# BUSINESS INTELLIGENCE

EGCO321 DATABASE SYSTEMS


KANAT POOLSAWASD
DEPARTMENT OF COMPUTER ENGINEERING
MAHIDOL UNIVERSITY

# BUSINESS INTELLIGENCE (1)

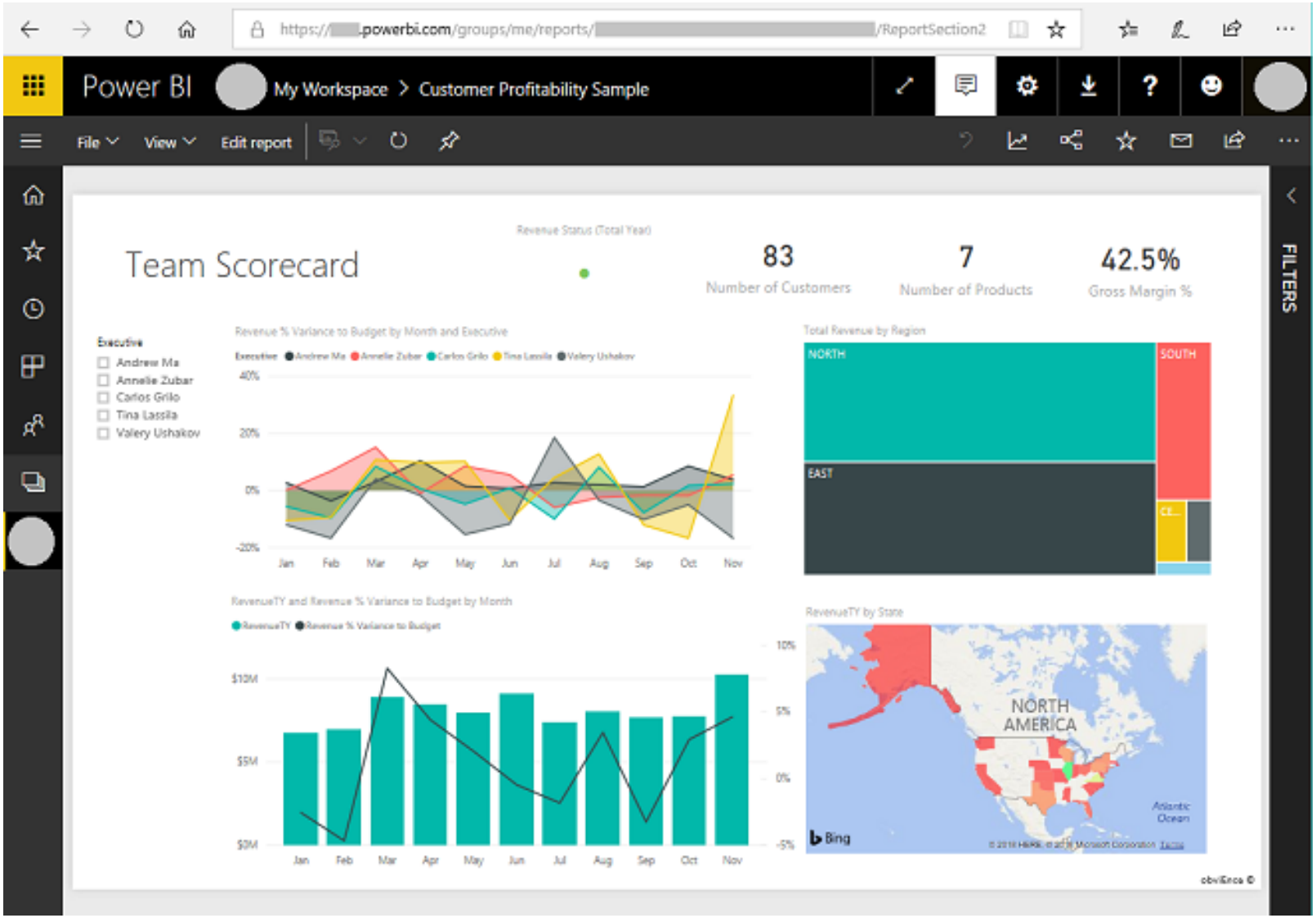
*"BI results when organizational culture, business processes and technologies are designed and implemented with the goal of improving the strategic and operational decision-making capabilities of a wide range of internal and external stakeholders."*

International Data Corporation (IDC)

# BUSINESS INTELLIGENCE (2)

*"Culture, processes and technologies to improve decision making for stakeholders."*

# MICROSOFT POWER BI



# WHAT IS POWER BI (1)

- Set of Business Intelligence and Analytical Services from Microsoft.
- It offers Interactive Visualization and advance analytics capabilities that empower everyone to take faster and smarter Realtime decisions.
- It is on the top of  popular BI tools due to ease of use and interactive visualization.
- It offers self service analytics capability to end users to create reports and dashboards.

# WHAT IS POWER BI (2)

- BI is a widely popular BI tool having customers ranging from students, startup , SME to large organizations.
- No programming skills are required.
- Any analyst can connect to any data source and quickly summaries findings in simple reports.

# POWER BI - FEATURES

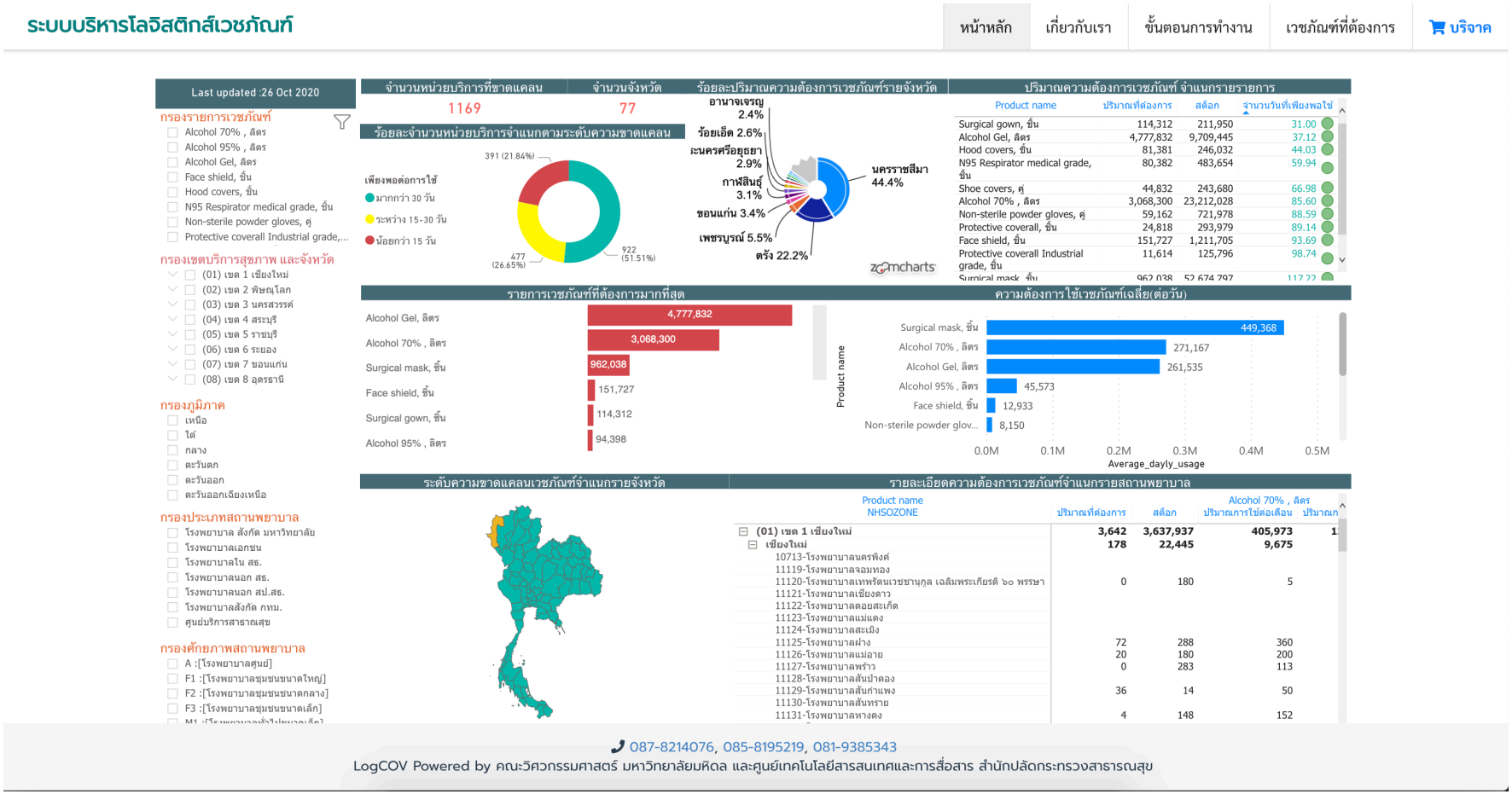
- Data Visualization
- Data Exploration
- Data Modeling
- Data Transformation
- Collaboration
- Mobile Access
- Natural Language Processing
- Real-Time Data

# TYPE OF POWER BI

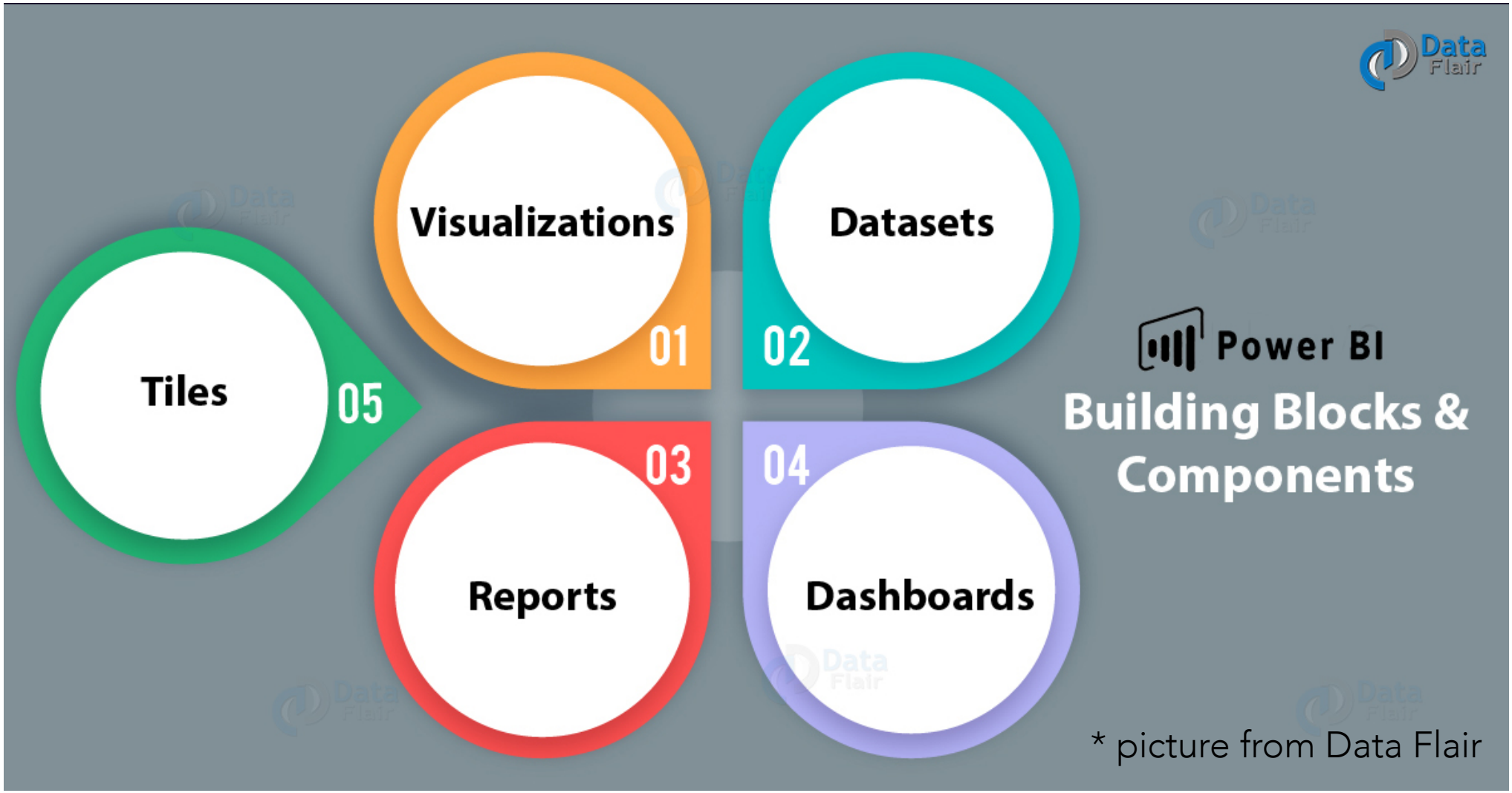
- Microsoft offers three types of Power BI platforms:
  - Power BI Desktop (Desktop Application)
  - Power BI Service (Software as a Service)
  - Power BI Mobile (For iOS and Android devices)

