase
0	\$./0	0		\$./3.214,4	6.990,00 €	1	01/01/2010 0:00:00	01/01/2010 0:00:00	2007	Retail
0	\$./0	0		\$./3.214,4	6.990,00 €	1	01/01/2010 0:00:00	01/01/2010 0:00:00	2009	Retail
0	\$./0	0		\$./3.214,4	6.990,00 €	1	01/01/2010 0:00:00	01/01/2010 0:00:00	2009	Retail
0	\$./0	0		\$./3.214,4	6.990,00 €	1	01/01/2010 0:00:00	01/01/2010 0:00:00	2008	Retail
0	\$./0	0		\$./3.214,4	6.990,00 €	1	01/01/2010 0:00:00	01/01/2010 0:00:00	2009	Retail
0	\$./0	0		\$./3.214,4	6.990,00 €	1	01/01/2010 0:00:00	01/01/2010 0:00:00	2008	Retail
0	\$./0	0		\$./3.214,4	6.990,00 €	1	01/01/2010 0:00:00	01/01/2010 0:00:00	2008	Retail
0	\$./0	0		\$./3.214,4	6.990,00 €	1	01/01/2010 0:00:00	01/01/2010 0:00:00	2009	Retail



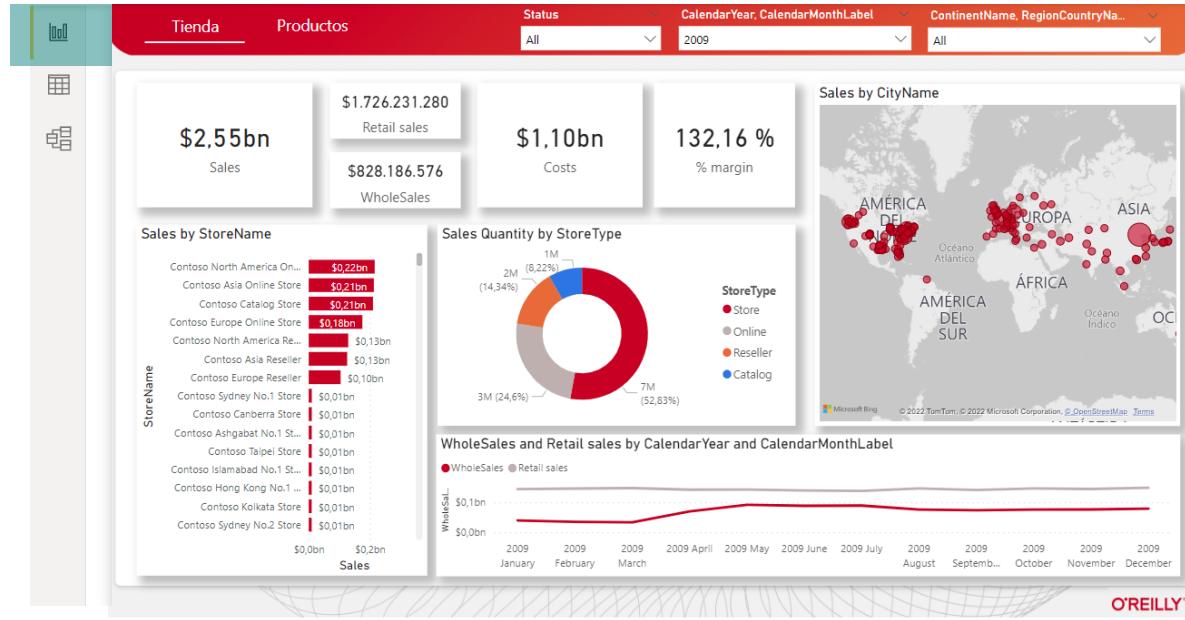
Our Method: Flow of Report Development





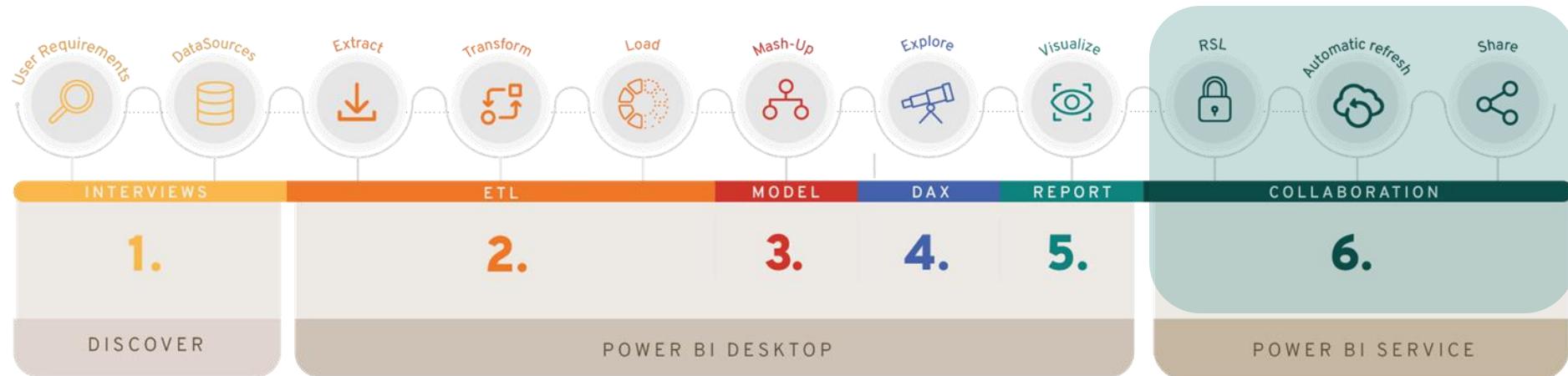
Power BI Desktop: Report

Create visuals for business users to understand their business





Our Method: Flow of Report Development





Power BI Service

Share reports with colleagues

- RSL
- Automatic refresh
- Share

The screenshot shows the Power BI Home page. At the top, it greets the user with "Good afternoon, Nicolás" and encourages finding and sharing actionable insights to make data-driven decisions. Below this, there's a "Recommended" section with three cards:

- "You frequently open this": CONTABILIDAD (with a bar chart icon)
- "Popular in your org": Report Ventas y Costes (with a bar chart icon)
- "You frequently open this": LaLigaBusinessSchool (with a user icon)

At the bottom of the page, there are navigation links: Recent (underlined), Favorites, and My apps.



Exercise 0.0

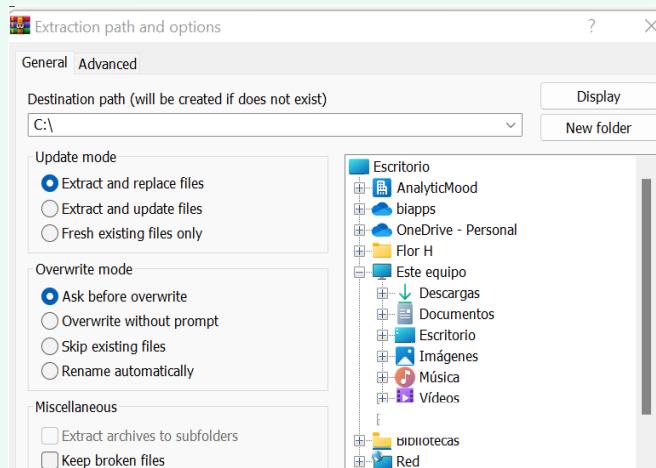


Exercise 0.0 – Initial set up

1

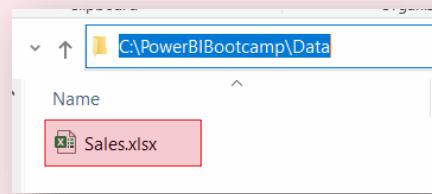
First you must **download** the shared .ZIP and extract it to the Local C:\ path.

- Option 01 - **AnalyticMood Web**
- Option 02 - **SharePoint**



2

Make sure the path to the **data sources (Sales.xlsx file)** is as follows: **C:\PowerBIBootcamp\Data**



3

Lets test Power BI Desktop by opening **Exercise0.0** that is located in
C:\PowerBIBootcamp\Week01\Exercises\Exercise0.0.pbix



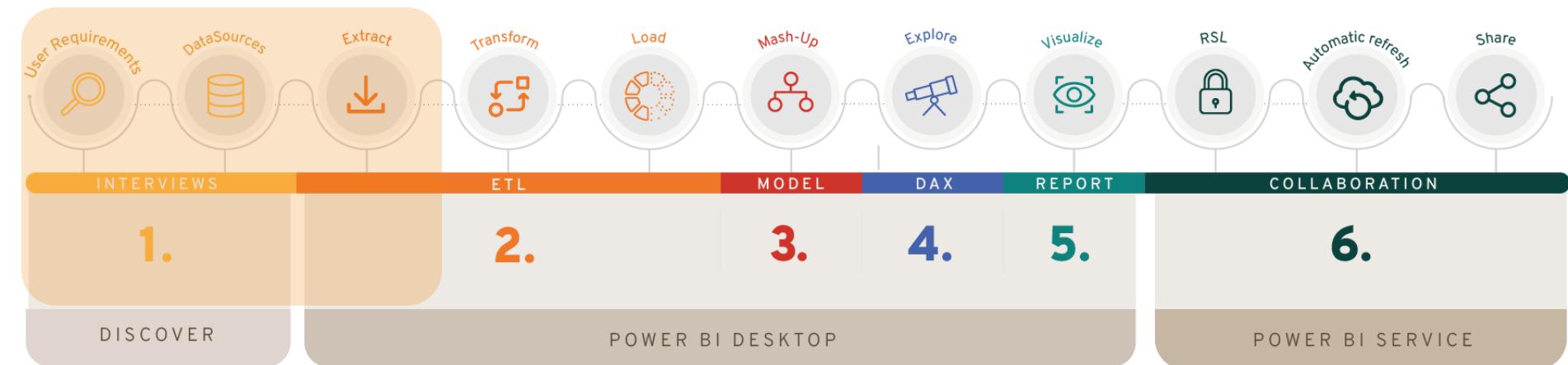


Basic Transformation in Power Query

- Demo 1.1: Connect to 3 Excel Sheets and do basic transformation in Power Query (delete columns, filter rows, change names, add calculated columns, change data types).
- Load transform data to Power BI.
- Exercise 1.1: Basic Transformation in Power Query.
- Q&A



Our Method: Flow of Report Development





Demo 1.0





Interviews

Understand processes, needs and data sources



You are not the user

- Who is the audience?
- What do they need?

How do you know your audience?

- Observing
- Listening
- Interviewing
- Understand the business.
- What are our user's goals?
- What is the objective of this dashboard?

Try to understand what they need, not what they want.



Interviews

Understand processes, needs and data sources



-  Excel Workbook
-  Text/CSV
-  XML
-  JSON
-  Folder
-  PDF
-  Parquet
-  SharePoint folder
-  SQL Server database
-  Access database
-  SQL Server Analysis Services database
-  Oracle database
-  IBM Db2 database
-  IBM Informix database (Beta)
-  IBM Netezza
-  MySQL database



Power BI Desktop: Power Query: Extract

Extract



File Home Insert Modeling View Help External Tools

Cut Copy Format painter

Paste Get data Excel Data SQL Enter data Dataverse Recent sources

Clipboard

Common data sources

- Excel workbook
- Power BI datasets
- Power BI dataflows
- Dataverse

Navigator

Display Options

DIMs.xlsx [8]

- CalendarTable
- ChannelTable
- ProductTable
- StoreTable

- Calendar
- Channel
- Product
- Store

Load Transform Data Cancel



Exercise 1.0



Exercise 1.0.

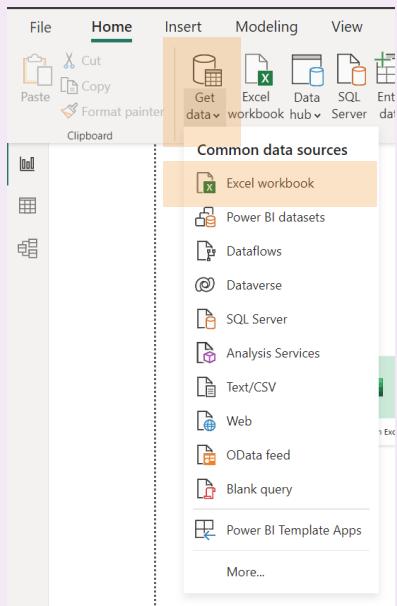
Goal: Become familiar with the different data sources.

In order to do it, open a new **Power BI Desktop** and connect it to the following data sources. Just select *transform* option before *loading* them.

1

Source: **Excel**

File: **Sales.xlsx** (Location: "C:\PowerBIBootcamp\Data\Sales.xlsx")



2

Tables:

a

Sales

b

Customer

c

Date

d

Product

The screenshot shows the Power BI Navigator interface. On the left, there's a tree view of the data sources: 'Sales.xlsx (8)' is expanded, showing 'Customer', 'Date', 'Product', and 'Sales'. Under 'Sales', there are further expansions for 'S.Customer', 'S.Date', 'S.Product', and 'S.Sales'. On the right, a preview of the 'Sales' table is displayed with the following data:

Invoice	OrderLineNumber	Quantity	Unit Price	Date	idProd
10451	12	1	70	09/01/2020	X1
10452	8	2	70	09/01/2020	X1
10453	18	2	70	09/01/2020	X1
10454	7	2	70	09/01/2020	X1
10544	16	2	49	09/01/2020	X10
10545	11	1	49	09/01/2020	X10
10546	1	1	82	09/01/2020	X2
11094	4	2	82	04/01/2020	X2
11140	5	1	82	04/01/2020	X2
10546	17	2	77	09/01/2020	X3
10806	15	1	77	04/01/2020	X3
10540	13	1	65	04/01/2020	X4
10541	14	2	65	04/01/2020	X4
11006	6	1	65	04/01/2020	X4
10650	10	1	58	04/01/2020	X5
10651	2	1	58	04/01/2020	X5
10741	3	3	29	04/01/2020	X7
10794	9	1	29	04/01/2020	X7
10401	8	2	20	04/01/2020	X3
10402	1	3	20	04/01/2020	X3
10899	4	1	49	04/01/2020	X10
10900	7	3	49	04/01/2020	X10

Below the table, there are buttons for 'Load' and 'Transform Data'.

*Note: these data are different from those of the demo



Demo 1.1





Presentation: Parts of Power query (report, data, relations)

The screenshot shows the Microsoft Power Query interface with several key components highlighted:

- Transform columns**: A red box highlights the "Transform" tab in the ribbon, which contains tools for managing data types, splitting columns, and applying various transformations.
- Queries**: A red box highlights the "Queries" pane on the left, which lists all the queries used in the current data model, including "Sales" which is currently selected.
- Data**: A red box highlights the main data grid area where the transformed data is displayed.
- Steps to transform data**: A red box highlights the "APPLIED STEPS" pane on the right, which lists the sequence of operations used to transform the data, such as "Source", "Filtered Hidden Files1", "Invoke Custom Function1", and "Renamed Column".

The main data grid displays the following sample data:

	SalesKey	DateKey	channelKey	StoreKey	ProductKey
1	3398163	04/07/2019	1	247	201
2	3395082	04/10/2019	1	52	565
3	3392414	15/05/2019	1	40	397
4	3388423	27/06/2019	1	67	391
5	3383821	20/10/2019	1	70	369
6	3382789				403
7	3378463				345
8	3371111				345
9	3369889	29/04/2019	1	167	201
10	3365947	25/05/2019	1	48	403
11	3353916	29/04/2019	1	194	635
12	3349671	30/06/2019	1	8	391
13	3346418	02/05/2019	1	102	397
14	3329410	29/10/2019	1	146	397
15	3327925	04/06/2019	1	93	613



Use first Row as Headers

The screenshot shows the Power BI Data Editor interface. On the left, the 'Queries [10]' pane is open, with 'Product' selected. In the main area, a table is displayed with four columns: Column1, Column2, Column3, and Column4. The first row contains the column headers: ProductKey, ProductLabel, ProductName, and ProductDescription. A red box highlights this first row. A callout bubble with a black arrow points from the 'Transform' tab in the ribbon to this red box, with the text: 'If column's names appear in the first row, you should use this transformation'. The ribbon at the top has tabs for Archivo, Home, Transform, Add Column, View, Tools, and Help. The 'Transform' tab is currently selected. The 'Data Type' dropdown is set to 'Any'. The 'Use First Row as Headers' button is highlighted with a blue arrow.

	Column1	Column2	Column3	Column4
1	ProductKey	ProductLabel	ProductName	ProductDescription
2	873		Mouse E50 Grey	Advanced 2.4 GH
3	874		Look Optical Mouse X205 Black	Wireless notebook
4	875		Look Optical Mouse X205 White	Wireless notebook
5	880	0308138	Contoso Optical Wheel OEM PS/2 Mouse E60 Black	PS/2 mouse, 6 fe
6	884	0308142	Contoso Bluetooth Notebook Mouse X305 White	Transceiver-free
7	886	0308144	Contoso Bluetooth Notebook Mouse X305 Grey	Transceiver-free
8	889	0308147	Contoso Bluetooth Notebook Mouse E70 Silver	Transceiver-free
9	891	0308149	SV Rechargeable Bluetooth Notebook Mouse E80 Silver	33 ft range, recha
10	893	0308151	SV Rechargeable Bluetooth Notebook Mouse E80 White	33 ft range, recha



Change names

= Table.SelectRows(#"Changed Type", each ([StoreKey] > null))

	ContinentName	CityName	StateProvinceName	RegionCountryName
1	17/06/2009 North America	Renton	Washington	United States
2	16/06/2009 North America	Albany	New York	United States
3	17/06/2009 North America	Greeley	Colorado	United States
4	17/06/2009 North America	Greeley	Colorado	United States
5	18/06/2009 North America	Appleton	Wisconsin	United States
6	16/06/2009 North America	Lafayette	Colorado	United States
7	17/06/2009 North America	Arlington	Texas	United States
8	16/06/2009 North America			
9	18/06/2009 North America			
10	17/06/2009 North America			
11	18/06/2009 North America			

Doble click in the column name if you want to change the name.

Queries [10]

- ▷ Transform File from Facts [2]
- ◀ Other Queries [6]
 - Channel
 - Calendar
 - Product
 - Sales
 - Store**
 - Measure

Doble click in the query name if you want to change the name.



Multiply Columns

Screenshot of the Power BI desktop interface showing the 'Transform' tab selected. The 'Add Column' ribbon group is open, displaying various column transformation options like 'Conditional Column', 'Merge Columns', 'Format', and 'From Text'. A context menu is open over a table, specifically over the 'SalesQuantity' column header, with the 'Multiply' option highlighted. A red callout box points to this option with the text: 'If you need to multiply two columns, select them using "Ctrl" key, and then "Multiply" button'.

Queries [10]

- Transform File from Facts [2]
- Other Queries [6]
 - Channel
 - Calendar
 - Product
 - Sales**
 - Store
 - Measure

	Cost	UnitPrice	SalesQuantity	
1	321,44	699	10	
2	321,44	699	10	
3	321,44	699	10	
4	321,44	699	10	
5	321,44	699	10	
6	321,44	699	10	
7	321,44	699	10	
8	321,44	699	10	
9	321,44	699	10	
10	321,44	699	10	



Filter Rows

The screenshot shows the Power BI Data Editor interface. On the left, the 'Queries [10]' pane is open, displaying a list of queries. The 'Store' query is selected, indicated by a yellow background. In the main area, a table is displayed with columns: StoreKey, GeographyKey, StoreManager, StoreType, and StoreName. All cells in the StoreKey column contain 'null'. A red box highlights the 'StoreKey' column header, and a black arrow points from it to a callout box containing the text: 'If you filter one value in one specific column, that full row will be deleted from the query.' Below the table, the 'Transform' ribbon tab is selected, showing various data manipulation tools like 'Close & Apply', 'New Source', and 'Data Type'.

Note: this does not affect the data source



Split Column

The screenshot shows the Power BI desktop interface with the 'Transform' ribbon tab selected. In the 'Text' section of the ribbon, the 'Split Column' option is highlighted with a red box. A black arrow points from this highlighted area to a callout box containing the text: 'You can separate columns delimited by comma or other separator using this option.'

ID	Category
X1	Jersey
X2	Jersey
X4	Jersey
X9	Jersey
X10	Jersey
X11	Hoddy
X13	Jersey
X12	T-Shirt
X7	Cap
X3	Jacket
X8	Jacket
X5	Jersey
X6	Boots

Split Column by Delimiter

Specify the delimiter used to split the text column.

Select or enter delimiter

--Custom--
,

Split at

- Left-most delimiter
- Right-most delimiter
- Each occurrence of the delimiter

Advanced options

Quote Character

"

Split using special characters

Insert special character

OK

Cancel



Remove Other Columns

The screenshot shows the Power BI Data Editor interface. The ribbon at the top has tabs for Home, Transform, Add Column, View, Tools, and Help. Under the Transform tab, there are buttons for New Source, Recent Sources, Enter Data, Data source settings, Manage Parameters, Refresh Preview, Advanced Editor, Properties, Choose Columns, and Remove Columns. The Remove Columns button is highlighted with a red box. Below the ribbon is a preview pane showing a table with columns: Invoice, Quantity, and Unit Price. A tooltip for the 'Remove Other Columns' option is displayed, stating: 'Remove all columns from this table, except the currently selected ones.' A large red arrow points from the bottom text box to this tooltip.

