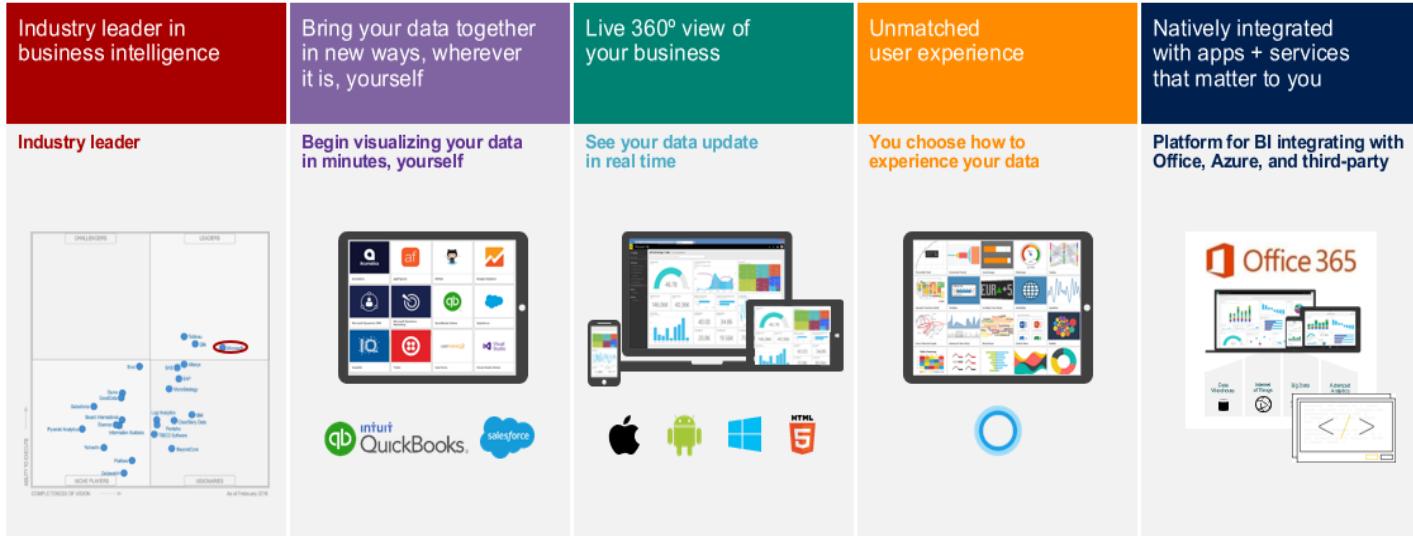
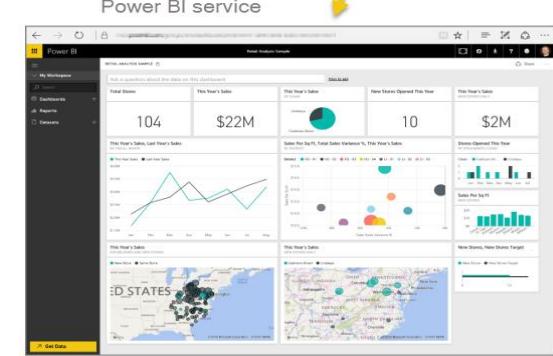
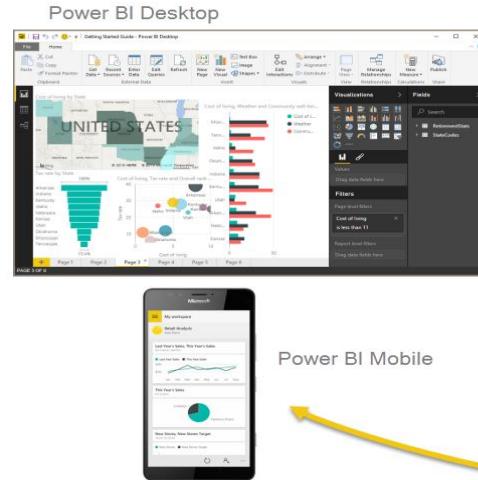


Power BI at a Glance

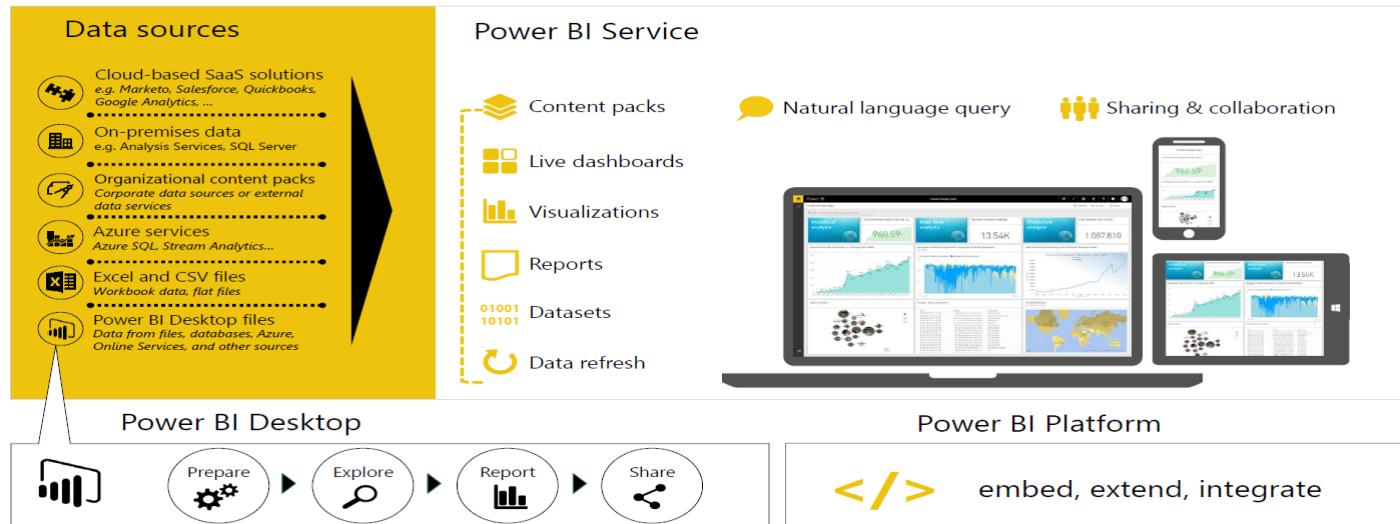
Power BI : Business Intelligence for Everyone



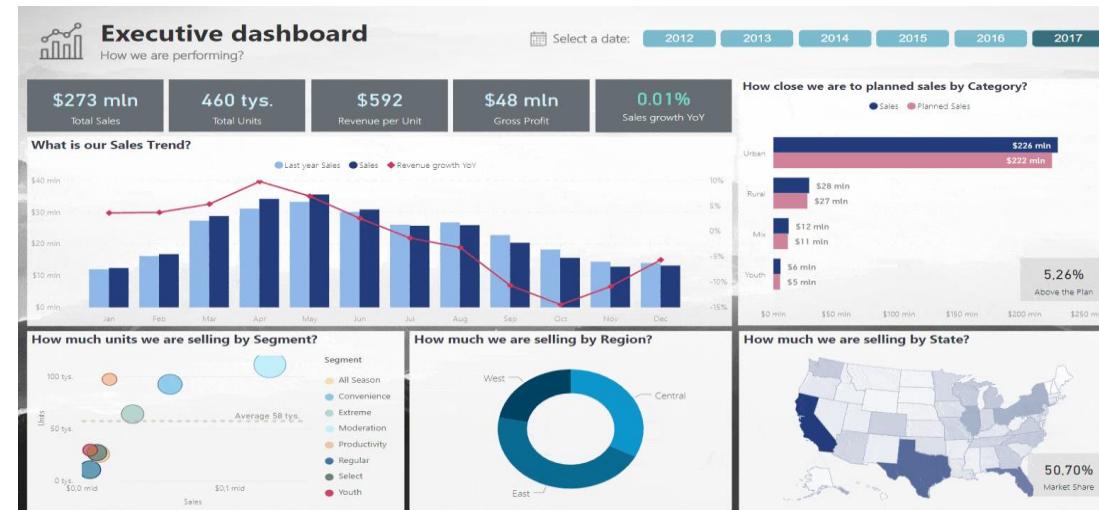
Major Parts of Power BI



Power BI Overview

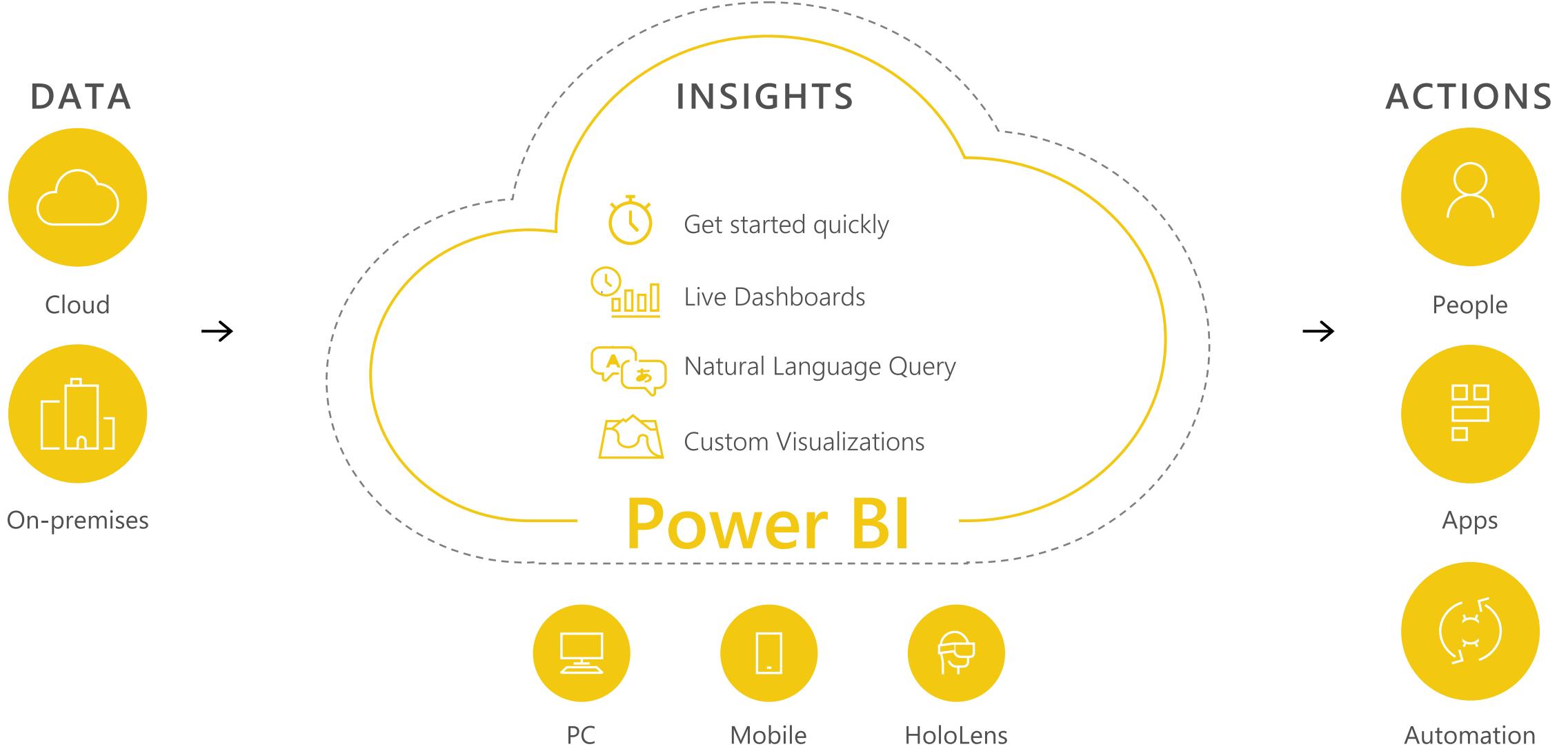


Power BI Analysis Dashboard



Power BI: experience your data

Any data, any way, anywhere



Power BI: Business Intelligence for Everyone

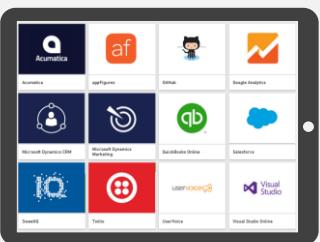
Industry leader in business intelligence

Industry leader



Bring your data together in new ways, wherever it is, yourself

Begin visualizing your data in minutes, yourself



qb intuit QuickBooks salesforce

Live 360° view of your business

See your data update in real time



Unmatched user experience

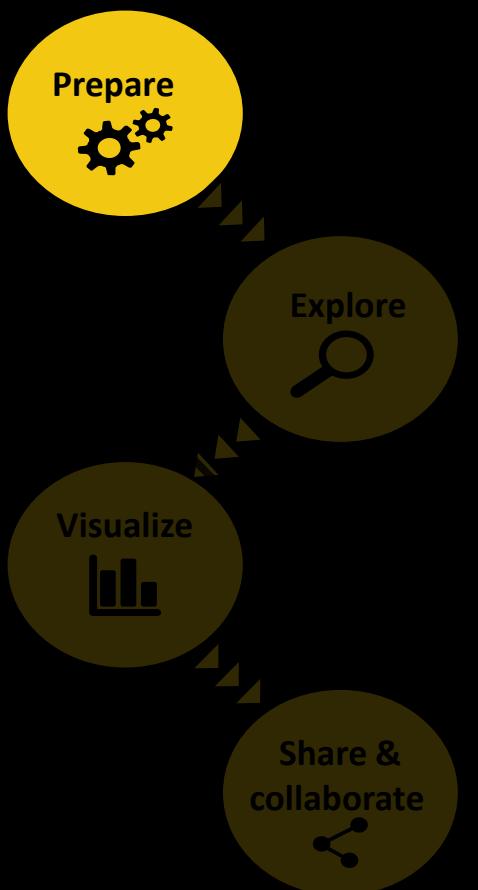
You choose how to experience your data



Natively integrated with apps + services that matter to you

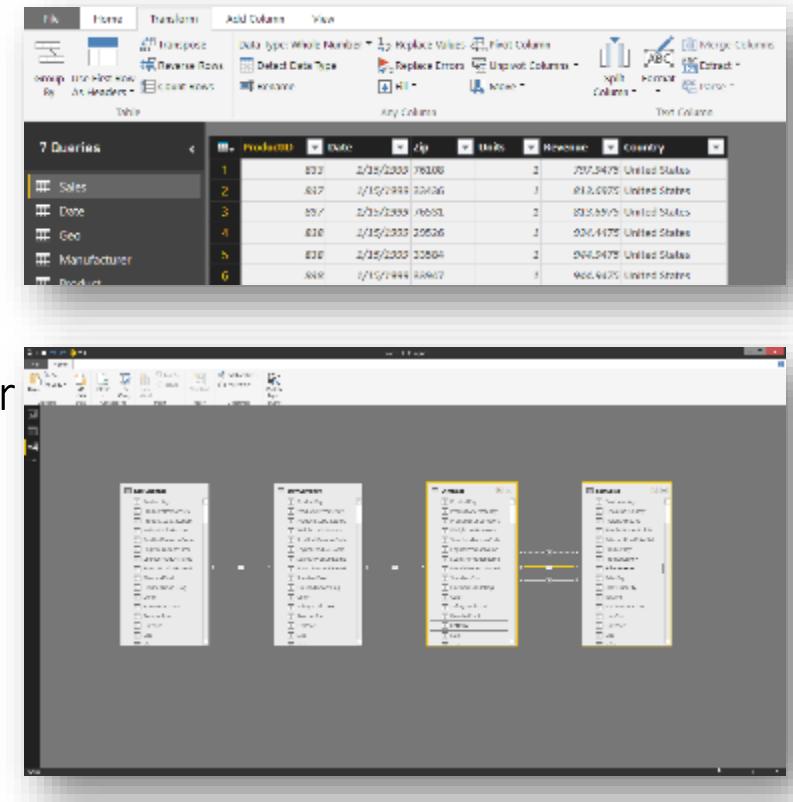
Platform for BI integrating with Office, Azure, and third-party

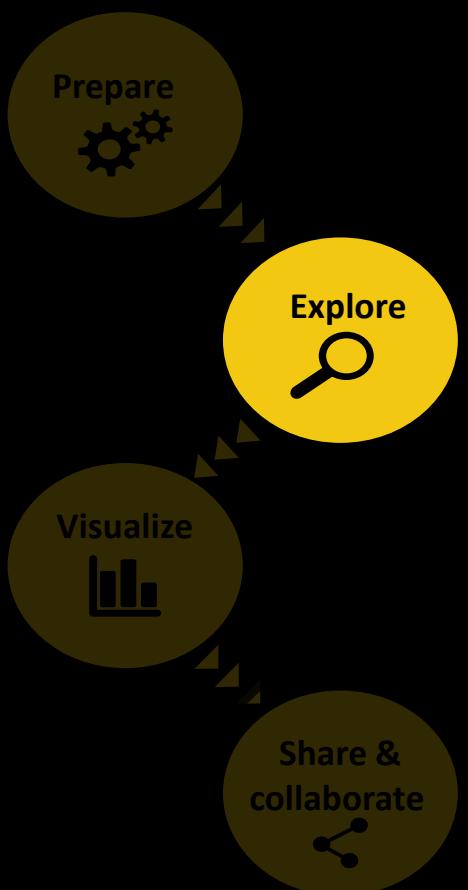




Clean and mash-up your DATA

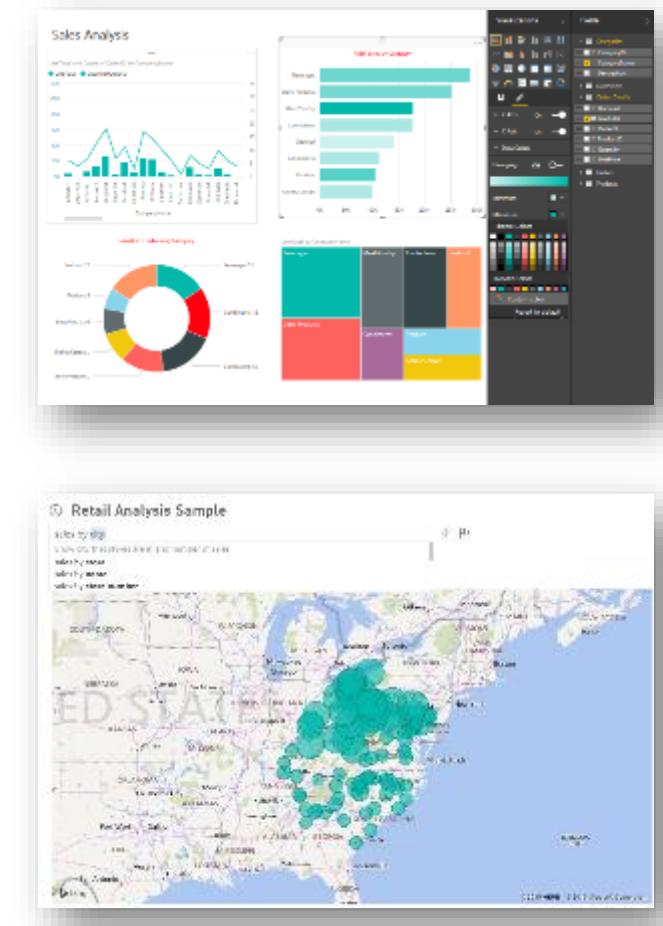
- Consolidate data from a broad range of sources
- Transform data to fit your needs using intuitive UI
- Define calculations to generate new fields for use in reports
- Develop advanced analytics using a combination of measures and relationships





- Explore data in a variety of ways and across multiple visualizations using drag and drop canvas
- Dig deeper into your reports
- Leverage Quick Insights to find insights in your data
- Ask questions of your data in natural language with Q&A

Explore your DATA

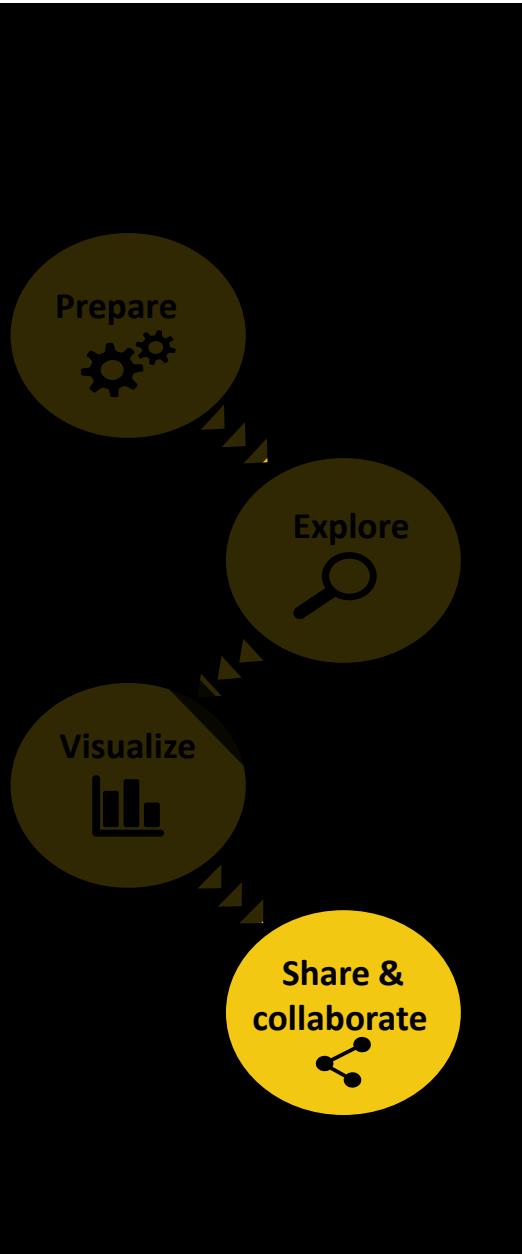




- Visualize data in a variety of ways
 - Growing number of visualization types
 - Donuts, basic area, waterfall, filled maps, tree maps, funnel, gauges combo charts and more
 - Custom visuals available from Power BI Visuals Gallery (visuals.powerbi.com)
 - Tools to develop, test, package new custom visuals
 - Visualizations on report page are connected – select value in one visualization to change other visualizations
 - Full screen pop out mode for report visuals to show additional details

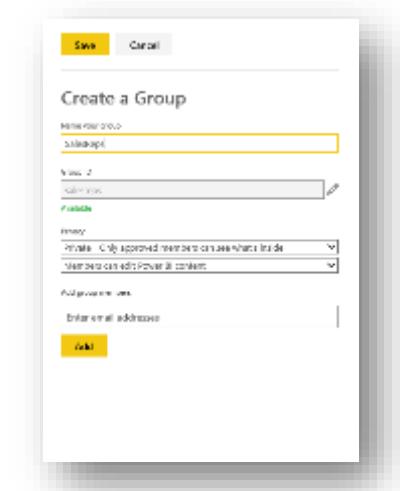
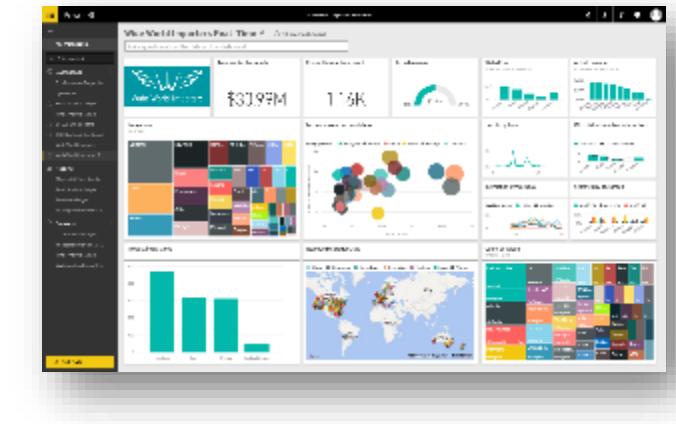
Visualize your DATA



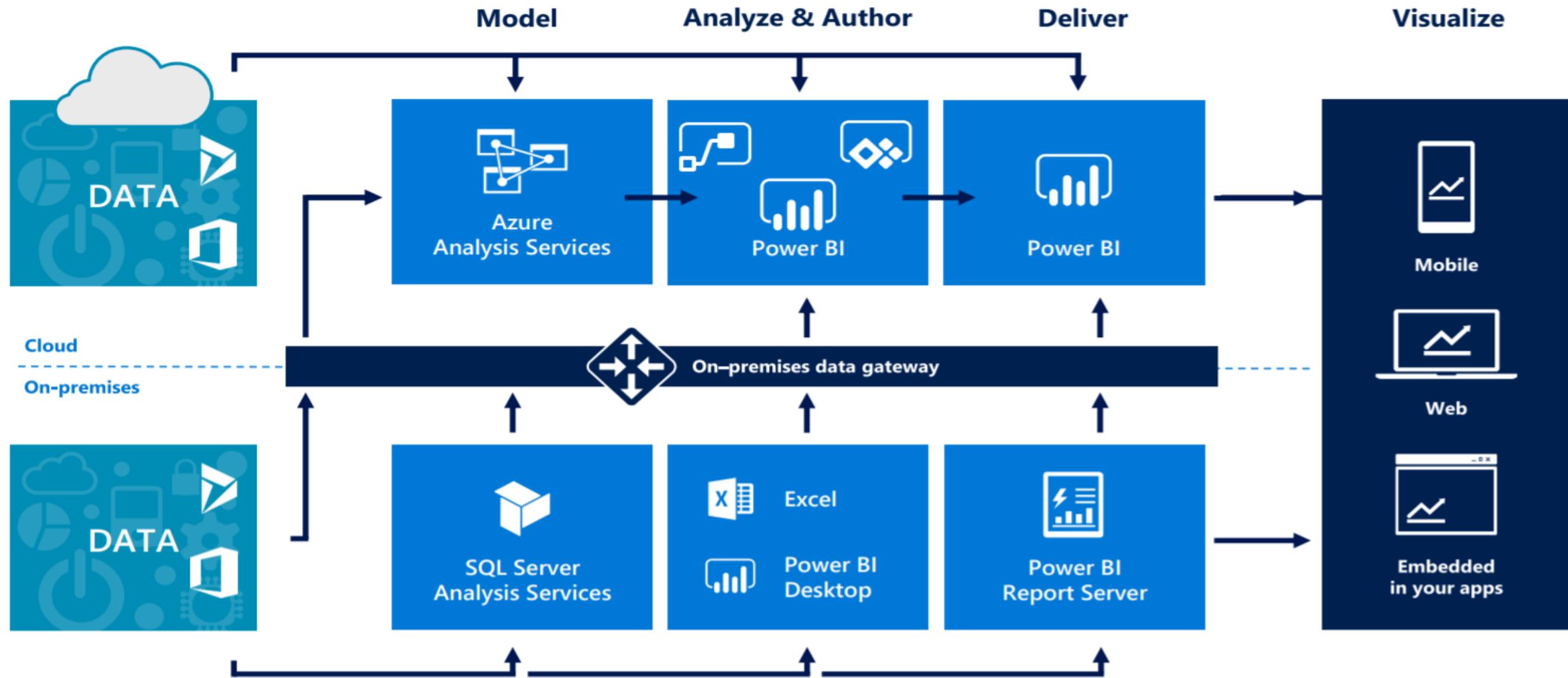


- Save Power BI Desktop report files and easily publish them to powerbi.com
- Access dashboards using native mobile apps for Windows, iOS and Android
- Share as appropriate with other Power BI users in your organization
- Easily embed interactive Power BI visualizations in blog posts, websites, through emails or social media With Power BI **Publish to web**

Bring your story to life with DATA



Microsoft Business Intelligence



Power BI Overview

Data sources

- Cloud-based SaaS solutions
e.g. Marketo, Salesforce, Quickbooks, Google Analytics, ...
- On-premises data
e.g. Analysis Services, SQL Server
- Organizational content packs
Corporate data sources or external data services
- Azure services
Azure SQL, Stream Analytics...
- Excel and CSV files
Workbook data, flat files
- Power BI Desktop files
Data from files, databases, Azure, Online Services, and other sources

Power BI Service

- Content packs
- Live dashboards
- Visualizations
- Reports
- Datasets
- Data refresh

Natural language query

Sharing & collaboration



Power BI Desktop



Power BI Platform



embed, extend, integrate

Power BI Data Sources

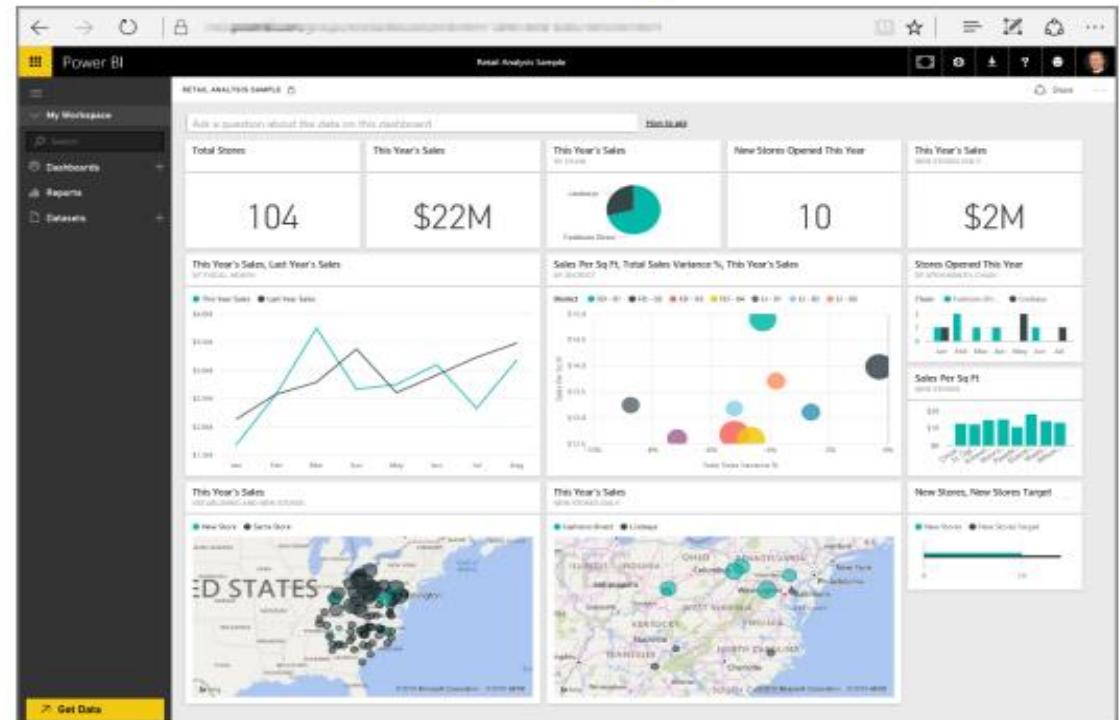
File	Database	Database	Online Services	Online Services	Other
Excel	IBM Netezza	Jethro (Beta)	SharePoint Online List	Planview Enterprise One - PRM (Beta)	Web
Text/CSV	MySQL database	InterSystems IRIS (Beta)	Microsoft Exchange Online	Planview Projectplace (Beta)	SharePoint list
XML	PostgreSQL database	Kyligence	Dynamics 365 (online)	QuickBooks Online (Beta)	OData Feed
JSON	Sybase database	MarkLogic	Dynamics NAV	Smartsheet	Active Directory
Folder	Teradata database	Azure	Dynamics 365 Business Central	SparkPost (Beta)	Microsoft Exchange
PDF	SAP HANA database	Azure SQL database	Dynamics 365 Business Central (on-premises)	Stripe (Beta)	Hadoop File (HDFS)
SharePoint folder	SAP Business Warehouse Application Server	Azure SQL Data Warehouse	Microsoft Azure Consumption Insights (Beta)	SweetIQ (Beta)	Spark
Power Platform	SAP Business Warehouse Message Server	Azure Analysis Services database	Azure DevOps (Beta)	Planview Enterprise One - CTM (Beta)	R script
Power BI datasets	Amazon Redshift	Azure Blob Storage	Azure DevOps Server (Beta)	Twilio (Beta)	Python script
Power BI dataflows	Impala	Azure Table Storage	Salesforce Objects	tyGraph (Beta)	ODBC
Common Data Service	Google BigQuery	Azure Cosmos DB	Salesforce Reports	Webtrends (Beta)	OLE DB
Database	Vertica	Azure Data Lake Storage Gen2 (Beta)	Google Analytics	Zendesk (Beta)	BI360 – Budgeting & Financial Reporting
SQL Server database	Snowflake	Azure Data Lake Storage Gen1	Adobe Analytics	Emigo Data Source (Beta)	Denodo
Access database	Essbase	Azure HDInsight (HDFS)	appFigures (Beta)	Intune Data Warehouse (Beta)	Information Grid (Beta)
SQL Server Analysis Services	AtScale cubes (Beta)	Azure HDInsight Spark	Data.World - Get Dataset (Beta)	Microsoft Graph Security (Beta)	Paxata
Oracle database	BI Connector	HDInsight Interactive Query	Facebook	TeamDesk (Beta)	QubolePresto (Beta)
IBM Db2 database	Dremio	Azure Data Explorer (Kusto)	GitHub (Beta)	Industrial App Store	Roamler (Beta)
IBM Informix database (Beta)	Exasol	Azure Cost Management (Beta)	MailChimp (Beta)	Quick Base	Workforce Dimensions (Beta)
	Indexima (Beta)		Marketo (Beta)	Dynamics 365 Customer Insights (Beta)	SurveyMonkey (Beta)
			Mixpanel (Beta)	Entersoft Business Suite (Beta)	Tenforce (Smart)List (Beta)
					Blank Query

The Parts of Power BI

Power BI Desktop



Power BI service



Power BI Mobile



Key Benefits & Differentiators



Fast deployment with a hybrid solution, ease of maintenance and 99.9% uptime SLA



Live connection to your data sources, on-premises and in the cloud



Keep your data secure, use groups to manage access and sharing



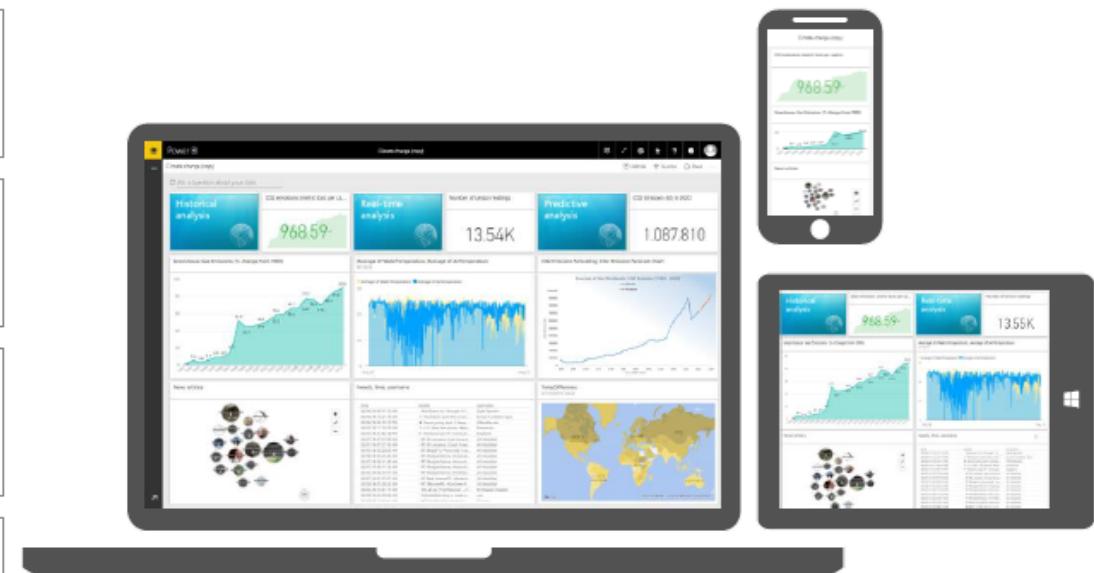
Integrated with familiar Microsoft products, utilizes infrastructure, scale & availability in Azure & O365



Open APIs for integration and new scenarios, e.g. real-time insights from devices



Content delivery (dashboards, reports, models) for ease of consumption across your organizations



Business Entities

Agencies	Agents	Agency Plans	Agency Visits	Agency Performance Summaries	Cases	Products	State Licenses	Quotes
Territory Manager Dashboard	Agency Management Overview	Activities	Territories	Households	Policy Holders	Policies	Claims	Cases
Applications	Leads Prospects	Opportunities	Activities	Start My Day Dashboard	Agencies	Agents	Agency Performance Summaries	Sales Dashboard
Policy Holders	Households	Agency Visit	Start My Day Agent Dashboard	Loss Prevention Surveys	Customer Accounts	Commercial Policies	Claims	Activities
Loss Prevention Dashboard	Survey History							

 Distribution Relationship Module

 Direct Channel Management

 Producer Productivity Suite

 Risk Management Module

Custom Workflows

Agency Visit Follow Ups	Case Process Flow	Case Escalations	Production Goal Notification	Agency Visit Automatic Creation	Automatic Case Creation	Agency Visit Process Flow
Policy Renewal	Licensing Expiration Notification	Agent Onboarding	Agency Onboarding	Policy Renewal	Automatic Case Creation	Overdue Leads List Population
Lead Conversion Process Flow	Case Escalations	Cross Sell Activities	Agency Visit Follow Up	Case Process Flow	Case Escalations	Automatic Case Creation
Agency Visit Process Flow	Policy Renewal	Automatic Survey Creation	Follow Up Activity Creation	Event Driven Survey Creation	Case Escalation	

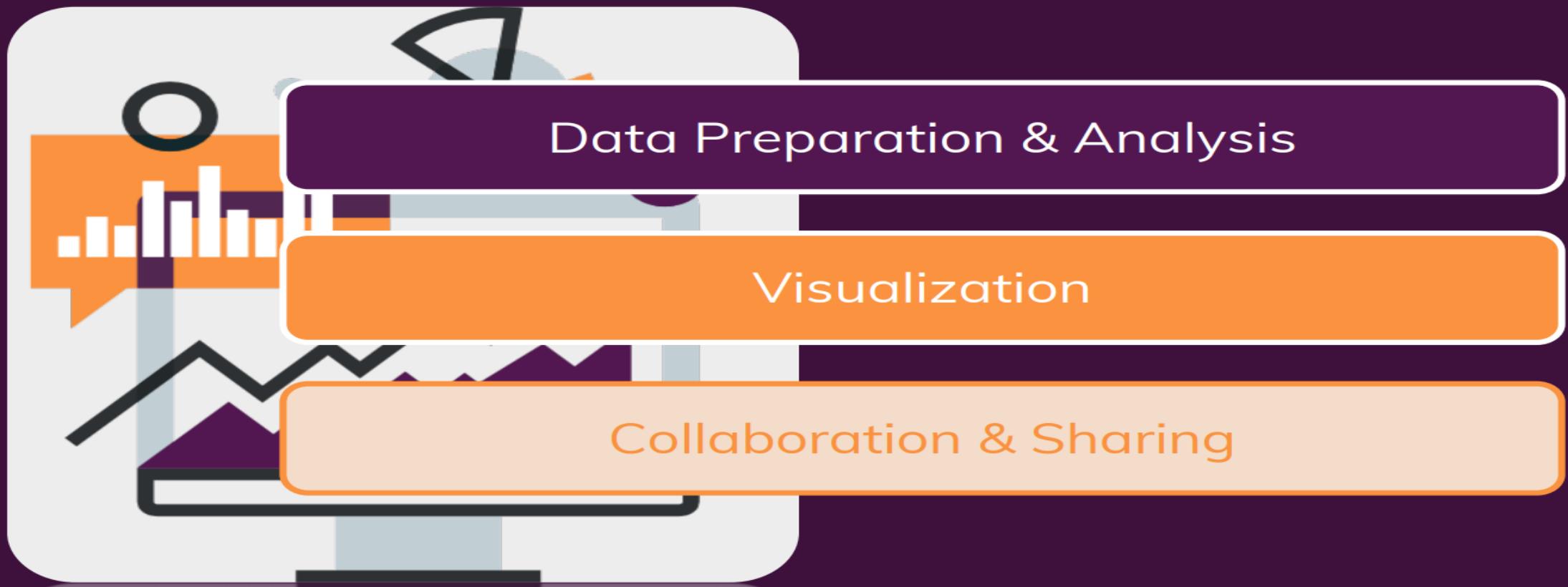
 Distribution Relationship Module

 Direct Channel Management

 Producer Productivity Suite

 Risk Management Module

Power BI Journey



Power BI Journey

Power BI Desktop



Windows Only

Power BI Service (Pro)



Website Login

Power BI Mobile



Mobile App



Datasets



Datasets



Visuals

Visuals

Reports

Reports

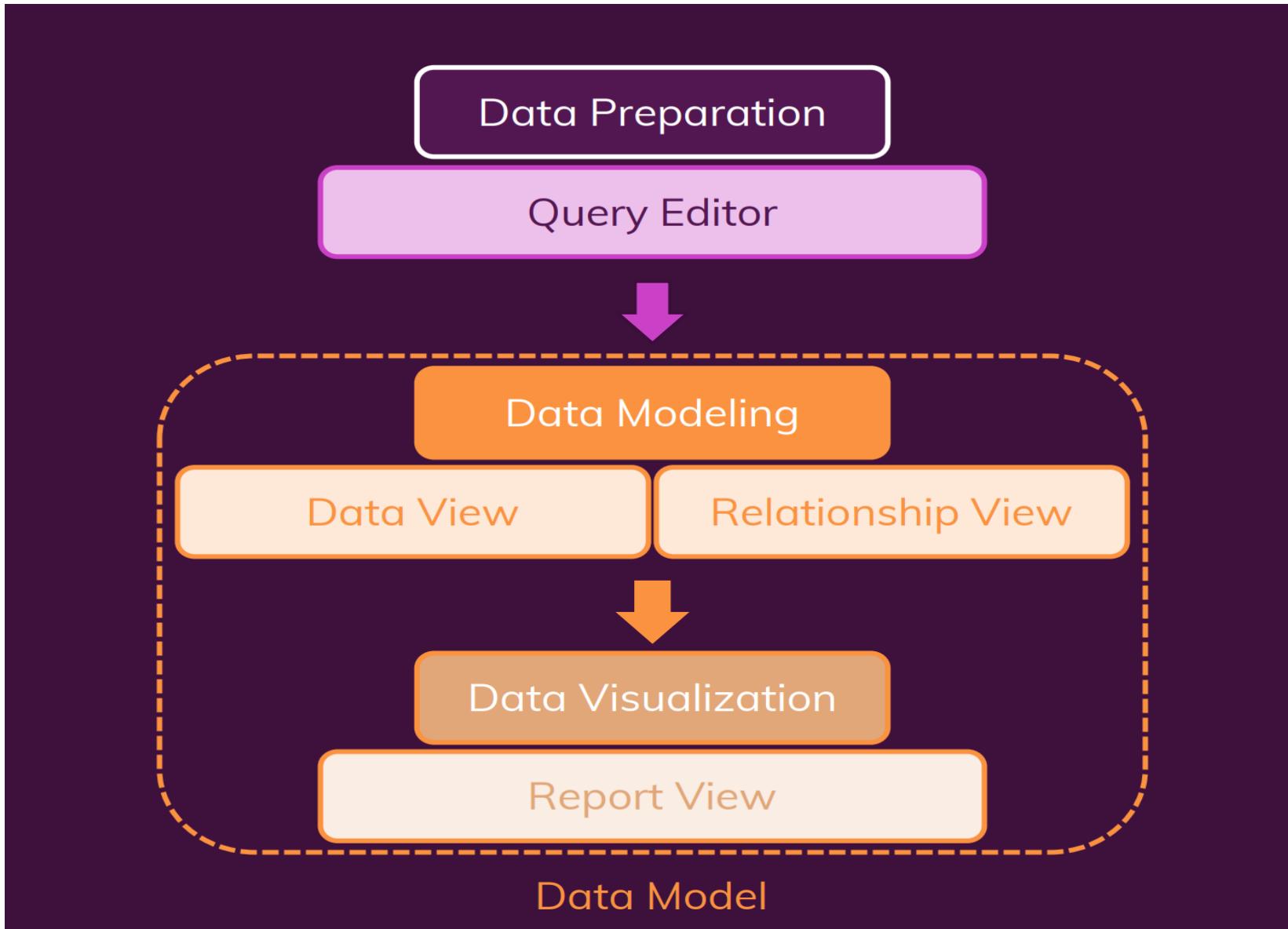
Dashboards

Collaboration

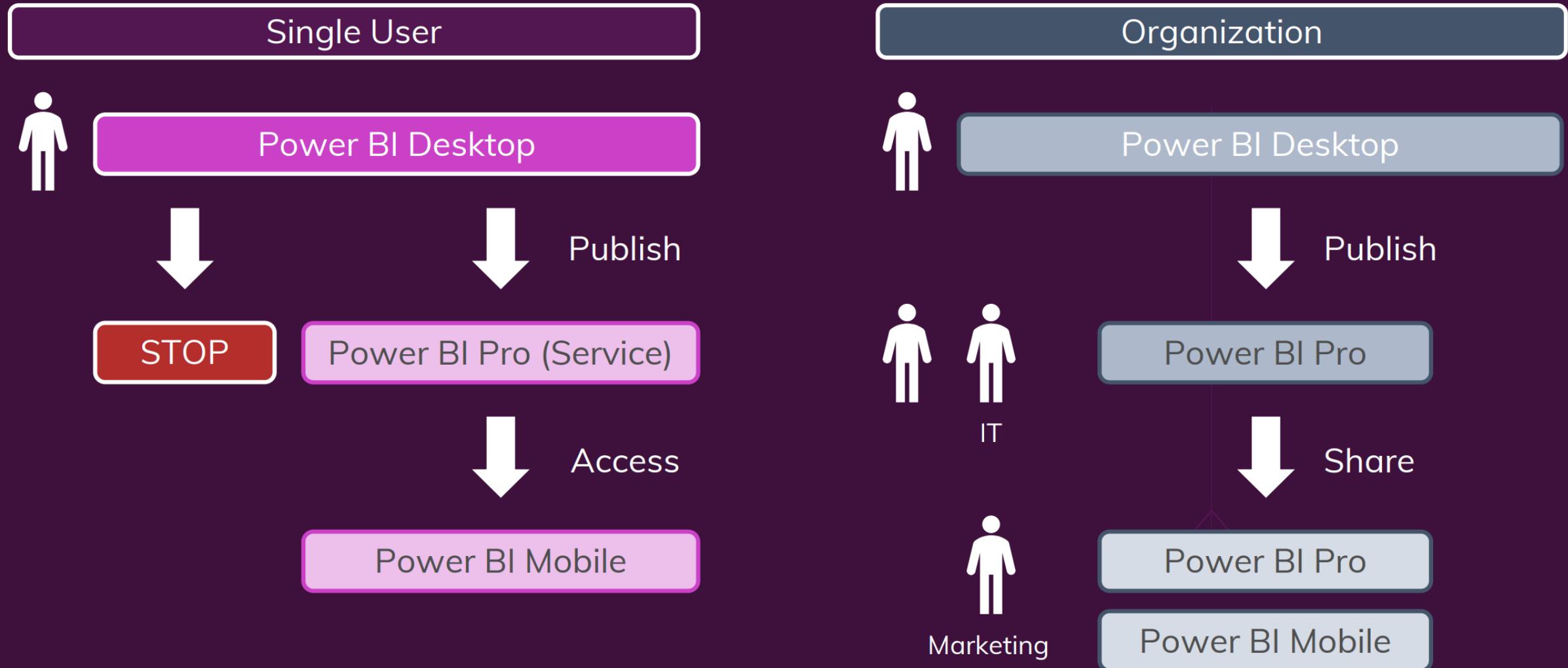
Share Results

Access Anywhere

Power BI Journey



Power BI Journey



Power BI Tools

1. Ribbon - Displays common tasks that are associated with reports and visualizations.

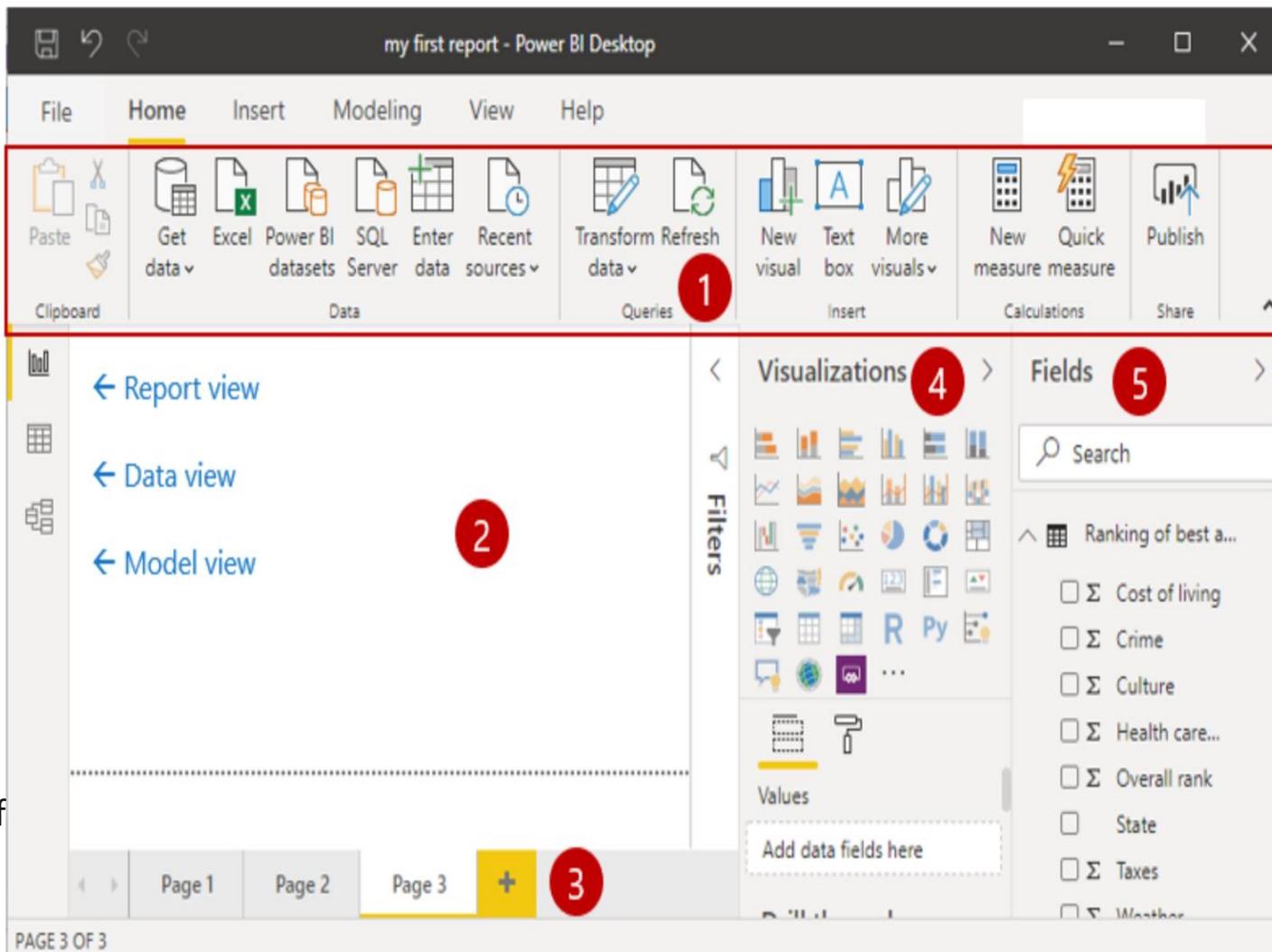
2. Report view, or canvas - Where visualizations are created and arranged.

1. The **Data view** allows you to view all of your data available in your report. This is an easy way to quickly check data types and validate data.
2. The **Model view** allows you to visually set the relationship between tables or elements. A relationship is where two or more tables are linked together because they contain related data. This enables users to run queries for related data across multiple tables.

3. Pages tab - Located along the bottom of the page, this area is where you would select or add a report page.

4. Visualizations pane - Where you can change visualizations, customize colours or axes, apply filters, drag fields, and more.

5. Fields pane - Where query elements and filters can be dragged onto the **Report view** or dragged to the **Filters** area of the Visualizations pane.



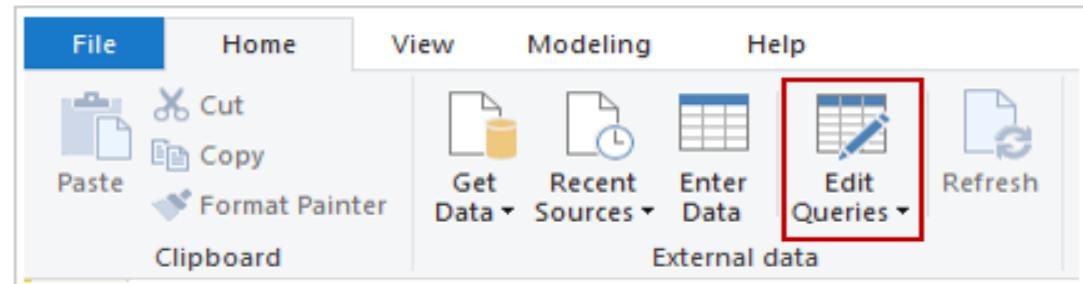
Power BI Tools

1.In the ribbon, the active buttons enable you to interact with the data in the query.

2.On the left pane, queries (one for each table, or entity) are listed and available for selecting, viewing, and shaping.

3.On the centre pane, data from the selected query is displayed and available for shaping.

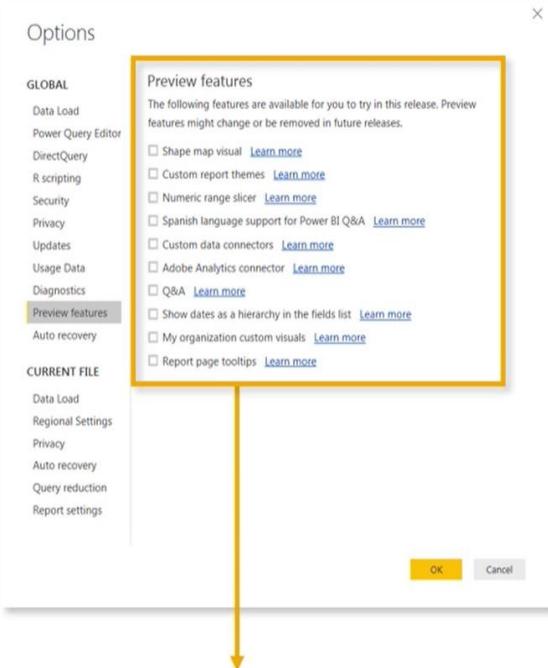
4.The **Query Settings** window lists the query's properties and applied steps.



A screenshot of the Microsoft Power BI desktop application. The ribbon is visible at the top with tabs like File, Home, Transform, Add Column, View, and Help. The 'Home' tab is selected. The 'Queries [1]' pane on the left shows a single query named 'Ranking of best and worst states for retire'. The main center pane displays a table with columns 'State' and 'Overall rank'. The first few rows show data for South Dakota, Utah, Idaho, New Hampshire, Florida, Montana, North Carolina, Wyoming, and Nebraska. A red circle labeled '1' is over the 'Data source settings' button in the ribbon. A red circle labeled '2' is over the 'Ranking of best and worst states for retire' query in the 'Queries' pane. A red circle labeled '3' is over the 'Overall rank' column header in the data grid. A red circle labeled '4' is over the 'Query Settings' pane on the right, which shows the 'PROPERTIES' section with the name 'Ranking of best and worst states for retire' and the 'APPLIED STEPS' section listing 'Source', 'Navigation', and 'Changed Type'.

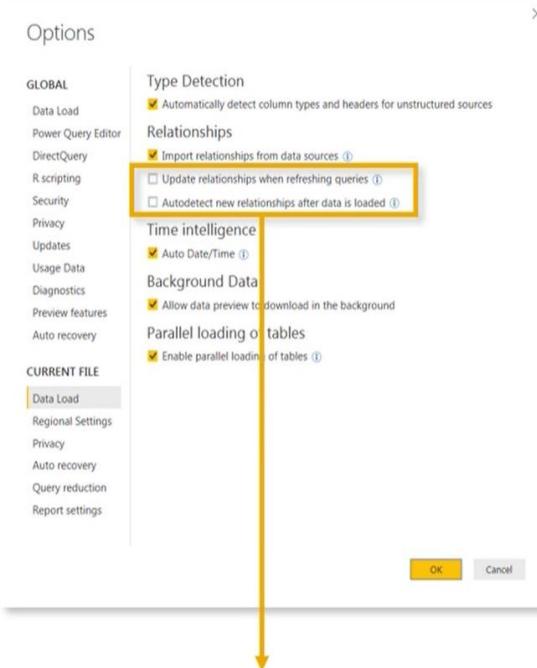
Settings

PREVIEW FEATURES



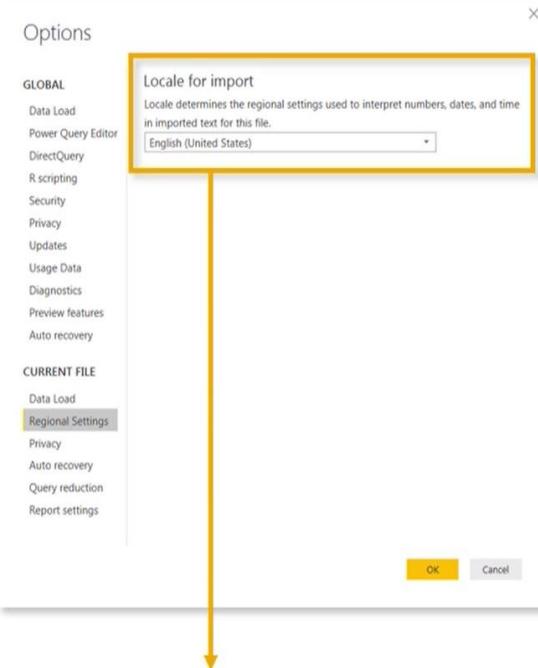
1) In the “Preview Features” tab, deselect any active features while you are taking the course

DATA LOAD



2) In the “Data Load” tab, deselect the “Update relationships” and “Autodetect new relationships after data is loaded” options

REGIONAL SETTINGS



3) In the “Regional Settings” tab, make sure to use the “English (United States)” locale for import

Data View

DATA VIEW TABS (CONTEXTUAL)

The diagram illustrates the three contextual tabs in the Data View ribbon, each corresponding to a different type of data object:

- Table tools:** Used for managing tables. It includes options for naming, marking as date table, managing relationships, and adding new measures or tables.
- Column tools:** Used for managing columns. It includes options for setting data types and formats, summarizing data, sorting, and grouping.
- Measure tools:** Used for managing measures. It includes options for calculating measures, determining home table, setting formats, and categories.

Yellow arrows point from specific fields in the "Fields" pane on the left to each of these tabs, demonstrating their contextual nature:

- An arrow points from "AW_Customer_Lo..." to the Table tools tab.
- An arrow points from "SubcategoryName" to the Column tools tab.
- An arrow points from "Bike Returns" to the Measure tools tab.

Fields Pane (Left):

- Search bar
- Tree view:
 - AW_Calendar_Lo...
 - AW_Customer_Lo...
 - AW_Product_Cate...** (highlighted)
 - AW_Product_Loo...
 - AW_Product_Sub...
 - ProductCategory...
 - ProductSubcateg...
 - SubcategoryName** (highlighted)
- AW_Returns
 - % of All Returns
 - ALL Returns
 - Bike Returns** (highlighted)
 - Prev Month Retur...

Table tools Tab (Top Left):

Buttons: Name (text input), Mark as date table, Manage relationships, New measure, Quick measure, New table, Calculations.

Table data:

CustomerKey	Prefix	FirstName	LastName	BirthDate	MaritalStatus	Gender	EmailAddress	AnnualIncome	TotalChildren
11206	Mr.	Blake	Flores	Friday, September 24, 1948	M	M	blake60@adventure-works.com	\$60,000	2
11214	Mr.	Charles	Miller	Monday, November 07, 1949	S	M	charles9@adventure-works.com	\$60,000	2
11227	Mr.	Marshall	Chavez	Sunday, August 12, 1951	S	M	marshall35@adventure-works.com	\$60,000	2

Column tools Tab (Top Middle):

Buttons: Name (text input), Format (dropdown), Summarization (dropdown), Data category (dropdown), Sort by column, Data groups, Manage relationships, New column.

Table data:

CustomerKey	Prefix	FirstName	LastName	BirthDate	MaritalStatus	Gender	EmailAddress	AnnualIncome	TotalChildren
11206	Mr.	Blake	Flores	Friday, September 24, 1948	M	M	blake60@adventure-works.com	\$60,000	2
11214	Mr.	Charles	Miller	Monday, November 07, 1949	S	M	charles9@adventure-works.com	\$60,000	2
11227	Mr.	Marshall	Chavez	Sunday, August 12, 1951	S	M	marshall35@adventure-works.com	\$60,000	2

Measure tools Tab (Bottom):

Buttons: Name (text input), Whole number, Data category (dropdown), New measure, Quick measure.

Table data:

OrderDate	StockDate	OrderNumber	ProductKey	CustomerKey	TerritoryKey	OrderLineItem	OrderQuantity	QuantityType
7/5/2015	6/3/2002	SO46718	360	12570	9	1	1	Single Item
7/7/2015	4/22/2002	SO46736	360	12341	9	1	1	Single Item
7/12/2015	5/5/2002	SO46776	360	12356	9	1	1	Single Item

TABLE TOOLS:

Access table attributes, manage relationships, add new calculations, etc.

COLUMN TOOLS:

Access column attributes, set data types and formats, use sorting and grouping tools, etc.

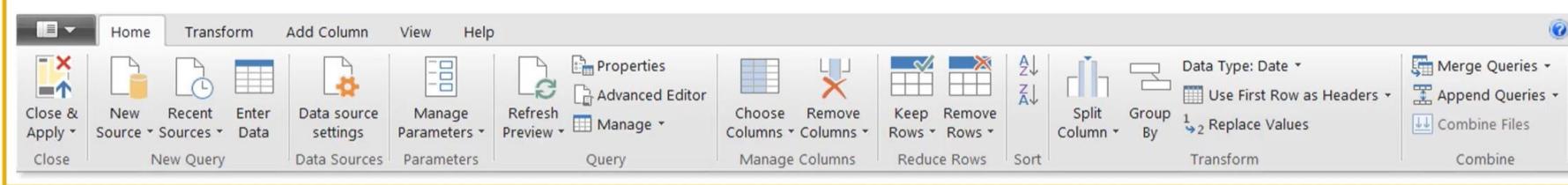
MEASURE TOOLS:

Access measure attributes, determine home table, set formats and categories, etc.

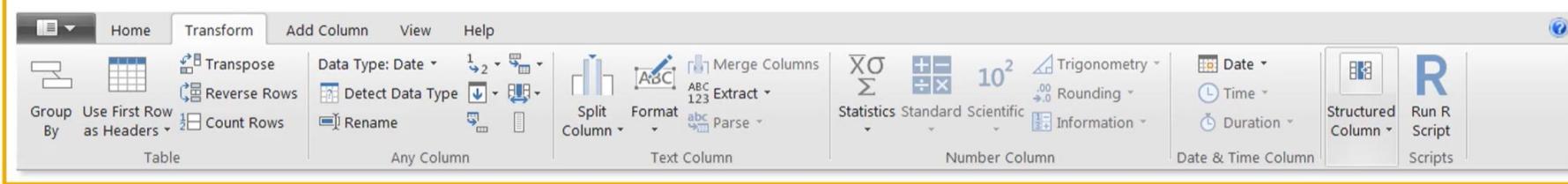
Query Editing Tools

QUERY EDITING TOOLS

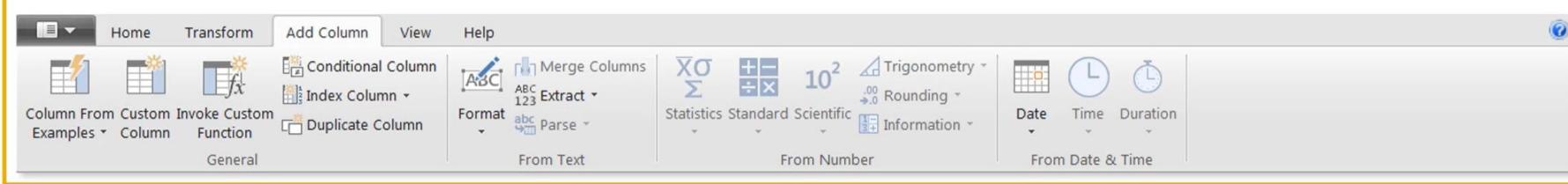
The **HOME** tab includes **general settings** and **common table transformation tools**



The **TRANSFORM** tab includes tools to **modify existing columns** (splitting/grouping, transposing, extracting text, etc)



The **ADD COLUMN** tools **create new columns** (based on conditional rules, text operations, calculations, dates, etc)



Basic Table Transformations

BASIC TABLE TRANSFORMATIONS

The screenshot shows the Power BI desktop application with the 'Transform' tab selected in the ribbon. Several toolbars and context menus are highlighted with yellow boxes and arrows pointing to specific features:

- Sort values (A-Z, Low-High, etc.)**: Points to the 'Sort' button in the 'Transform' ribbon.
- Change data type (date, \$, %, text, etc.)**: Points to the 'Data Type' dropdown in the 'Transform' ribbon.
- Promote header row**: Points to the 'Use First Row as Headers' option in the 'Transform' ribbon.
- Choose or remove columns**: Points to the 'Manage Columns' section of the ribbon, which includes 'Choose Columns', 'Remove Columns', and 'Remove Other Columns'.
- Keep or remove rows**: Points to the 'Manage Rows' section of the ribbon, which includes 'Keep Rows', 'Remove Rows', 'Reduce Rows', and 'Sort'.
- Duplicate, move & rename columns**: Points to the context menu for a column header in the 'OrderData' table, which includes options like 'Remove', 'Duplicate Column', 'Add Column From Examples...', 'Remove Duplicates', 'Remove Errors', 'Change Type', 'Transform', 'Replace Values...', 'Replace Errors...', 'Group By...', 'