



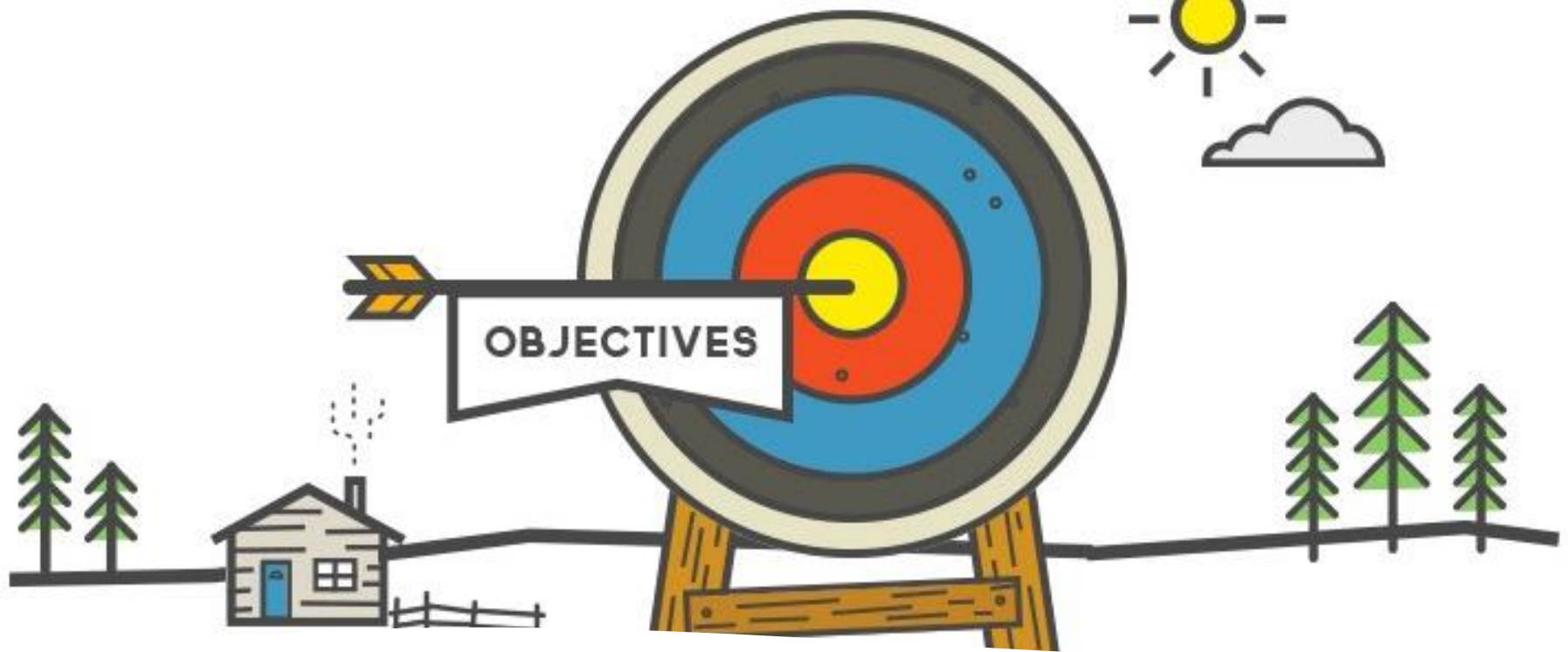
Lisbon School
of Economics
& Management
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Tools for Data Visualization

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Learning Goals

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

- Understand the role of data visualization in analytics
- Navigate Tableau and Power BI interfaces
- Prepare data for visualization
- Build basic dashboards
- Apply storytelling techniques using data

Session Overview

- Introduction to Data Visualization
- Tableau Basics
- Power BI Basics
- Break
- Data Preparation
- Hands-on Lab
- Case Study & Storytelling

What is Data Visualization?

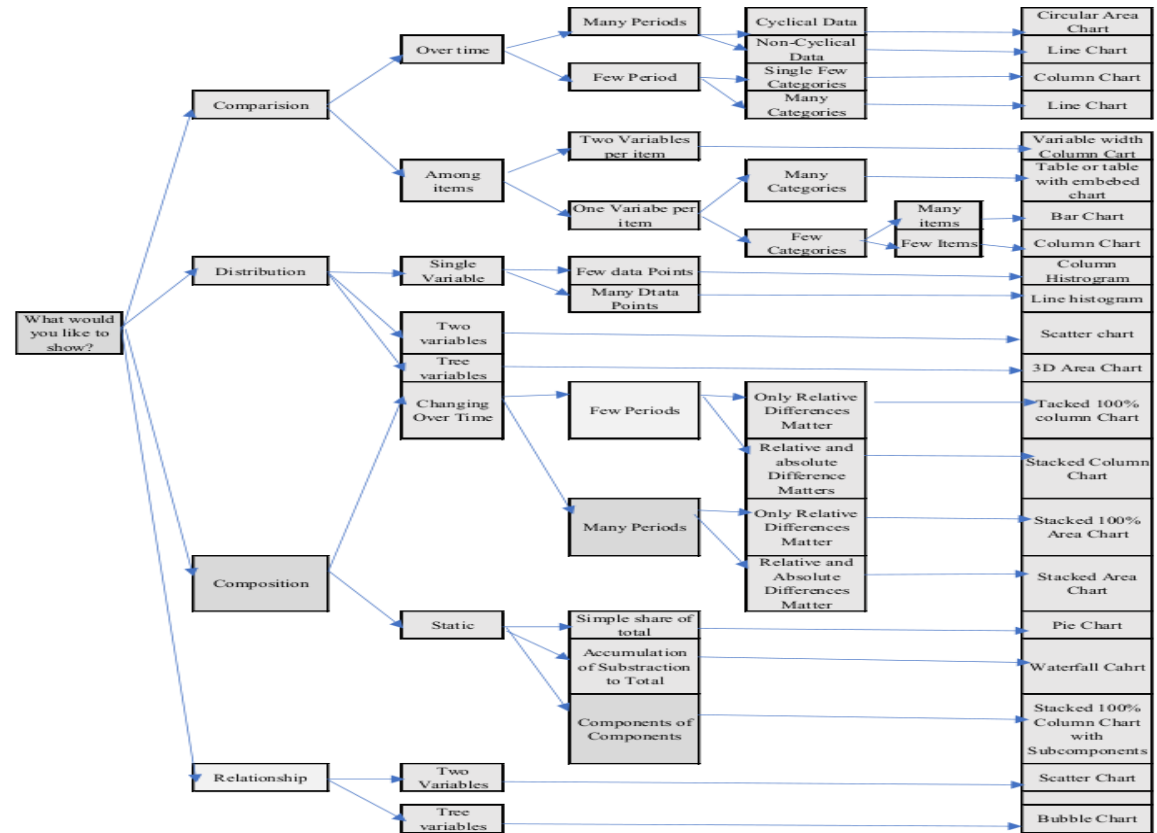
- Representation of data through visual elements
- Helps understand patterns, trends, and insights

Why Visualization Matters

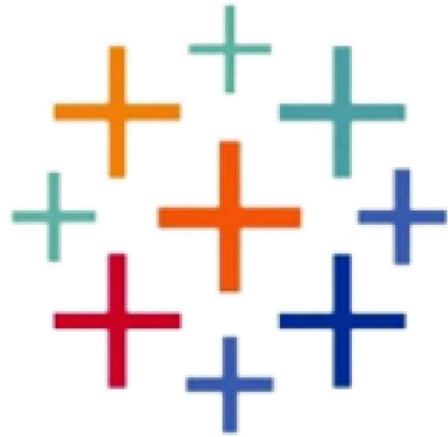
- Faster decision-making
- Simplifies complex data
- Improves communication

