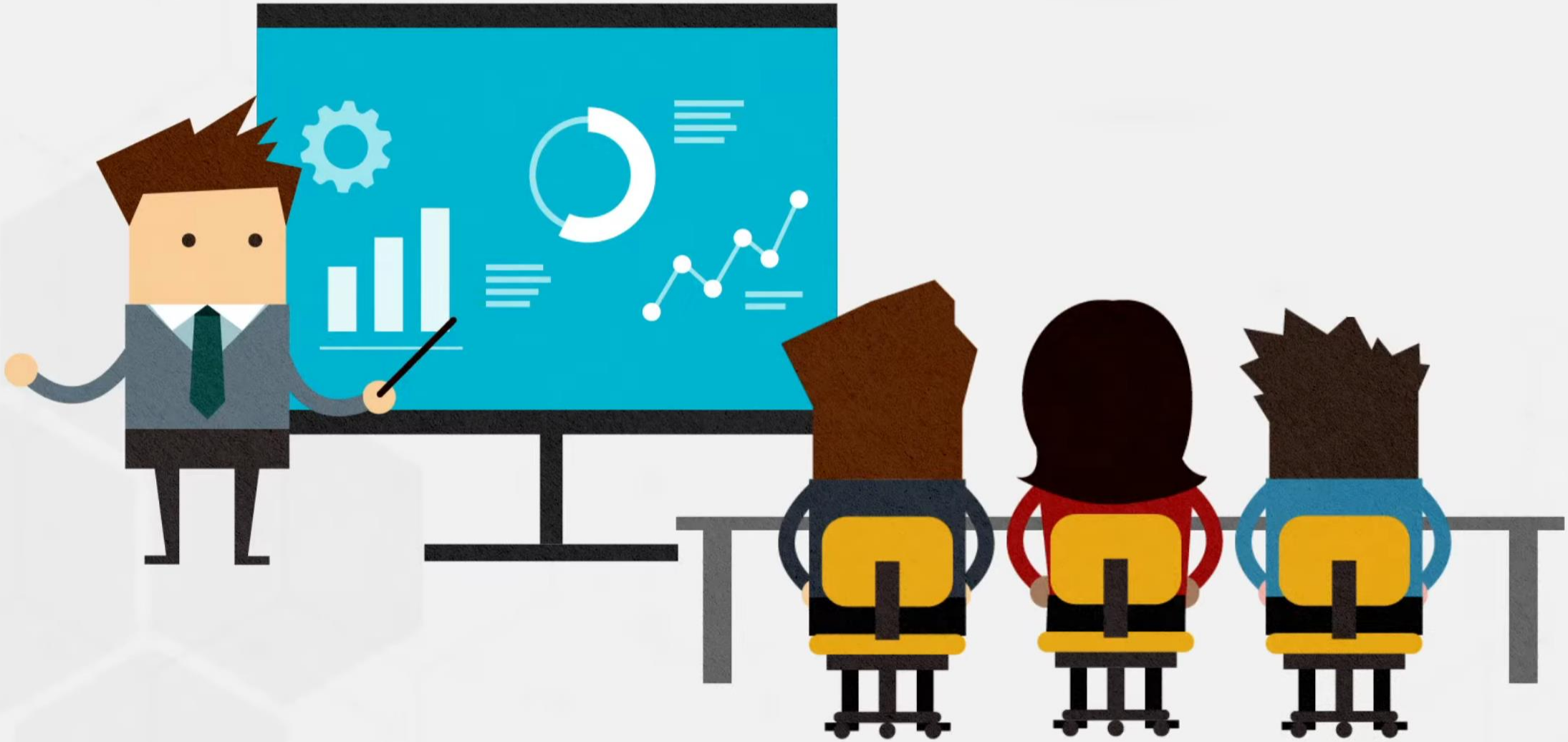
sadā śiva samāramabhāṃ śaṅkarācārya madhyamām..
asmadācārya paryantāṃ vande guru paramparām..

Salutation to the lineage starting with lord Sadasiva, with Adi Sankara in the middle and continuing up to my immediate teacher.

Power BI

Business Intelligence

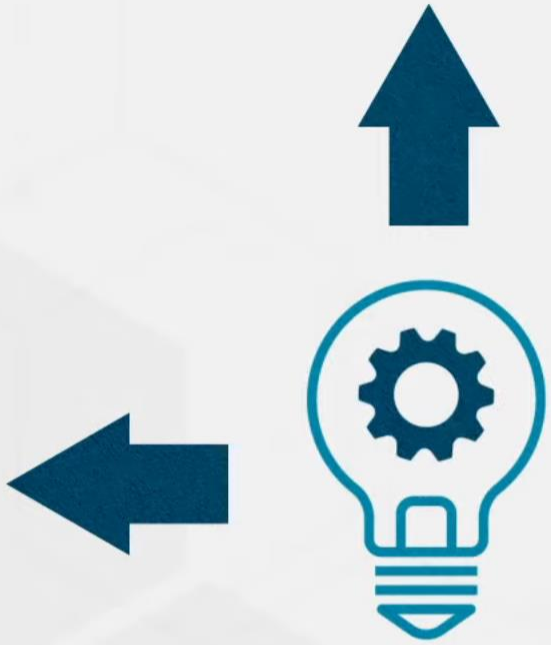
BI(Business Intelligence) is a set of processes, architectures, and technologies that convert raw data into meaningful information that drives profitable business actions.



What is Business Intelligence?

Business intelligence is the practice of turning **data** into **actionable insights.**

Actionable insights allow business leaders to **change or maintain a course of action.**



Business Intelligence

Business Analytics

Business Intelligence

Business Analytics

Is BI the same as Data Science?

Business Intelligence

What has happened and **what trends are developing?**

Typical Questions

How many loans did we issue compared to last year?

Which category delivered the highest margin in Q4?

Key Skills

Basic Stats

Data Transformation

Data Visualization

Business Knowledge

Data Analysis

Data Science

What will happen or **which outcome is most likely?**

Typical Questions

Can we predict which customers are likely to default on loans?

Can we suggest relevant movies that a user will like, based on their previous choices?

Key Skills

Coding

Data Mining

Advanced Stats

Domain Knowledge

BI – Roles and Processes

Roles	 Data Engineer	 Data Analyst	 Data Visualization Specialist	 Business Leader
Processes	 Data Storage & ETL	 Data Models & Analysis	 Visuals, Dashboards & Reporting	 Decision Making

The Data Analyst

Data analysts are responsible for building data models and metrics, which facilitate analysis and visualization.

Extract, Transform & Load

- Import data from Excel files, CSV files and databases
- Transform data into desired format
- Load data into models

Create Models

- Combine tables to create **data models** that link related data
- Set up automated refreshes

Calculate Metrics

- Write formulas to calculate business performance
- Understand the data structure

Documentation

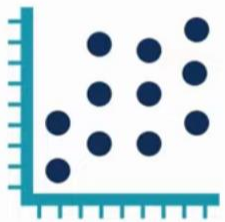
- Document data models for other analysts.
- Document metric definitions using a data dictionary.

The Data Analyst – Common Tools

Traditional Tools	Excel	VBA
Data Transformation	Power Query	SQL
Analysis	Tableau	Power Pivot	Power BI
Other Popular Tools	Qlik	R	Python

The Data Visualization Specialist

Data visualization specialists focus on turning clean data into visuals that help communicate a message or help answer a specific question.



Create Visuals

- Focus on one or a few metrics
- Highlight key data points or trends

Dashboarding

- Combine multiple visuals
- Tell a story using data & visuals
- See detail, identify root causes

Communicating Results

- Present to audiences
- Ensure consistency
- Manage audience permissions

Audience Feedback

- Improve definitions
- Avoid uncertainty
- Make reports clearer

The Business Leader

Business leaders are the main audience of business intelligence reports and dashboards. They are also key to guiding our data and analysis strategy.

Decision Making

- Maintain course of action
- Change course of action

Communicate

- Ask questions that highlight priorities
- Questions should engage thought
- Avoid transactional questions

Bad Example

"Could you run the sales and inventory report for me for September?"

Good Example

"Our warehousing costs are too high. I need to understand which products have the lowest turnover rate."

The Data Engineer

Data engineers source, organize and move data between systems. They can also be involved in decisions about data storage and infrastructure.

Extract, Transform & Load

- Move data between systems
- Automate data feeds

Create Data Warehouses

- Store all business data
- Optimized for analysis
- Everything accessible in one place

Data Systems Knowledge

- Understand data structures
- Help analysts avoid issues

Data Governance

- Ensure the security of data
- Ensure data integrity

Types of Database Systems

Optimized for computers → **Optimized for human analysis**

OLTP

- Optimized to Enter, Modify, Delete and Read data.

Data Warehouse

- Combines data from multiple sources.
- Optimized for analysis and human interaction.

Data Mart

- Small data warehouses used for a specific project or team.

Data Lake

- Stores raw data in original format.
- Can store both **structured data** like tables and lists
- as well as **unstructured** data like emails and phone conversations.

Data Warehouse

Transaction Table DB

Order ID	Product ID	Category ID	Revenue
7	1	A	25,995
8	2	B	42,495
9	3	A	26,500

Product Table DB2

Product ID	Product
1	Megane
2	F-150
3	Focus

Category Table XLS

Category ID	Category
A	Car
B	Truck

Transaction Table

Order ID	Product ID	Category ID	Revenue
7	1	A	25,995
8	2	B	42,495
9	3	A	26,500

Product Table

Product ID	Product	Category
1	Megane	Car
2	F-150	Truck
3	Focus	Car

Benefits

- Combines and links data from different sources in one accessible database.
- Organized by **semantic** groups, that bring together related data into simple tables.

Data Engineer – Common Tools

Data Storage				Data Storage
Cloud Services inc. Data Storage	Google GCS	Microsoft Azure	Amazon AWS	
Coding Languages	SQL	Python	Scala	
Big Data Manipulation	Hadoop	Spark	Databricks	
Live Streaming Data	Kafka	Pubsub	Kinesis DS	Apache Beam

Business Intelligence Team Skills

The Data Engineer

The Data Analyst

The Data Visualization Specialist

Data Storage & ETL

Data Models & Analysis

Visuals, Dashboards & Reporting

- In the real word, these roles may not be so clearly defined.
- Responsibilities, skills and tools are likely to be shared across roles.

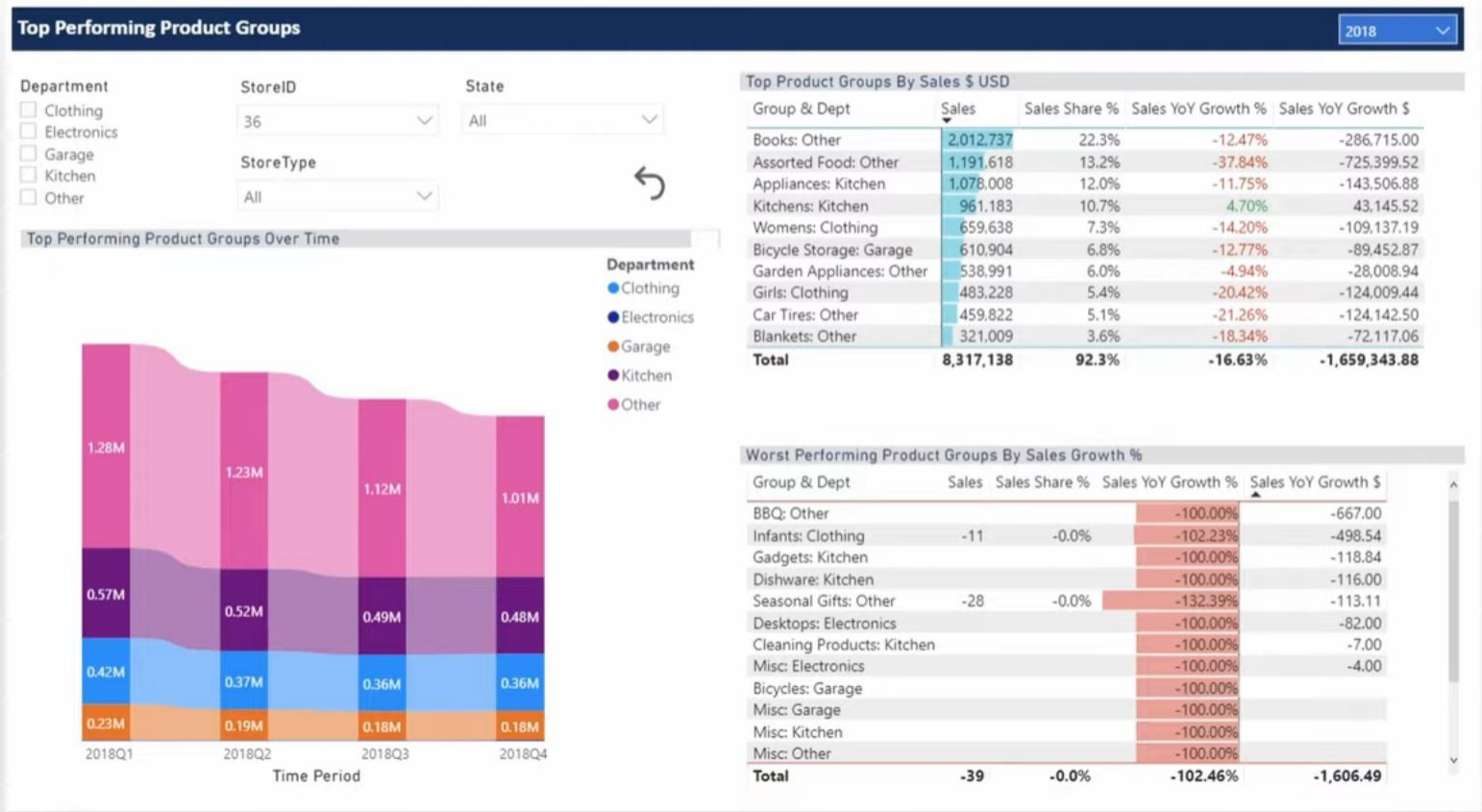
Data Architect **ETL Developer** **BI Developer** **BI Consultant**

DBA **SQL Developer** **Business Analyst** **BI Partner**

Visuals vs. Dashboards

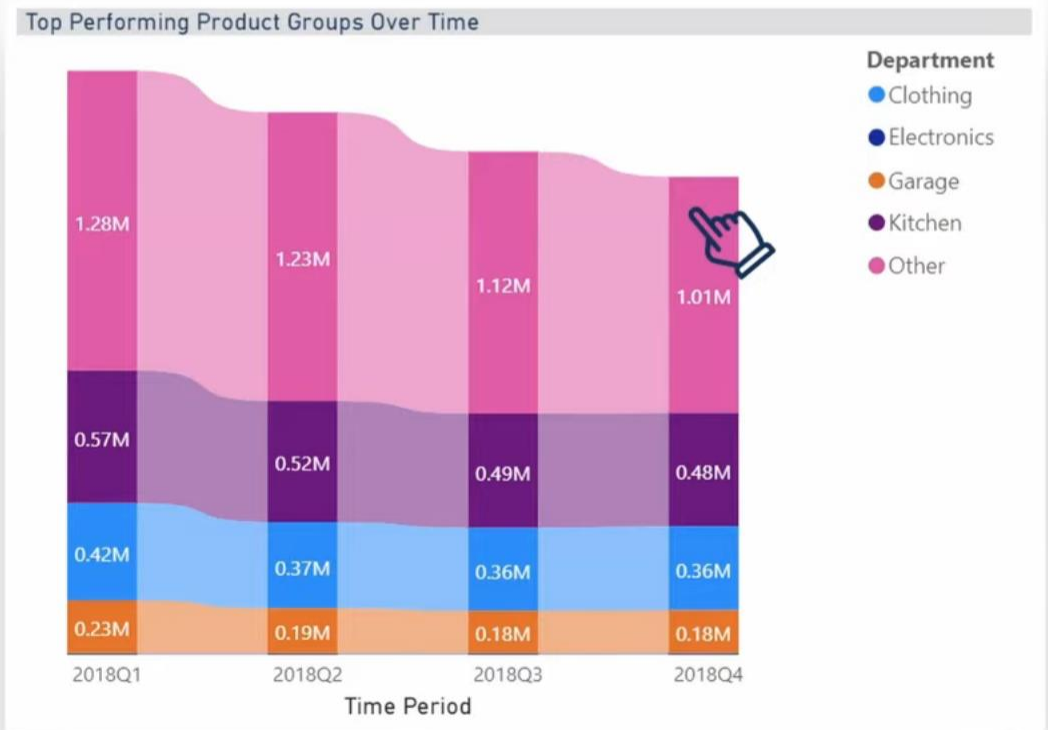
A visual represents a single table, chart or diagram.

A dashboard brings together several related charts to tell or story about the selected data.



What is a data story?

- Provides more detail on the current data, over time, across categories or locations.
- Helps identify the actual or forecasted consequences of the current data.
- Helps identify the root causes of an issue or success.



Worst Performing Product Groups By Sales Growth %

Group & Dept	Sales	Sales Share %	Sales YoY Growth %	Sales YoY Growth $
Assorted Food: Other	1,191,618	25.7%	-37.84%	-725,399.52
Books: Other	2,012,737	43.3%	-12.47%	-286,715.00
Car Tires: Other	459,822	9.9%	-21.26%	-124,142.50
Blankets: Other	321,009	6.9%	-18.34%	-72,117.06
Photo Services: Other	114,817	2.5%	-22.75%	-33,808.15
Garden Appliances: Other	538,991	11.6%	-4.94%	-28,008.94
BBQ: Other			-100.00%	-667.00
Seasonal Gifts: Other	-28	-0.0%	-132.39%	-113.11
Misc: Other			-100.00%	
Car Wash: Other			-100.00%	0.00
Total	**4,638,967**	**99.9%**	**-21.51%**	**-1,270,971.28**

Chart Types

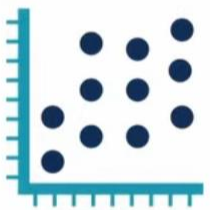
Bar

Column

Line or Area

Waterfall

Card



Scatter

Tornado

Box & Whisker

Tree

Heatmap

Map

Donut or Pie

The **best chart is often the simple one** that communicates a message with absolute clarity.

Focusing Attention

Presenting and Comparing Values

Length

Size

Annotation

Order

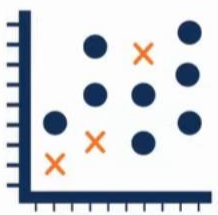
Averages

Dual Axis

Highlighting Values

Color

Enclosure



Shape

Position

Charts are used to answer questions, so **make sure the answers are clear**.

Good vs Bad Visuals

You are the FP&A manager for a large department store.

Each week, you have a meeting to focus on the performance of one departments.

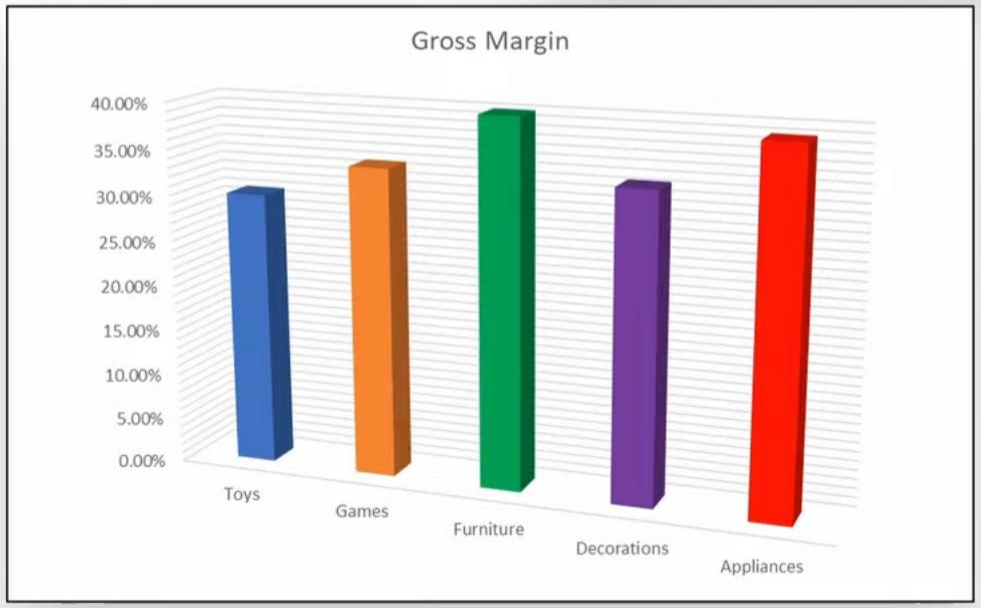
Key Questions

- What margin are we achieving in Decorations?
- How does that compare to other departments?
- What rank is this department in our business?

Good vs Bad Visuals

Key Questions

- What margin are we achieving in Decorations?
- How does that compare to other departments?
- What rank is this department in our business?



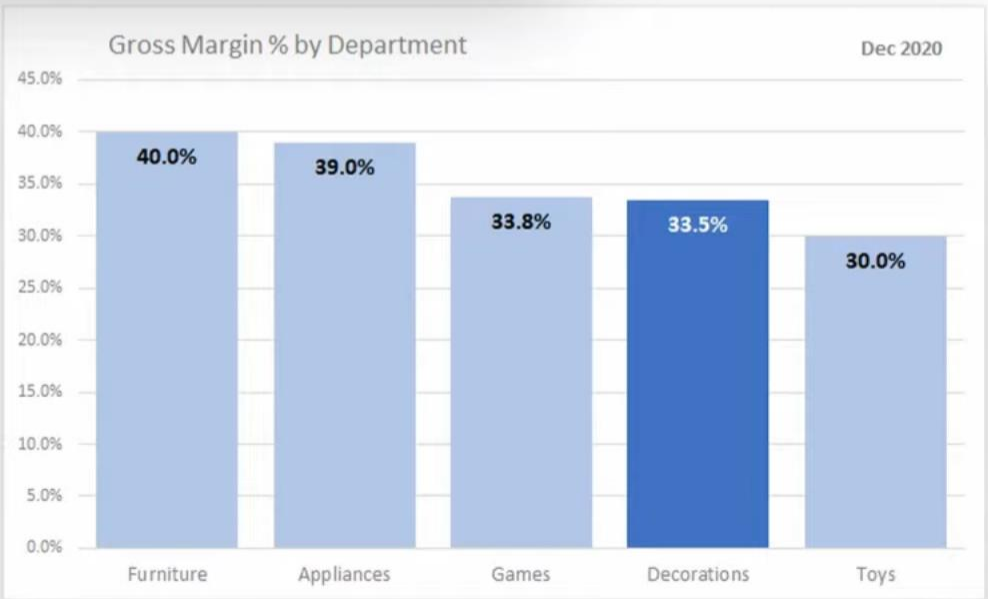
- ✗ 3D bars are distracting?
- ✗ Which bar should I be focusing on?
- ✗ What period is the data from?
- ✗ Difficult to compare Decorations to Games.

Good vs Bad Visuals

Key Questions

- What margin are we achieving in Decorations?
- How does that compare to other departments?
- What rank is this department in our business?

- ✓ Title and period are clear
- ✓ Data point of interest is highlighted
- ✓ Bar ordering helps identify ranking

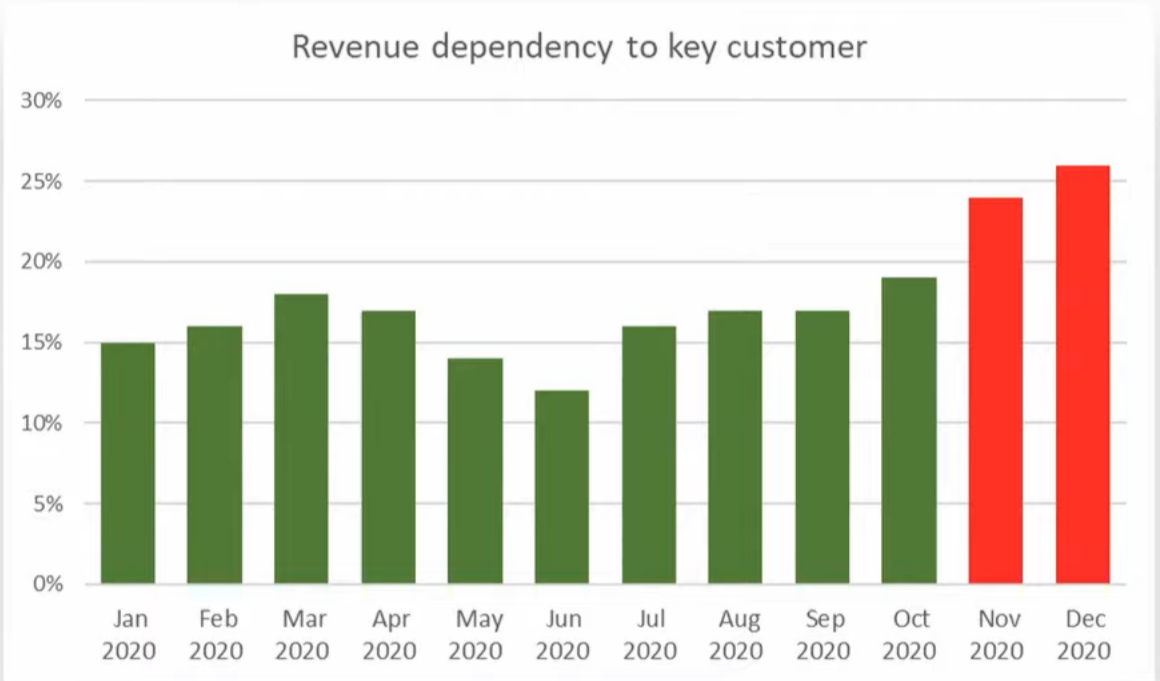


Design Principles

Industry Norms

Month	Amount
January 2020	10,300
February 2020	(20,200)
March 2020	13,250
April 2020	19,200
May 2020	(2,302)

Accessibility



Design Principles

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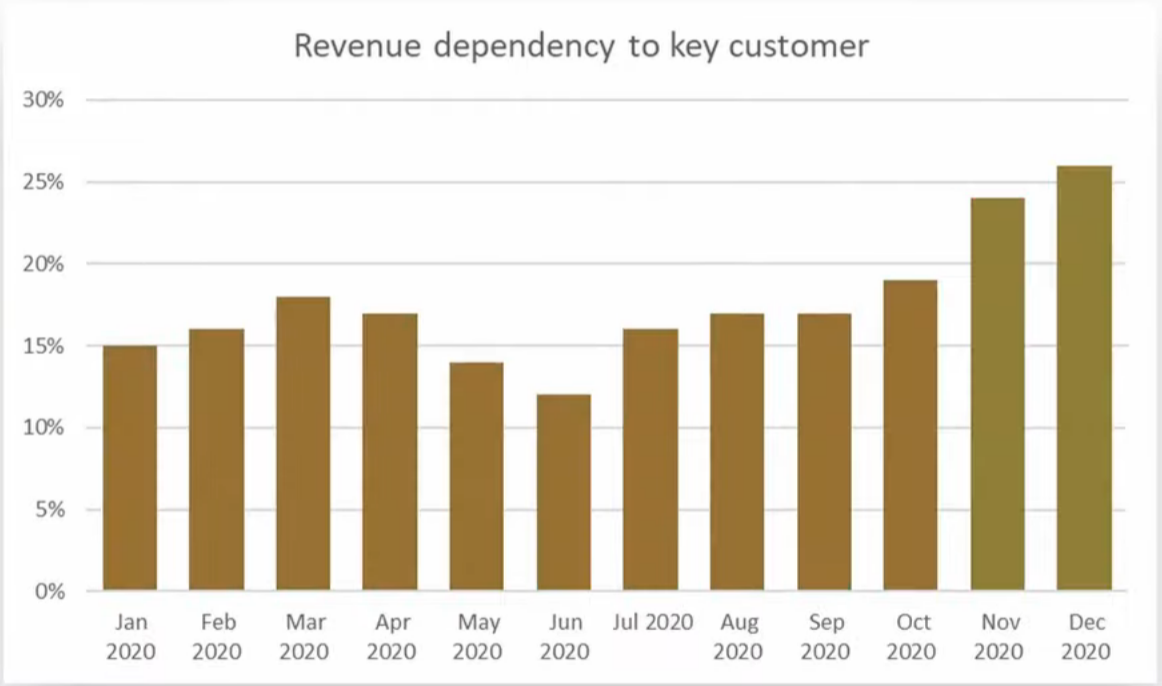

Colour Blind?

Design Principles

Industry Norms

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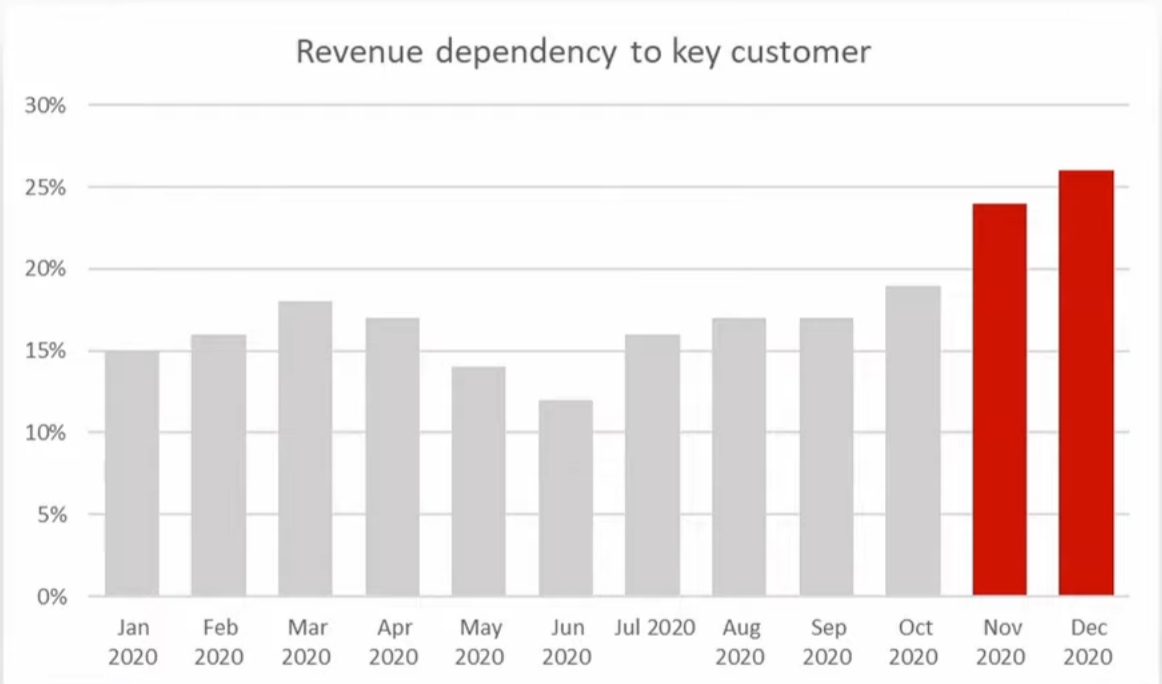


Power BI


You'll know enough about Power BI
to build your own simple data mashups

PREREQUISITES:

Simple spreadsheets with formulas

Getting Started with Power BI

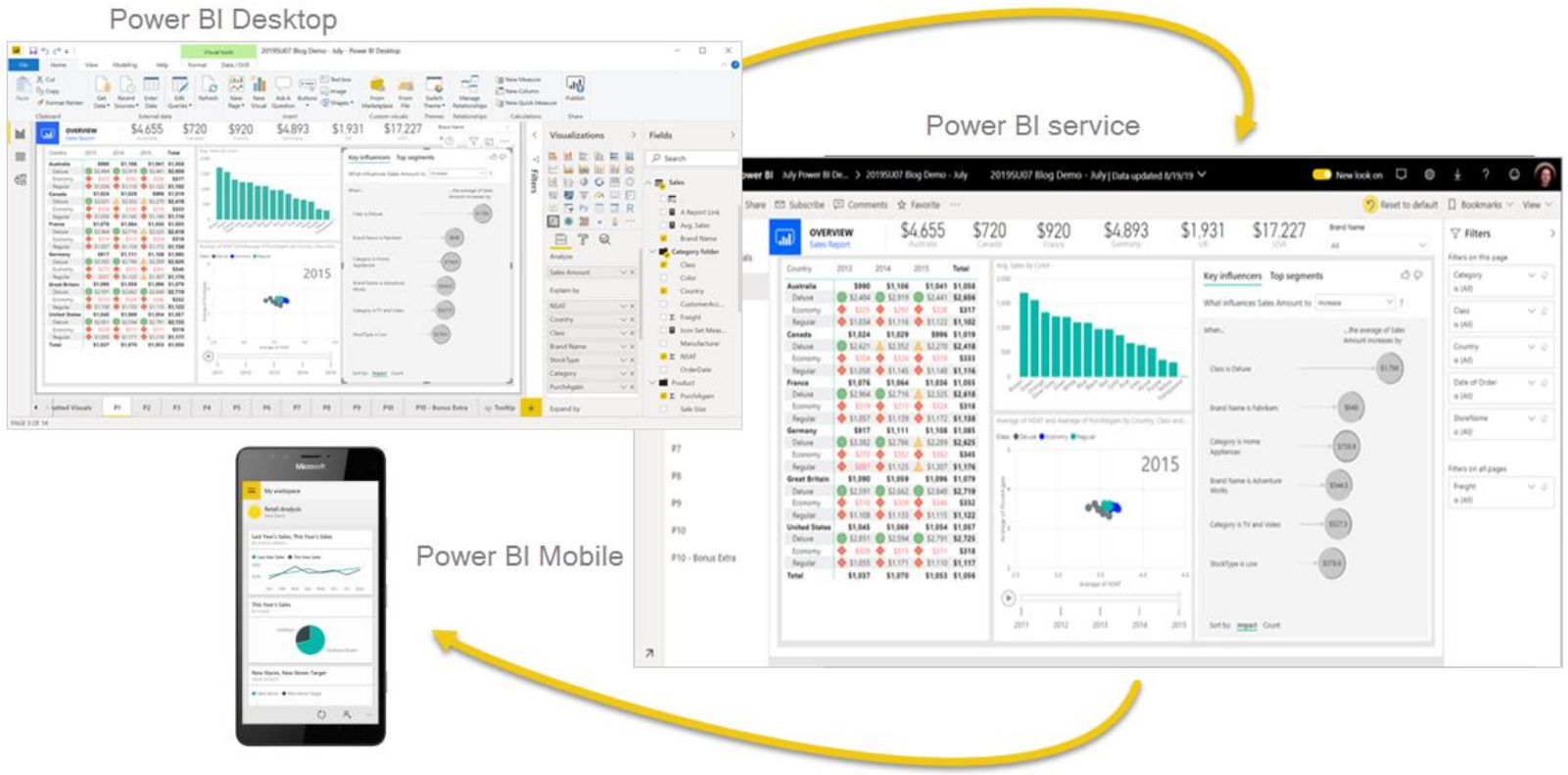
Introducing Power BI

Power BI is a collection of software services, apps, and connectors that work together to turn your unrelated sources of data into coherent, visually immersive, and interactive insights. Your data might be an Excel spreadsheet, or a collection of cloud-based and on-premises hybrid data warehouses. Power BI lets you easily connect to your data sources, visualize and discover what's important, and share that with anyone or everyone you want.