# EXAMPLE OF BI

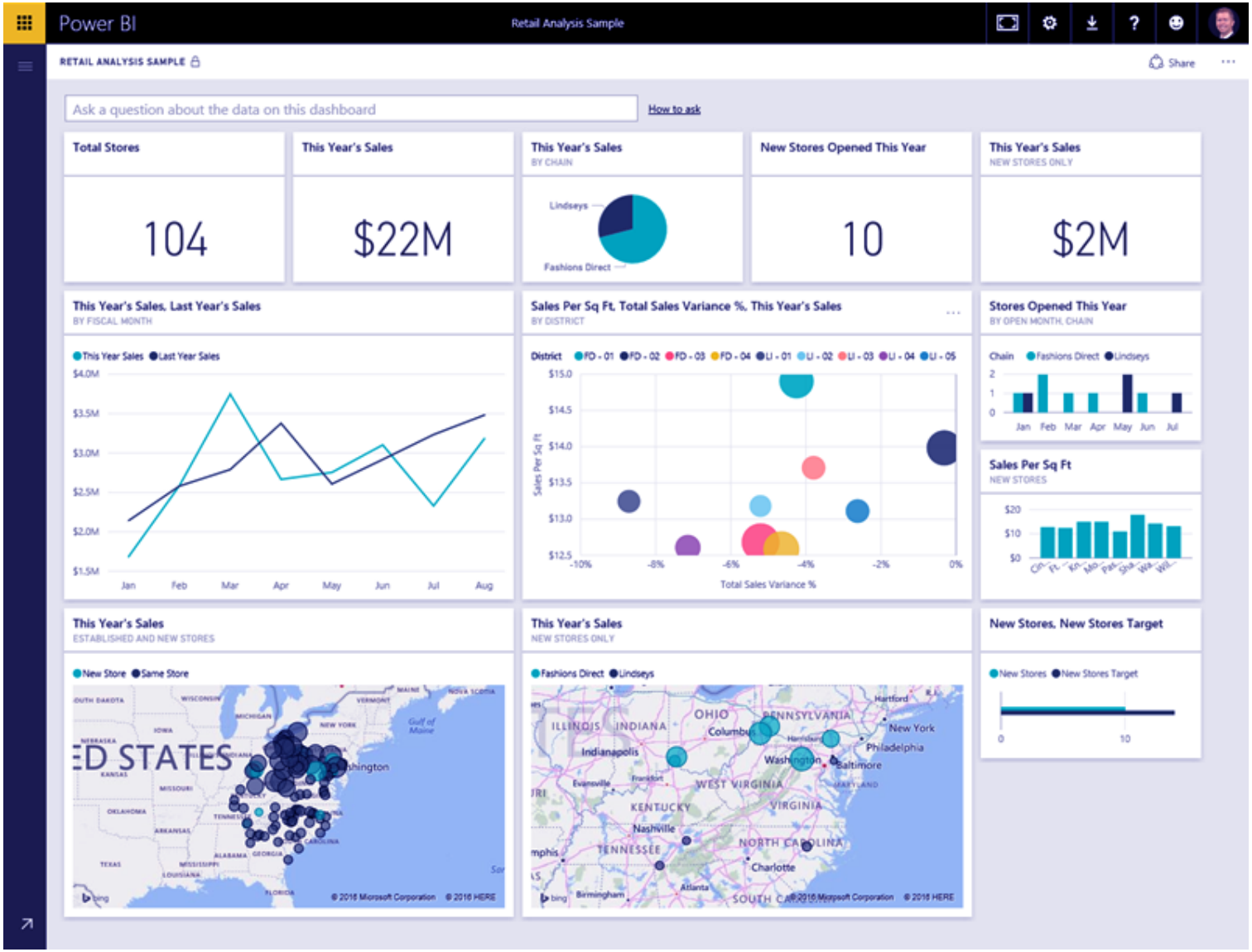
- SmartMedSupply for COVID-19
  - http://smartmedsupply.moph.go.th/newhomepage



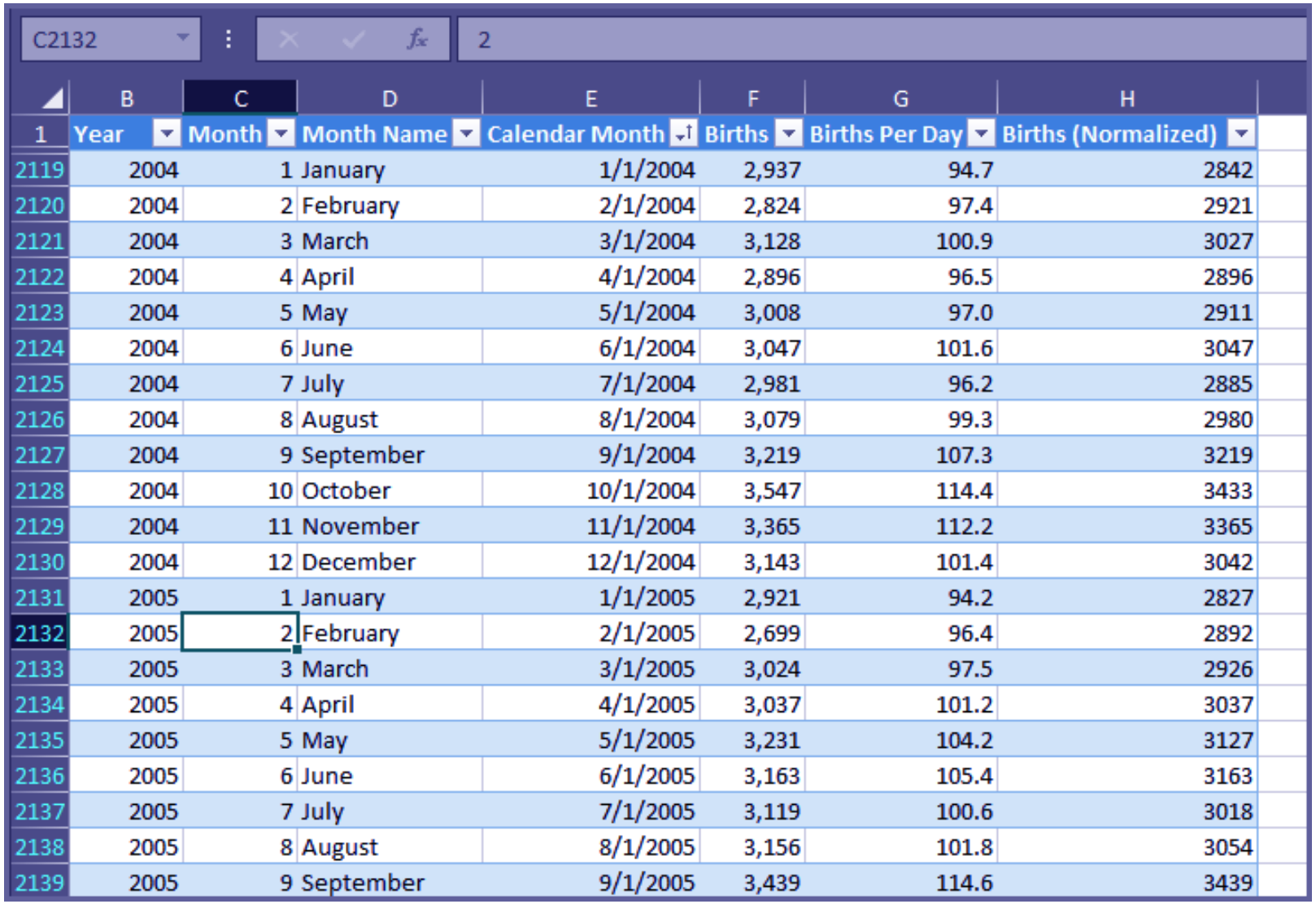
# POWER BI BUILDING BLOCKS



# VISUALISATION



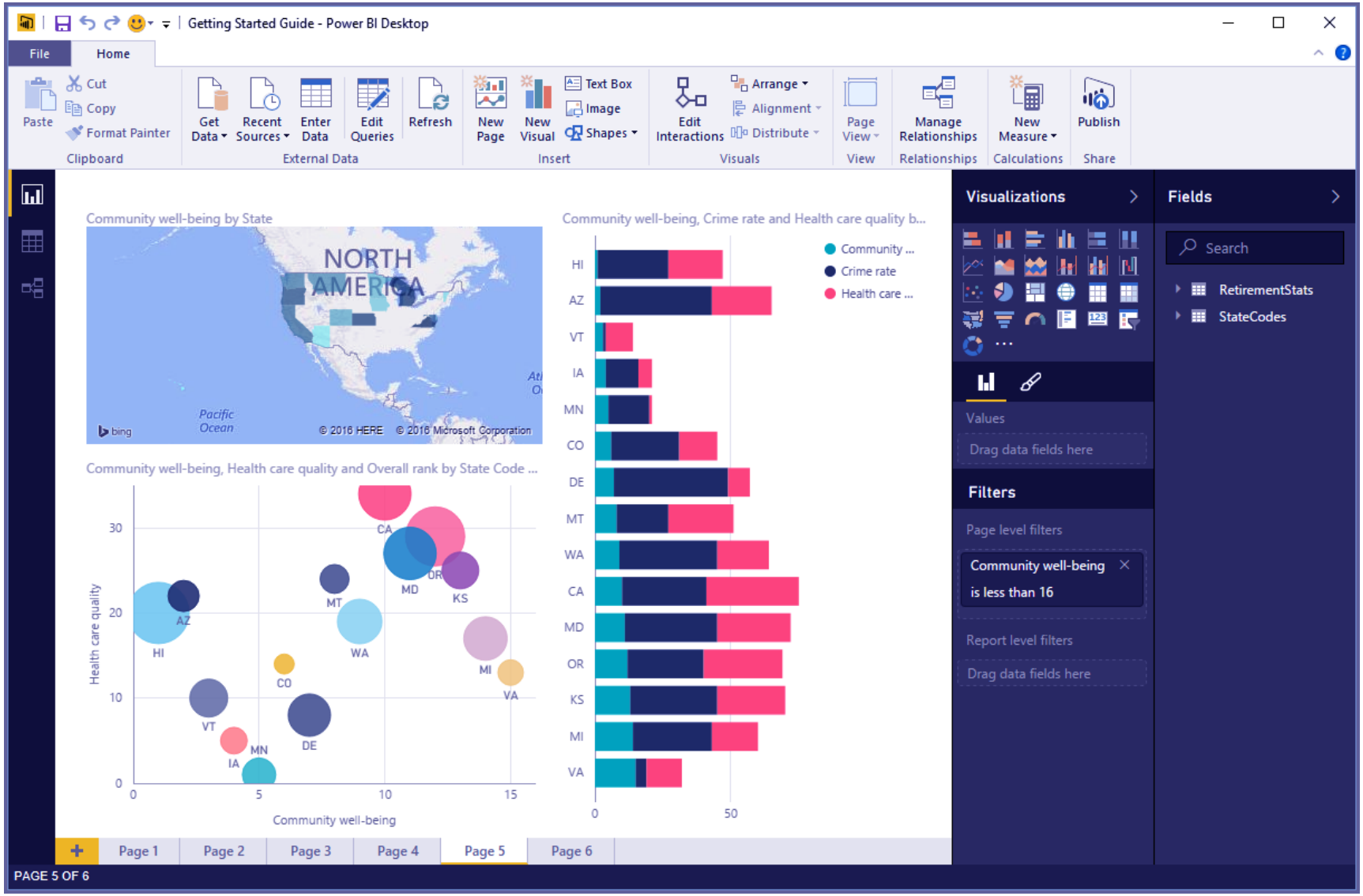
# DATASETS



C2132 | 2

| | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|
| 1 | Year | Month | Month Name | Calendar Month | Births | Births Per Day | Births (Normalized) |
| 2119 | 2004 | 1 | January | 1/1/2004 | 2,937 | 94.7 | 2842 |
| 2120 | 2004 | 2 | February | 2/1/2004 | 2,824 | 97.4 | 2921 |
| 2121 | 2004 | 3 | March | 3/1/2004 | 3,128 | 100.9 | 3027 |
| 2122 | 2004 | 4 | April | 4/1/2004 | 2,896 | 96.5 | 2896 |
| 2123 | 2004 | 5 | May | 5/1/2004 | 3,008 | 97.0 | 2911 |
| 2124 | 2004 | 6 | June | 6/1/2004 | 3,047 | 101.6 | 3047 |
| 2125 | 2004 | 7 | July | 7/1/2004 | 2,981 | 96.2 | 2885 |
| 2126 | 2004 | 8 | August | 8/1/2004 | 3,079 | 99.3 | 2980 |
| 2127 | 2004 | 9 | September | 9/1/2004 | 3,219 | 107.3 | 3219 |
| 2128 | 2004 | 10 | October | 10/1/2004 | 3,547 | 114.4 | 3433 |
| 2129 | 2004 | 11 | November | 11/1/2004 | 3,365 | 112.2 | 3365 |
| 2130 | 2004 | 12 | December | 12/1/2004 | 3,143 | 101.4 | 3042 |
| 2131 | 2005 | 1 | January | 1/1/2005 | 2,921 | 94.2 | 2827 |
| 2132 | 2005 | 2 | February | 2/1/2005 | 2,699 | 96.4 | 2892 |
| 2133 | 2005 | 3 | March | 3/1/2005 | 3,024 | 97.5 | 2926 |
| 2134 | 2005 | 4 | April | 4/1/2005 | 3,037 | 101.2 | 3037 |
| 2135 | 2005 | 5 | May | 5/1/2005 | 3,231 | 104.2 | 3127 |
| 2136 | 2005 | 6 | June | 6/1/2005 | 3,163 | 105.4 | 3163 |
| 2137 | 2005 | 7 | July | 7/1/2005 | 3,119 | 100.6 | 3018 |
| 2138 | 2005 | 8 | August | 8/1/2005 | 3,156 | 101.8 | 3054 |
| 2139 | 2005 | 9 | September | 9/1/2005 | 3,439 | 114.6 | 3439 |

# REPORTS


Getting Started Guide - Power BI Desktop
File
Home
Paste
Cut
Copy
Format Painter
Clipboard
Get Data
Recent Sources
Enter Data
Edit Queries
Refresh
External Data
New Page
New Visual
Text Box
Image
Shapes
Insert
Edit Interactions
Arrange
Alignment
Distribute
Visuals
Page View
View
Manage Relationships
Relationships
New Measure
Calculations
Publish
Share
Community well-being by State
NORTH AMERICA
Pacific Ocean
© 2016 HERE © 2016 Microsoft Corporation
Community well-being, Crime rate and Health care quality b...
Community ...
Crime rate
Health care ...
HI
AZ
VT
IA
MN
CO
DE
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WA
CA
MD
OR
KS
MI
VA
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Community well-being, Health care quality and Overall rank by State Code ...
Health care quality
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Visualizations
Values
Drag data fields here
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Fields
Search
RetirementStats
StateCodes
Page 1
Page 2
Page 3
Page 4
Page 5
Page 6
PAGE 5 OF 6

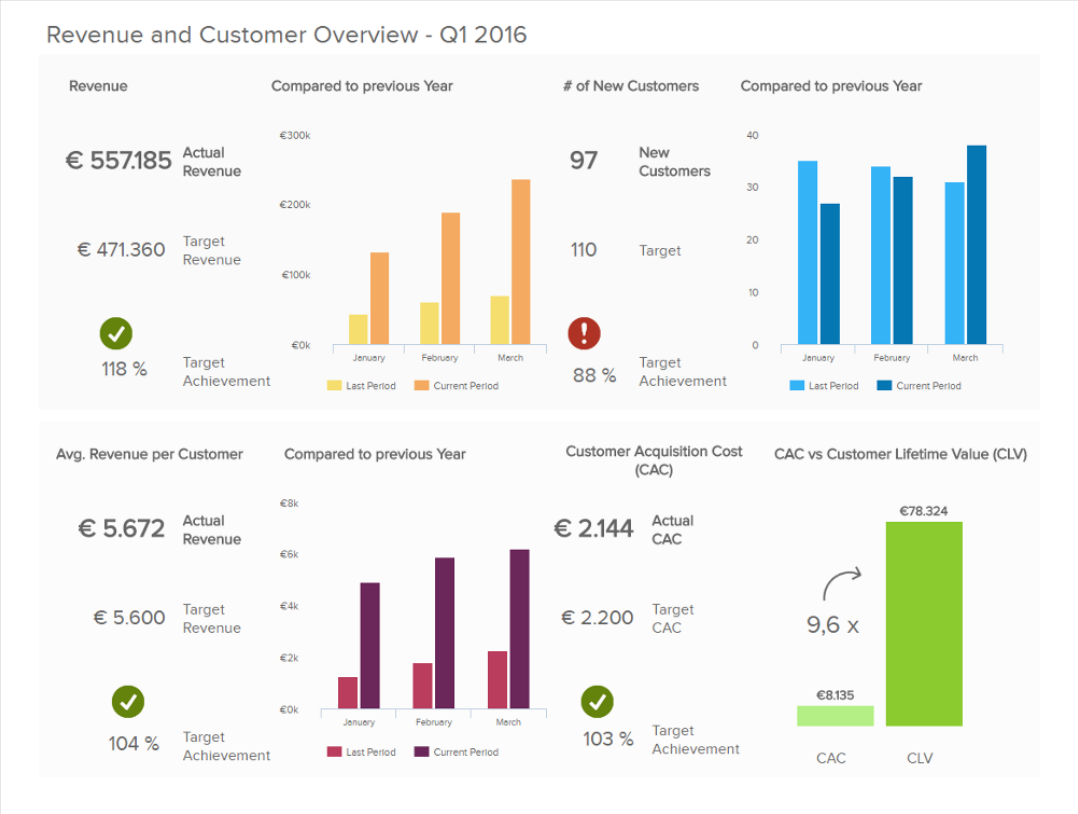
# DASHBOARDS (1)

- Power BI dashboard is a gathering of visuals from a solitary page that you can impart to others. Frequently, it's a chosen gathering of visuals that give snappy understanding into the information or story you are attempting to exhibit.
- Dashboard needs to fit on a solitary page, frequently called a canvas. Consider it like the canvas that a craftsman or painter utilizes.
- Workspace where you make, consolidate, and adjust fascinating and convincing visuals. You can impart dashboards to different clients or gatherings, who would then able to communicate with your dashboard when they're in Power BI benefit, or on their cell phone.