Invoice	Quantity	Unit Price			
10451	1	70	03/01/2020	X1	
10452	1	70	03/01/2020	X1	
10453	2	70	03/01/2020	X1	
10454	2	70	03/01/2020	X1	
10934	2	49	03/01/2020	X10	
10935	1	49	03/01/2020	X10	
10535	1	82	03/01/2020	X2	

It is a good practice to remove all unnecessary columns.

This option leaves only the necessary columns of the model.



Extract

The screenshot shows the Power BI Data Editor interface. A red box highlights the 'Extract' button in the ribbon's 'Text' section. A tooltip for 'Text Before Delimiter' is displayed, stating: 'Return the text that occurs before a delimiter.' Below the ribbon, a table is shown with two columns: 'Date' and 'Year'. The 'Date' column contains dates like '01.01.2020-' and '02.01.2020-'. The 'Year' column contains '2020' repeated five times.

Characters can be extracted from the different values in order to clean the data.

The screenshot shows the Power BI Data Editor interface. A red box highlights the 'Extract' button in the ribbon's 'Text' section. A tooltip for 'First Characters' is displayed, stating: 'Return a specified number of characters from the start of each value in this column.' Below the ribbon, a table is shown with two columns: 'Date' and 'Year'. The 'Date' column contains dates like '01.01.2020' and '02.01.2020'. The 'Year' column contains '2020' repeated four times.

Extract First Characters

Enter how many starting characters to keep.

Count
10

OK Cancel

It is also possible to extract the first characters only.



Change Data Types

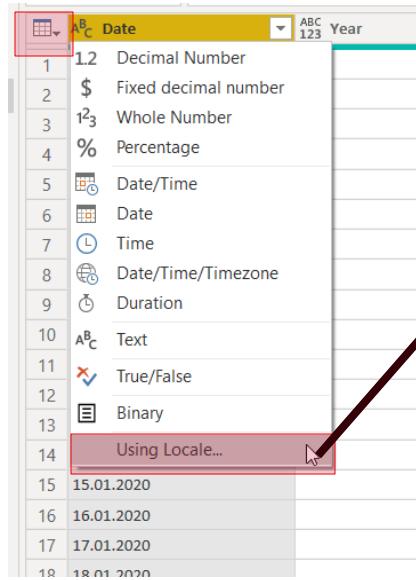
ABC 123	Customer	ABC 123	City	ABC 123
1.2	Decimal Number		Buse	Fra
\$	Fixed decimal number		Sydney	Aus
123	Whole Number		es	Fra
%	Percentage		Waverly	Aus
	Date/Time		Journe	Aus
	Date		h Brisbane	AUS
	Time		haven	Fra
	Date/Time/Timezone		chaven	USA
	Duration		chester	UK
ABC	Text		ern	Nor
✗✓	True/False		Kfurt	Ger
	Binary		dale	USA
	Using Locale...		rid	Spai
			ouver	Can

It is important that each column has the correct data type for better compression.

123	Total Sales	123	Total Cost
1.2	Decimal Number		63
\$	Fixed decimal number		63
123	Whole Number		126
%	Percentage		126
	Date/Time		70
	Date		35
	Time		35
	Date/Time/Timezone		130
	Duration		65
ABC	Text		52
✗✓	True/False		104
	Binary		52
	Using Locale...		56

It is also important for correct calculations that the numerical columns are well categorized.

Change Data Types (cont.)



A screenshot of the Power BI Data View interface. On the left, there's a column header 'Date' with a dropdown arrow. Below it is a list of data types: Decimal Number, Fixed decimal number, Whole Number, Percentage, Date/Time, Date, Time, Date/Time/Timezone, Duration, Text, True/False, and Binary. At the bottom of this list is a button labeled 'Using Locale...'. The row numbers 1 through 18 are listed on the left, and the date values 15.01.2020, 16.01.2020, 17.01.2020, and 18.01.2020 are shown in the corresponding cells.

Sometimes it is necessary to change using the locale of the source file.

Change Type with Locale

Change the data type and select the locale of origin.

Data Type
Date

Locale
Spanish (Spain, International Sort)

Sample input values:
29/03/2016
martes, 29 de marzo de 2016
29 de marzo
marzo de 2016

You must select the data type and its locale

OK Cancel



Detect Data Type

The screenshot shows the Power BI desktop interface with the 'Transform' tab selected. In the ribbon, the 'Data Type: Any' dropdown is open, and the 'Detect Data Type' option is highlighted with a red box. A tooltip window titled 'Detect Data Type' provides instructions: 'Automatically detect the data type of the currently selected columns.' Below the ribbon, a table is displayed with four rows of date data. The first column is labeled 'Date' and has dropdown arrows indicating it's selected. The second column is labeled 'Year' (highlighted in yellow), the third is 'Month Num', and the fourth is 'Month'. The data in the table is as follows:

Date	Year	Month Num	Month
01/01/2020	2020	1	Jan
02/01/2020	2020	1	Jan
03/01/2020	2020	1	Jan
04/01/2020	2020	1	Jan

Tip: Ctrl + A to select all columns at the same time

To detect all types of data automatically it is very useful to use this functionality.

Select the required columns and click Detect Data Type in the Transform tab.



Detect Data Type

The screenshot shows the Power BI desktop interface with the 'Transform' tab selected. In the ribbon, the 'Data Type' dropdown is open, and the 'Detect Data Type' option is highlighted with a red box and a mouse cursor. Below the ribbon, a tooltip for 'Detect Data Type' is displayed, stating: 'Automatically detect the data type of the currently selected columns.' A red arrow points from this tooltip down to a callout box. The main area shows a table with four rows and three columns labeled 'Year', 'Month Num', and 'Month'. The first column contains dates ('01/01/2020', '02/01/2020', '03/01/2020', '04/01/2020'). The second column contains the year '2020'. The third column contains the month name 'Jan'. The entire table is selected.

Tip: Ctrl + A to select all columns at the same time

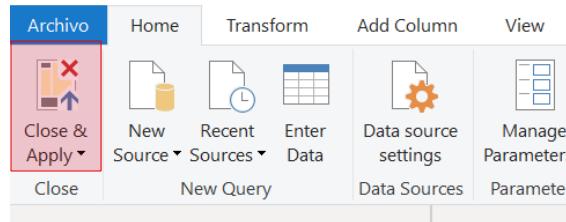
To detect all types of data automatically it is very useful to use this functionality.

Select the required columns and click Detect Data Type in the Transform tab.



Load data to model

- Once all changes have been made, close and apply the changes to view them and generate a data model.





Exercise 1.1



Exercise 1.1. Open the file **Exercise1.1.pbix** (Location: C:\PowerBI\Bootcamp\Week01\Exercises\Exercise 1.1.pbix) and then open Power Query

1

In Product table separate the product from the category. Rename columns.

The screenshot shows the Power BI interface with the 'Product' table selected. A context menu is open over the 'Category' column, with the 'Split Column' option highlighted. A callout points to the 'By Delimiter' tab of the 'Split Column by Delimiter' dialog. The dialog shows a dropdown for 'Select or enter delimiter' with 'Custom' selected, and a text input field containing a comma (,). Below this, under 'Split at', the 'Each occurrence of the delimiter' radio button is selected. The main table view shows the original 'Product, Category' column and a new 'Category' column with values like 'Athletic Bilbao home jersey,Fc' and 'Barcelona pre match tra'.

3

In Date table:

a

Extract first 10 characters from date column.

The screenshot shows the Power Query Editor with the 'Date' table selected. A step named 'First Characters' is applied to the 'Year' column, with the value '10' specified. The formula bar shows the formula = Source{[Item="T"]}[Year]. The preview pane shows the transformed data where the 'Year' column now contains '2020' for all rows.

b

Change Type with Date Locale.

The screenshot shows the Power Query Editor with the 'Date' table selected. A step named 'Using Locale...' is applied to the 'Year' column, with the locale set to 'Spanish (Spain, International Sort)'. The formula bar shows the formula = Year{[Using Locale=Spanish (Spain, International Sort)]}. The preview pane shows the transformed data where the 'Year' column now contains '01/01/2020' for all rows.

2

In Sales table:

a Filter out null records.

The screenshot shows the Power BI interface with the 'Sales' table selected. A context menu is open over a null value in the 'OrderLineNumber' column, with the 'Clear Filter' option highlighted. A callout points to the 'Clear Filter' option in the menu.

b Remove the OrderLineNumber column.

4

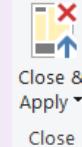
Check the data types for each column.

The screenshot shows the Power Query Editor with the 'Quantity' column selected. A context menu is open over the column header, with the 'Data Type' option highlighted. A callout points to the 'Data Type' dropdown menu, which lists various options like 'Decimal Number', 'Fixed decimal number', 'Whole Number', 'Percentage', 'Date/Time', 'Date', 'Time', 'Duration', 'Text', 'True/False', 'Binary', and 'Using Locale...'.

Tip: Press Ctrl + A and use Detect Data Type in Transform tab.

5

Load the tables into the data model.



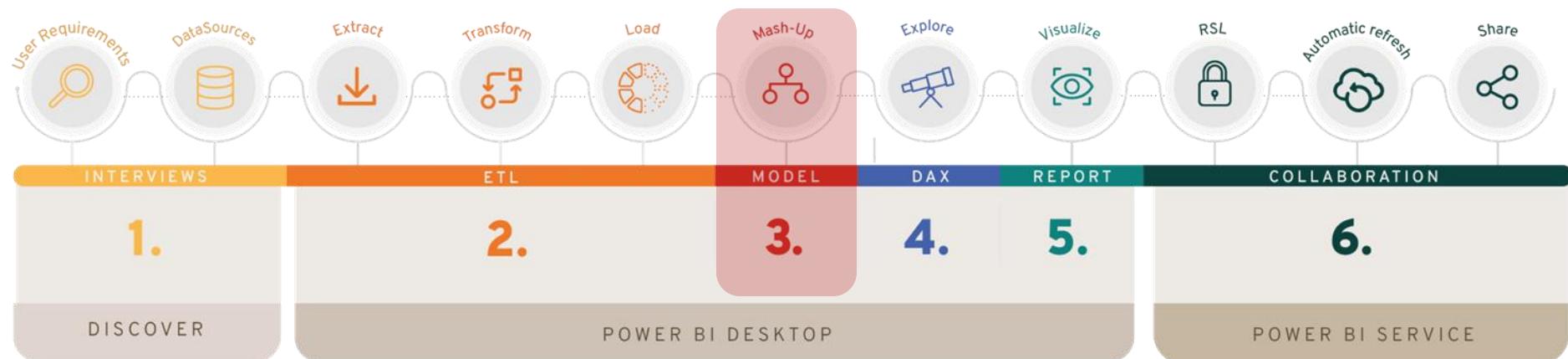


Why build star schema models in Power BI

- What is a Star Schema Model?
- Facts and dimensions of star schema models.
- What do we mean with relationships between tables.



Our Method: Flow of Report Development



What type of models are better suited for data analysis?





Denormalized models in Excel

#	ProductID	Product	Date	CustomerID	Email	Last Name	First Name	Full Name	CampaignID	Units	Cartegory
1	876	Maximus UC-41	8/25/2011	70226	Farron.Kent@xyz.com	Kent	Farrah	Farrah Kent	22	1	10
2	885	Maximus UC-50	3/23/2014	70227	Farron.Kent@xyz.com	Kent	Farrah	Farrah Kent	15	1	10
3	885	Maximus UC-50	11/30/2014	138233	Martha.McClain@xyz.com	McClain	Martha	Martha McClain	8	1	10
4	885	Maximus UC-50	6/21/2015	27193	Hedda.McIntosh@xyz.com	McIntosh	Hedda	Hedda McIntosh	22	1	10
5	885	Maximus UC-50	1/6/2013	239790	Lunes.Walker@xyz.com	Walker	Lunes	Lunes Walker	21	1	10
6	885	Maximus UC-50	3/21/2013	182241	Upton.Page@xyz.com	Page	Upton	Upton Page	17	1	10
7	449	Maximus UN-54	9/25/2011	191391	Drake.Wells@xyz.com	Wells	Drake	Drake Wells	22	1	4
8	449	Maximus UN-54	9/7/2014	160009	Wallace.Bender@xyz.com	Bender	Wallace	Wallace Bender	17	1	4
9	449	Maximus UN-54	4/2/2013	110793	Aetna.Erickson@xyz.com	Erickson	Aetra	Aetra Erickson	20	1	4
10	449	Maximus UN-54	4/16/2014	40221	Edmund.Dickens@xyz.com	Dickens	Edmund	Edmund Dickens	7	1	4
11	449	Maximus UN-54	2/26/2013	65982	Toko.Gross@xyz.com	Gross	Toko	Toko Gross	17	1	4
12	449	Maximus UN-54	6/6/2013	65987	Yoshi.Grant@xyz.com	Grant	Yoshi	Yoshi Grant	10	1	4
13	449	Maximus UN-54	5/12/2013	56737	Brian.Carrillo@xyz.com	Carrillo	Brian	Brian Carrillo	10	1	4
14	449	Maximus UN-54	4/9/2015	244715	Mark.Hewitt@xyz.com	Hewitt	Mark	Mark Hewitt	19	1	4
15	449	Maximus UN-54	4/28/2013	244715	Mark.Hewitt@xyz.com	Hewitt	Mark	Mark Hewitt	8	1	4
16	449	Maximus UN-54	3/28/2014	244851	Oscar.Avila@xyz.com	Avila	Oscar	Oscar Avila	18	1	4
17	449	Maximus UN-54	2/26/2014	201004	Duncan.Mcintosh@xyz.com	Mcintosh	Duncan	Duncan Mcintosh	19	1	4
18	615	Maximus UC-80	5/14/2012	212645	Jacob.Santiago@xyz.com	Santiago	Jacob	Jacob Santiago	22	1	10
19	615	Maximus UC-80	5/14/2012	70466	Hillary.Coller@xyz.com	Collier	Hillary	Hillary Collier	22	1	10
20	615	Maximus UC-80	5/14/2012	114459	Chester.Mitchell@xyz.com	Mitchell	Chester	Chester Mitchell	22	1	10
21	615	Maximus UC-80	5/14/2012	221670	Sage.Yang@xyz.com	Yang	Sage	Sage Yang	22	1	10
22	615	Maximus UC-80	6/7/2012	160007	Wallace.Bender@xyz.com	Bender	Wallace	Wallace Bender	22	1	10
23	615	Maximus UC-80	6/3/2012	194439	Illiana.Dunlap@xyz.com	Dunlap	Illiana	Illiana Dunlap	22	1	10
24	615	Maximus UC-80	6/4/2012	191391	Joelle.Lee@xyz.com	Lee	Joelle	Joelle Lee	22	1	10

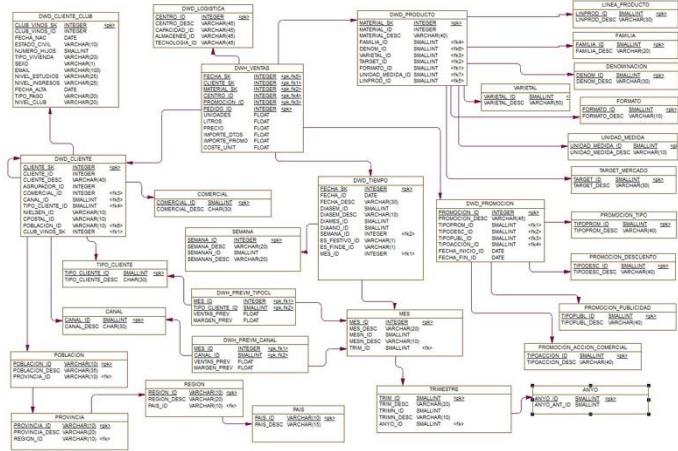
- Data Duplication:** Excel often leads to data duplication as different sheets or workbooks may contain similar data, increasing the risk of inconsistencies and errors.

- Performance Issues:** As the data grows, Excel's performance can degrade, leading to slow calculations and analysis, especially when using complex formulas or functions.

- Lack of Data Integrity:** Excel lacks strict data integrity controls, making it easier for users to input incorrect or inconsistent data, impacting the accuracy of analysis and reporting.



Normalized models in Data Bases



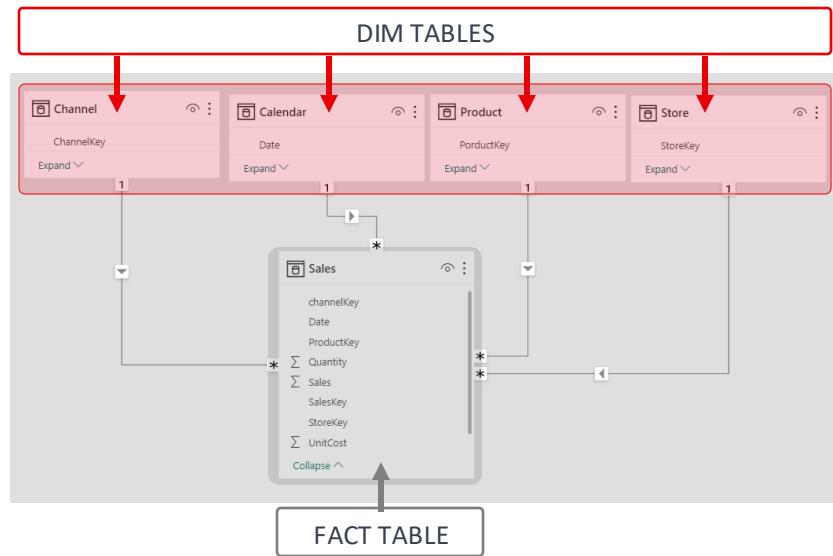
- Readability:** The normalized structure may result in cryptic column names and lack of context, making it harder for non-technical users to understand the data and generate reports.
- Complex Queries:** Normalized models require complex queries with multiple joins to retrieve meaningful data for reporting, leading to slower performance and increased query complexity.
- Performance Overhead:** The need for multiple joins and complex data retrieval can cause performance overhead, leading to slower reporting and longer processing times.



Star Schema Overview

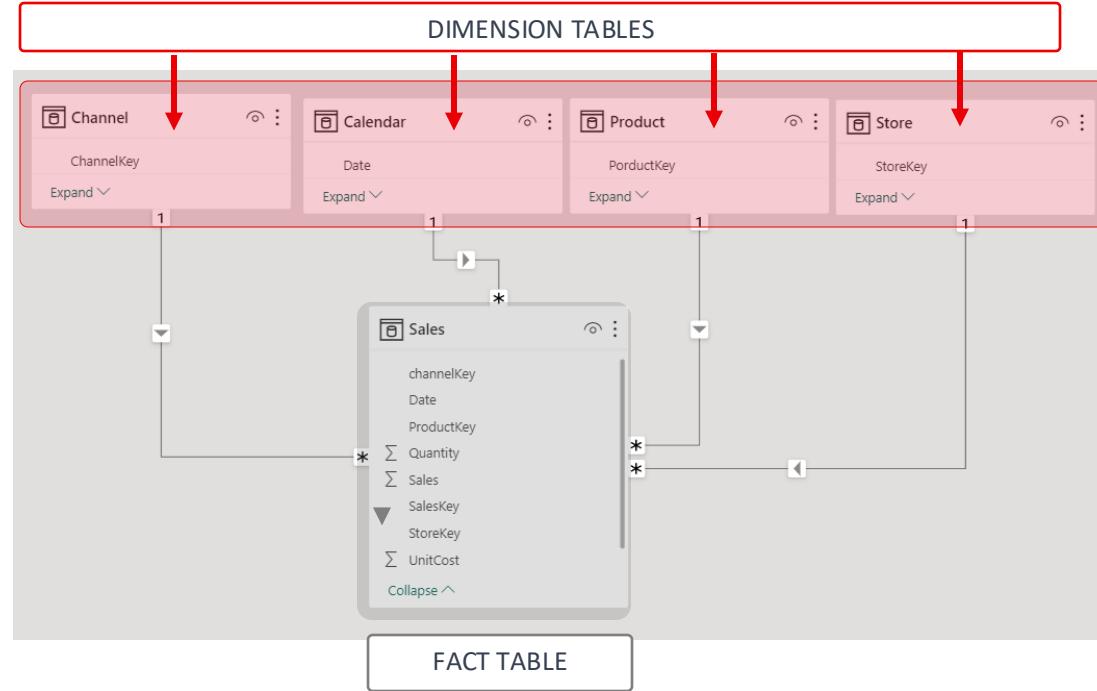
A star schema is a type of data modeling approach used in data warehouses and business intelligence systems.

It is designed for efficient data analysis and reporting.





Dim & Facts



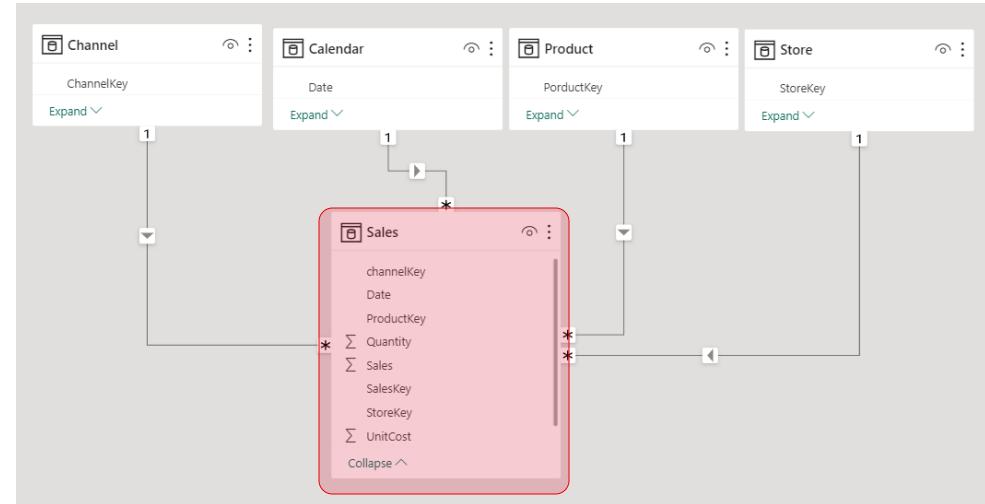


Facts

A **fact table** represents individual transactions or events.