The parts of Power BI:

Power BI consists of several elements that all work together, starting with these three basics:

- A Windows desktop application called *Power BI Desktop*.
- An online software as a service (SaaS) service called the *Power BI service*.
- Power BI Mobile apps for Windows, iOS, and Android devices.



What is the Power BI service?

Power BI is a collection of software services, apps, and connectors that work together to help you create, share, and consume business insights in the way that serves you and your business most effectively.

The Microsoft Power BI service (https://app.powerbi.com), sometimes referred to as Power BI online is the software as a service (SaaS) part of Power BI. In the Power BI service, *dashboards* help you keep a finger on the pulse of your business.

Dashboards display *tiles*, which you can select to open *reports* for exploring further. Dashboards and reports connect to *datasets* that bring all of the relevant data together in one place.

GLOBOMANTICS

Use Power BI to analyze customers and sales

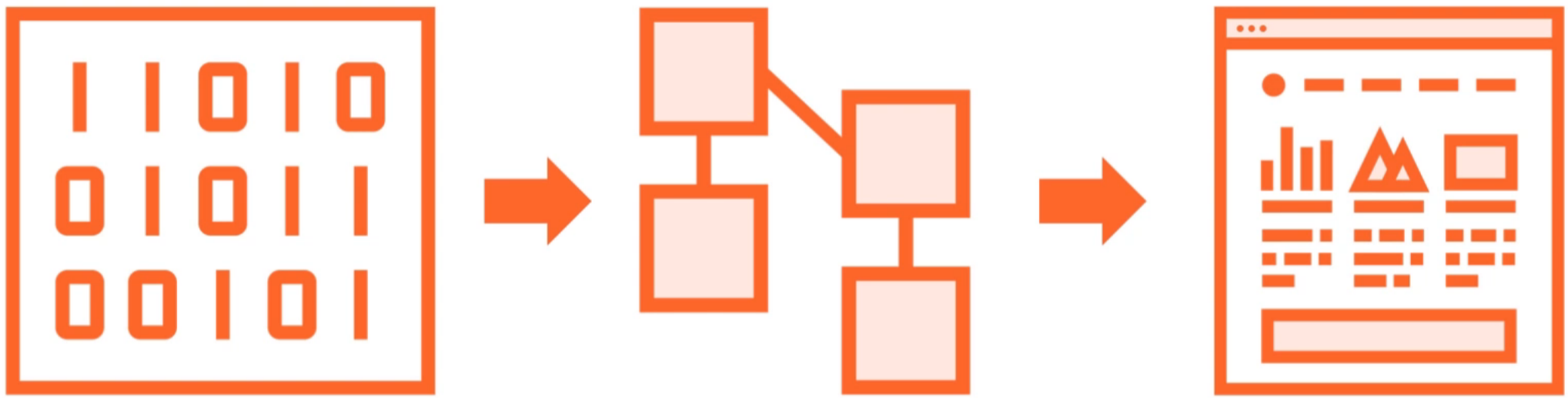
Data sources:

- Microsoft Access database
- US Census Bureau data – CSV and XLS files
- Zip code data to download from Web
- Manually entered data for income categorization

Introducing Globomantics Requirements

Goals

Power BI report


Data
Power BI model
Power BI report

Power BI - Supported data sources

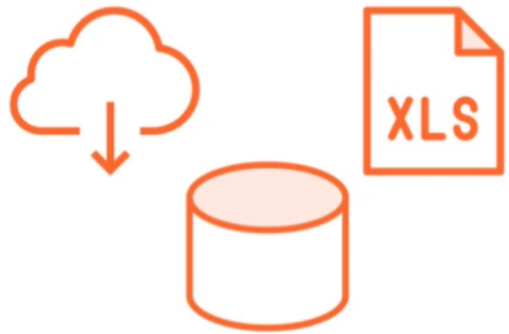
Power BI supports large range of data sources. You can click Get data and it shows you all the available data connections. It allows you to connect to different flat files, SQL database, and Azure cloud or even web platforms such as Facebook, Google Analytics, and Salesforce objects. It also includes ODBC connection to connect to other ODBC data sources, which are not listed.

Following are the available data sources in Power BI −

- Flat Files
- SQL Database
- OData Feed
- Blank Query
- Azure Cloud platform
- Online Services
- Blank Query
- Other data sources such as Hadoop, Exchange, or Active Directory

Power BI Key Ideas

Cloud-based Service



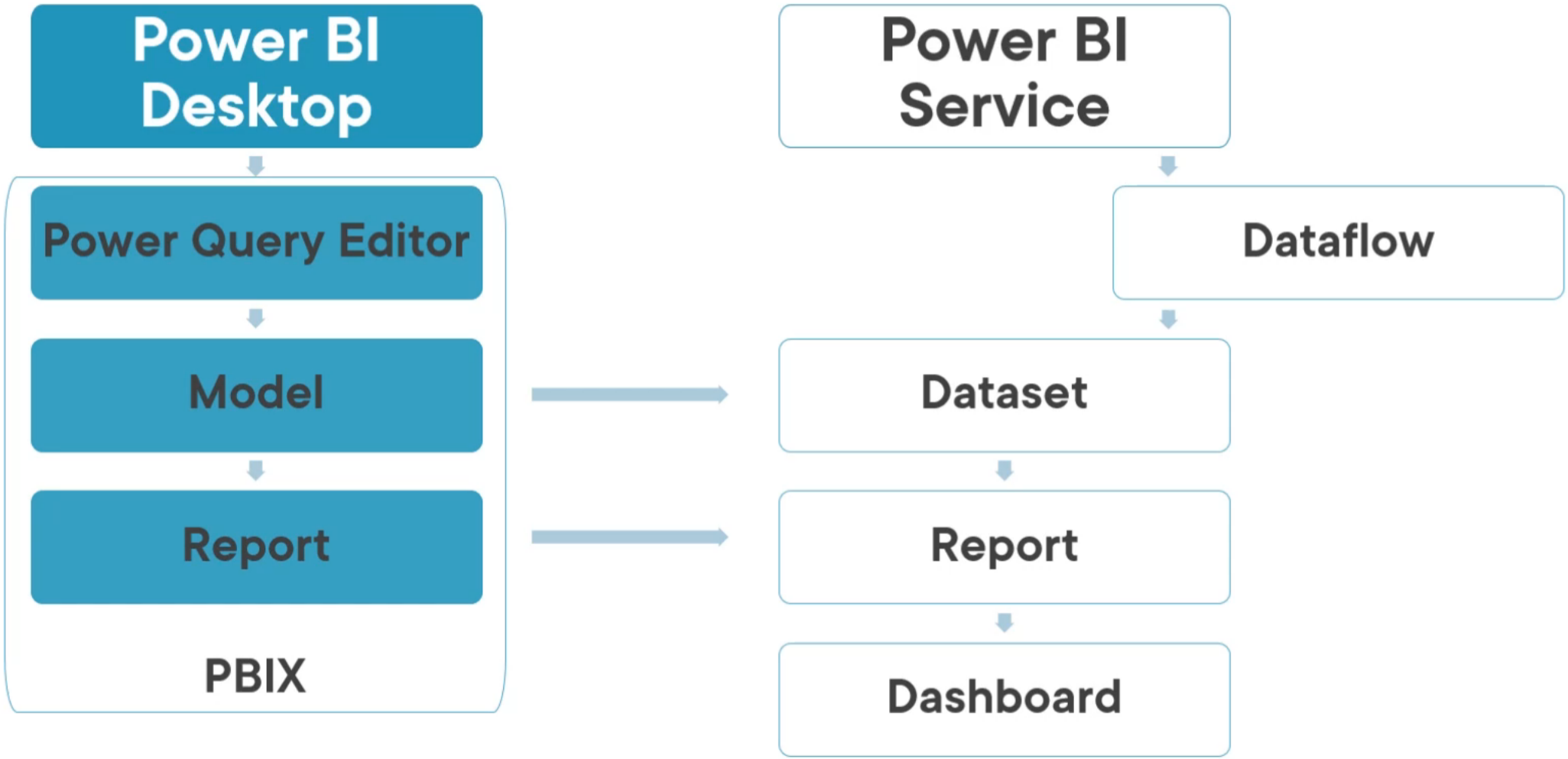
Cloud and On-premises Data

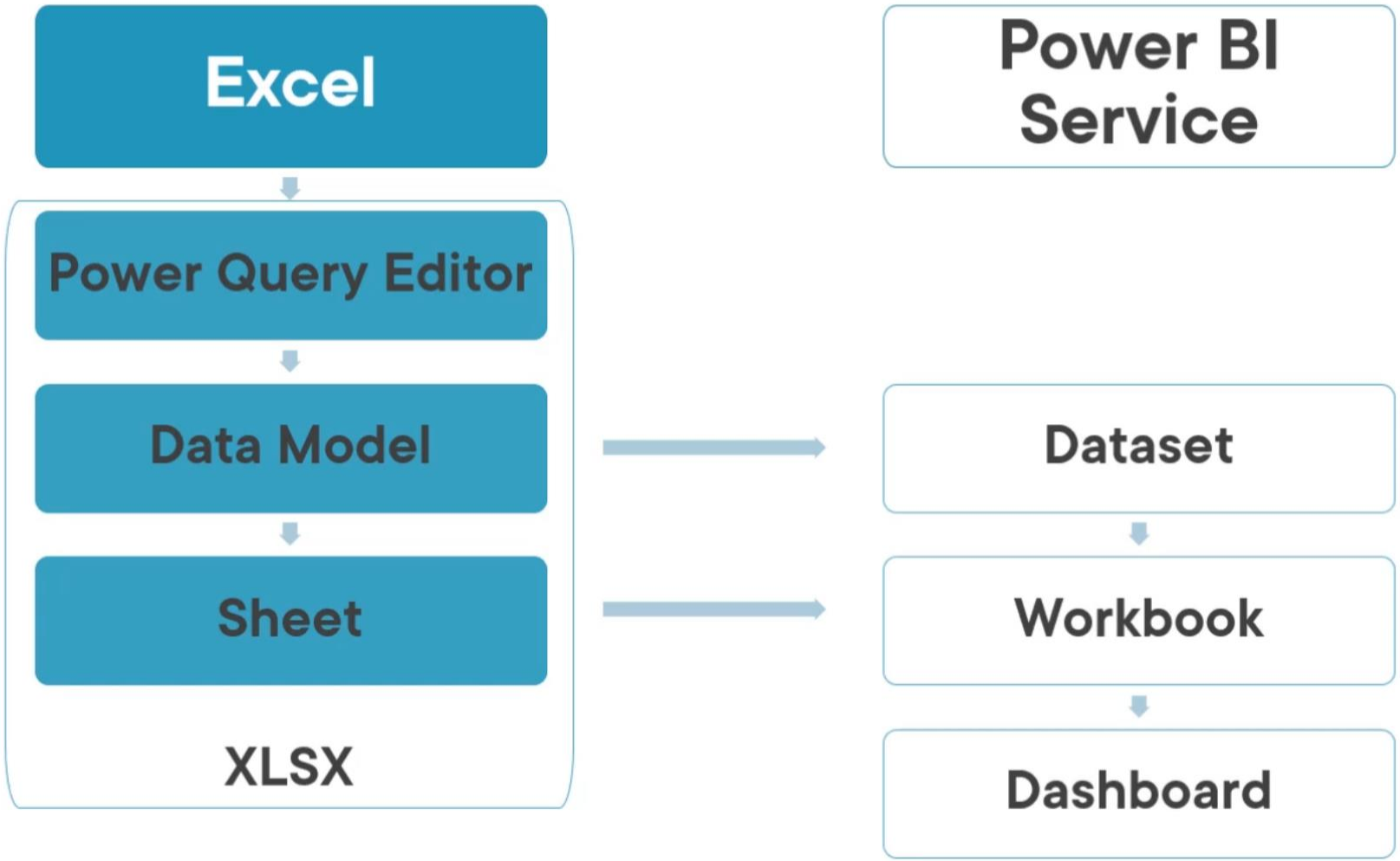
Data Models

Reports and Dashboards

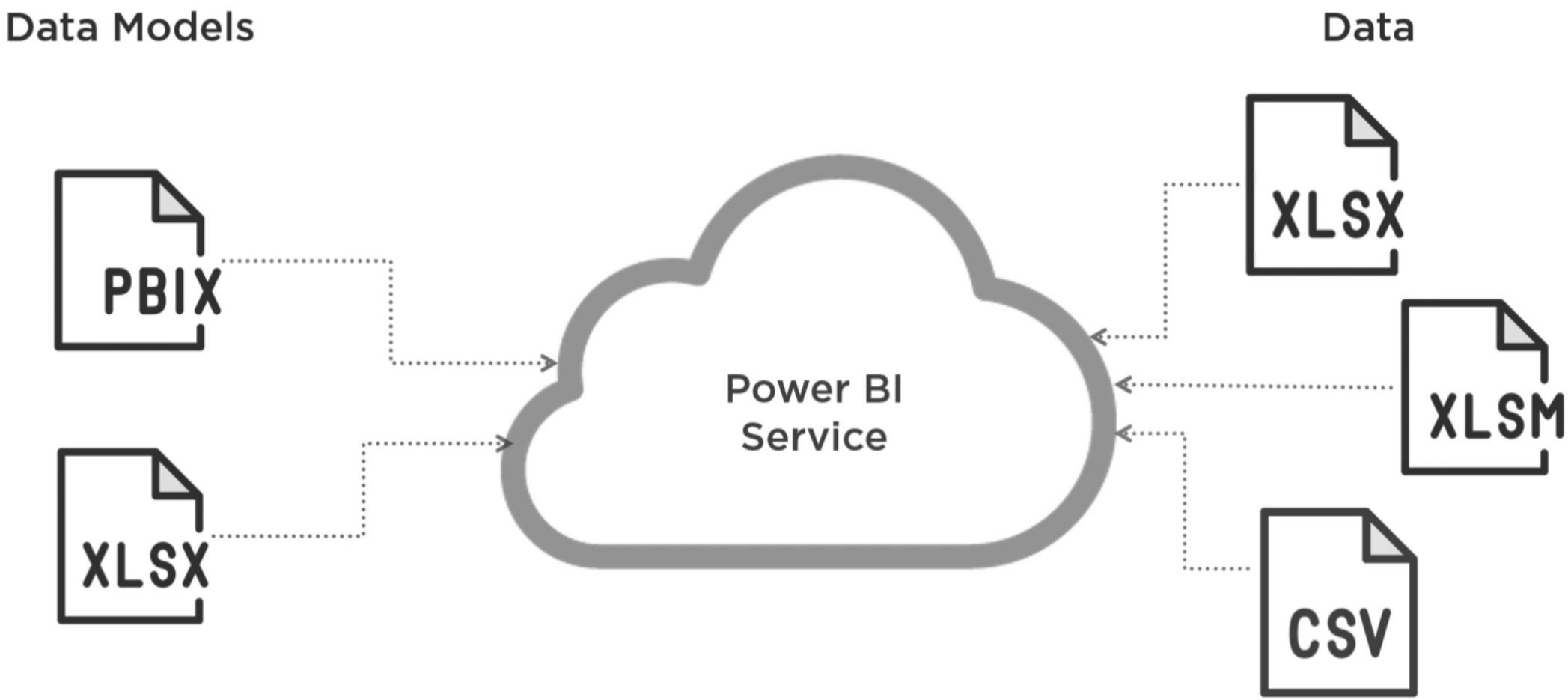
Natural Language Queries and Quick Insights