# DASHBOARDS (2)

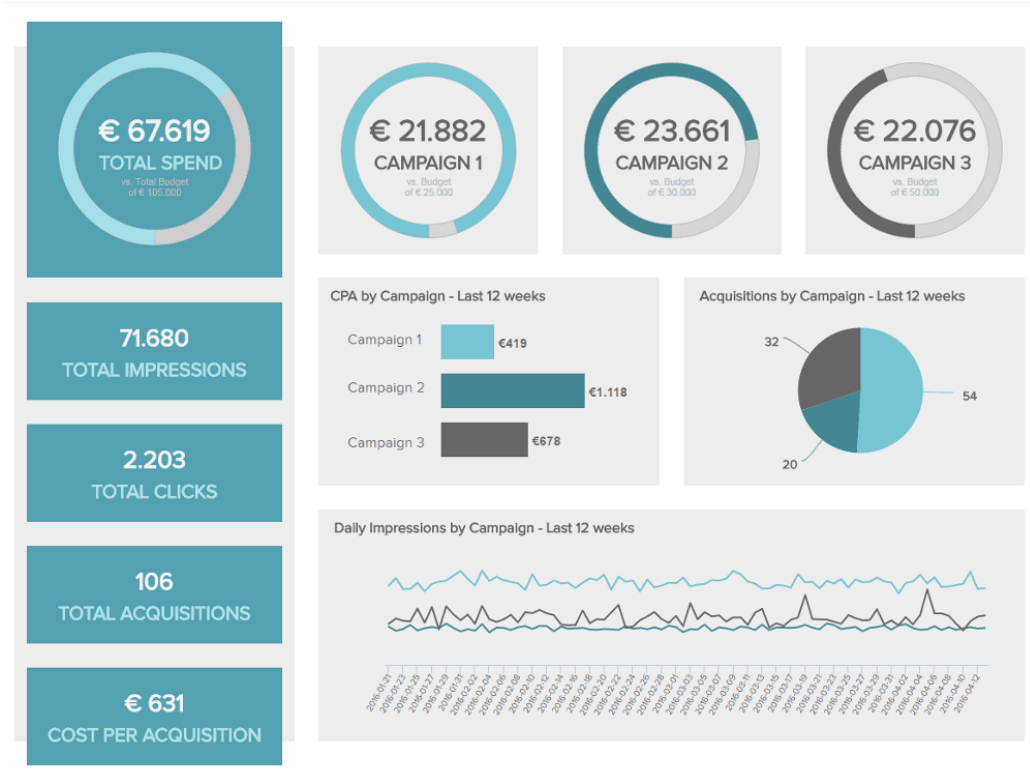
- There are several types of dashboards. Based on their purpose, they can be categorized into three main types:
  - Strategic Dashboard
  - Operational Dashboard
  - Analytical Dashboard

# STRATEGIC DASHBOARD



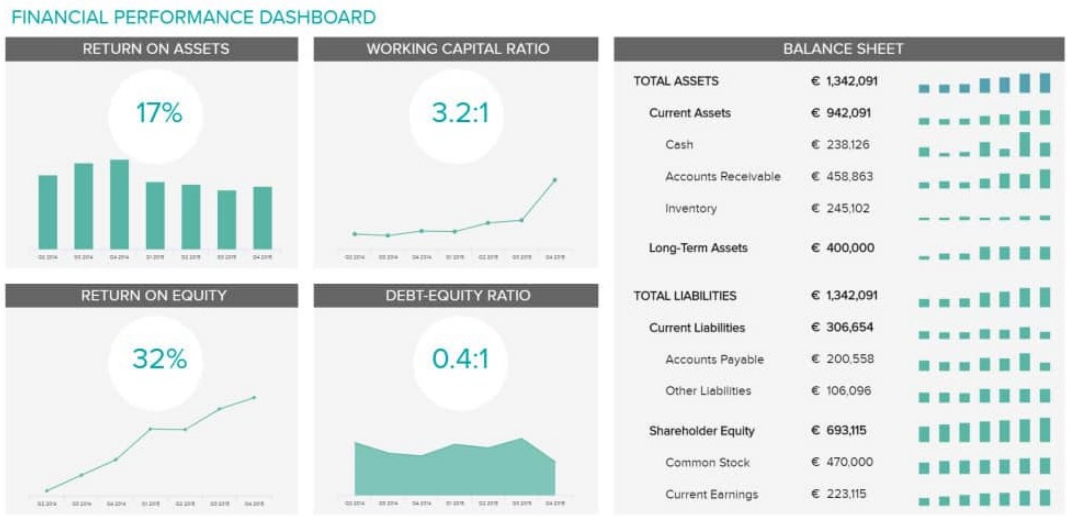

- Dashboard for strategic planning
- Decision making at all levels.
- Focuses on displaying key organizational indicators or KPIs, making it easy to understand and see the organization's overall performance.

# OPERATIONAL DASHBOARD




- Dashboard for management and team lead level.
- Monitors and controls task progress.
- Displays a current overview of an area or product line, and shows real-time results when issues arise.
- Typically, detailed data drilling is not required.

# ANALYTICAL DASHBOARD

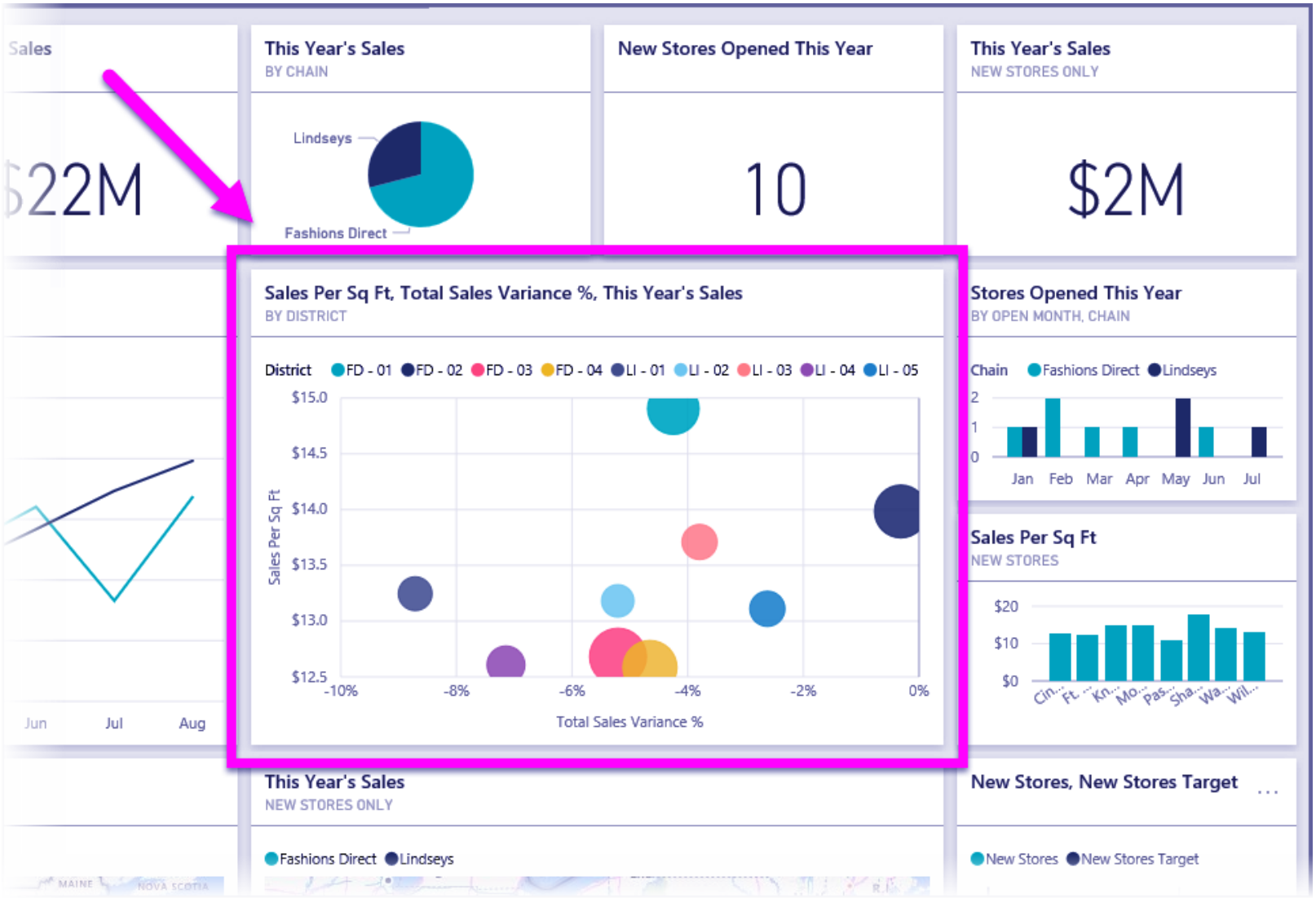



- Dashboard for analysis.
- Provides data from multiple perspectives, often without specific indicators.
- It includes a variety of data, such as historical data that can be filtered and compared, and emphasizes viewing the data from different analytical perspectives

# SCORECARD

- A Scorecard in Power BI is a tool within the Power BI Service that allows organizations to track and measure key performance indicators (KPIs) and goals.
- Using the Power BI Goals feature, which includes scorecards, users can create interactive visualizations of organizational metrics, set targets, and monitor progress toward specific business objectives over time.
- Scorecards help teams focus on outcomes, provide insights into performance gaps, and drive data-informed decision-making.