Types of Visualizations

- Bar charts
- Line charts
- Pie charts
- Maps
- Dashboards



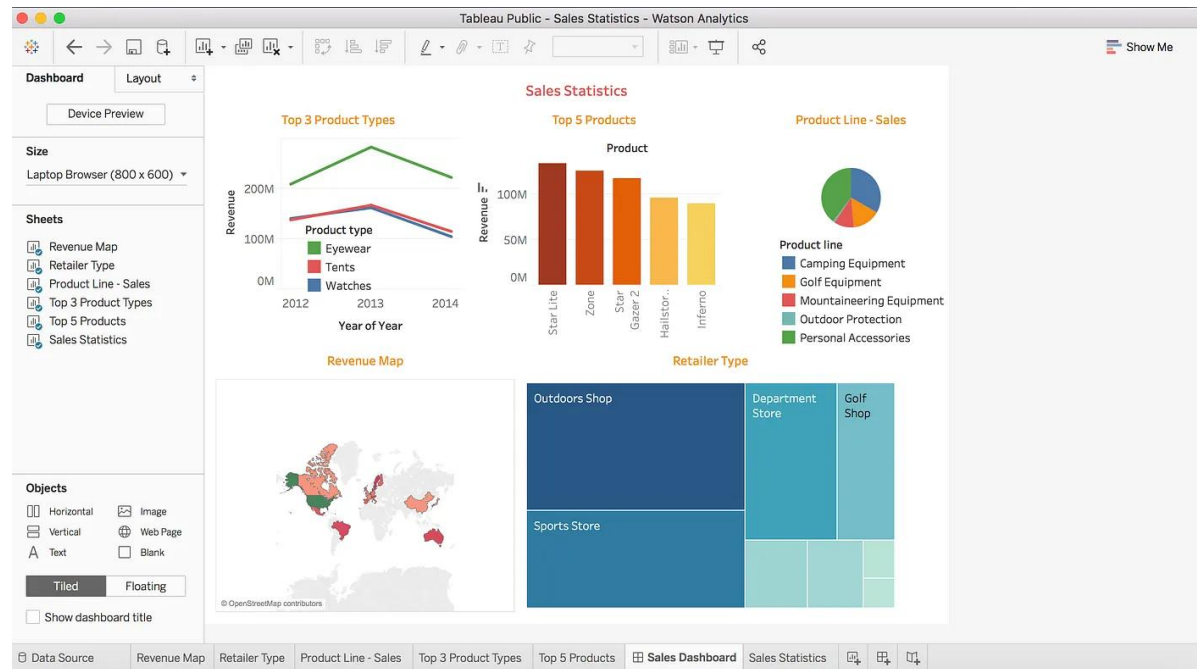
Dashboard design charts decision tree



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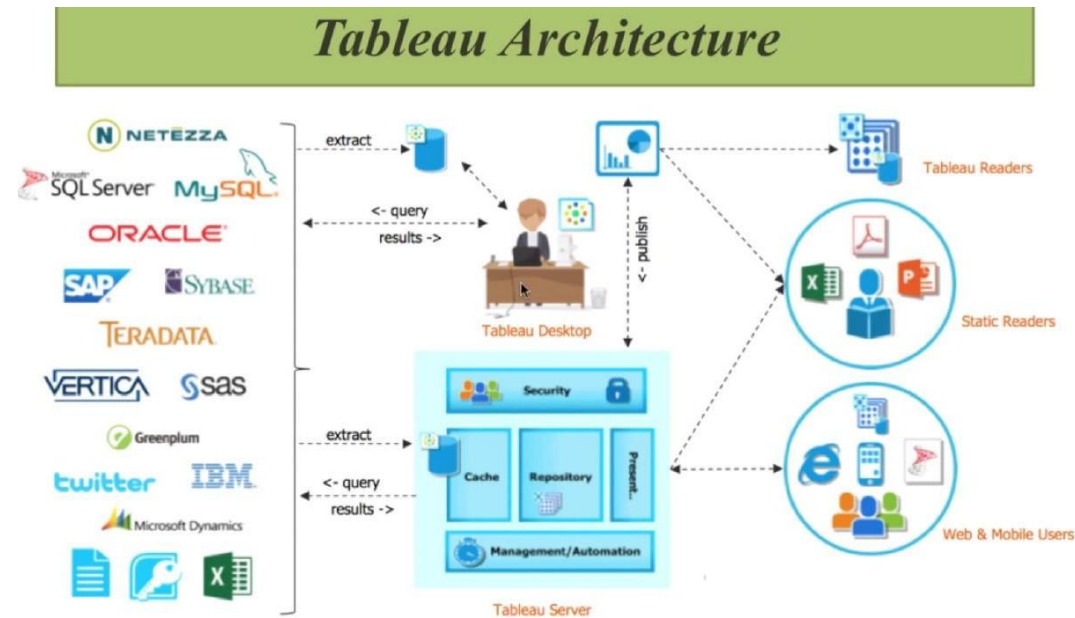
What Tableau Really Is

- Tableau is a system for visual data analysis
- Enables fast exploration of data
- Reduces time from question to insight
- Supports iterative analytical thinking



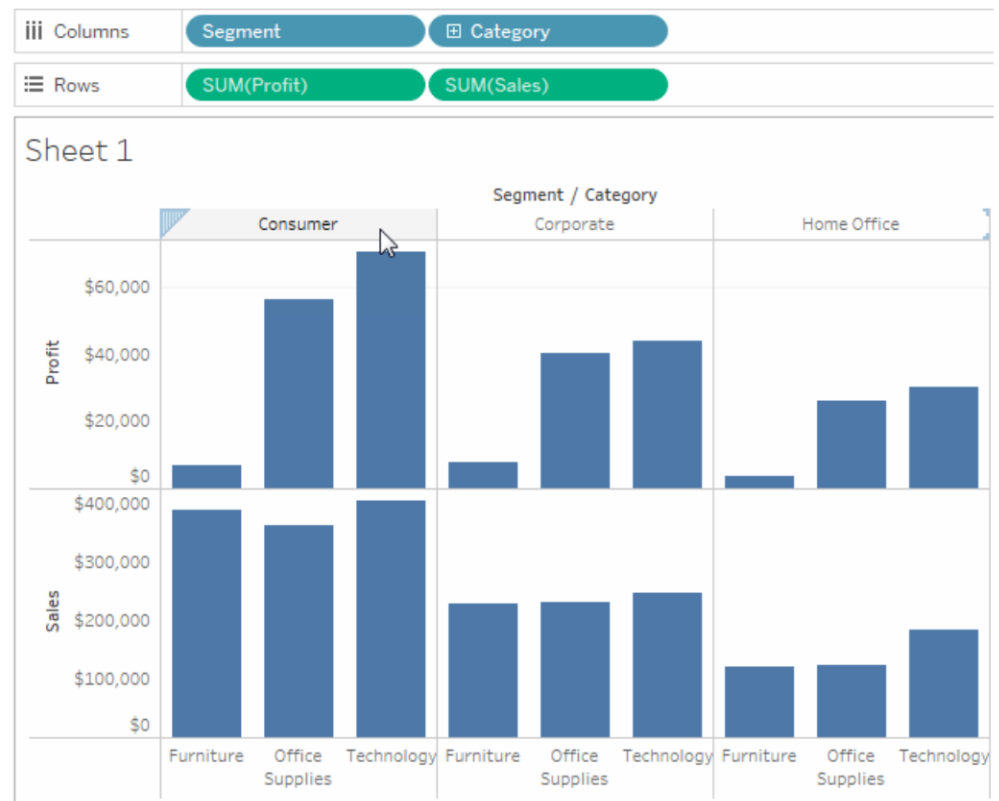
Why Tableau Exists

- Traditional: Data → Model → Chart
- Tableau: Data → Chart → Insight → Refine
- Faster iteration
- Better for exploration



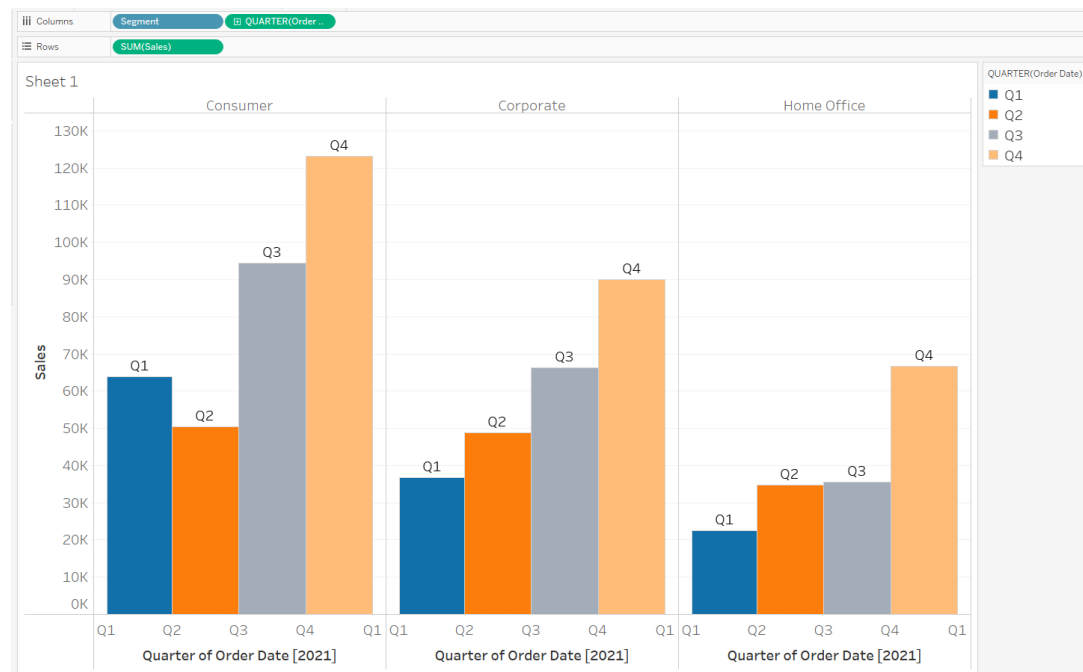
Core Concept of Tableau

- Dimensions (grouping)
- Measures (values)
- Marks (representation)
- Layout (rows & columns)



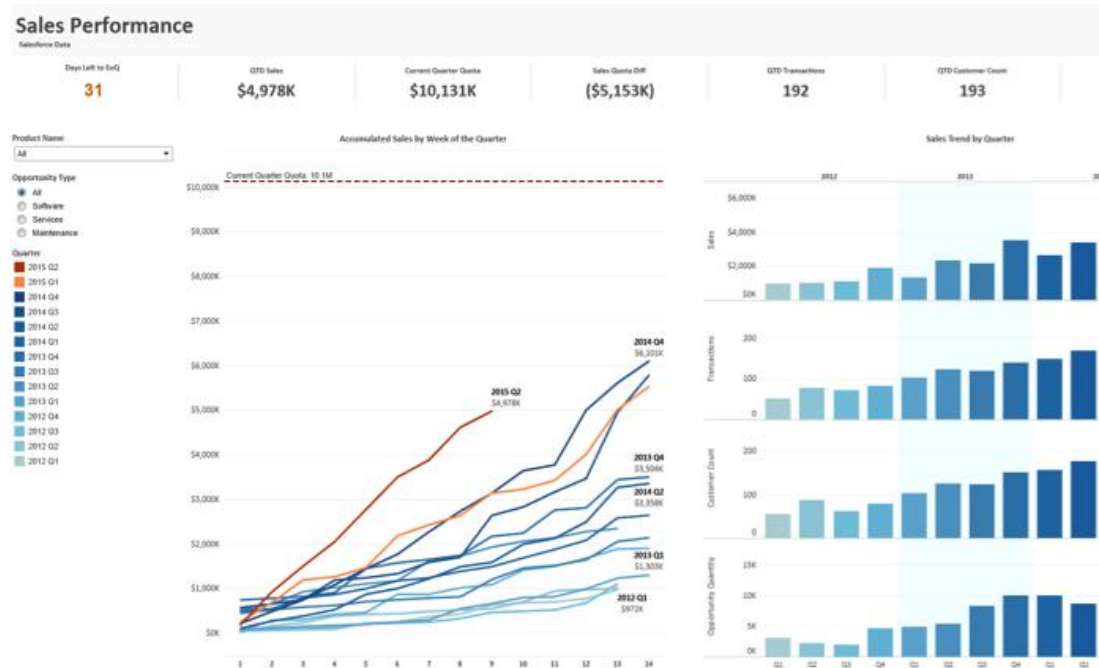
Dimensions

- Represent categories
- Define grouping
- Create headers
- Examples: Region, Category



Measures

- Represent numeric values
- Aggregated automatically
- Create axes
- Examples: Revenue, Profit



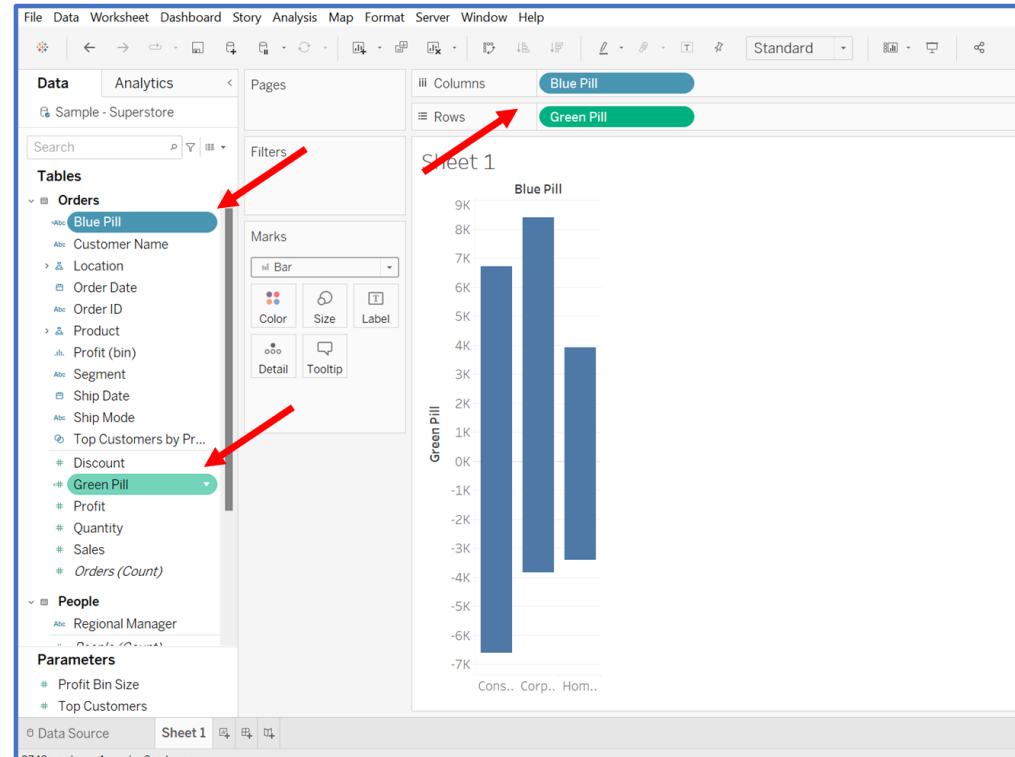
Dimension vs Measure

- Dimensions = structure
- Measures = magnitude
- Blue vs Green in Tableau

**Dimensions organize the data,
and measures quantify it.**

Blue = categories (Discrete)

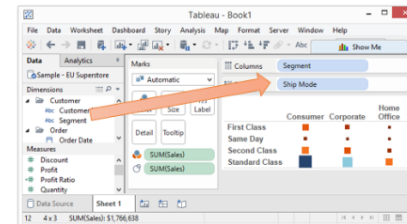
Green = numbers with range (Continuous)



Drag Fields = Query

- Dragging builds a query
- Category → grouping
- Revenue → aggregation
- SUM(Revenue) by Category