Mobile Apps

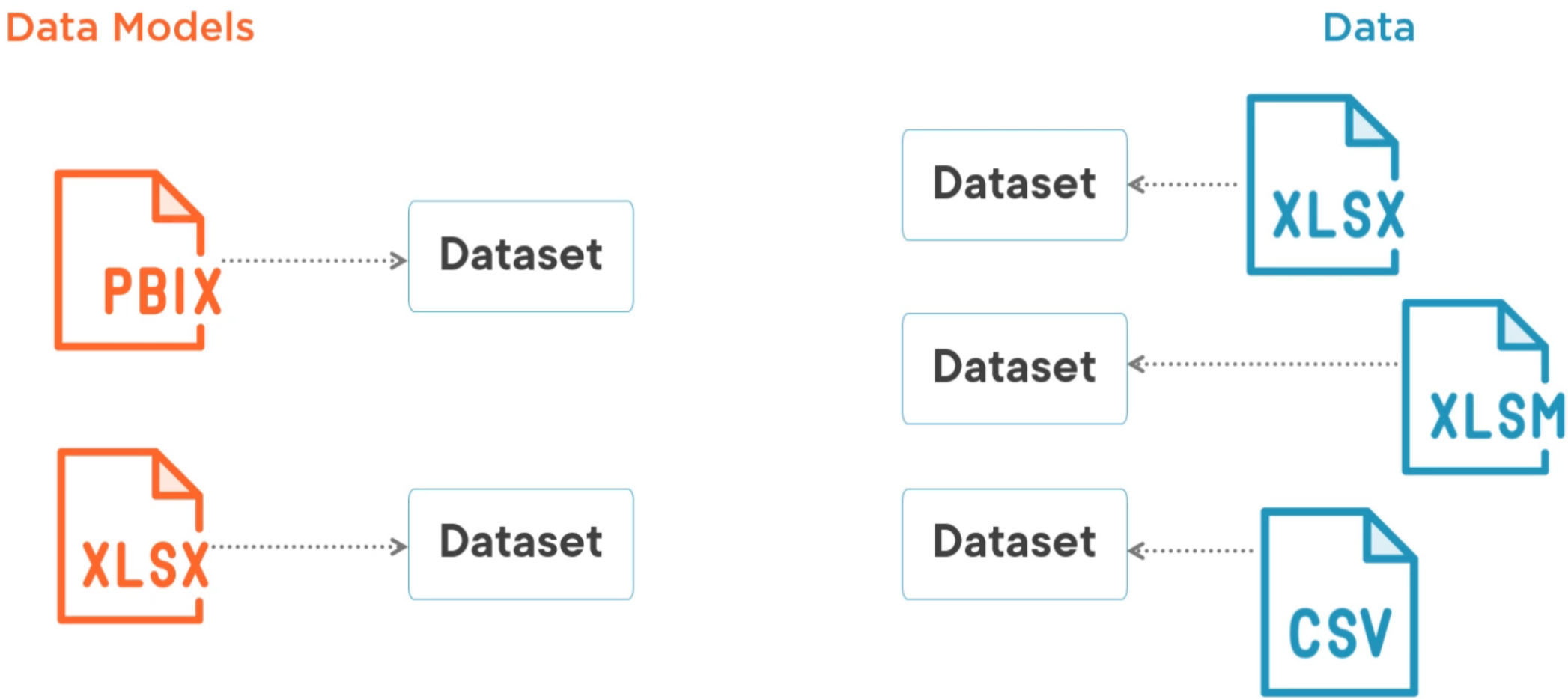

Power BI Desktop
Power Query Editor
Model
Report
PBIX
Power BI Service
Dataflow
Dataset
Report
Dashboard


Excel
Power Query Editor
Data Model
Sheet
XLSX
Power BI Service
Dataset
Workbook
Dashboard

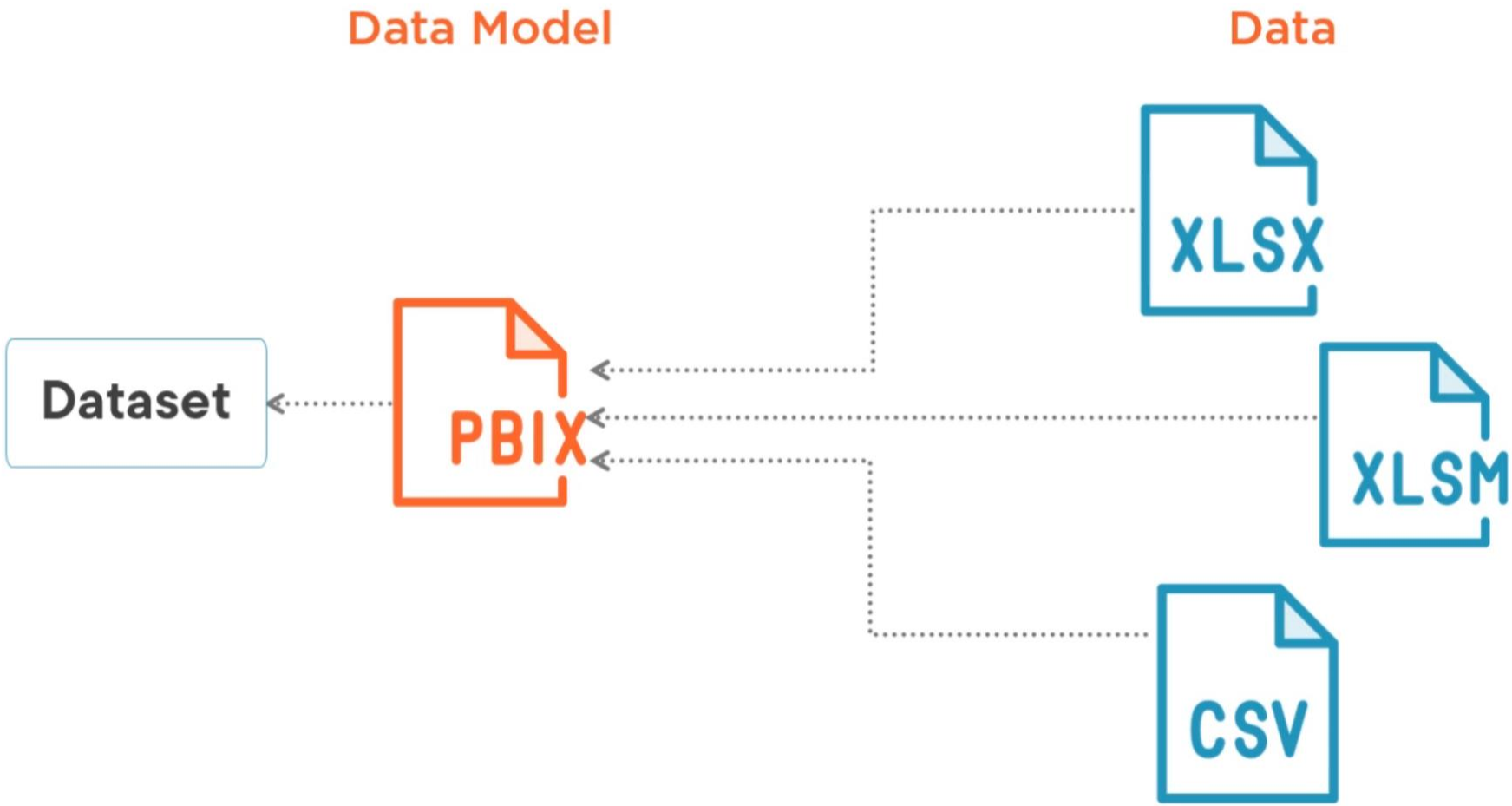
Datasets, Data Models, and Data Files



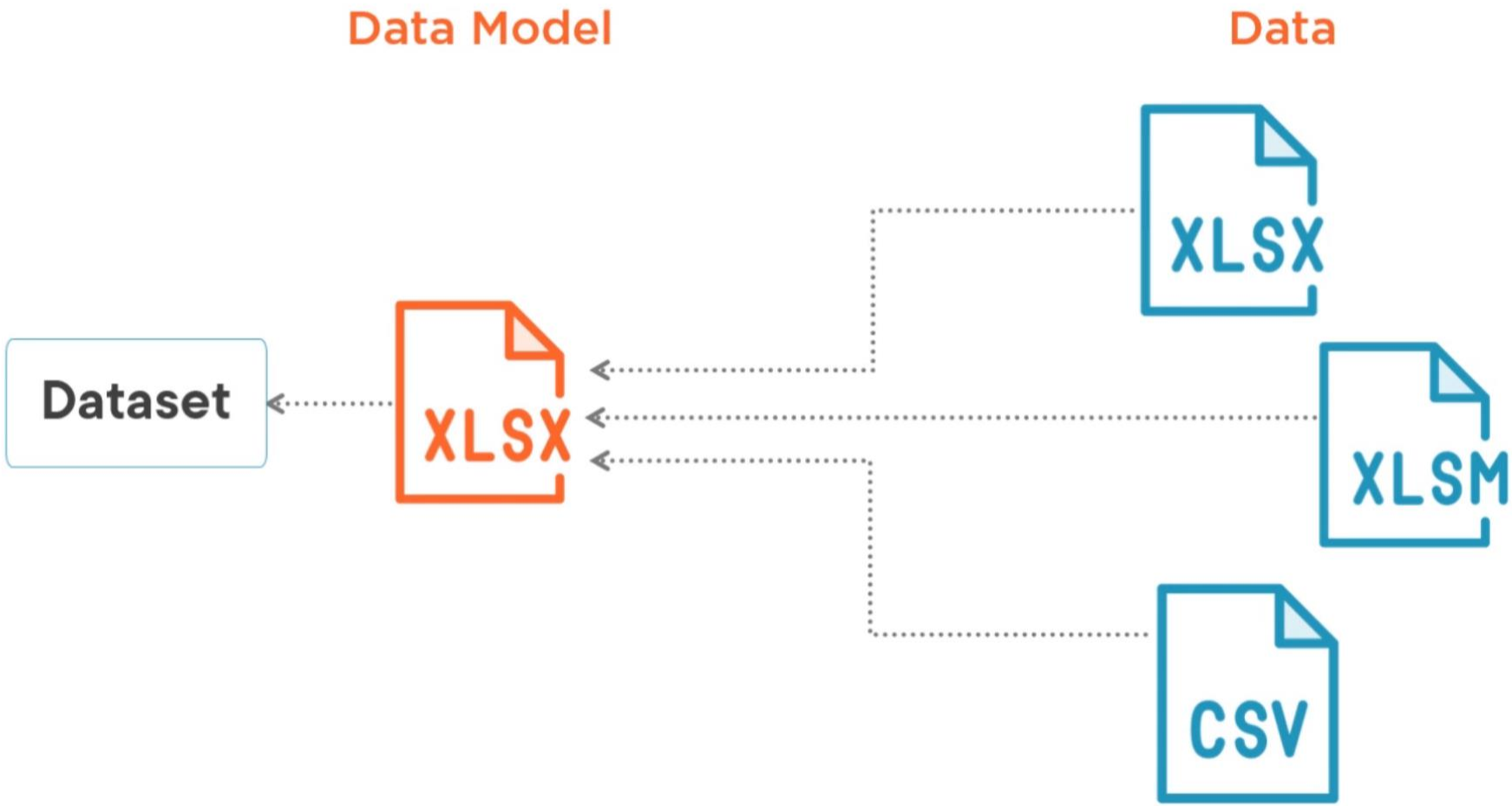
Datasets, Data Models, and Data Files



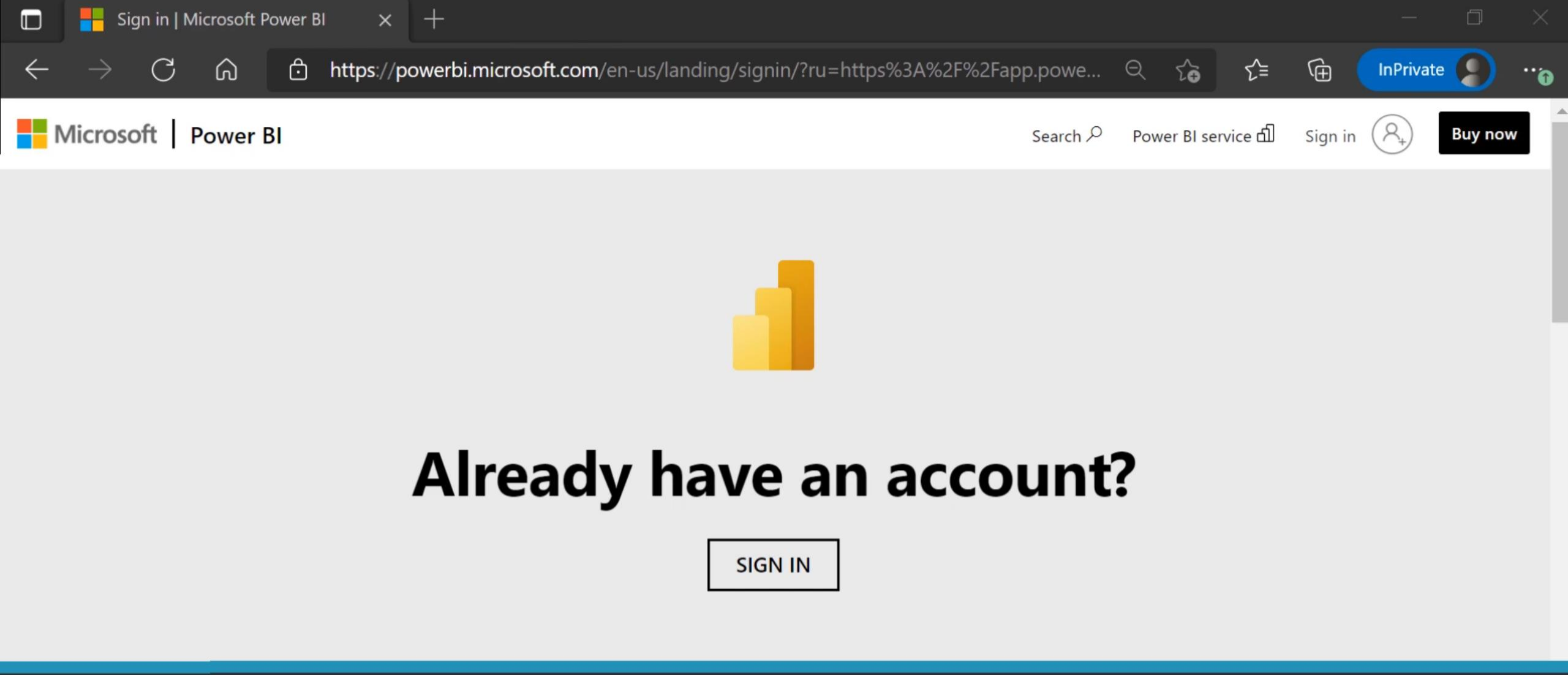
Datasets, Data Models, and Data Files



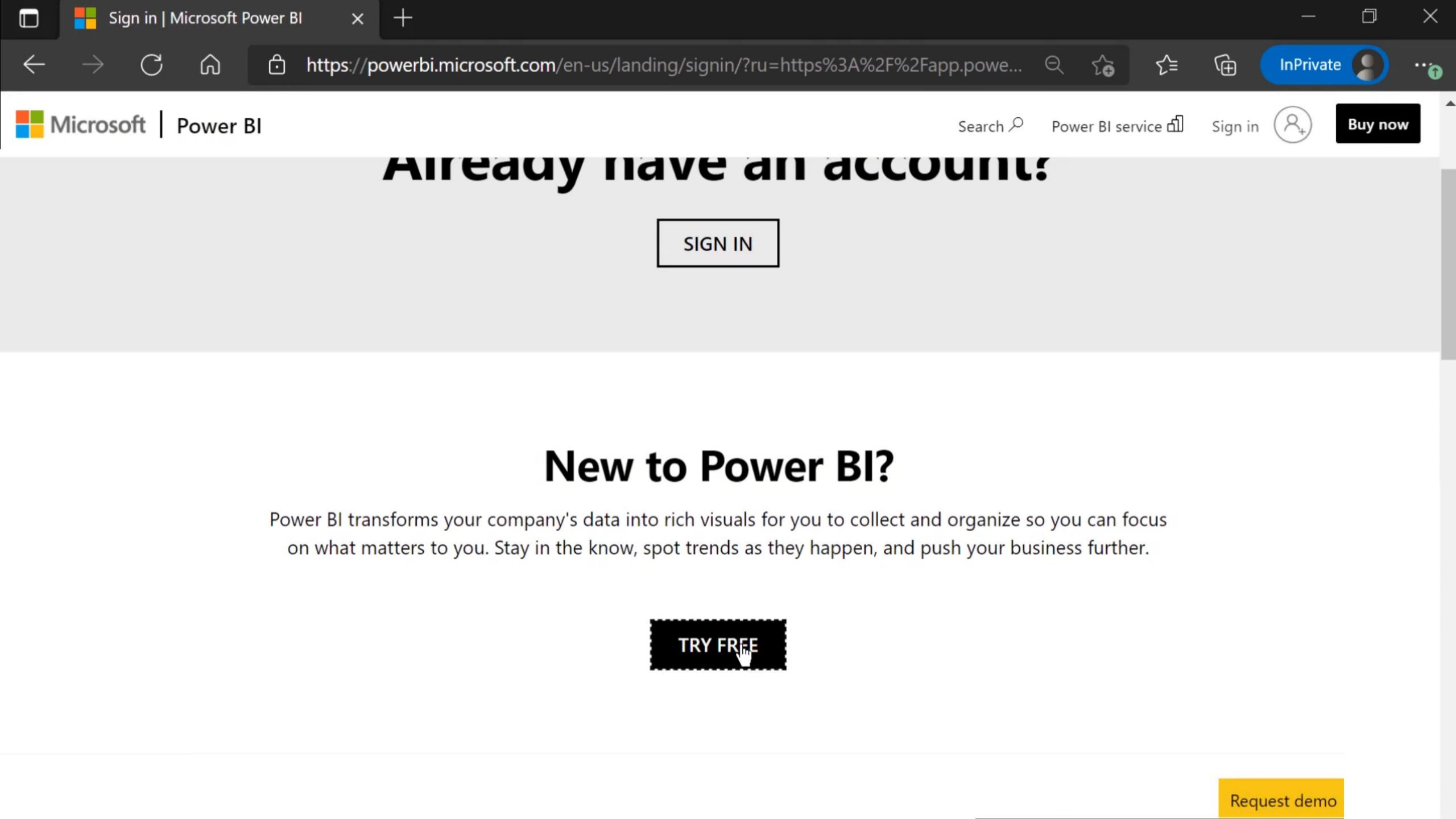
Datasets, Data Models, and Data Files



Feature	Tableau	Power BI
Data Visualization	Tableau provides strong data visualization and is one of the main data visualization tool in the market.	Power BI provides a strong backend data manipulation feature with access to simple visualizations.
Size of Dataset	Tableau can connect much larger datasets as compared to Power BI.	Power BI has a limit of 1GB data in free version.
Data Sources	Tableau covers a vast range of data sources to connect with for data visualization. In Tableau, you select the dataset first and visualizations are used on the fly.	Power BI covers most of the data sources available in Tableau. It is closely integrated with Office 365, hence provides connectivity to SharePoint. Power BI online version also supports direct visualization on Search Engine, though, only Bling is supported at this point.
Costing	Tableau is expensive as compared to Power BI but still under budget for small and medium enterprise.	Power BI provides a free version with 1GB limit on dataset. Power BI Pro is also a cheaper solution when compared with any other BI tool.
License and Pricing	Tableau Desktop Profession: USD70/user/month and it can connect to hundreds of data sources. Tableau Desktop Personal: USD35/user/month and it can connect to data sources such as Google Sheets and Excel files. Tableau Server: Minimum 10 users with the cost of USD35/user/month Tableau Online with private cloud: USD 42/user/month	Power BI: Free 1 GB storage 10k rows/hour data streaming Power BI Pro: USD9.99/user/month 10 GB storage 1 million rows/hour
Implementation	Tableau provides different implementation types as per organizational needs panning from few hours to few weeks.	Power BI uses cloud storage and includes simple implementation process.



https://powerbi.com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https://powerbi.microsoft.com/en-us/landing/signin/?ru=https%3A%2F%2Fapp.powe...
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New to Power BI?
Power BI transforms your company's data into rich visuals for you to collect and organize so you can focus on what matters to you. Stay in the know, spot trends as they happen, and push your business further.
TRY FREE
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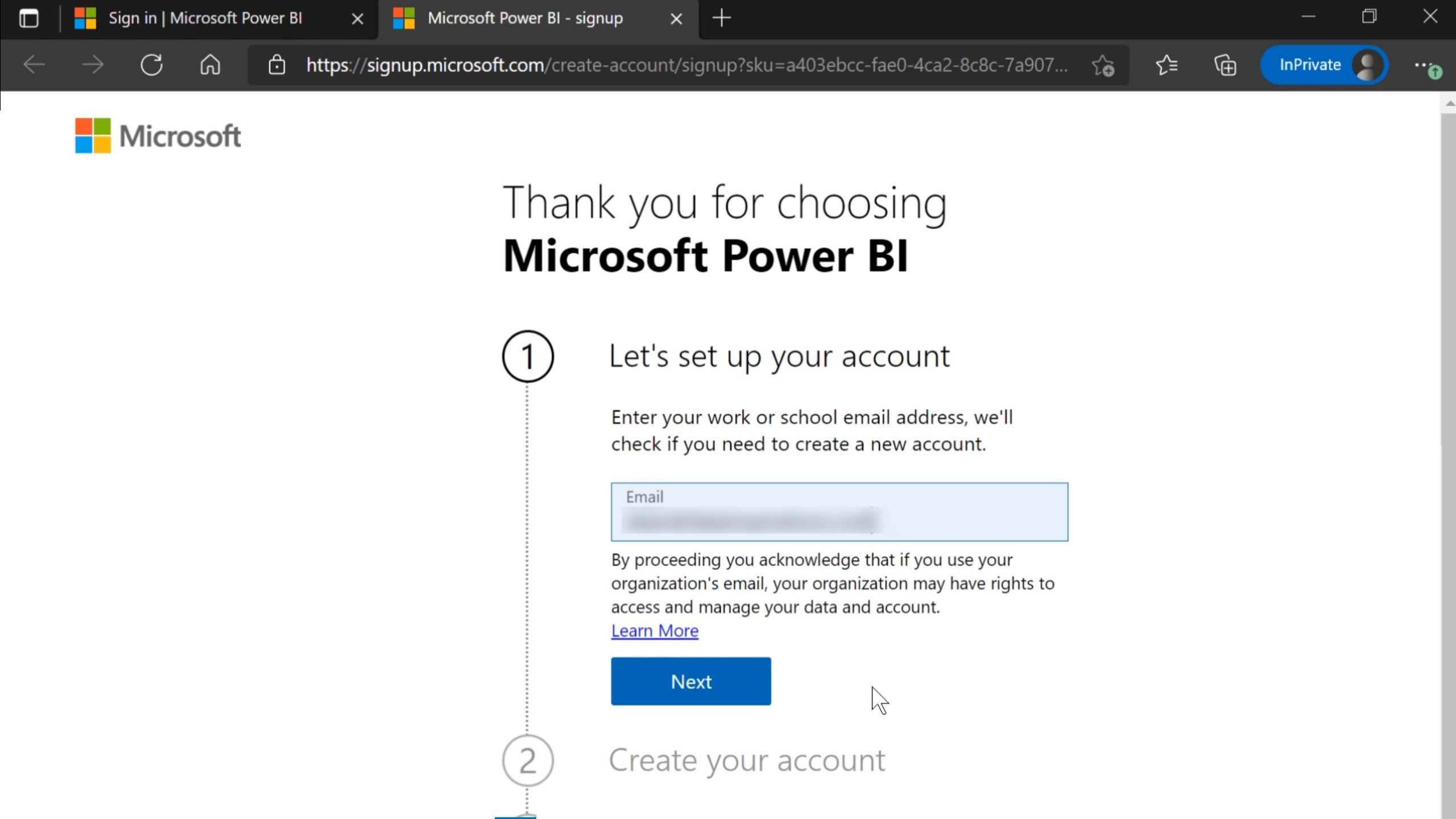
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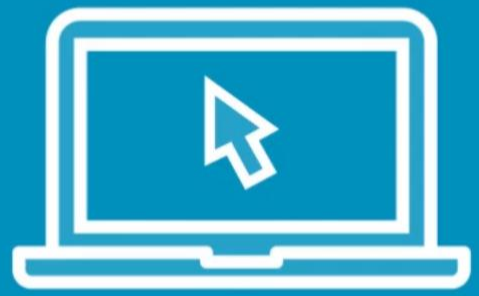
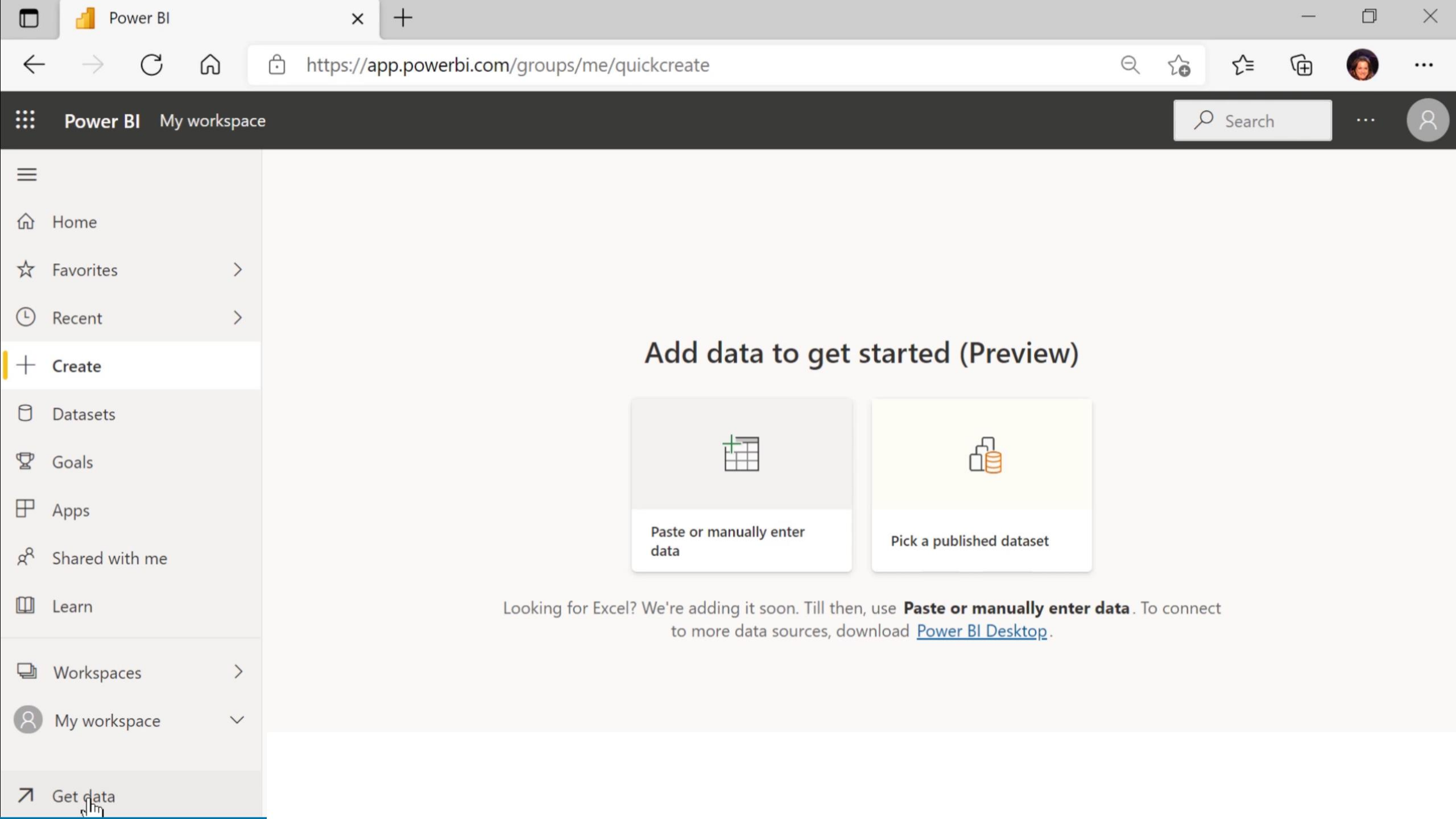
Microsoft Power BI - signup
https://signup.microsoft.com/create-account/signup?sku=a403ebcc-fae0-4ca2-8c8c-7a907...
InPrivate
Microsoft
Thank you for choosing
Microsoft Power BI
1
Let's set up your account
Enter your work or school email address, we'll check if you need to create a new account.
Email
By proceeding you acknowledge that if you use your organization's email, your organization may have rights to access and manage your data and account.
Learn More
Next
2
Create your account

Demo



Upload the Customer Analysis.pbix file


Power BI
https://app.powerbi.com/groups/me/quickcreate
Power BI
My workspace
Search
Home
Favorites
Recent
Create
Datasets
Goals
Apps
Shared with me
Learn
Workspaces
My workspace
Get data
Add data to get started (Preview)
Paste or manually enter data
Pick a published dataset
Looking for Excel? We're adding it soon. Till then, use Paste or manually enter data. To connect to more data sources, download Power BI Desktop.

Power BI

https://app.powerbi.com/groups/me/getdata

Power BI My workspace

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Workspaces

My workspace

Get data

Get Data

Download Power BI Desktop for the best report-building experience

Discover content

My organization

Discover apps published by other people in your organization.

Get

Services

Choose apps from online services that you use.

Get

Create new content

Files

Bring in your reports, workbooks, or data from Excel, Power BI Desktop or CSV files.