Each row contains numerical data to be aggregated.

Examples include sales, units sold, and costs.

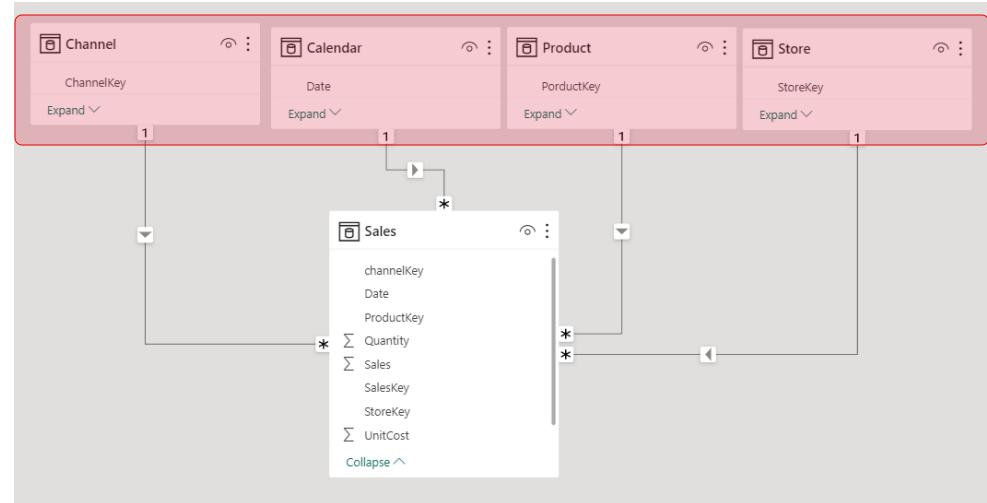




Dimensions

A Dim (or Dimension) table contains descriptive attributes that define how a fact should roll up.

- Sales by customer
- Quantity by Product





Facts & Dim

The **fact table** stores two types of information:

- Numeric values
- Dimensions ID

VALUE DATA			DIMENSION ID		
ORDER_ID	SALES_AMOUNT	QUANTITY	PRODUCT_ID	EMPLOYEE_ID	DATE_ID
101	150	2	22	12225	20230501
102	210	3	17	12588	20230505
103	250	1	12	14558	20230509
104	350	5	16	13225	20230512
105	70	1	16	16442	20230515

The **dim table** stores two types of information:

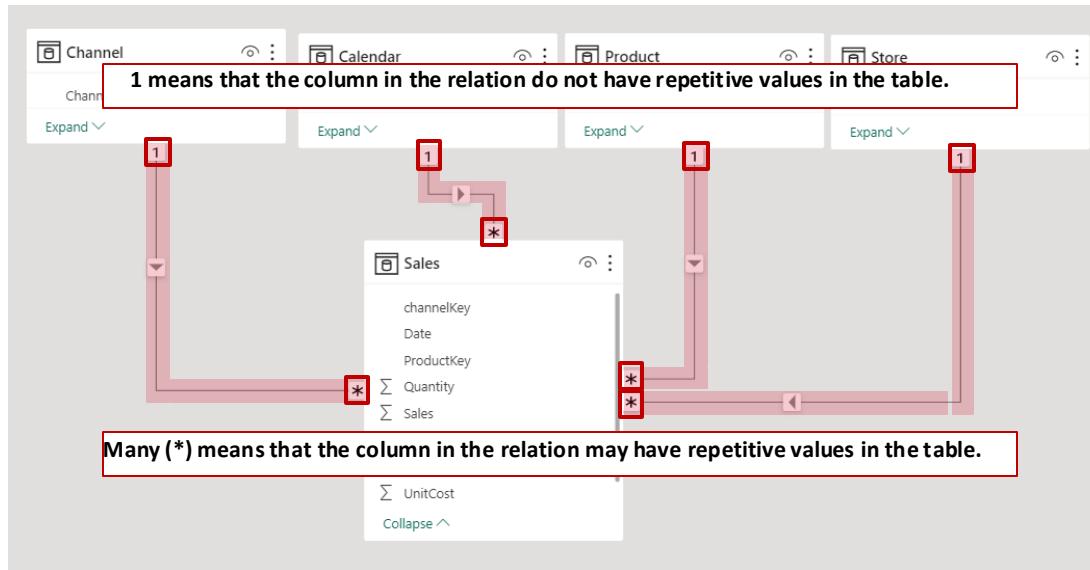
- Dimensions ID
- Descriptive columns

DIMENSION ID	DESCRIPTIVE COLUMNS			
PRODUCT_ID	PRODUCT_NAME	MANUFACTURER	RANGE	TYPE
1	Apple Watch Series 7	Apple Inc.	Very Light	Smartwatch
2	Lenovo IdeaCentre AIO 520	Lenovo	Light	All-in-One PC
3	LG UltraGear 27GL850	LG	Very Light	Gaming Monitor
4	ASUS RT-AX82U	ASUS	Medium	Wi-Fi Router
5	Dell XPS 13	Dell	Light	Laptop
6	TP-Link Kasa Smart Plug	TP-Link	Light	Smart Plug
7	Sony PlayStation 5	Sony	Light	Gaming Console
8	Epson Perfection V600	Epson	Very Light	Flatbed Scanner
9	iPad Pro 12.9-inch	Apple Inc.	Medium	Tablet
10	Philips Hue White & Color	Signify	Light	Smart Bulb
11	Samsung Galaxy S22	Samsung	Very Light	Smartphone



Cardinality

A relationship in Power BI establishes a connection between two tables (typically a fact table and a dimension table) using a column from each table.

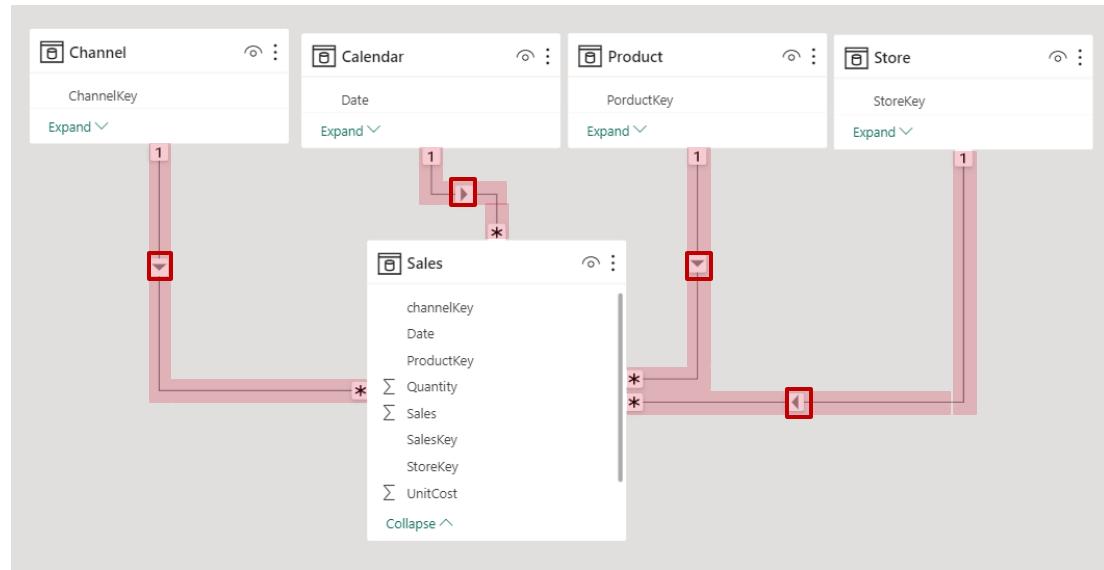




Direction

The direction in a relationship determines how data flows between tables.

In a traditional Star model (image), **dimensions filter the facts** through the field that is part of the relationship.





Building the model

- Presentation: Parts of Power BI (report, data, relations)
- Demo1.2: Create relations between 3 tables (products, sales & calendar) and draw a table in Power BI. The difference between number, text, and date columns is explained in order to validate and assign the correct data type to create the correct visualization.
- Exercise 1.2: Building a model
- Q&A



Demo 1.2





Presentation: Parts of Power BI (report, data, relations)

The screenshot shows the Power BI desktop application interface. The top navigation bar includes File, Home, Insert, Modeling, View, Optimize, Help, and External tools. The Home tab is selected. The ribbon below has sections for Clipboard, Data, Queries, Insert, Calculations, Sensitivity, and Share.

Three red boxes with arrows point to specific areas:

- Click here to design your report**: Points to the 'New visual' button in the Insert ribbon.
- Click here to see data in your tables**: Points to the 'Data' pane on the right, which displays a message: 'You haven't loaded any data yet. Get data'.
- Click here to design the data model**: Points to the 'Data' ribbon section, which includes options like 'Get data', 'Enter data', 'Data hub', 'SQL Server', 'Dataverse', 'Recent sources', and 'Transform data'.

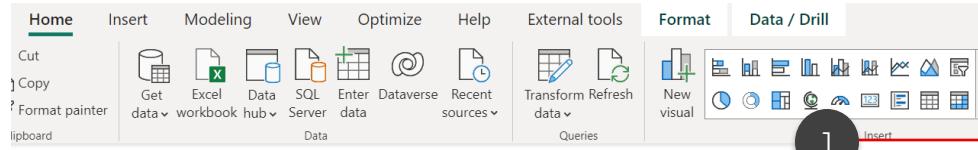
In the center workspace, there is a 'Build a visual' dialog box for a 'Stacked column chart'. It shows a data grid with three columns and a 'Select or drag data to populate this visual' message. Below the grid, there are buttons for 'Suggest a type', 'Data', and '+Add data'.

At the bottom, a red box highlights the text: **Visuals that you can use in your report**.

The bottom navigation bar includes tabs for INTERVIEWS, ETL, MODEL, DAX, REPORT (which is highlighted in green), and COLLABORATION.



Your first visual in Power BI



1

First select the
visual you want
to create

Select or drag data to populate this visual

Build a visual

Visual types

Suggest a type

Y-axis

+Add data

X-axis

+Add data

Legend

+Add data

Small multiples

+Add data

Tooltips

+Add data

Select data

Search

financials

- Sales
- COGS
- Country
- Date
- Discount Band
- Discounts
- Gross Sales
- Manufacturing Price
- Month Name
- Month Number
- Product
- Profit
- Sale Price
- Segment
- Unit Sale

2

Then select the
fields you want
to visualize.



Exercise 1.2

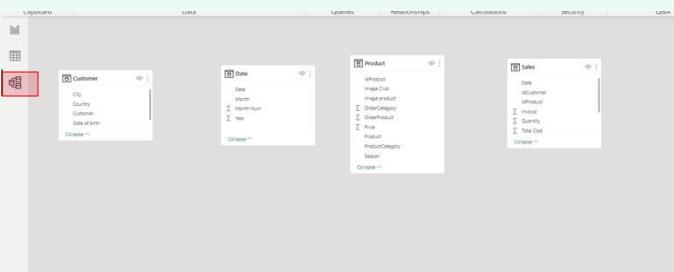


Exercise 1.2.

Open the file **Exercise1.2.pbix** (Location: C:\PowerBIBootcamp\Week01\Exercises\Exercise1.2.pbix)

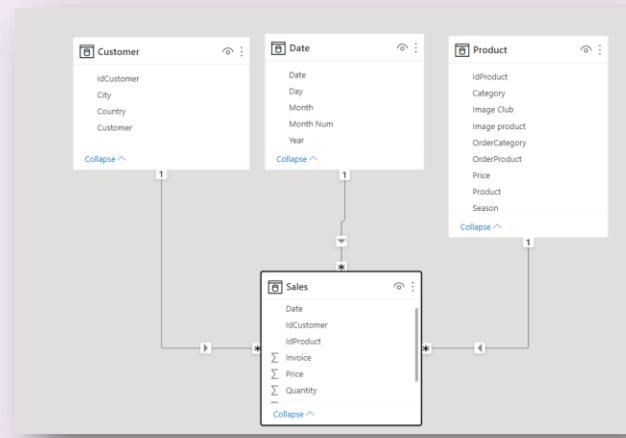
1

Check that the tables are properly loaded.



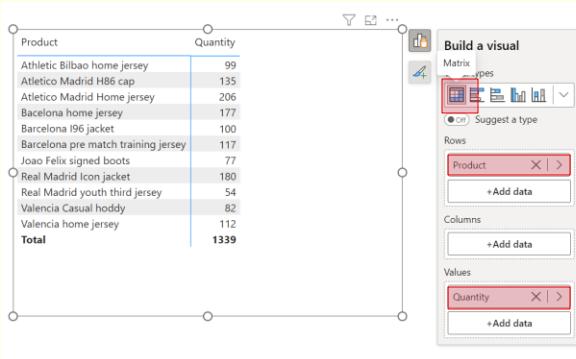
2

Create the relationships between the **Sales** table and the rest of the tables through their main keys. For the relationship with the **Date** table, create an active relationship with the column date.



3

Insert a matrix to visualize the quantity sold per product.



*HINT: You may need to preview some of the tables to see what is in them.

Think about: What sort of data model are you creating?



Poll

What type of model is recommended to use in Power BI?

- ✓ Star schema Model
- ✓ Denormalized
- ✓ Single table repeating data
- ✓ Normalized
- ✓ None of them





Recommendations for Next Steps

Part of the Power BI
Bootcamp Series

Advanced Learning Path:

- 1) Power BI Bootcamp: Building the Foundations for Power BI
- 2) Power Query: Data Connections and Transformations
- 3) Data Modeling for optimal structure & DAX for calculations
- 4) Visualizations for impactful reporting & Power BI Service

This Bootcamp





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Q&A

- Write your questions in the chat so that we can answer them and discuss them together.



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