1. Drag & Drop



2. Data Query



3. Data Source



4. Aggregated Results

6. Cache Reuse

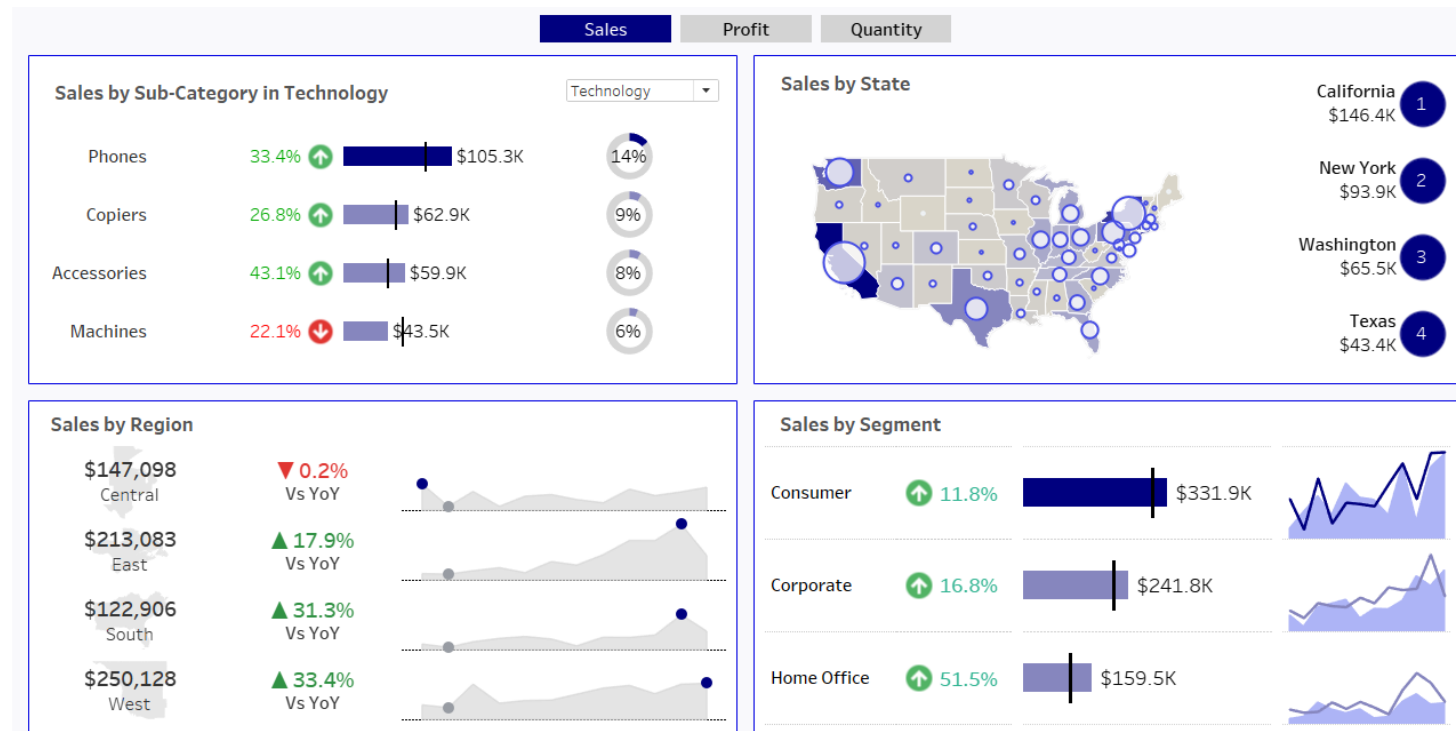


| | X | Y | Z |
|---|------------|------------|------------|
| A | SUM(Sales) | SUM(Sales) | SUM(Sales) |
| B | SUM(Sales) | SUM(Sales) | SUM(Sales) |
| C | SUM(Sales) | SUM(Sales) | SUM(Sales) |
| D | SUM(Sales) | SUM(Sales) | SUM(Sales) |