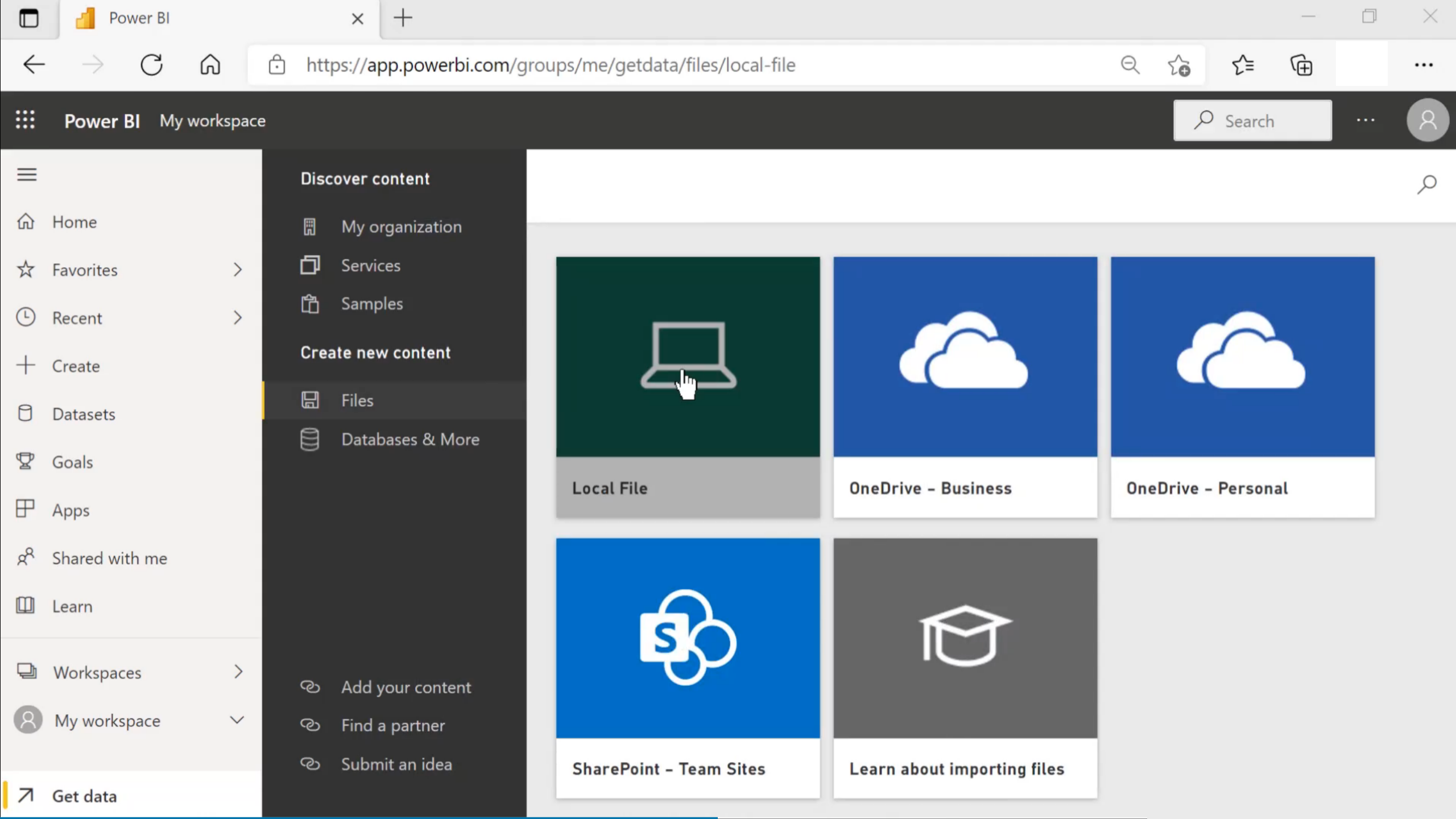
Get

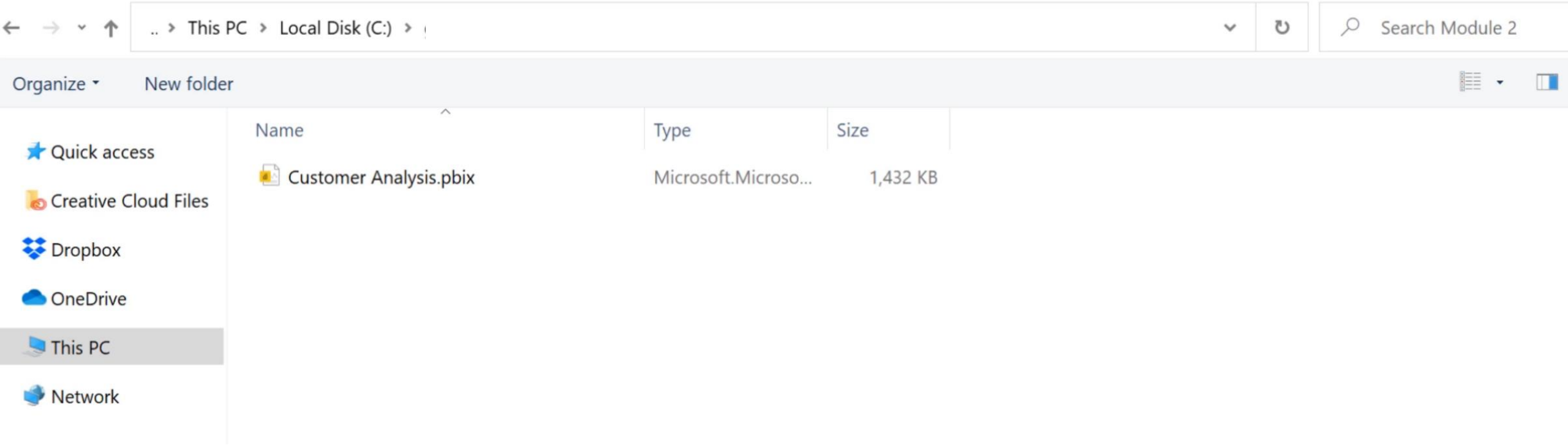
Files, Get

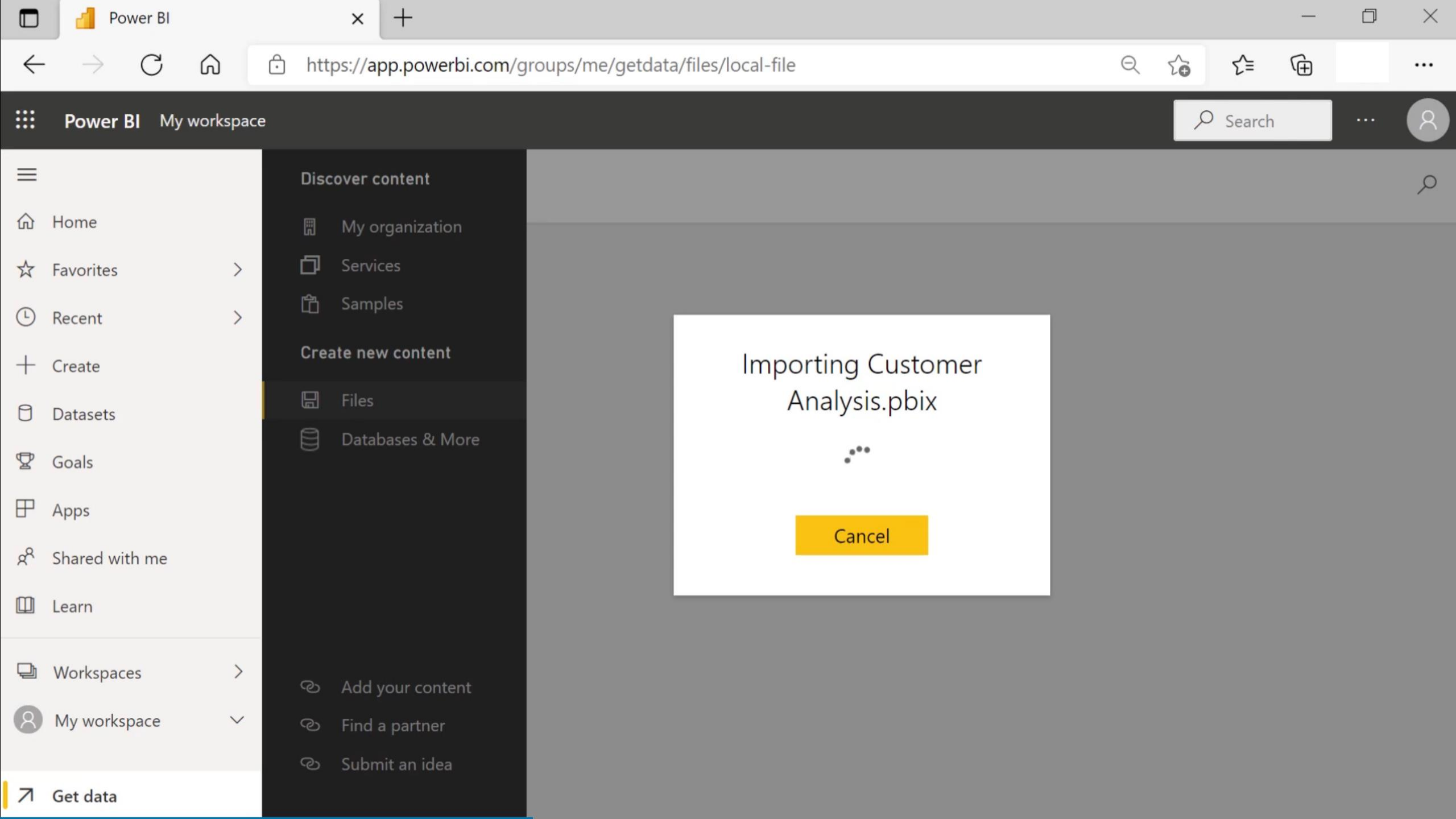
Databases

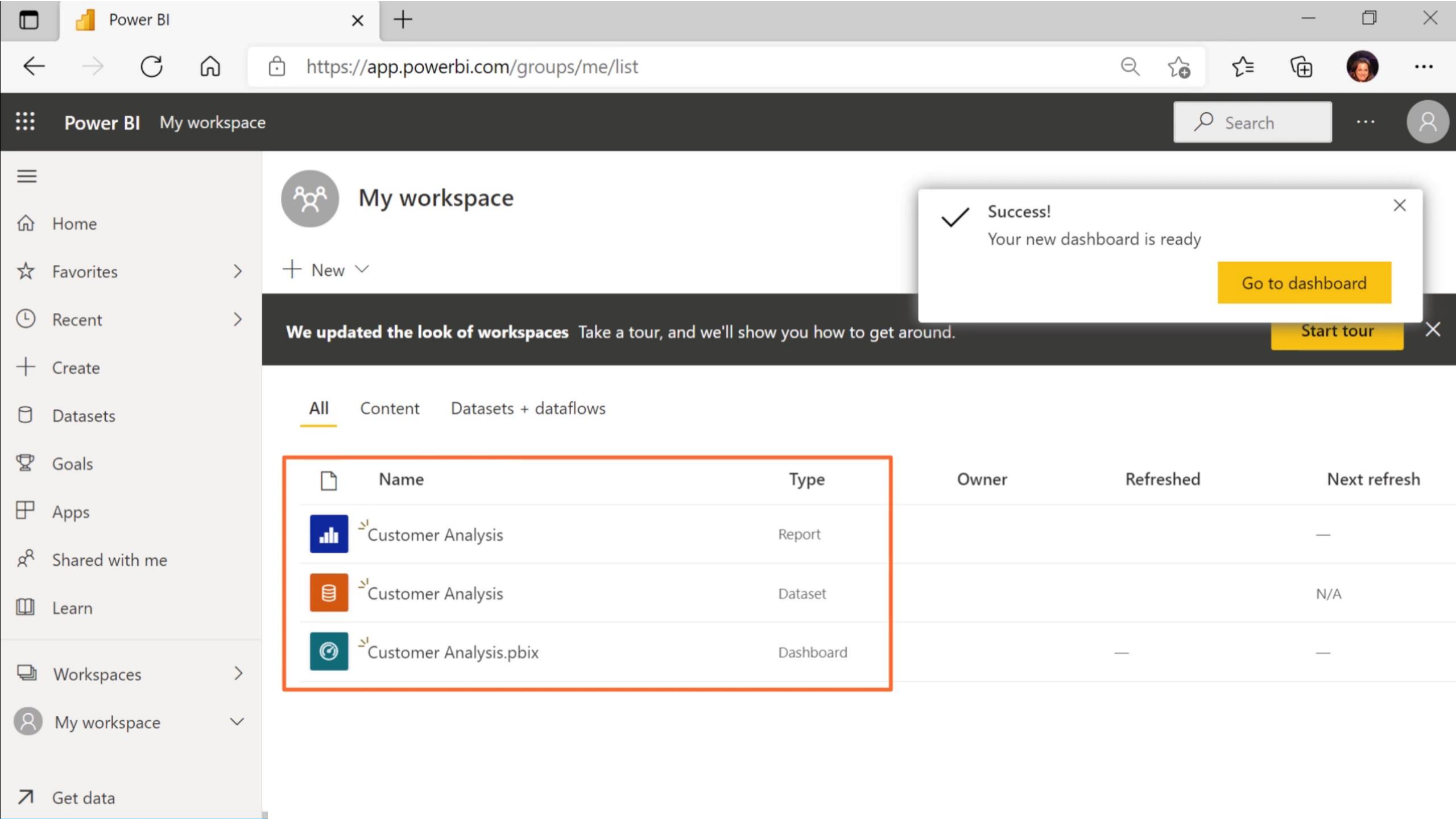
Use Power BI Desktop to connect to data in Azure SQL Database and more.

Get


Power BI
https://app.powerbi.com/groups/me/getdata/files/local-file
Power BI
My workspace
Search
Home
Favorites
Recent
Create
Datasets
Goals
Apps
Shared with me
Learn
Workspaces
My workspace
Get data
Discover content
My organization
Services
Samples
Create new content
Files
Databases & More
Add your content
Find a partner
Submit an idea
Local File
OneDrive – Business
OneDrive – Personal
SharePoint – Team Sites
Learn about importing files

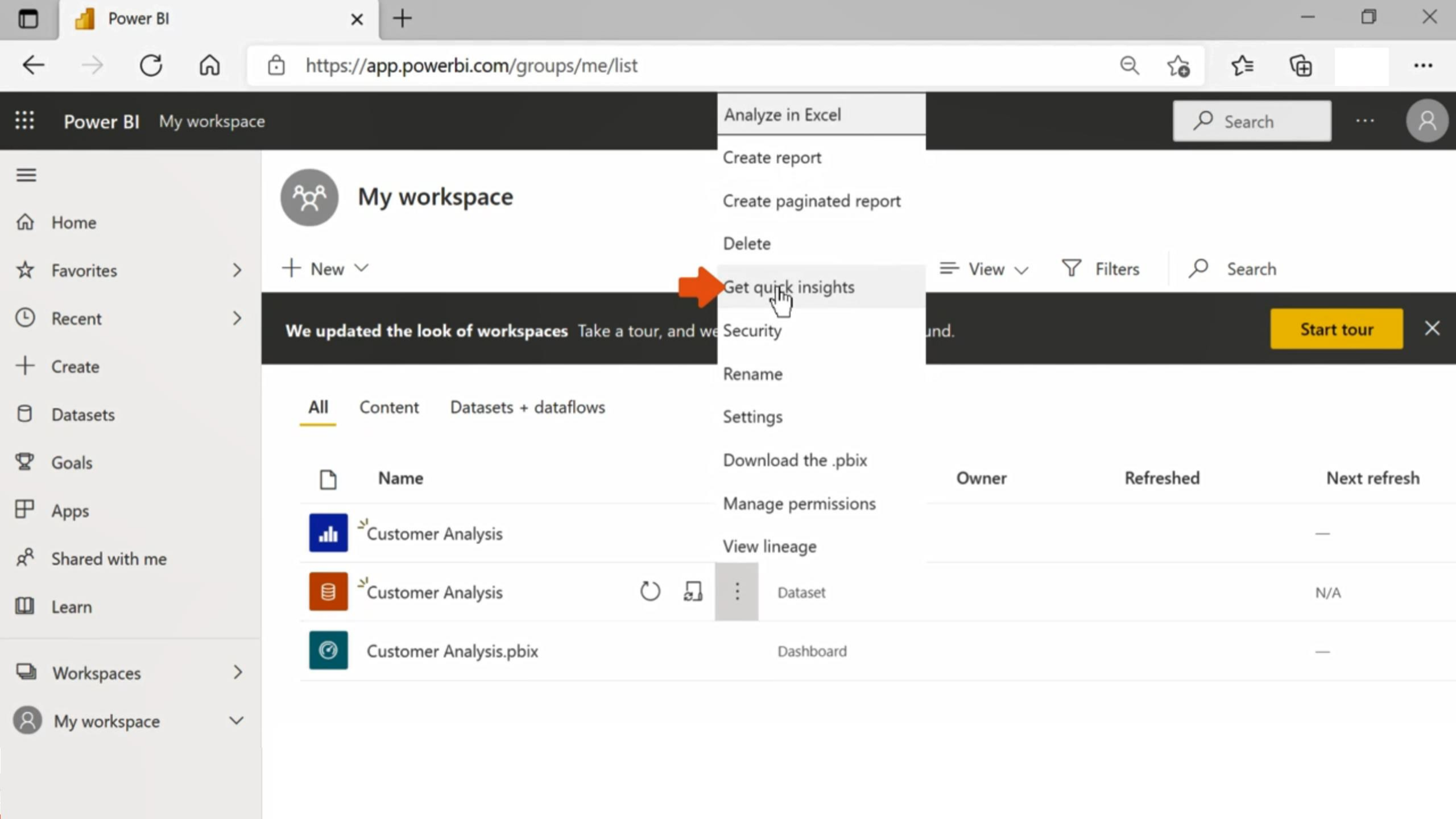

.. > This PC > Local Disk (C:) >
Search Module 2
Organize
New folder
Quick access
Creative Cloud Files
Dropbox
OneDrive
This PC
Network
Name
Type
Size
Customer Analysis.pbix
Microsoft.Microso...
1,432 KB


Power BI
https://app.powerbi.com/groups/me/getdata/files/local-file
Power BI
My workspace
Search
Home
Favorites
Recent
Create
Datasets
Goals
Apps
Shared with me
Learn
Workspaces
My workspace
Get data
Discover content
My organization
Services
Samples
Create new content
Files
Databases & More
Add your content
Find a partner
Submit an idea
Importing Customer Analysis.pbix
Cancel


Power BI
https://app.powerbi.com/groups/me/list
Power BI
My workspace
Search
Home
Favorites
Recent
Create
Datasets
Goals
Apps
Shared with me
Learn
Workspaces
My workspace
Get data
My workspace
New
Success!
Your new dashboard is ready
Go to dashboard
We updated the look of workspaces Take a tour, and we'll show you how to get around.
Start tour
All
Content
Datasets + dataflows
Name
Type
Owner
Refreshed
Next refresh
Customer Analysis
Report
—
Customer Analysis
Dataset
N/A
Customer Analysis.pbix
Dashboard
—
—

Demo

Using the Quick Insights feature online


Power BI
https://app.powerbi.com/groups/me/list
Power BI My workspace
Search
Home
Favorites
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Datasets
Goals
Apps
Shared with me
Learn
Workspaces
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My workspace
New
View
Filters
Search
We updated the look of workspaces Take a tour, and we
und.
Start tour
All
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Datasets + dataflows
Name
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Refreshed
Next refresh
Customer Analysis
Customer Analysis
Dataset
N/A
Customer Analysis.pbix
Dashboard
Analyze in Excel
Create report
Create paginated report
Delete
Get quick insights
Security
Rename
Settings
Download the .pbix
Manage permissions
View lineage

Power BI

https://app.powerbi.com/groups/me/insights/5dfc9c67-d474-4319-887b-003da76c3679

Power BI My workspace

Search

Home

Favorites

Recent

Create

Datasets

Goals

Apps

Shared with me

Learn

Workspaces

My workspace

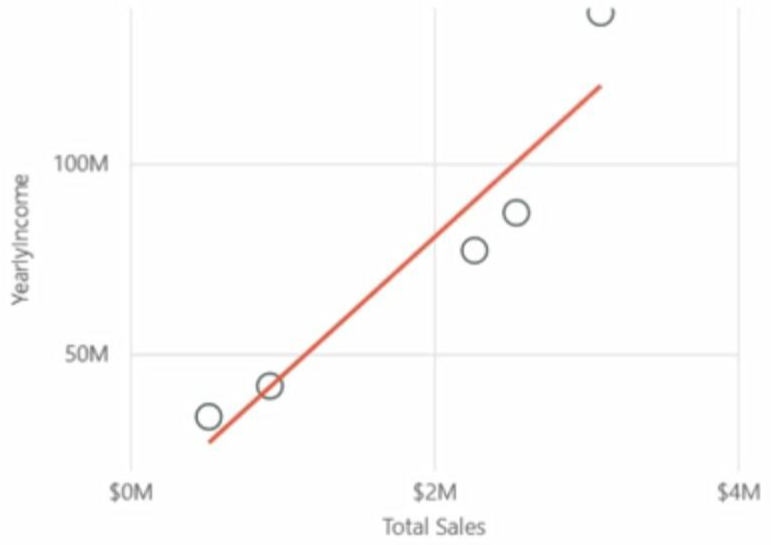
Get data

Quick Insights for Customer Analysis

A subset of your data was analyzed and the following insights were found. Learn more