# TILES


Sales
$22M
This Year's Sales
BY CHAIN
Lindseys
Fashions Direct
New Stores Opened This Year
10
This Year's Sales
NEW STORES ONLY
$2M
Sales Per Sq Ft, Total Sales Variance %, This Year's Sales
BY DISTRICT
District
FD - 01
FD - 02
FD - 03
FD - 04
LI - 01
LI - 02
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LI - 04
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$13.5
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Sales Per Sq Ft
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-4%
-2%
0%
Total Sales Variance %
Stores Opened This Year
BY OPEN MONTH, CHAIN
Chain
Fashions Direct
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Jan
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May
Jun
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Sales Per Sq Ft
NEW STORES
$20
$10
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Jun
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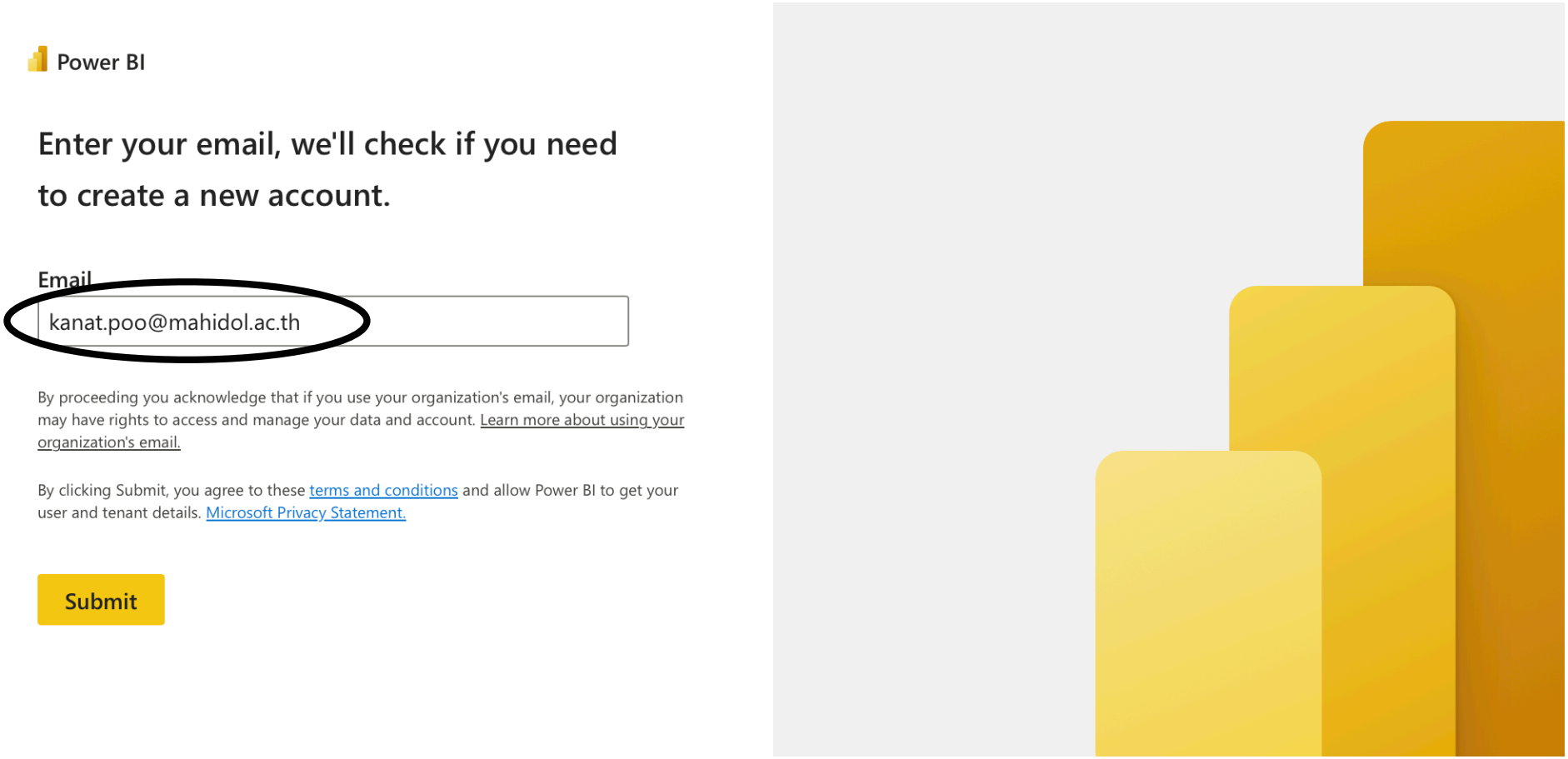
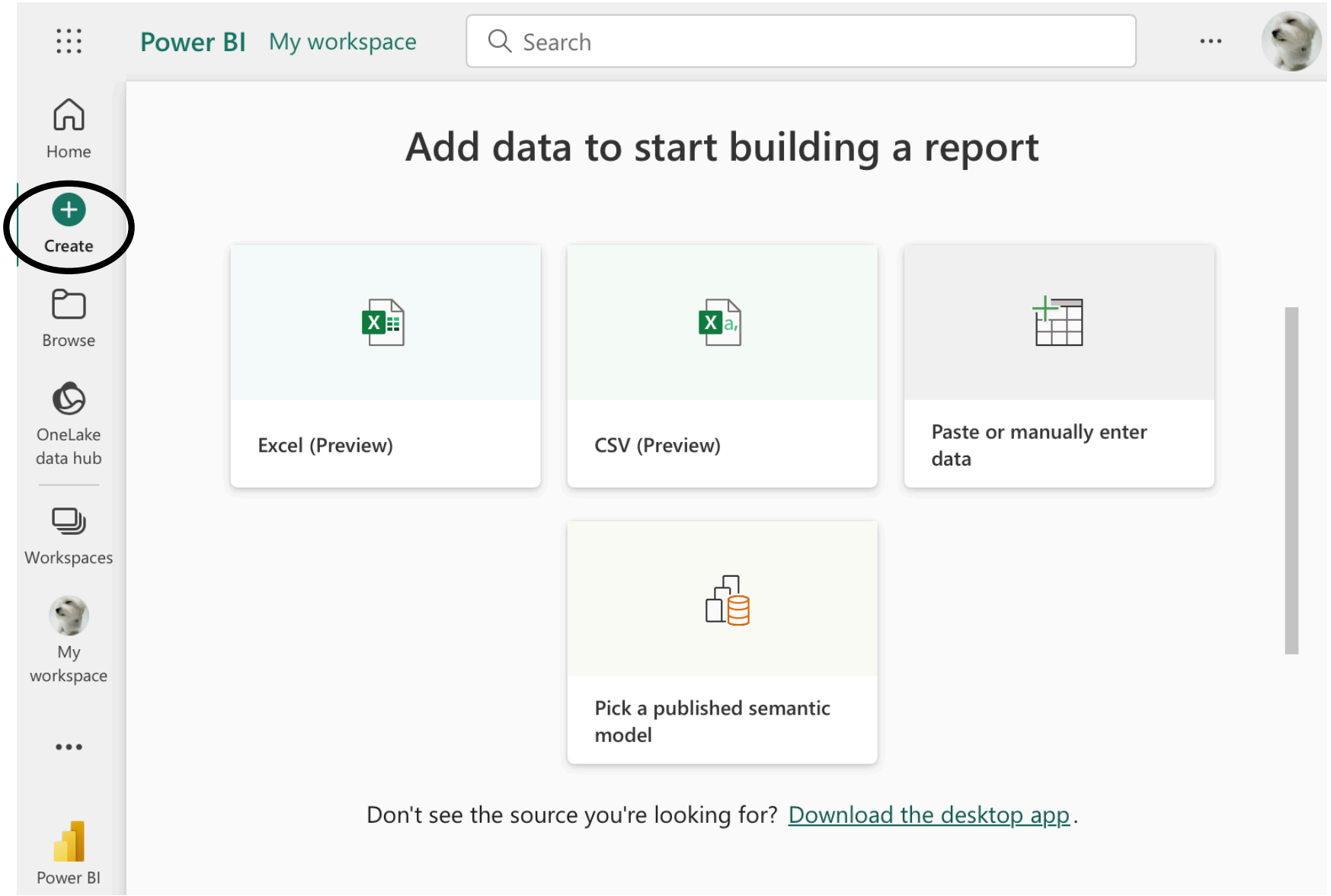
Aug
This Year's Sales
NEW STORES ONLY
Fashions Direct
Lindseys
New Stores, New Stores Target
New Stores
New Stores Target

# MICROSOFT POWER BI (ONLINE)

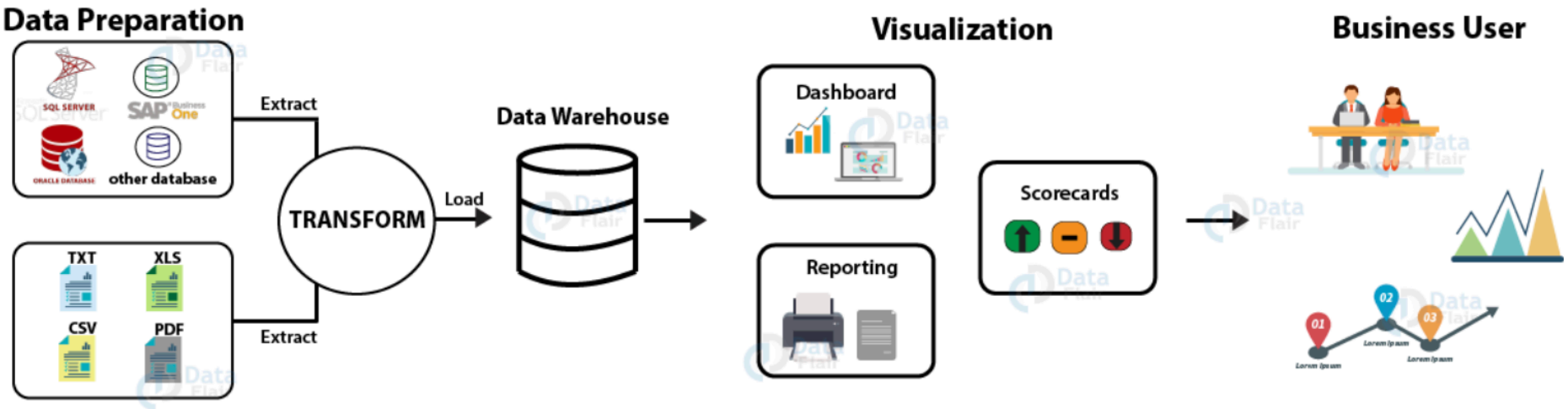
https://powerbi.microsoft.com or http://powerbi.com



# MICROSOFT POWER BI (ONLINE)



# POWER BI ARCHITECTURE




* picture from Data Flair

# POWER BI PROCESS

- Connect to Data Source (Get Data)
- Clean Up (ETL: Power Query)
- Import
- Report (Visualization)
- Publish & Share

# APPS

- Apps are packaged collections of related dashboards, reports, and datasets designed for easy sharing and collaboration.
- Apps allow organizations to create, distribute, and manage analytics content for different users or teams while ensuring data consistency and access control.
- Low-Code/No-Code Application Building: Easy to use with drag-and-drop functionality and pre-built components.

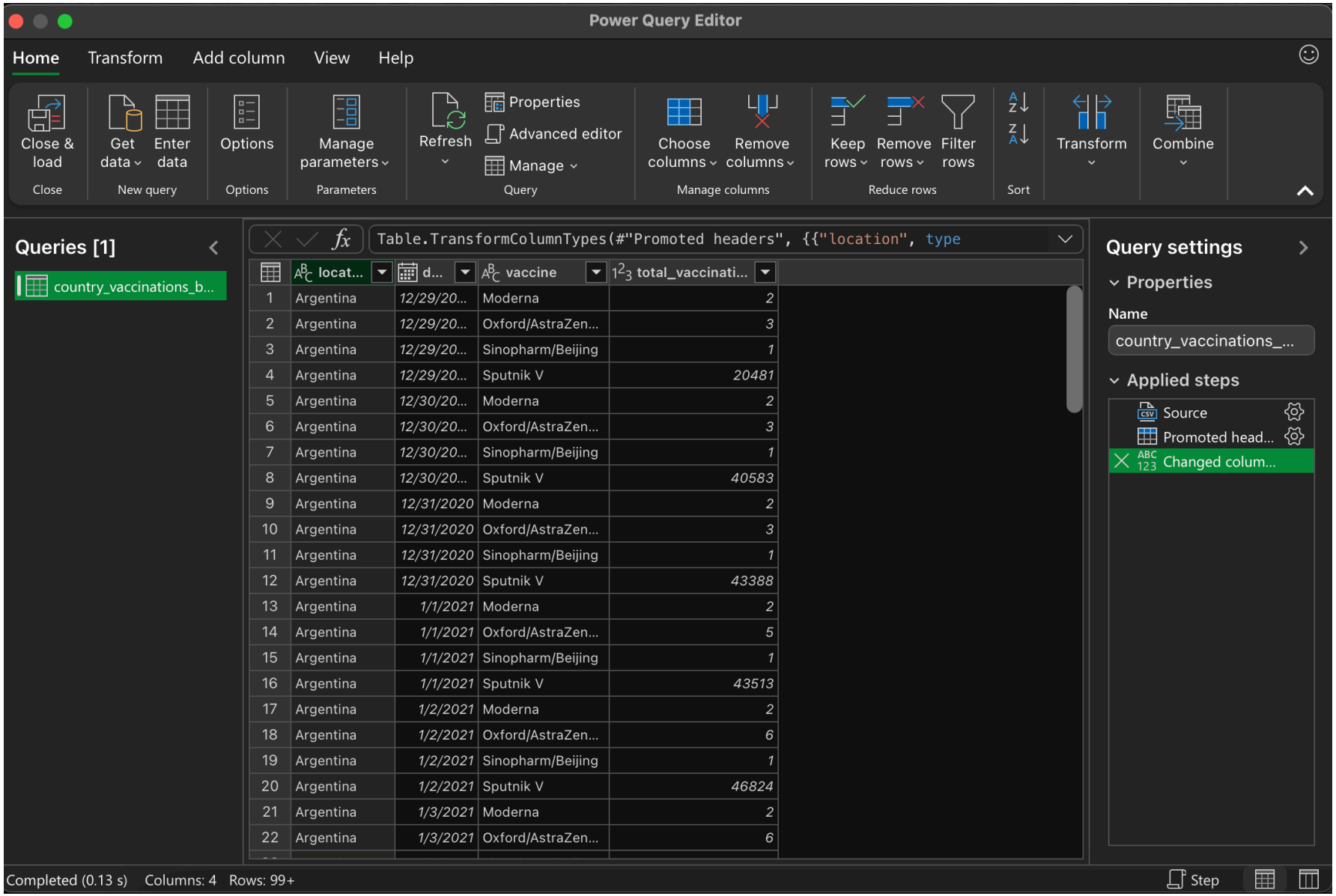
# GETTING DATA

- Power BI can connect to wide variety of data sources, including on-premises databases, Azure storage, Excel worksheets and a large number of 3rd party services.
  - Clean and transform data with the Query Editor
  - Connect to advanced data sources and create transformations
  - “Massage” irregularly formatted data

# POWER QUERY (1)

- Power Query is a data transformation and preparation tool (ETL) available in Microsoft Excel and Power BI.
- It allows users to connect to various data sources, clean, transform, and reshape data before analysis.
- Power Query is designed to automate repetitive tasks, such as data extraction, filtering, merging, and sorting, without needing advanced programming skills.
- In Excel, go to the Data tab and select “Get Data” (Power Query) to open Power Query.