5. "Local" Data Cache

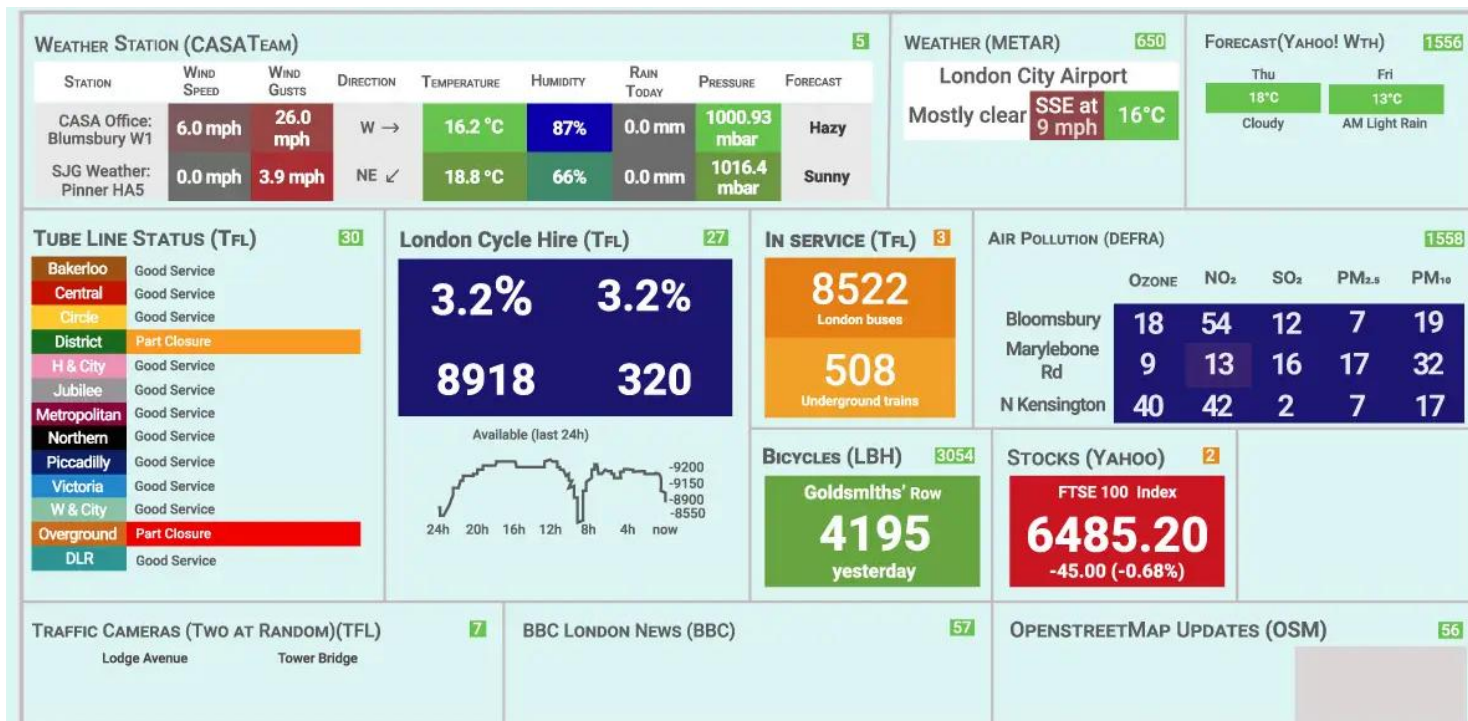
Dashboard

- Multiple views
- Interactive
- Decision-focused



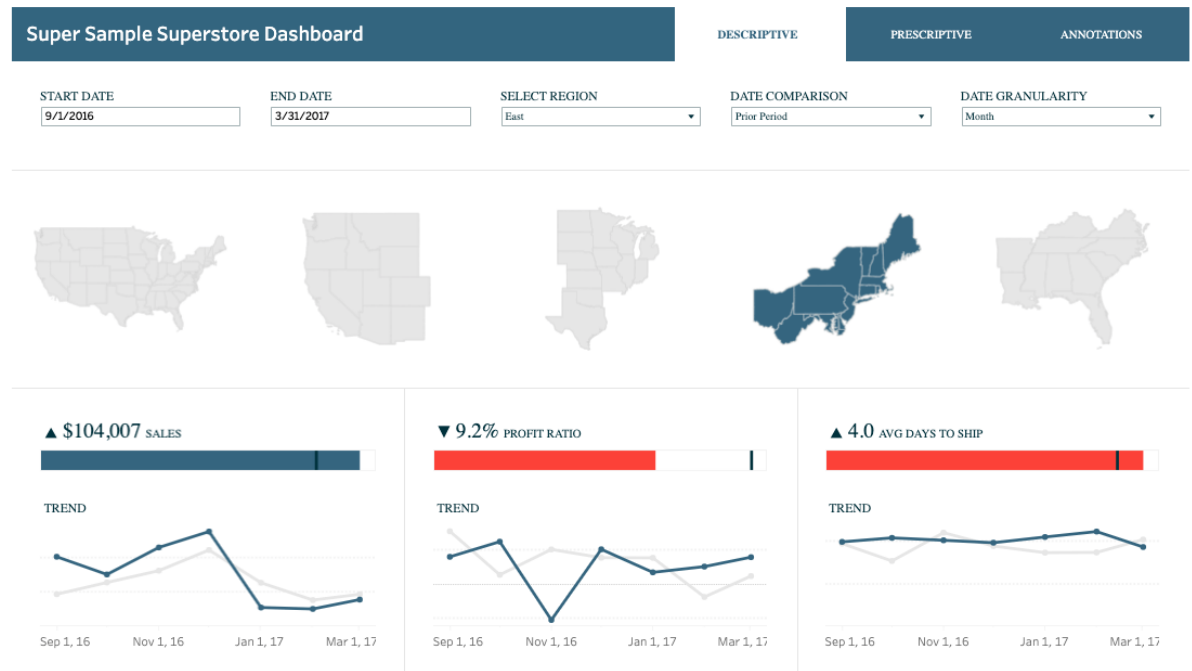
Bad Dashboard

- Too many charts
- No hierarchy
- Too many colors



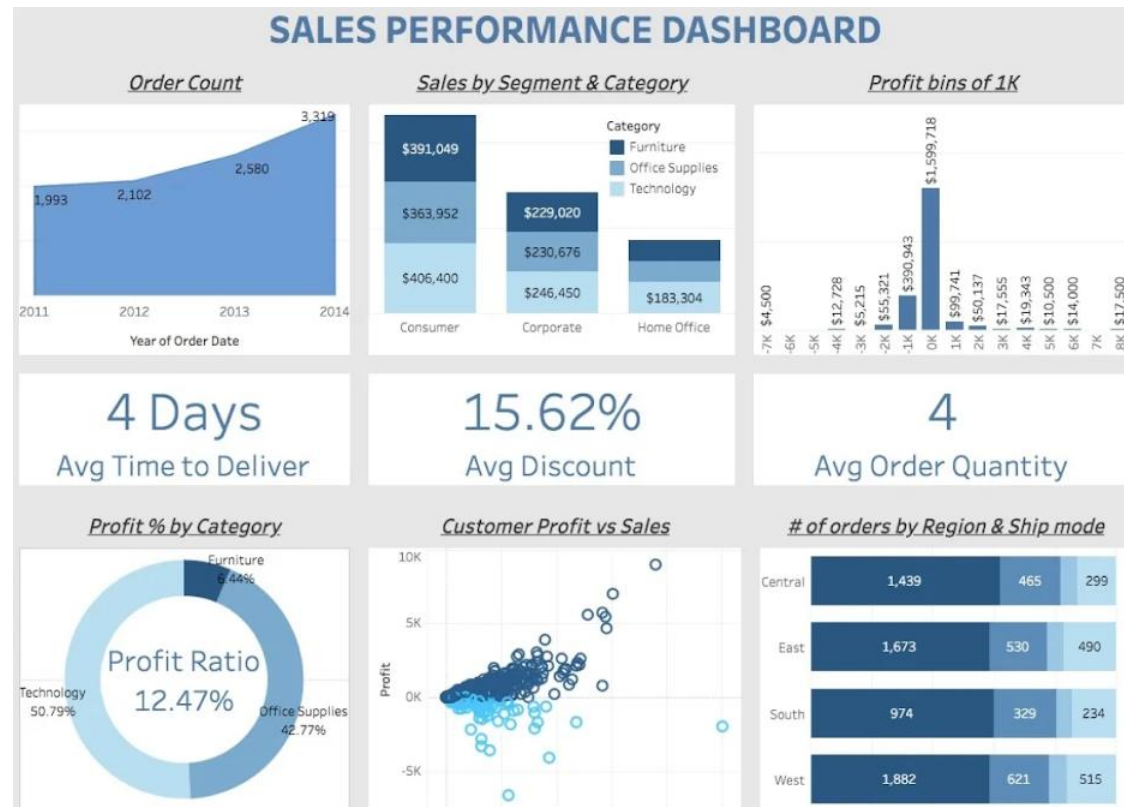
Good Dashboard

- One main message
- Supporting visuals
- Clear layout



Interactivity

- Filtering
- Exploration
- Scenario analysis



Final Insight

- Tableau = asking questions
- Exploring data
- Not just charts

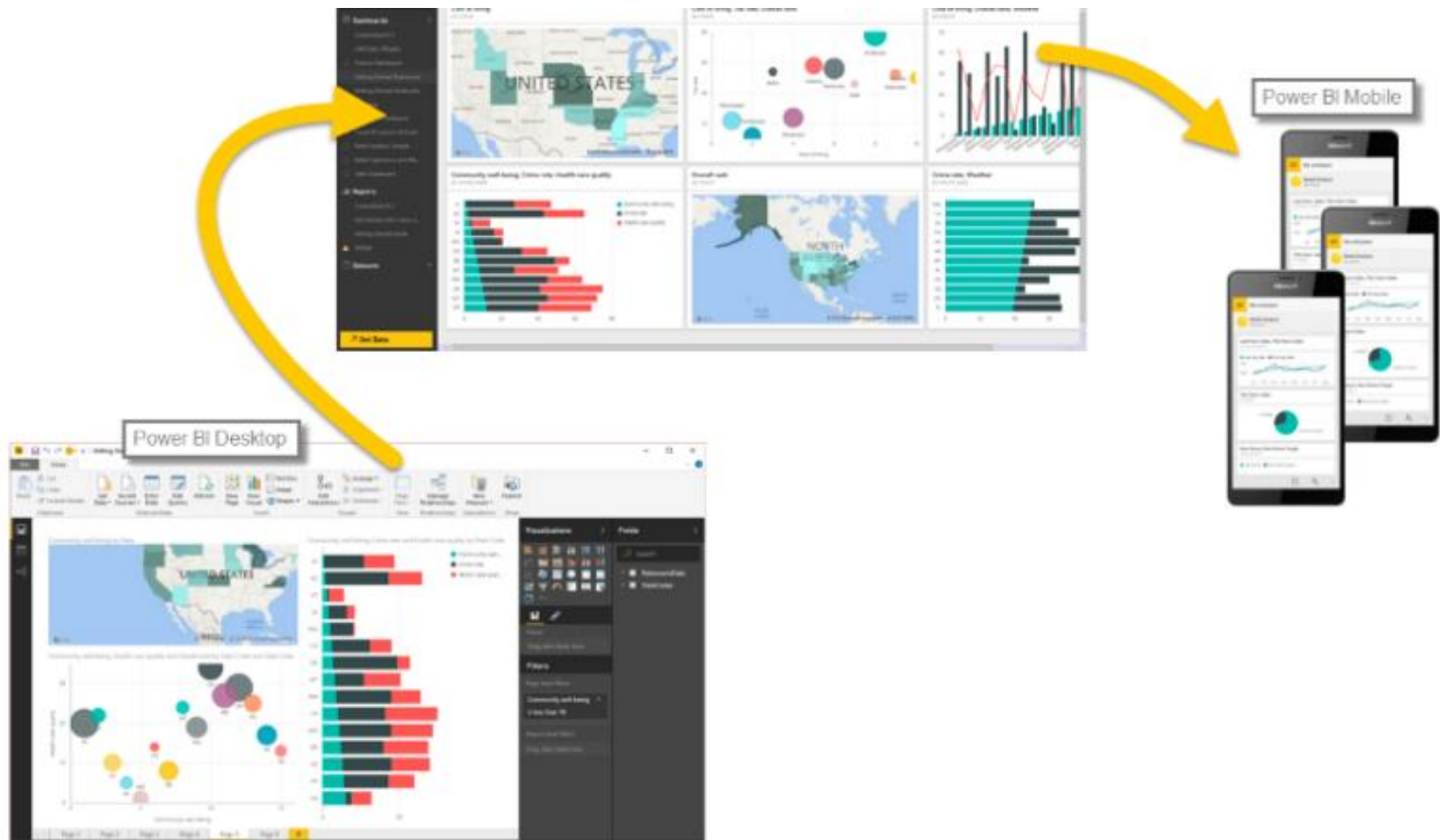
Mini Exercise (5 min)

- Create a bar chart
- Add a filter



Power BI

The parts of Power BI

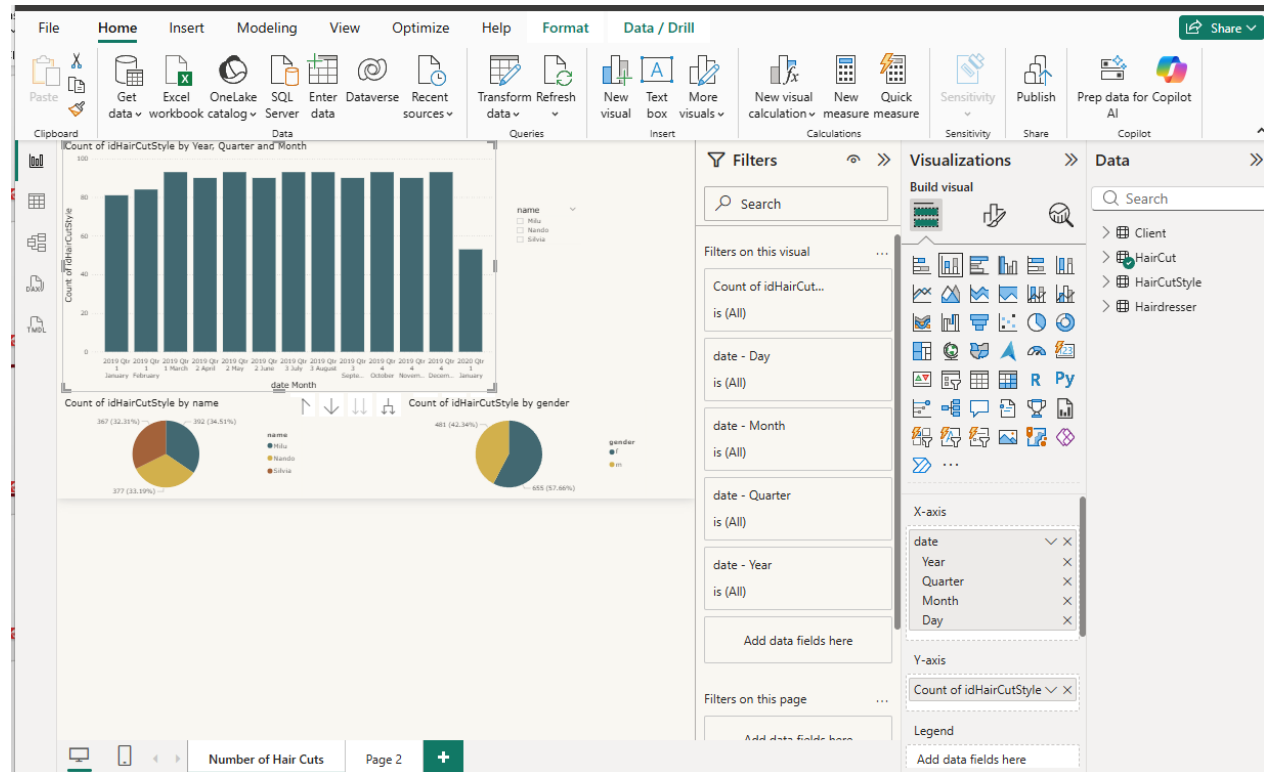


What is Power BI?

- Business analytics tool by Microsoft
- Strong integration with Excel and databases

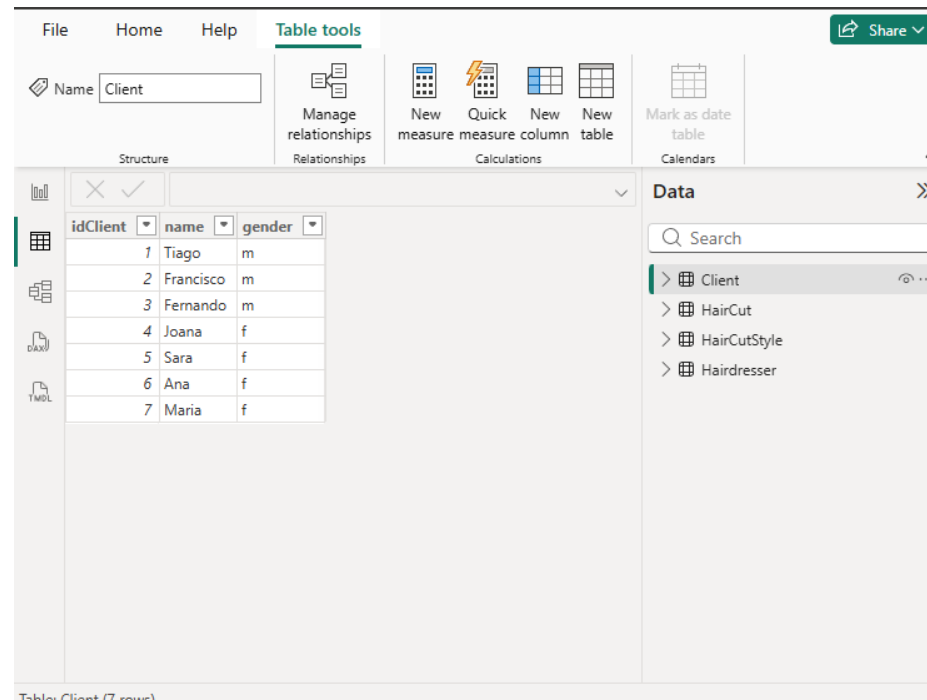
Power BI Interface

- Report view
- Table view
- **Model view**



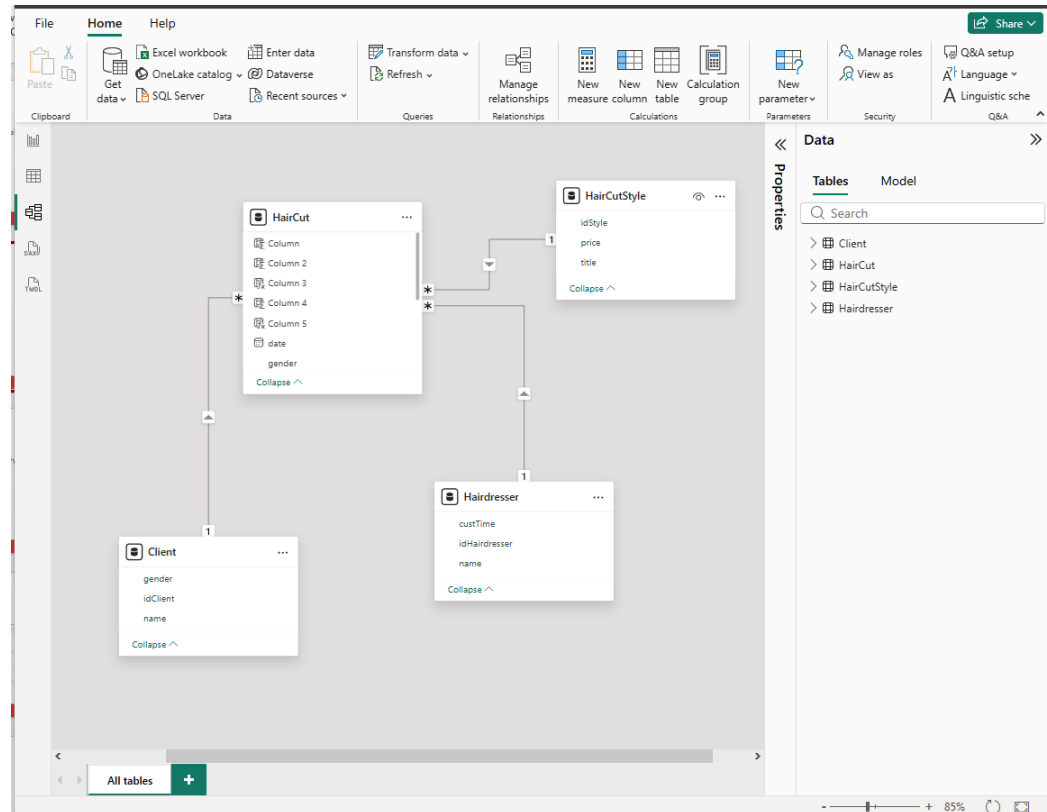
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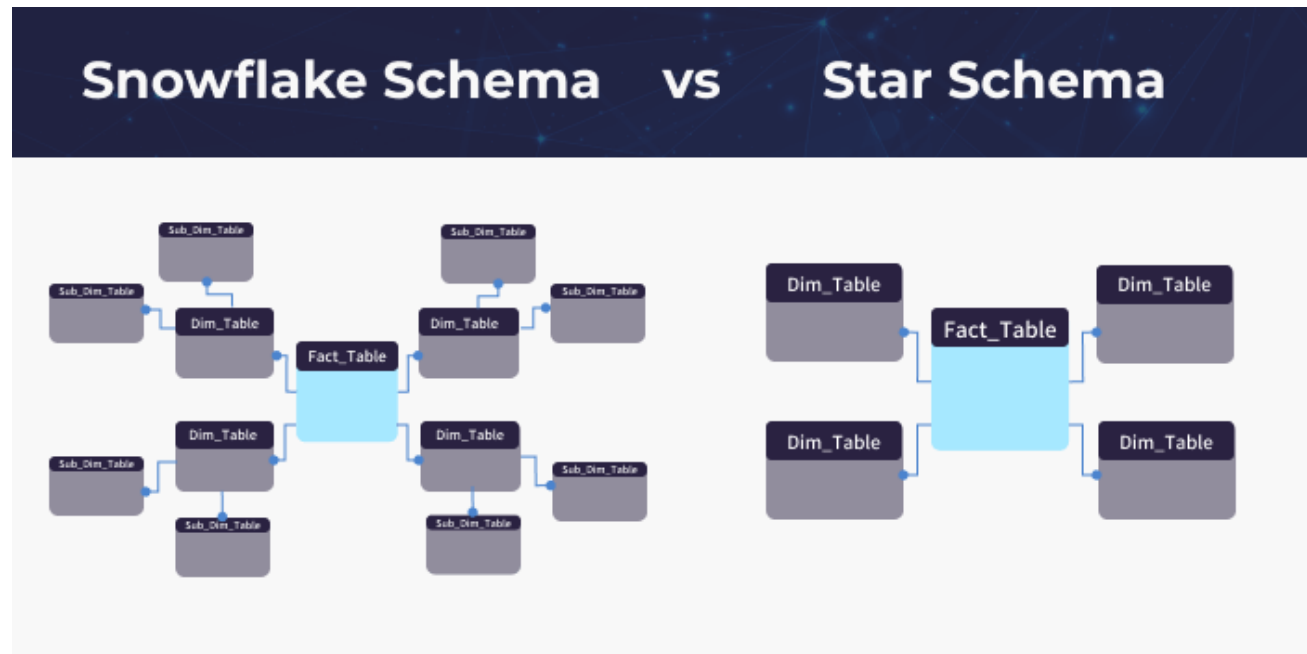
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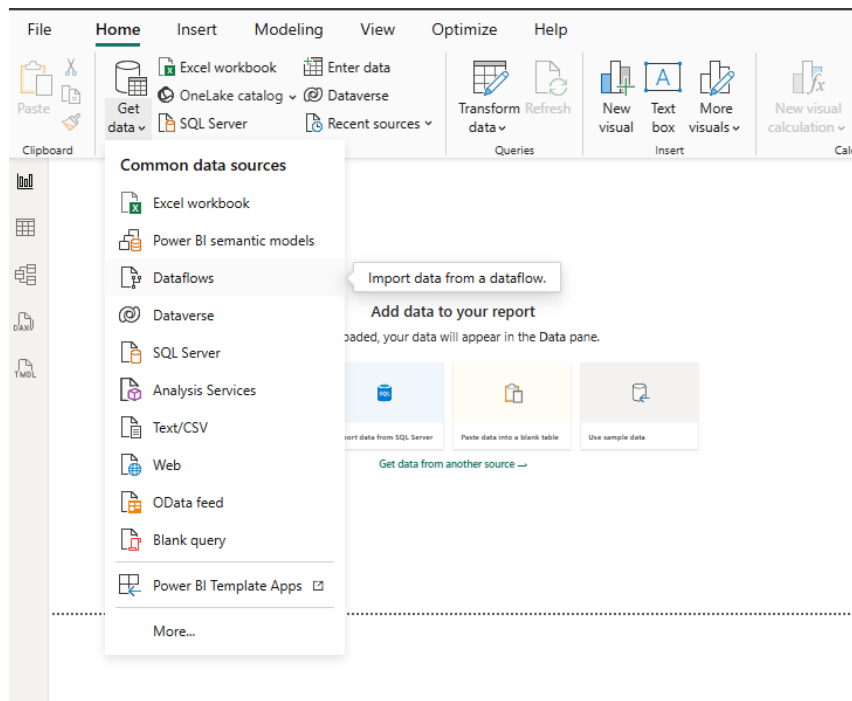
Power BI Interface

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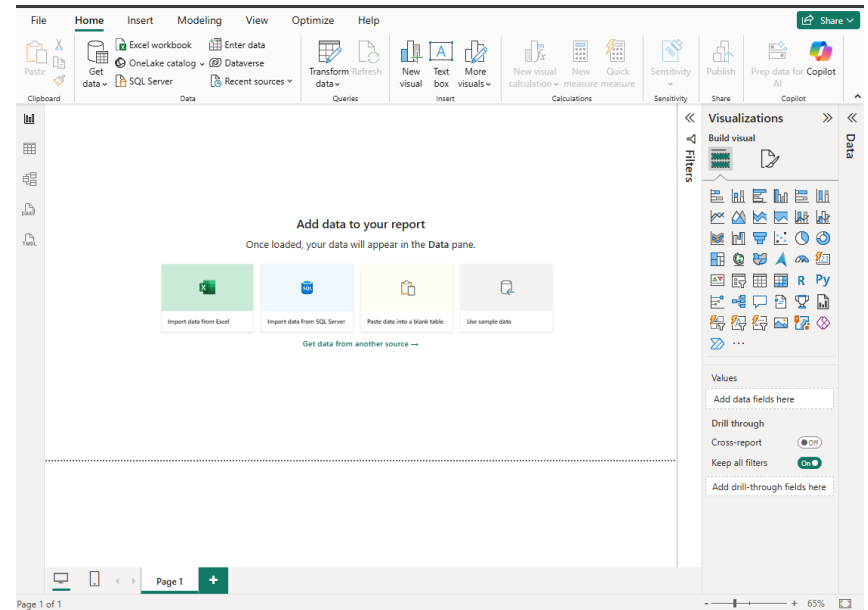
Data Integration

- Import from Excel, APIs, databases
- Data transformation with Power Query



Creating Visuals

- Drag fields into visuals
- Use built-in charts



Dashboard Creation

- Combine visuals into reports
- Add interactivity (filters, slicers)

DAX

- DAX is a collection of functions that can be used to perform a task and return one or more values.
- DAX is primarily a formula or a query language.

DAX

- was developed in 2009 by Microsoft to be used with Microsoft's PowerPivot, which at that time was available as an Excel (2010) add-in.
- It is now the language of choice for Power BI

New Column

- New Column for SalesValue:

$\text{SalesValue} = \text{Order}[\text{SalesPrice}] * \text{Order}[\text{quantity}]$

New Column

- New Column Unit Cost:
- UnitCosts =
LOOKUPVALUE('Product'[unitCost];
Product'[idProduct];
Sales[idProduct])

Create New Table

- Create a new table for Date

```
Date = CALENDAR (DATE(2018;1;1); DATE(2020;12;31))
```

- or:

```
Date =  
  ADDCOLUMNS (  
    CALENDAR (DATE(2000;1;1); DATE(2025;12;31));  
    "Year"; YEAR ( [Date] )  
  )
```

Create New Table

- Create new table called BackMagicStore Including all orders corresponding to Black Magic (p3).

BlackMagicStore=FILTER(Orders,Orders[ProductID] = "p3")

Create Column for Customer type

- create a column with total

```
Total =SUMX(FILTER(Orders;  
    Orders[CustomerID]=Customer[CustomerID]);  
    [Quantity]*[SalesPrice])
```

- Create a column with total:

```
CustomerType = VAR TotalSales=Customer[Total]  
    RETURN  
    IF(TotalSales>100000;"Gold";"Silver")
```

DATA PREPARATION

JIM, DO WE REALLY HAVE 2 BILLION EMPLOYEES?



I DON'T KNOW. I'M NOT SURE I USED THE RIGHT TABLE...

 Dataedo /cartoon

Piot@Dataedo

Common Issues & Cleaning Techniques

Common Issues

- Missing values
- Duplicates
- Inconsistent formats

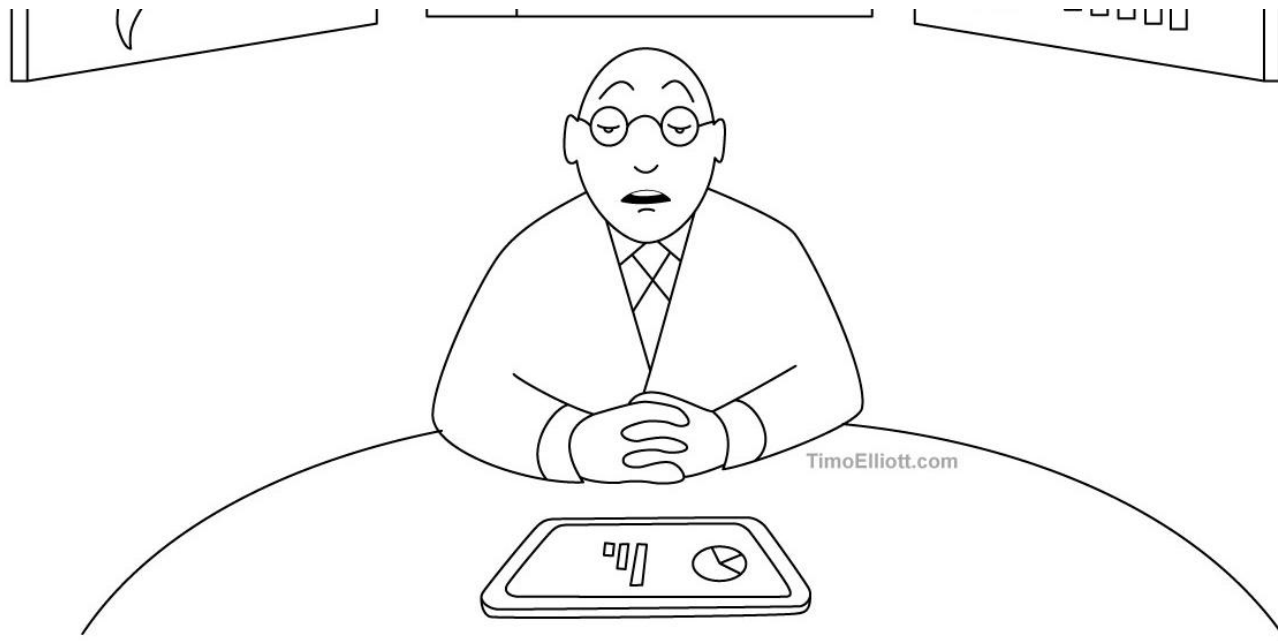
Cleaning Techniques

- Filtering
- Formatting
- Removing nulls

Power BI Example

- Exercise 01
- Exercise 02
- Exercise 03

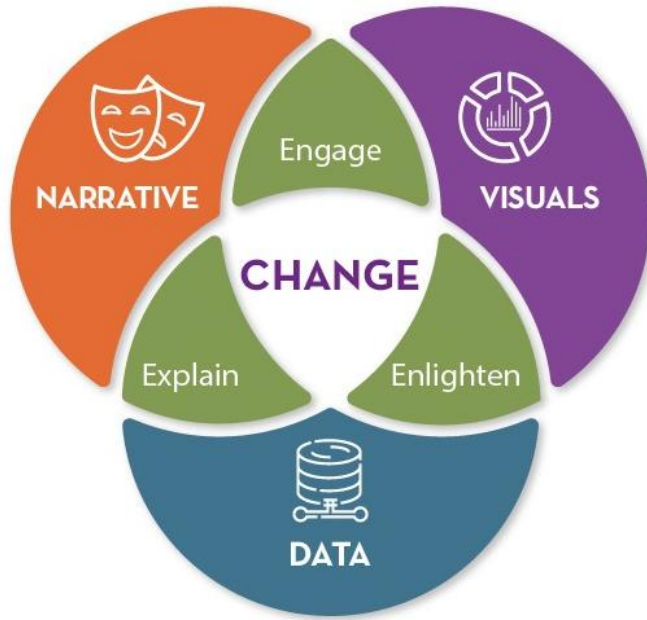
CASE STUDY & STORYTELLING



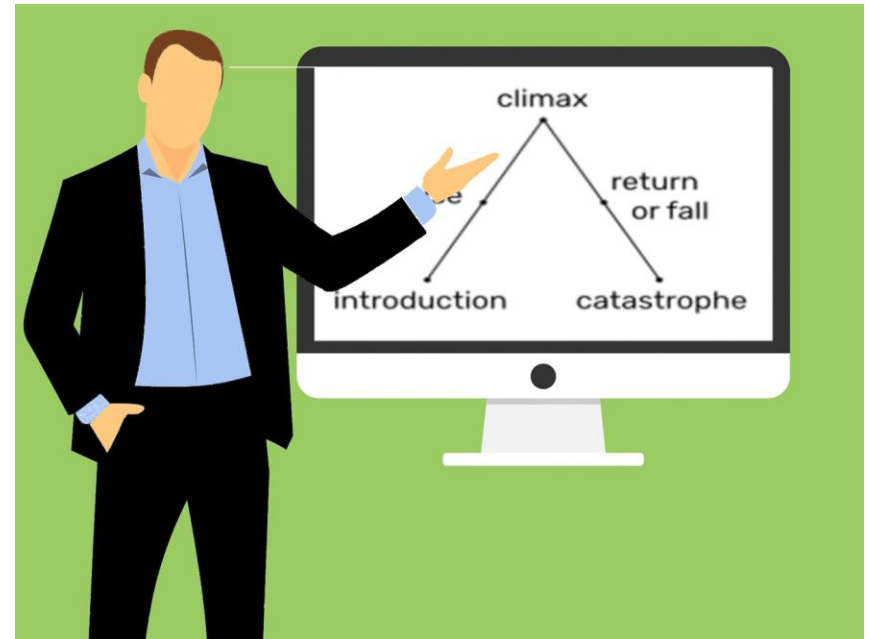
“Once upon a time, along came big, bad digital disruption..”

What is Data Storytelling?

Elements of Data Story telling



Freytag's Pyramid



What is Data Storytelling?

Comic book structure



Sequential narrative with panels

Data story structure



Effectivedatastorytelling.com

Sequential narrative with scenes

Storytelling Elements

- Context
- Insight
- Action

- Example:
 - Sales dropped in region X -> investigate cause

Discussion

- What makes a good dashboard?



Summary

- Tableau & Power BI are powerful tools
- Clean data is essential
- Dashboards support decision-making
- Storytelling adds value

References:

Aparicio, M., & Costa, C. J. (2015). Data visualization. *Communication design quarterly review*, 3(1), 7-11.

Costa, C. J., & Aparício, M. (2019). Supporting the decision on dashboard design charts. In *Proceedings of 254th The IIER International Conference 2019* (pp. 10-15).

PowerBI Manual

Tableau Manual