Total Sales and YearlyIncome

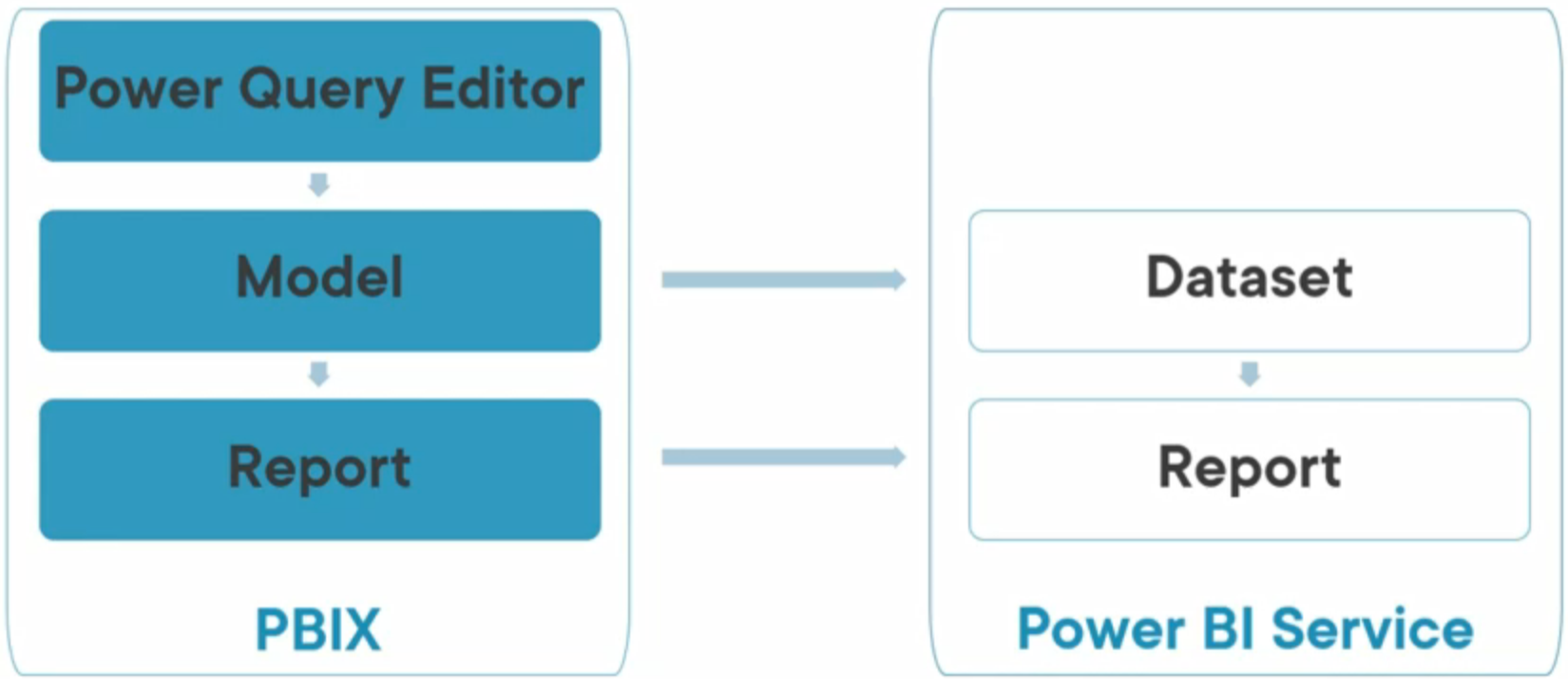
BY NUMBERCARSOWNED



There is a correlation between Total Sales and YearlyIncome .

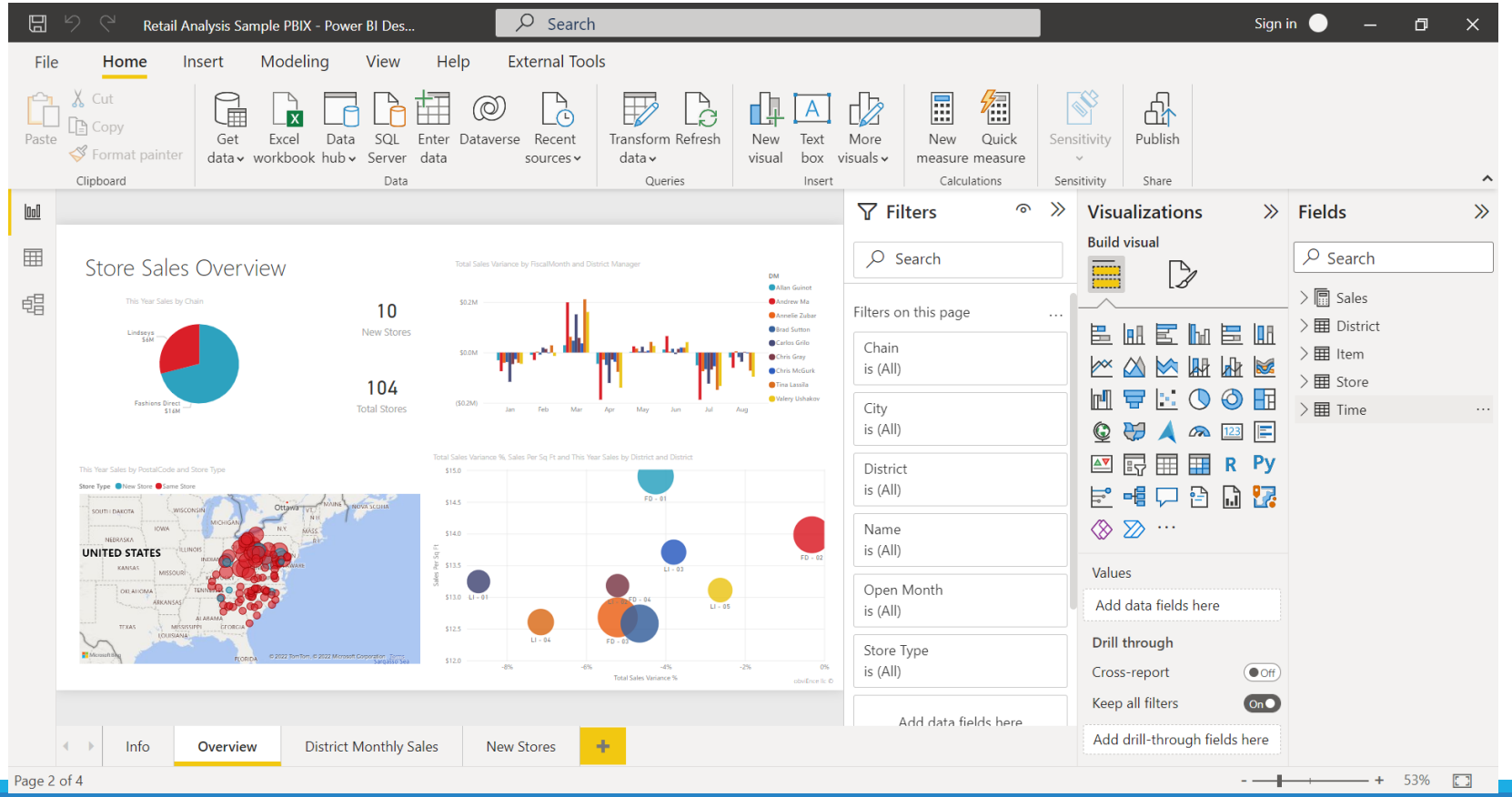
Count of PhoneNumber

Report From PBIX to Power BI Service



What is Power BI Desktop?

Power BI Desktop is a free application you install on your local computer that lets you connect to, transform, and visualize your data. With Power BI Desktop, you can connect to multiple different sources of data, and combine them (often called *modeling*) into a data model. This data model lets you build visuals, and collections of visuals you can share as reports, with other people inside your organization. Most users who work on business intelligence projects use Power BI Desktop to create reports, and then use the *Power BI service* to share their reports with others.



The most common uses for Power BI Desktop are as follows:

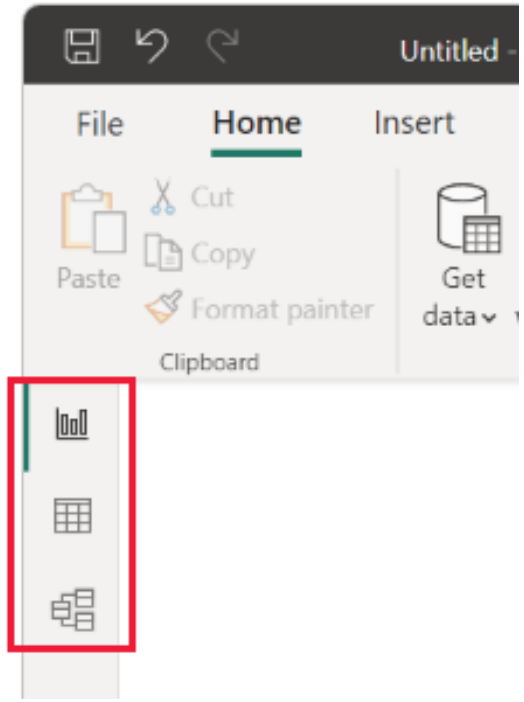
- Connect to data.
- Transform and clean data to create a data model.
- Create visuals, such as charts or graphs that provide visual representations of the data.
- Create reports that are collections of visuals on one or more report pages.
- Share reports with others by using the Power BI service.

People who are responsible for such tasks are often considered *data analysts* (sometimes referred to as *analysts*) or business intelligence professionals (often referred to as *report creators*). Many people who don't consider themselves an analyst or a report creator use Power BI Desktop to create compelling reports, or to pull data from various sources. They can build data models, and then share the reports with their coworkers and organizations.

There are three views available in Power BI Desktop, which you select on the left side of the canvas. The views, shown in the order they appear, are as follows:

- **Report**: You create reports and visuals, where most of your creation time is spent.
- **Data**: You see the tables, measures, and other data used in the data model associated with your report, and transform the data for best use in the report's model.
- **Model**: You see and manage the relationships among tables in your data model.

The following image shows the three views, as displayed along the left side of the canvas:



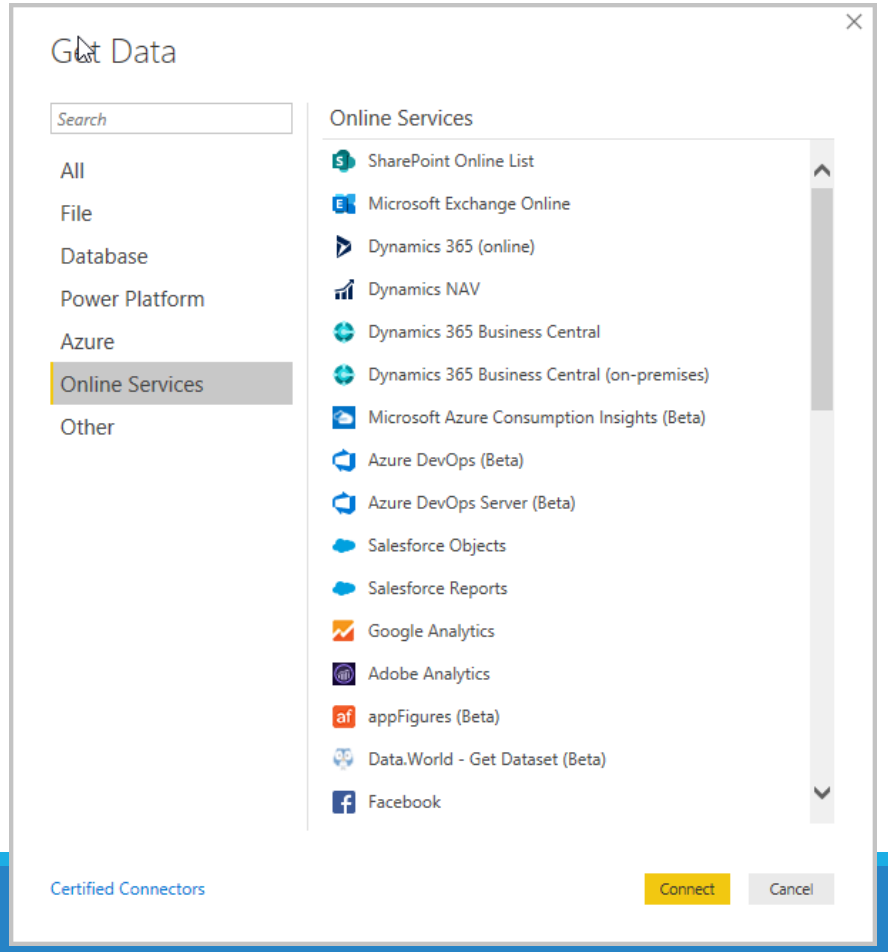
Connect to data

To get started with Power BI Desktop, the first step is to connect to data. There are many different data sources you can connect to from Power BI Desktop.

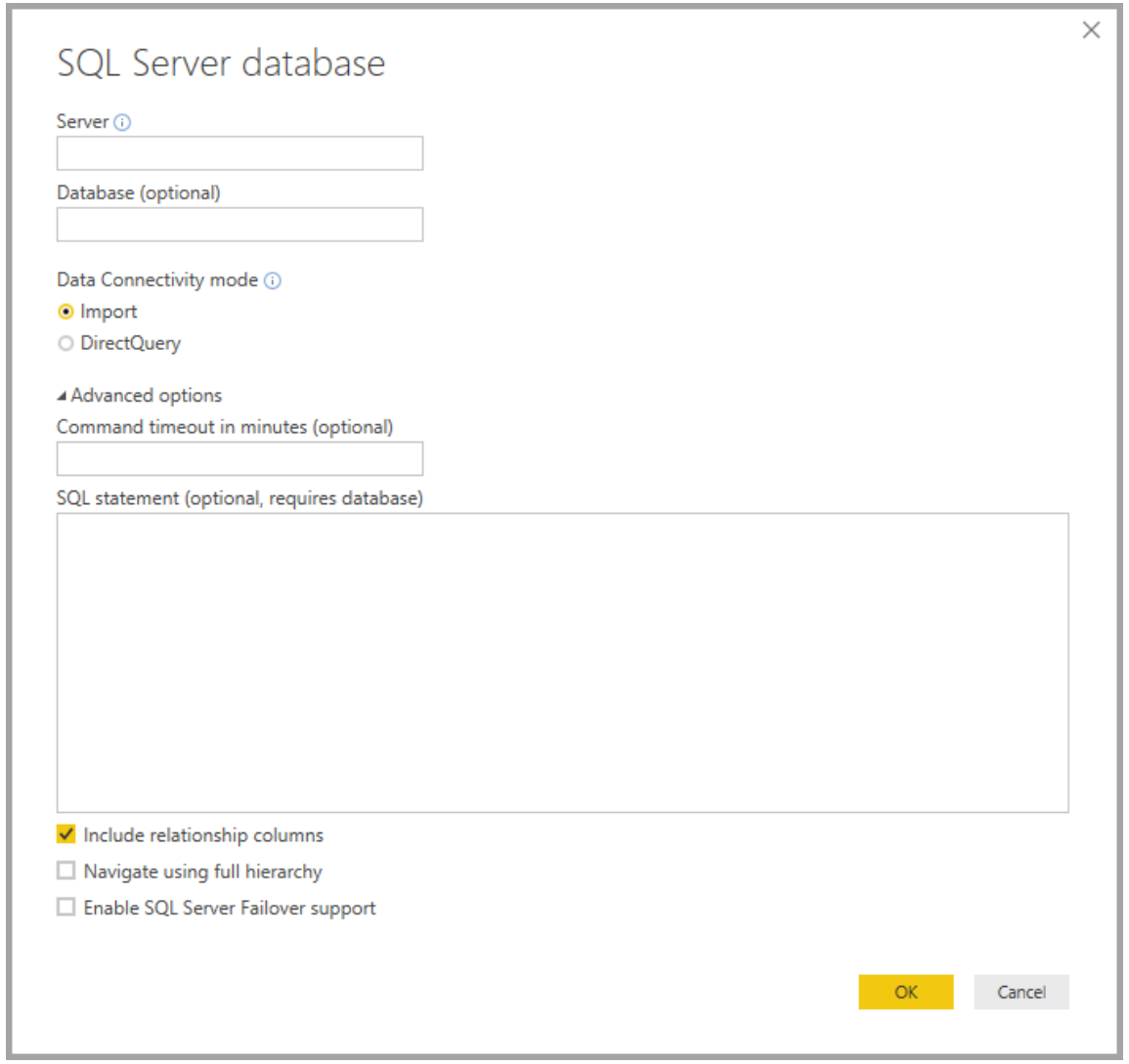
To connect to data:

1.From the **Home** ribbon, select **Get Data** > **More**.