# POWER QUERY (2)

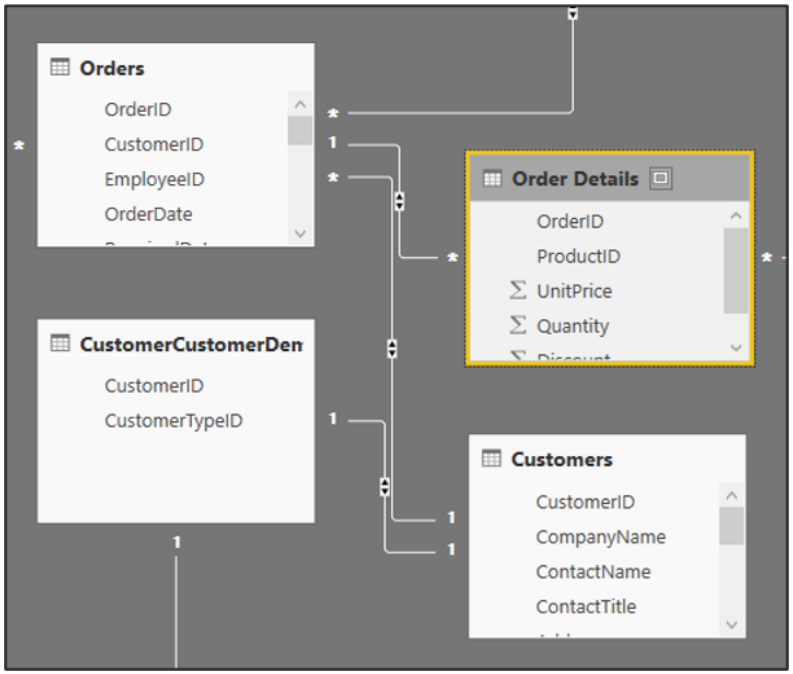


# ONELAKE DATA HUB

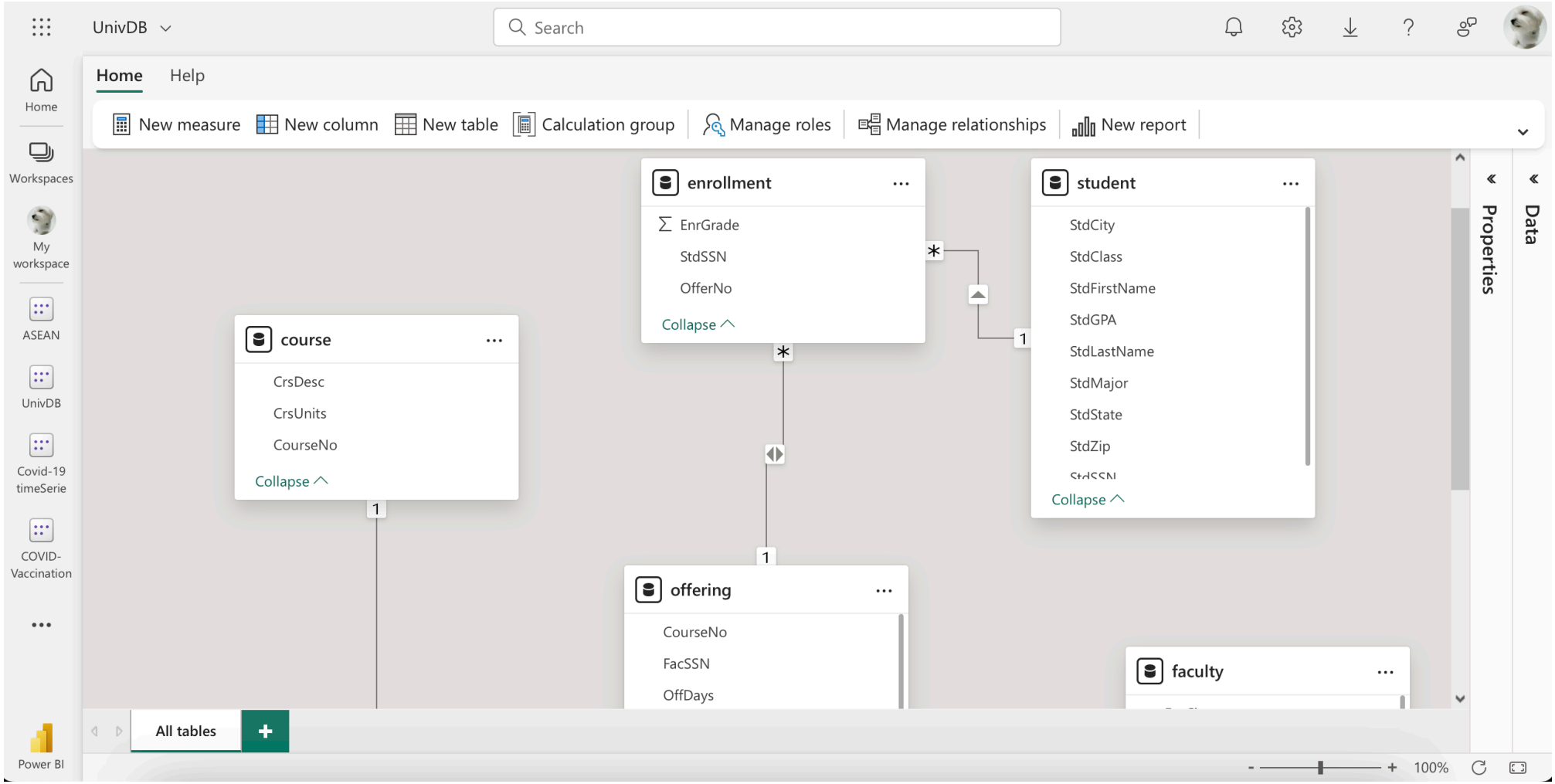
- Data Lake in Power BI typically refers to integrating Power BI with a data lake storage, commonly using Azure Data Lake Storage (ADLS).
- This allows users to centralize large datasets from multiple sources into a single, scalable storage.
- By connecting Power BI with a data lake, users gain robust capabilities to explore, transform, and visualize massive datasets without the need to import all data directly into Power BI.

# DATA MODELING (1)

- Modeling is the technique of creating a logical connections and relationships between data sources.
  - Create Calculated Columns
  - Optimize data models for better visuals
  - Create Measures and work with time-based functions
  - Create Calculated Tables

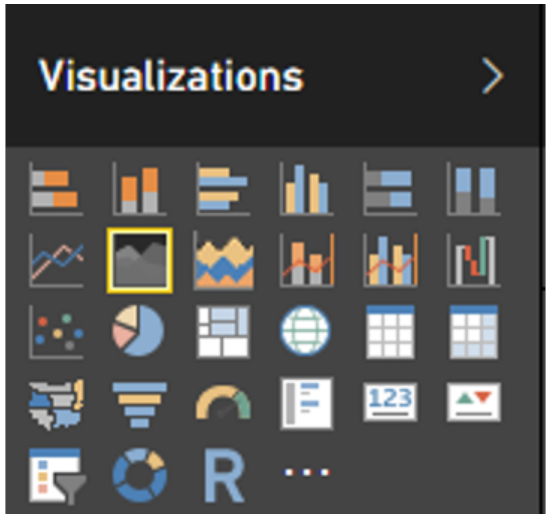


# DATA MODELING (2)



# VISUALISATION

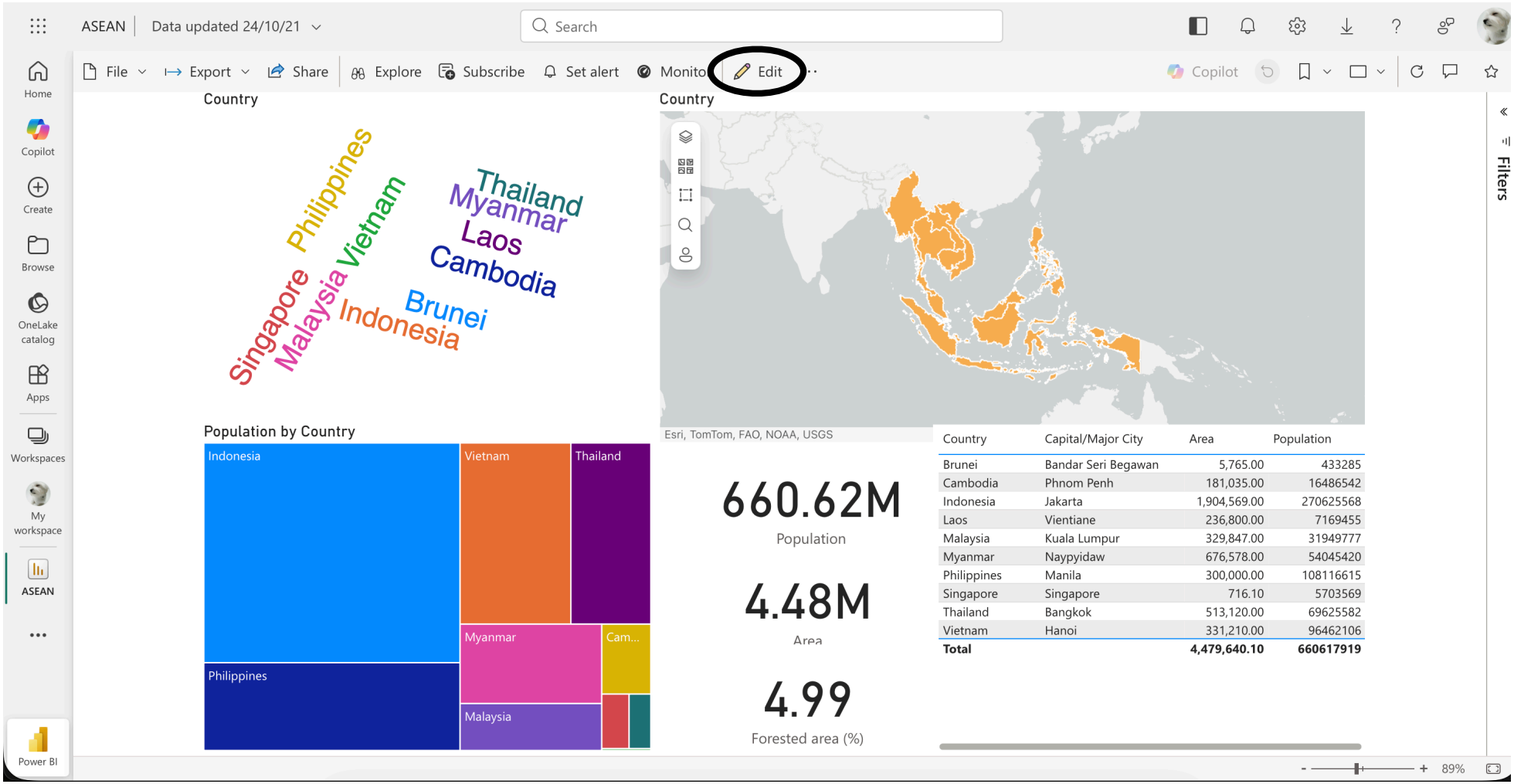
- A visualization is a visual representation of data, such as a chart, graph, map, or other “visual” representations of data.
  - Line, bar, pie, stacked
  - Matrix/pivots
  - Key performance
  - Tree maps
  - Geo and filled maps
  - Slicers/filters
  - Custom visualizations



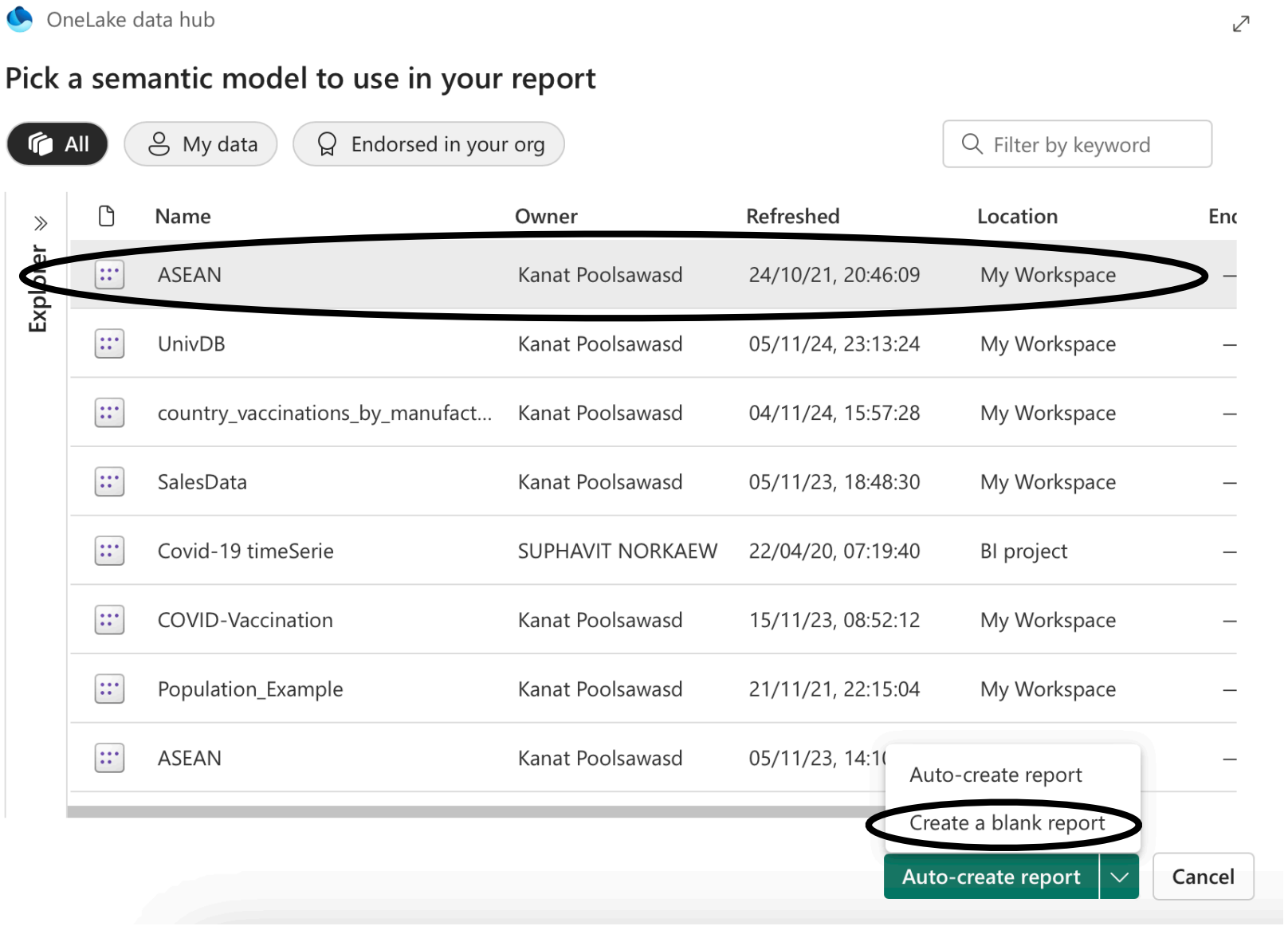
# DATA ANALYSIS EXPRESSIONS

- DAX is a collection of functions, operators, and constants that can be used in a formula, or expression, to calculate and return one or more values.
  - **Measure**
    Calculation on a collection of rows AFTER aggregation.
  - **Calculated Column**
    Calculation on each individual row BEFORE aggregation.

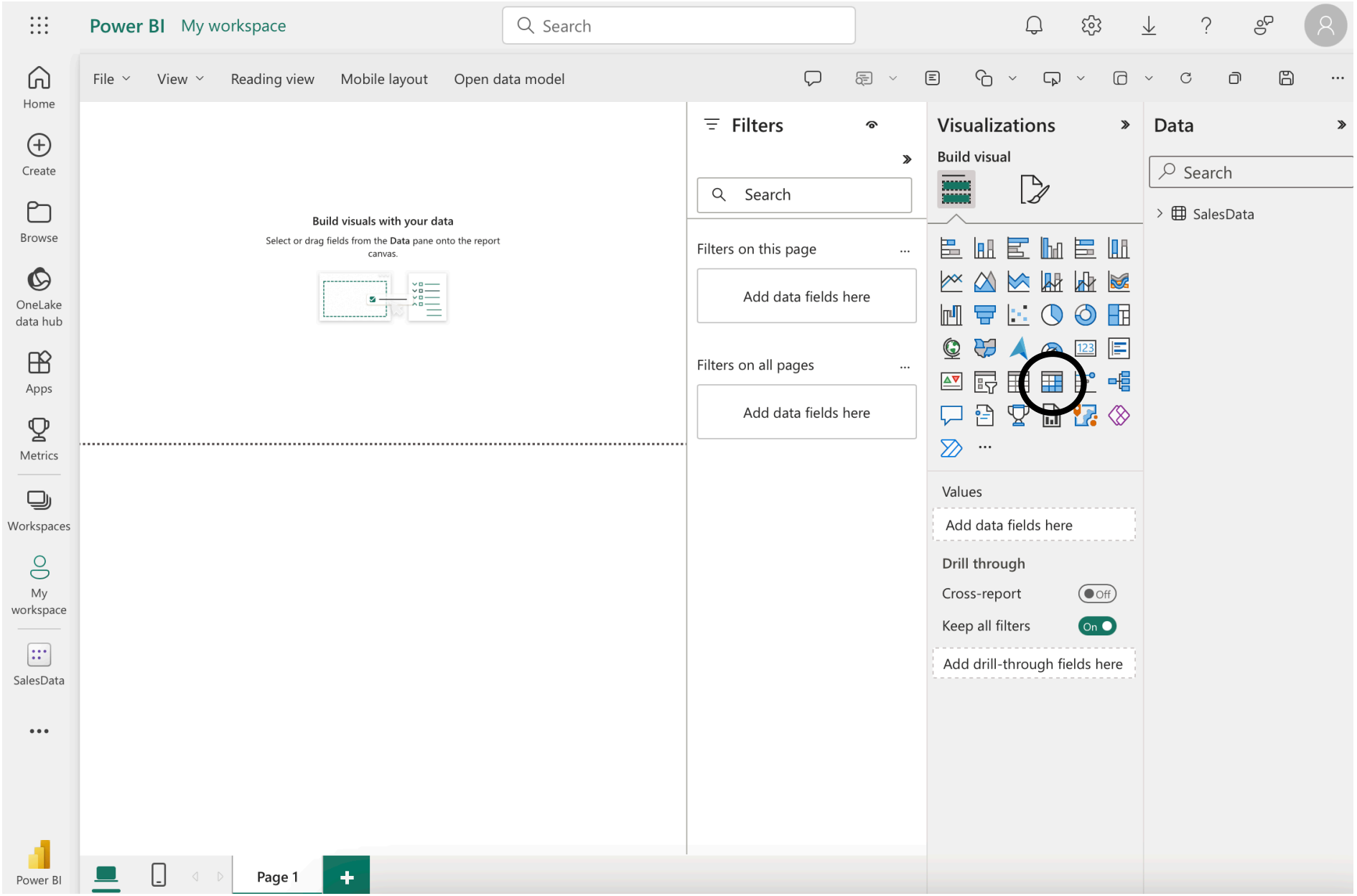
# VISUALIZE DATA



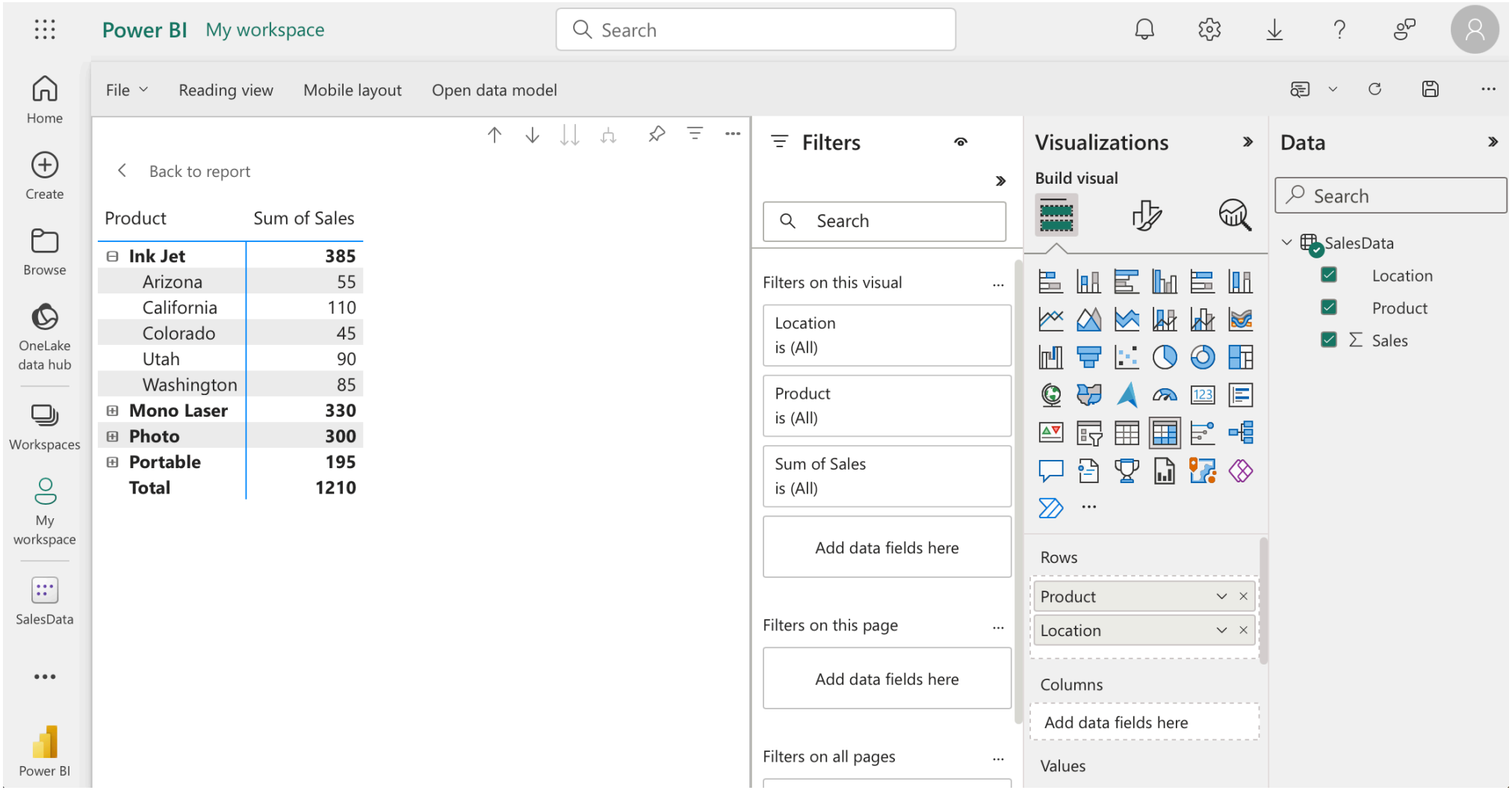
# CREATE PIVOT (MATRIX) TABLE



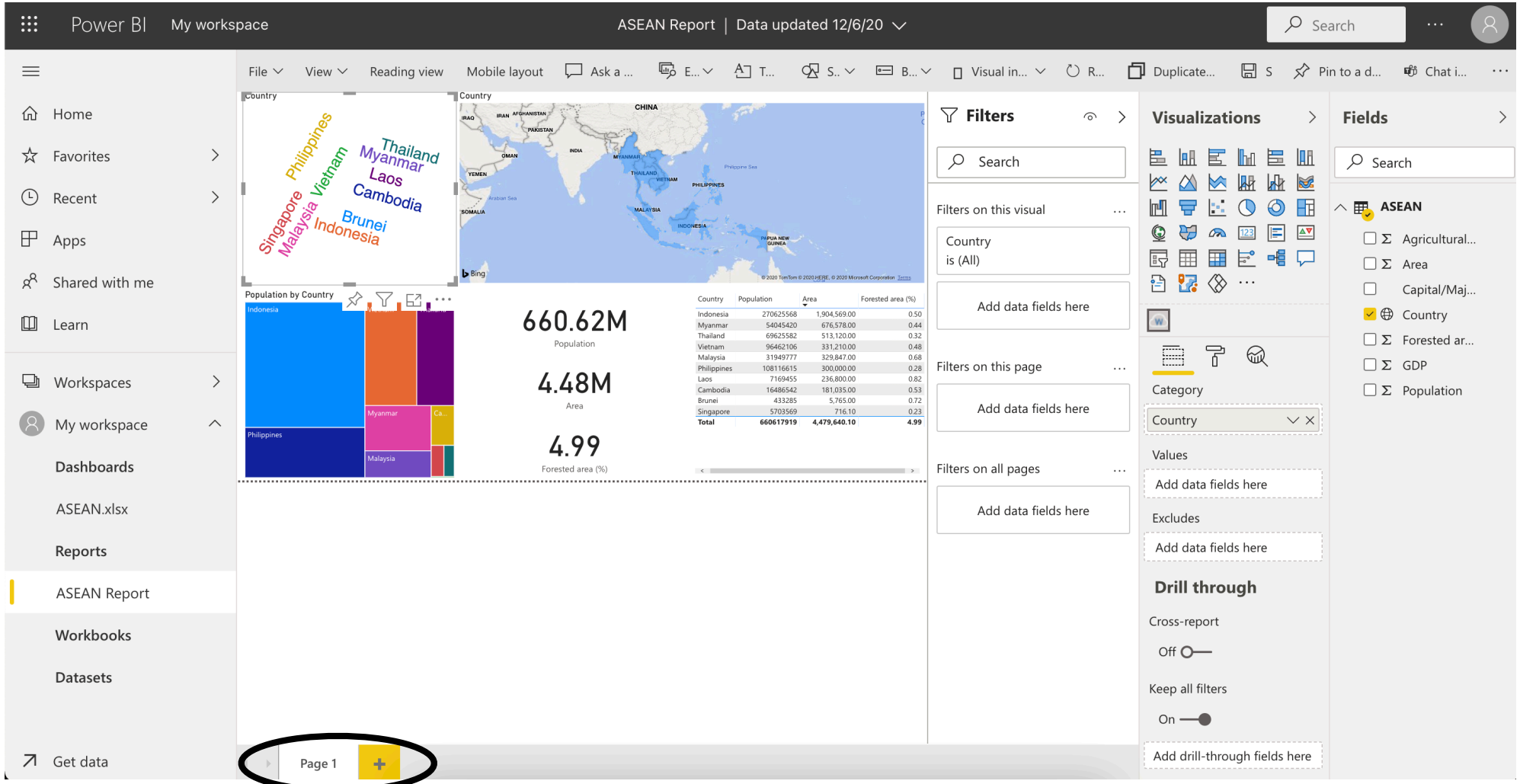
# CREATE PIVOT (MATRIX) TABLE



# CREATE PIVOT (MATRIX) TABLE



# POWER BI - REPORT



# PUBLISHING & SHARING (1)

- Publish reports from Power BI Desktop to the Power BI Service
- Print and export dashboards
- Manually republish and refresh data
- Create and connect to content packs
- Integrate OneDrive for Business

# PUBLISHING & SHARING (2)

## Success! Your report is ready to share

Link you can send in email

https://app.powerbi.com/view?r=eyJrIjoiYz  Copy

HTML you can paste into a website

<iframe title="ASEAN" width="600" height  Copy

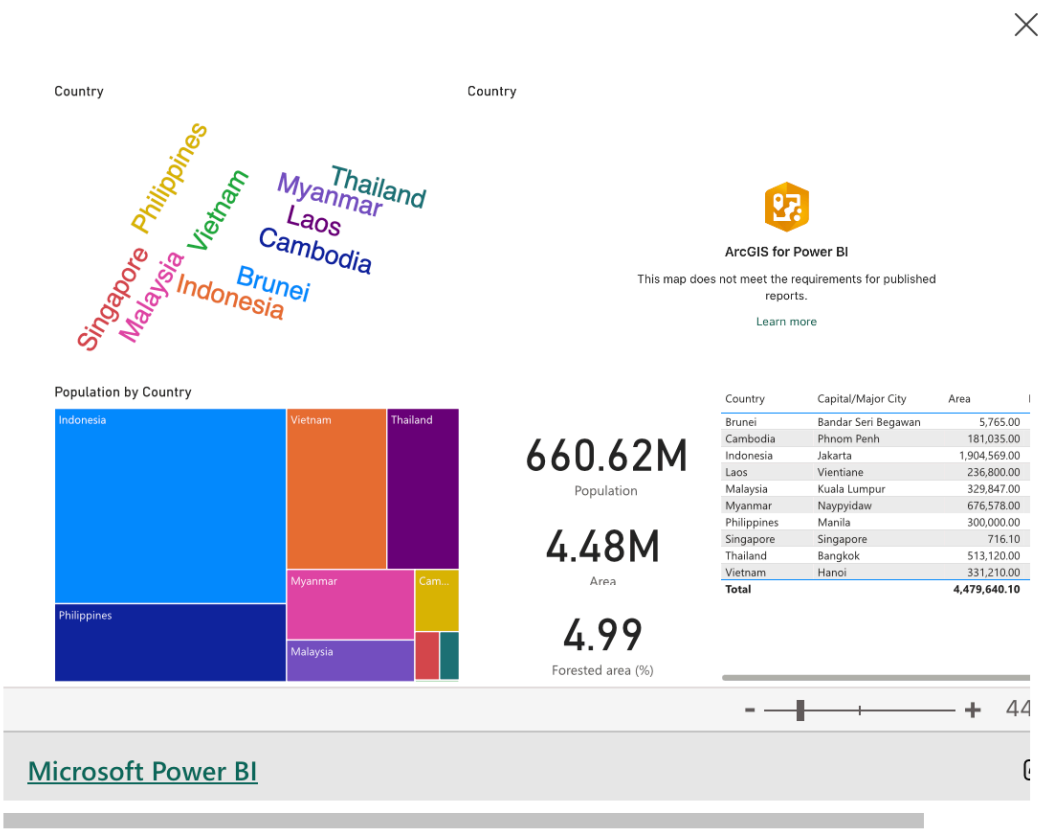
**Size** 600 x 373.5 px

**Placeholder image**

Upload

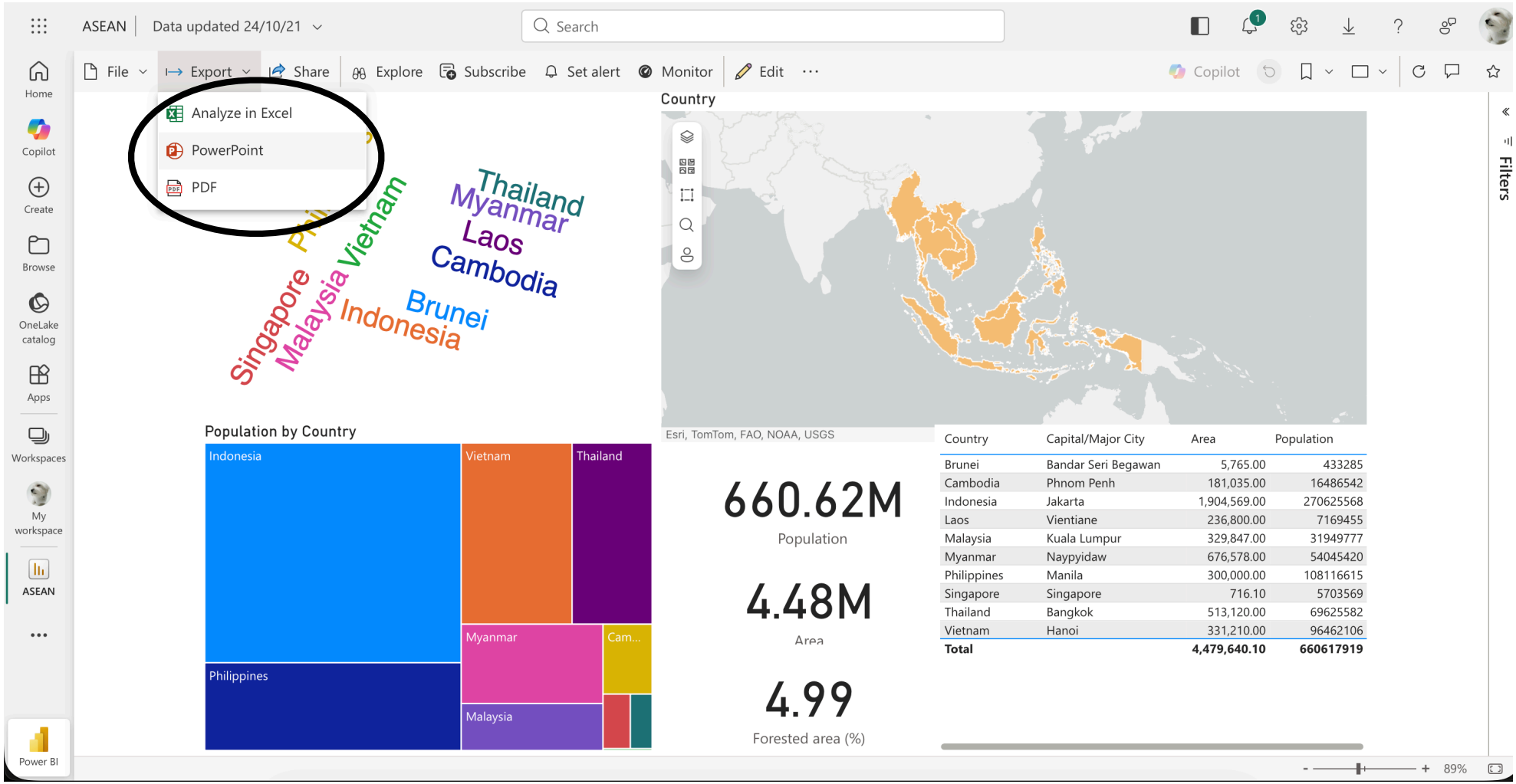
Delete

**Default Page** Default

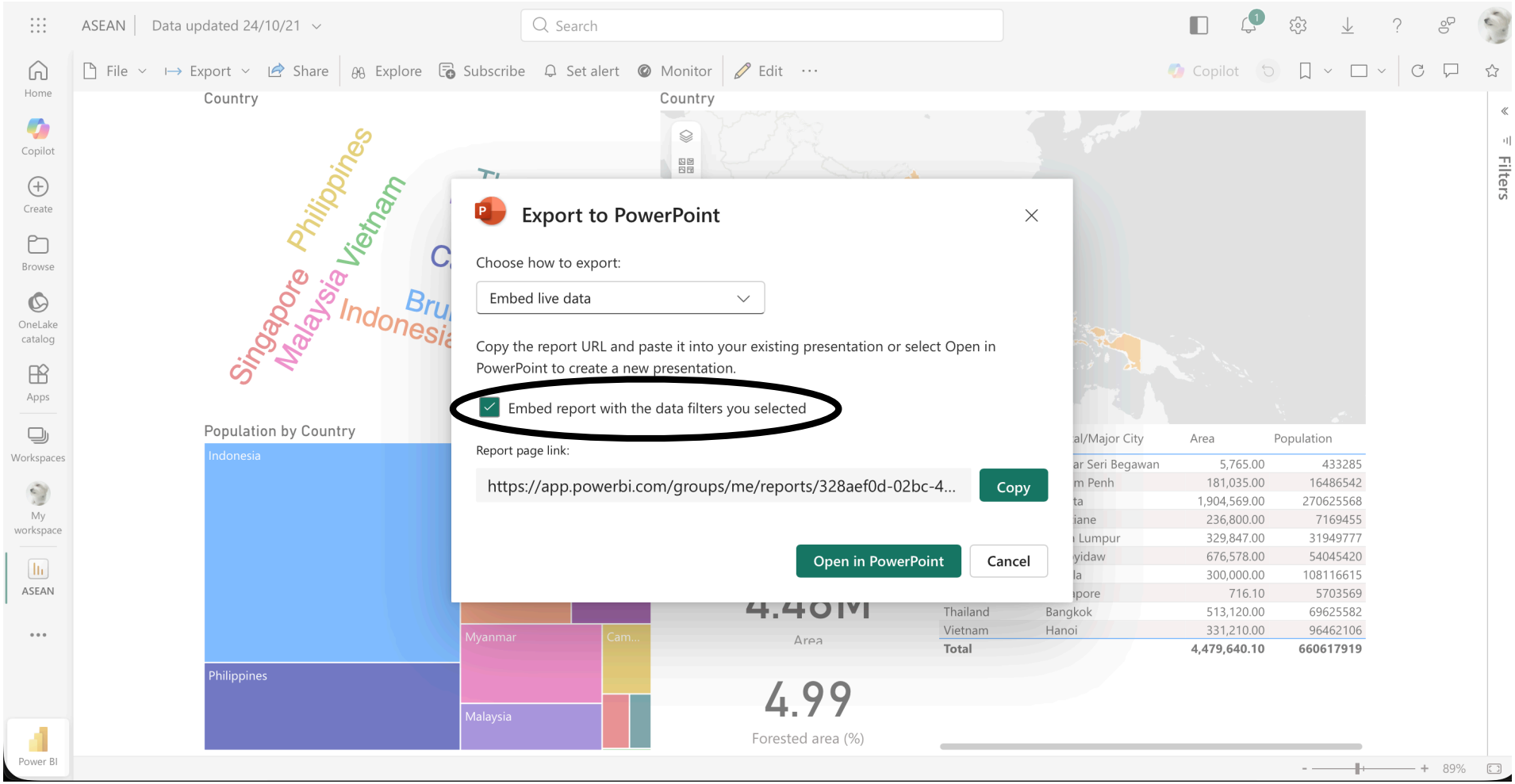



Close

# EXPORT REPORT (1)



# EXPORT REPORT (2)

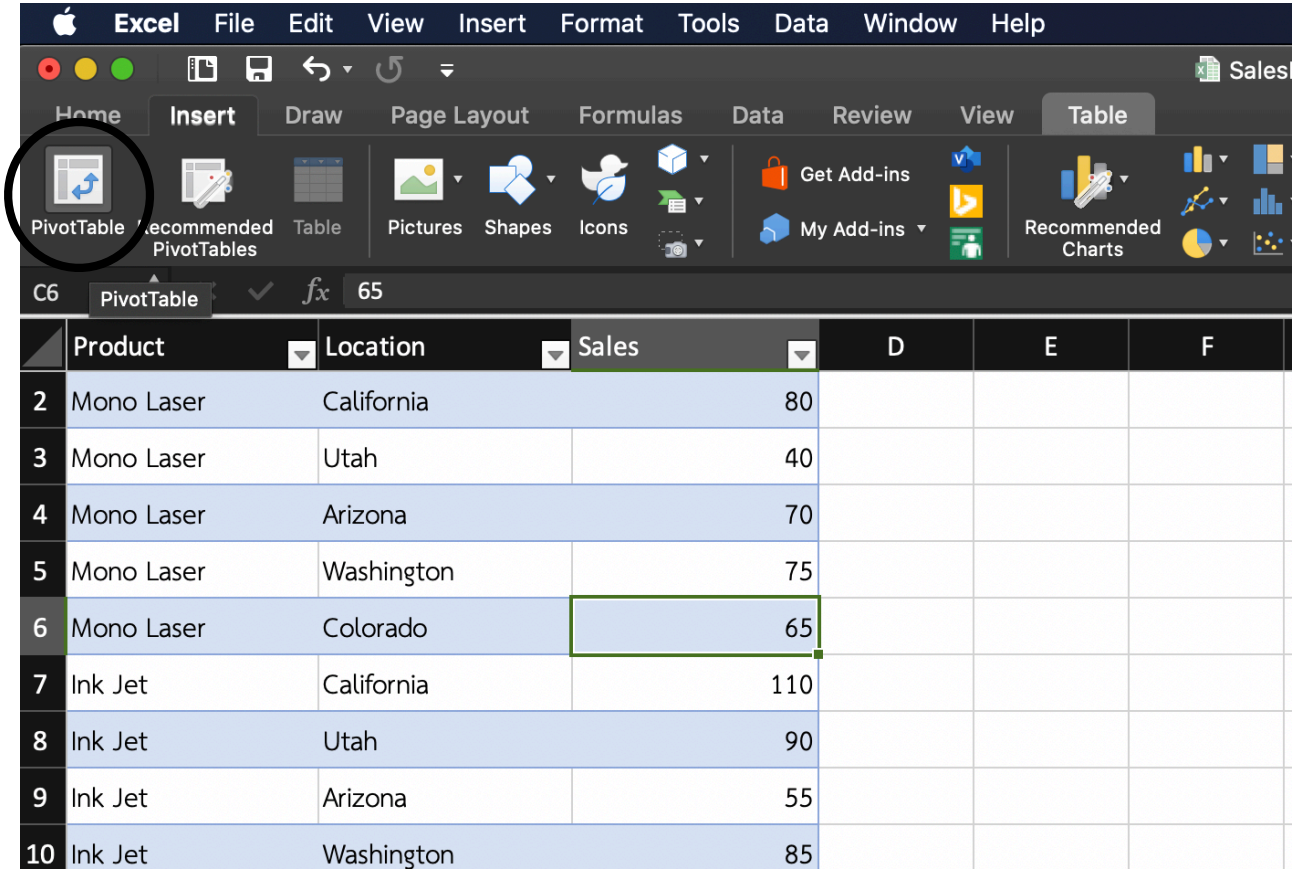


# PIVOT TABLES IN EXCEL (1)

- Pivot tables are one of Excel's most powerful features. A pivot table allows you to extract the significance from a large, detailed data set.

# PIVOT TABLES IN EXCEL (2)

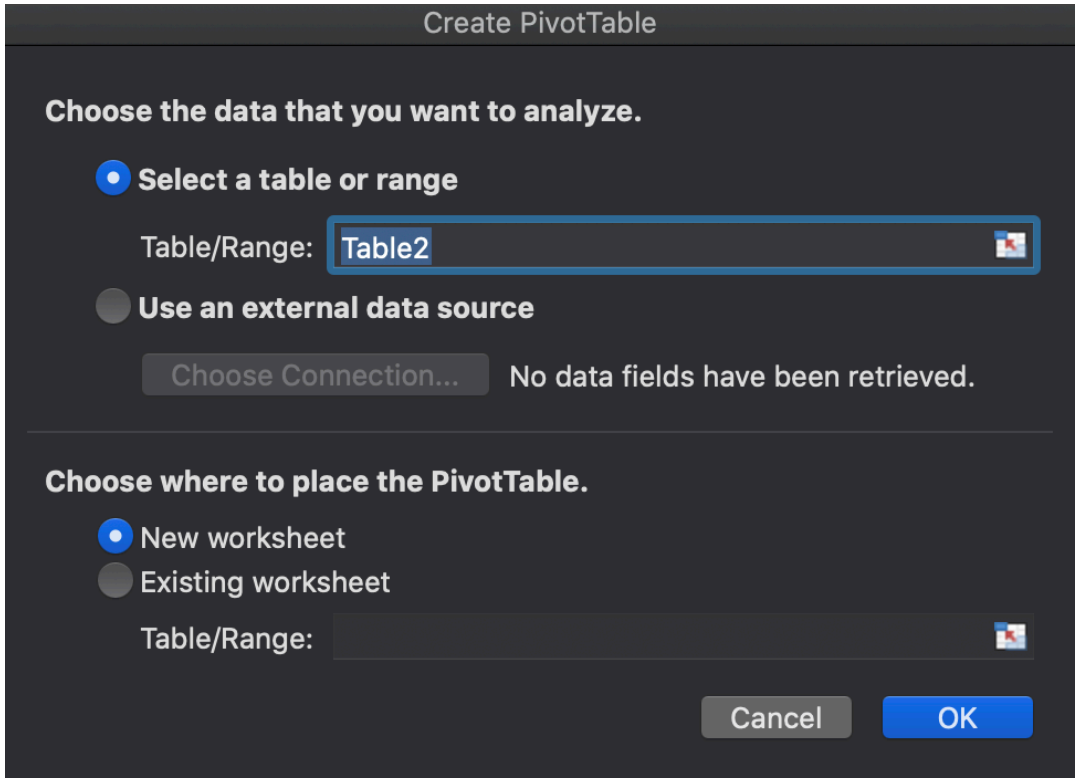
- Click any single cell inside the data set.
- On the Insert tab, in the Tables group, click PivotTable.




| | Product | Location | Sales | D | E | F |
|---|---|---|---|---|---|---|
| 2 | Mono Laser | California | 80 | | | |
| 3 | Mono Laser | Utah | 40 | | | |
| 4 | Mono Laser | Arizona | 70 | | | |
| 5 | Mono Laser | Washington | 75 | | | |
| 6 | Mono Laser | Colorado | 65 | | | |
| 7 | Ink Jet | California | 110 | | | |
| 8 | Ink Jet | Utah | 90 | | | |
| 9 | Ink Jet | Arizona | 55 | | | |
| 10 | Ink Jet | Washington | 85 | | | |

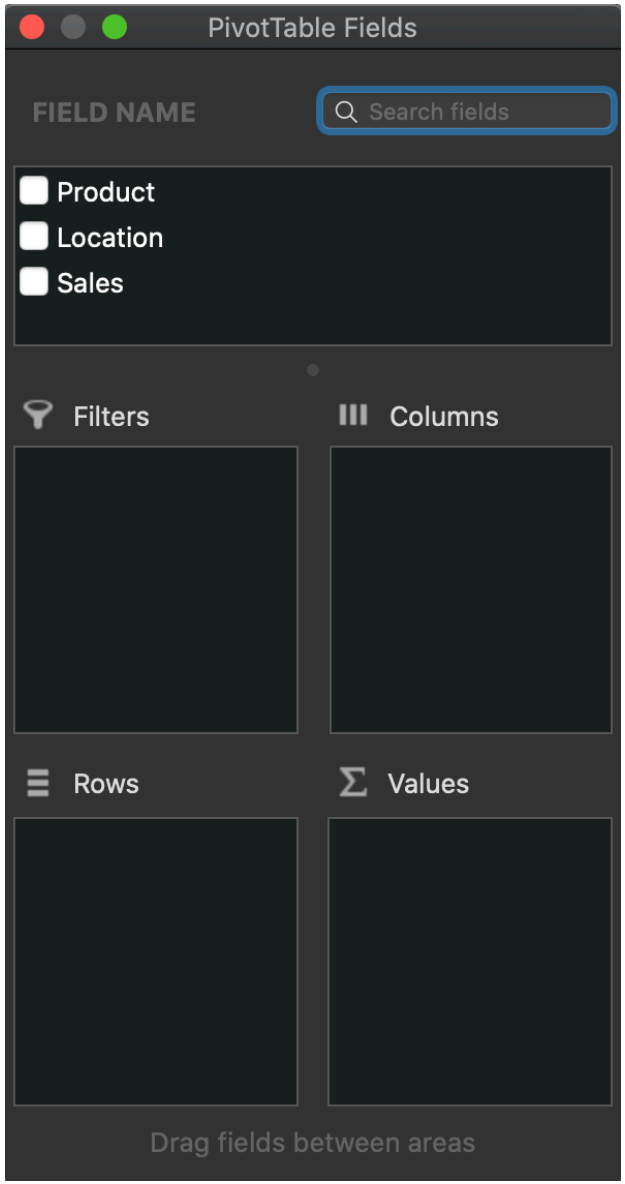
# PIVOT TABLES IN EXCEL (3)

- The following dialog box appears. Excel automatically selects the data for you. The default location for a new pivot table is New Worksheet, and click OK

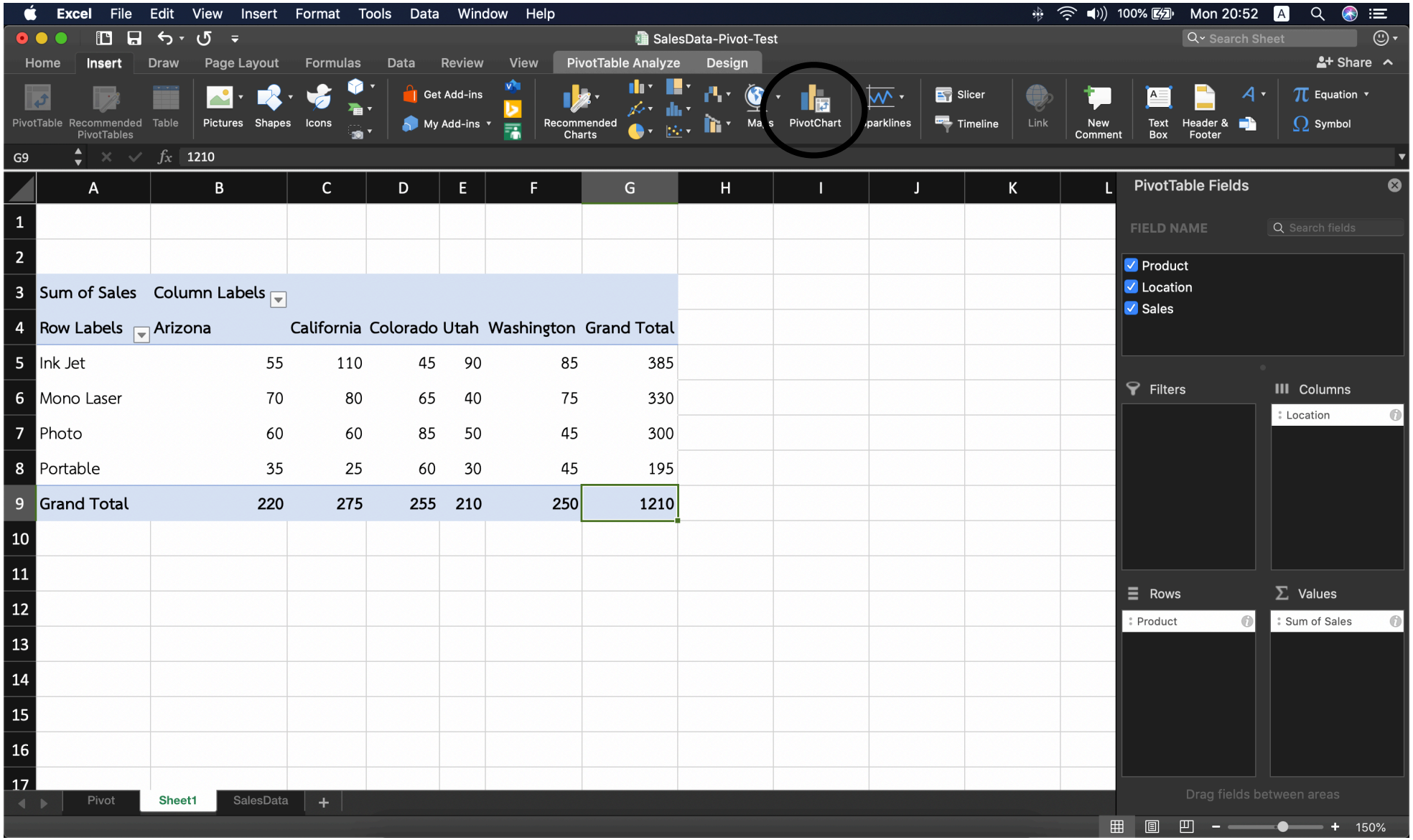


# PIVOT TABLES IN EXCEL (4)

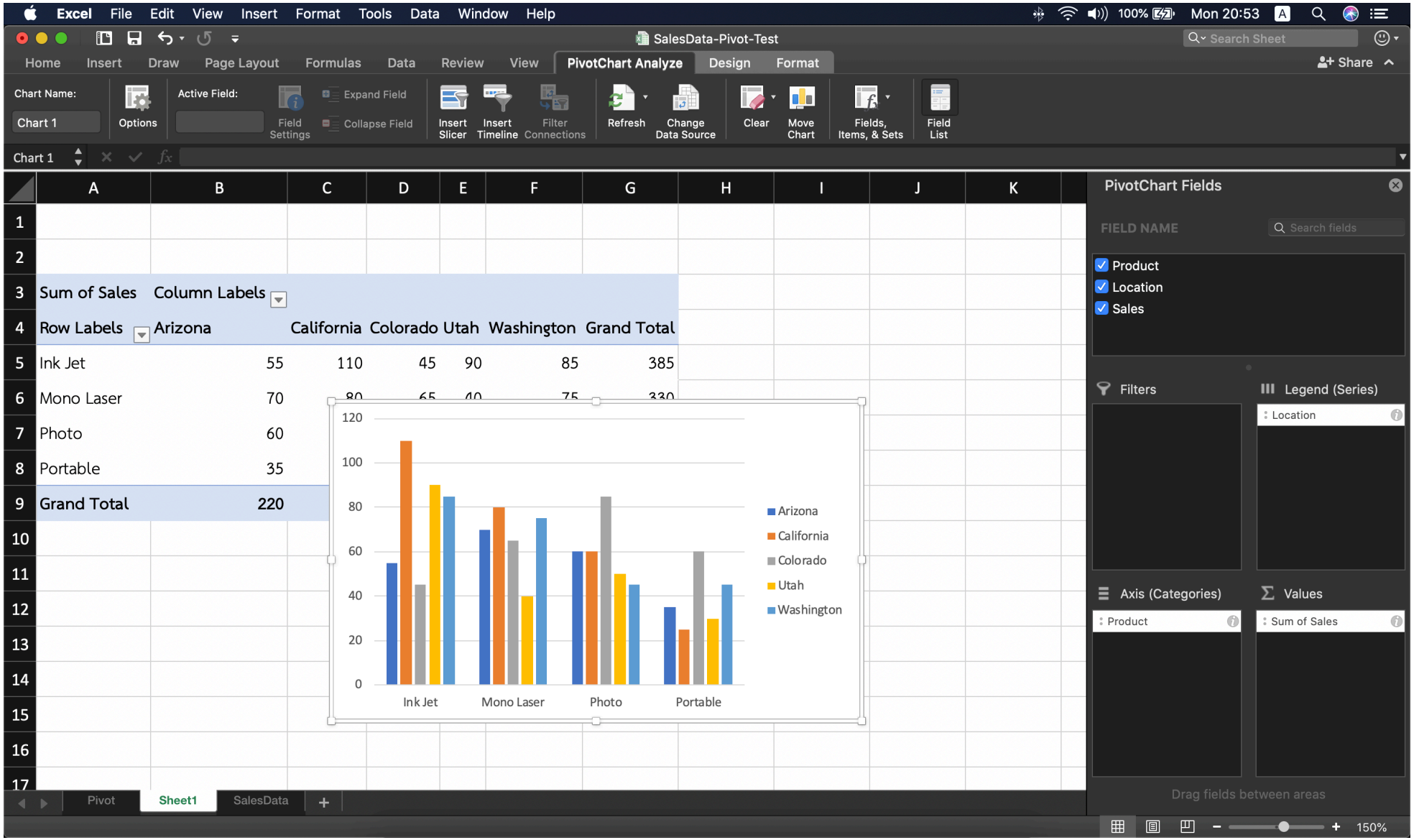
- The PivotTable Fields pane appears. To get the total amount exported of each product, drag the following fields to the different areas.



# PIVOT TABLES IN EXCEL (5)



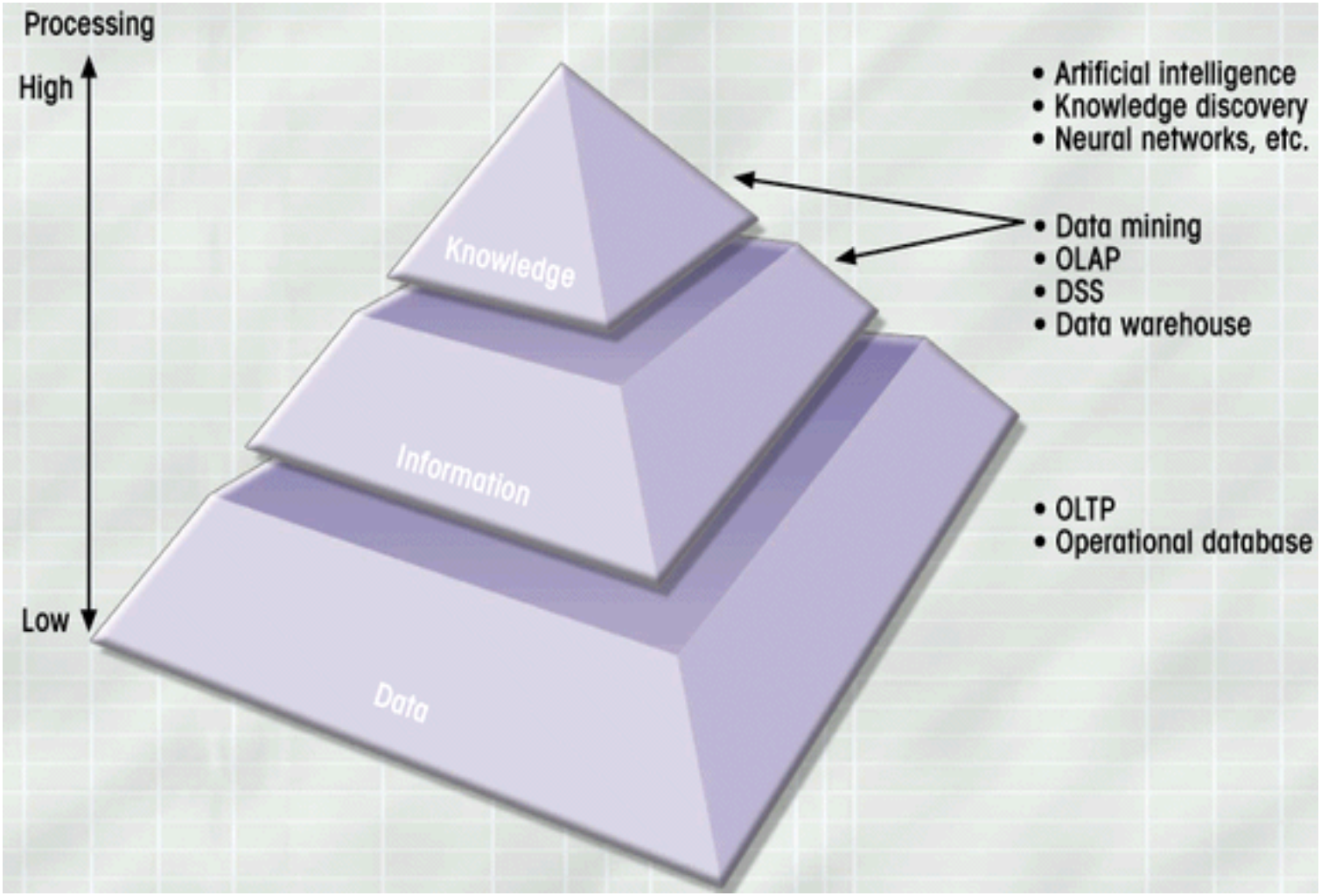
# PIVOT TABLES IN EXCEL (6)



# DATA MINING

- Seeks to discover unknown data characteristics
- Automatically searches data for anomalies and relationships
- Data mining tools
  - Analyse data
  - Uncover problems or opportunities
  - Form computer models based on findings
  - Predict business behavior with models
  - Require minimal end-user intervention

# EXTRACTION OF KNOWLEDGE FROM DATA



# ASSIGNMENT 6 (1)

- ให้ดาวน์โหลดไฟล์ **country_vaccinations_by_manufacturer.csv** เพื่อใช้เป็นข้อมูลในไฟล์ในการสร้างรายงาน (Report) ของการฉีดวัคซีนในช่วงการระบาดของ COVID-19
- ข้อมูลดังกล่าวมีวัตถุประสงค์เพื่อใช้เป็นรายงานสรุปความคืบหน้าของการฉีดวัคซีนในแต่ละประเทศ/ทวีป ยี่ห้อของวัคซีนที่ฉีด/ประเภทของวัคซีน (mRNA / Viral Vector / Protein Subunit / Inactivated) ให้ค้นหาข้อมูลอื่นที่จำเป็น (ทวีป ประเภทวัคซีน และจำนวนประชากร) เพื่อใช้ประกอบการทำ Data Warehouse

# ASSIGNMENT 6 (2)

- ให้แต่ละกลุ่มออกแบบ Star Schema สำหรับเก็บข้อมูลวัคซีนดังกล่าว

  **Deadline: 28 November 2025**
- จัดทำข้อมูลเพื่อตอบคำถามต่อไปนี้
  - วัคซีนประเภทใดถูกฉีดมากที่สุด
  - ทวีปใดฉีดวัคซีน mRNA มากที่สุด
  - ประเทศใดมีอัตราการฉีดวัคซีนต่อจำนวนประชากร น้อย/มาก ที่สุด
  - อัตราการฉีดวัคซีนประเภท mRNA เปรียบเทียบกับ Inactivated Vaccine มีอัตราที่ เพิ่มขึ้น/ลดลง เมื่อดูรายไตรมาส

  **Deadline: 19 December 2025**