2.The **Get Data** window appears, showing the many categories to which Power BI Desktop can connect.



When you select a data type, you're prompted for information, such as the URL and credentials, necessary for Power BI Desktop to connect to the data source on your behalf.

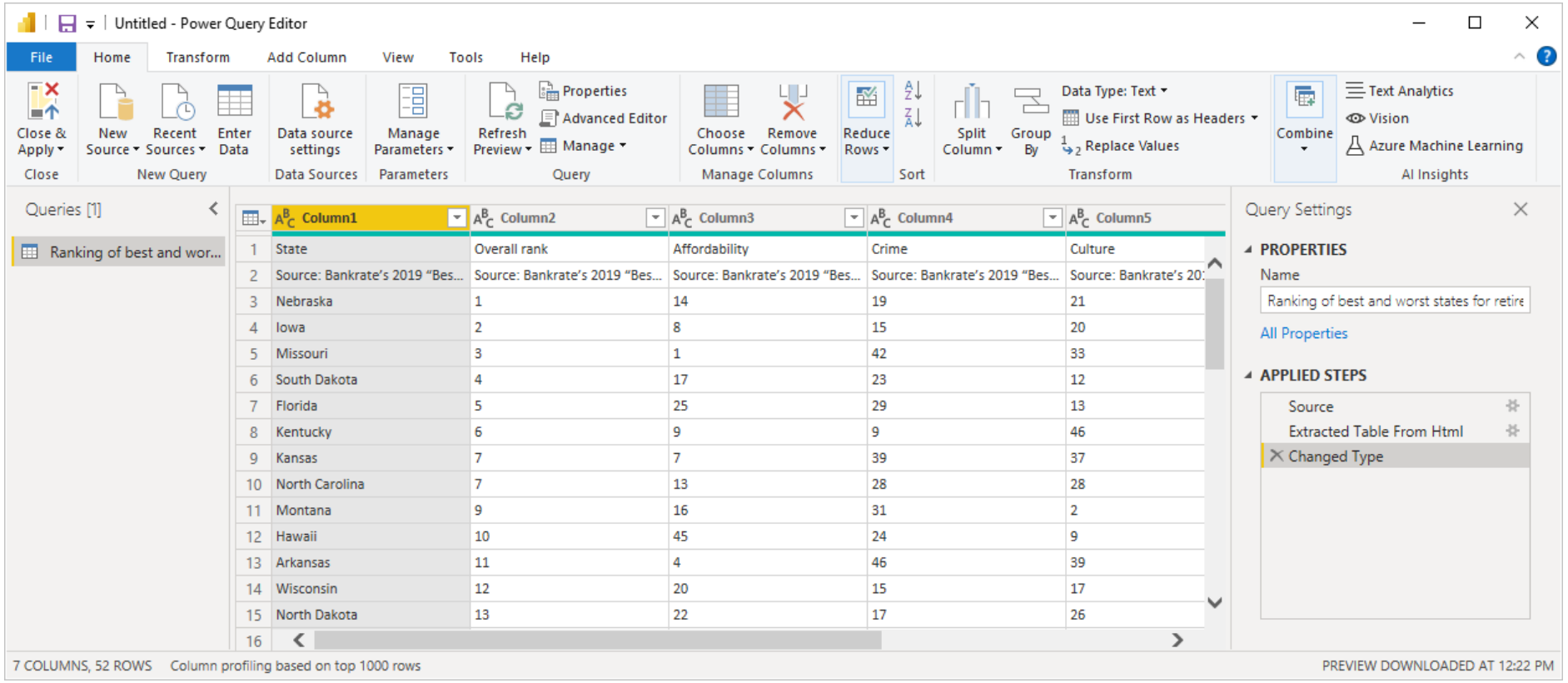


After you connect to one or more data sources, you may want to transform the data so it's useful for you.

Transform and clean data, create a model:

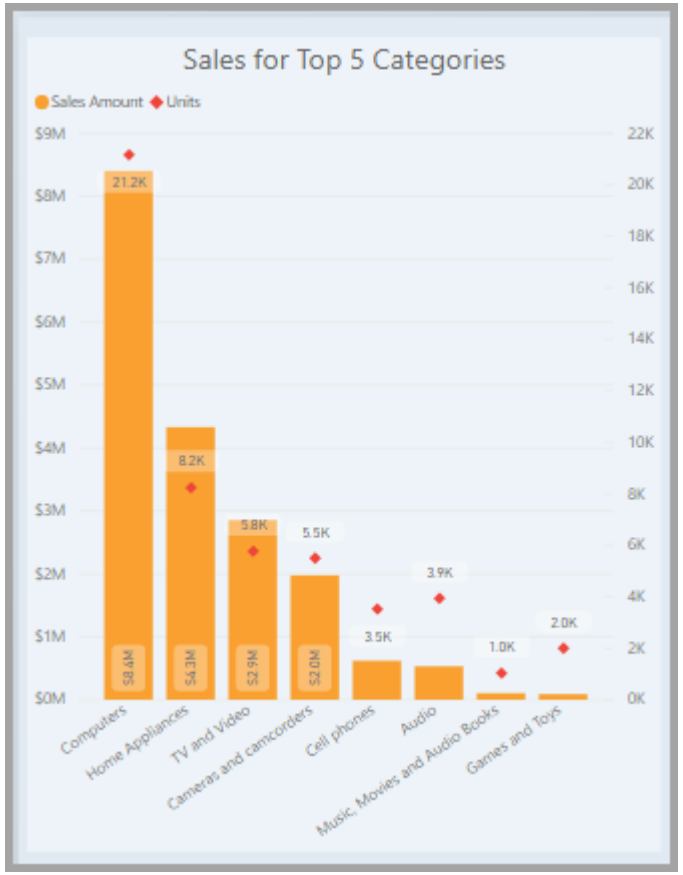
In Power BI Desktop, you can clean and transform data using the built-in Power Query Editor. With Power Query Editor, you make changes to your data, such as changing a data type, removing columns, or combining data from multiple sources. It's like sculpting: you start with a large block of clay (or data), then shave off pieces or add others as needed, until the shape of the data is how you want it.

To start Power Query Editor:
•On the **Home** ribbon, in the **Queries** section, select **Transform data**.
•The **Power Query Editor** window appears.



Create visuals:

After you have a data model, you can drag *fields* onto the report canvas to create *visuals*. A visual is a graphic representation of the data in your model. There are many different types of visuals to choose from in Power BI Desktop. The following visual shows a simple column chart.



To create or change a visual :

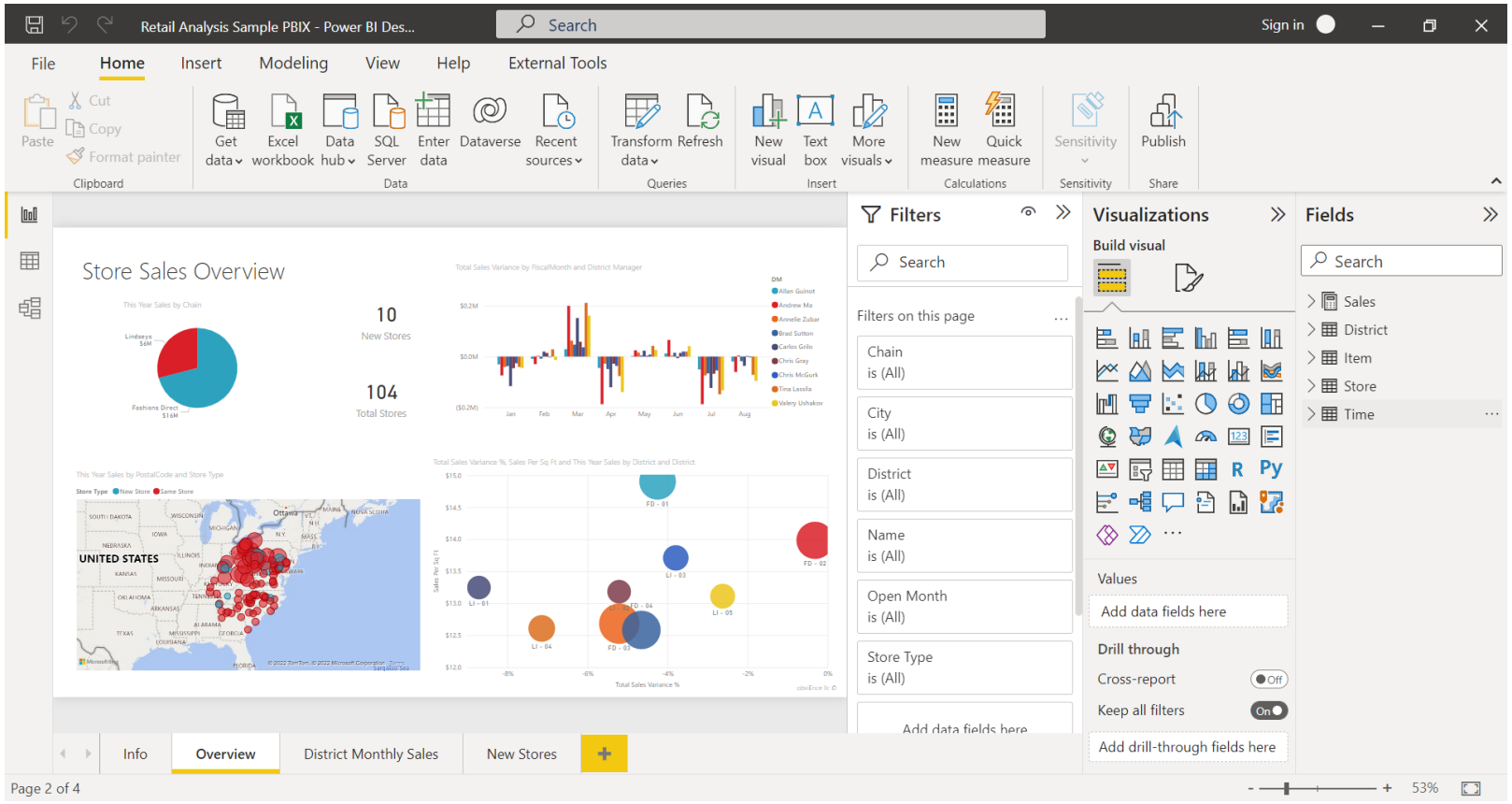
- From the **Visualizations** pane, select the **Build visual** icon.

Create reports:

More often, you'll want to create a collection of visuals that show various aspects of the data you've used to create your model in Power BI Desktop. A collection of visuals, in one Power BI Desktop file, is called a *report*. A report can have one or more pages, just like an Excel file can have one or more worksheets.

With Power BI Desktop you can create complex and visually rich reports, using data from multiple sources, all in one report that you can share with others in your organization.

In the following image, you see the first page of a Power BI Desktop report, named **Overview**, as seen on the tab near the bottom of the image.

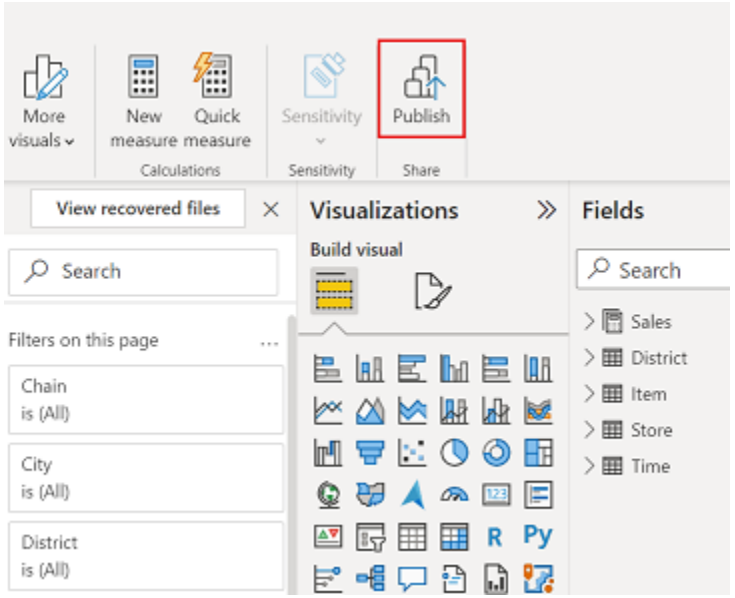


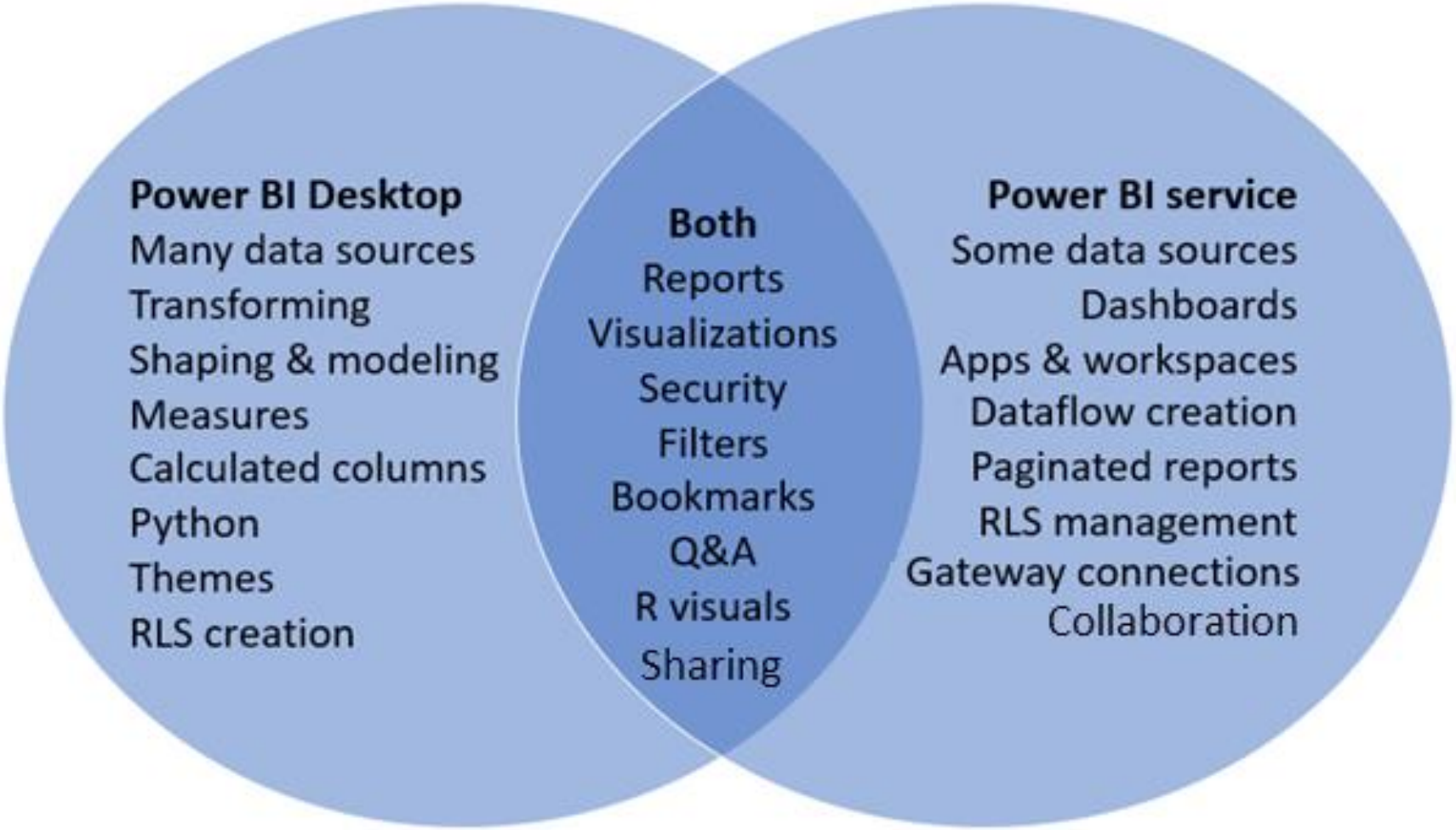
Share reports

After a report is ready to share with others, you can *publish* the report to the Power BI service, and make it available to anyone in your organization who has a Power BI license.

To publish a Power BI Desktop report:

1.Select **Publish** from the **Home** ribbon.




Power BI Desktop
Many data sources
Transforming
Shaping & modeling
Measures
Calculated columns
Python
Themes
RLS creation
Both
Reports
Visualizations
Security
Filters
Bookmarks
Q&A
R visuals
Sharing
Power BI service
Some data sources
Dashboards
Apps & workspaces
Dataflow creation
Paginated reports
RLS management
Gateway connections
Collaboration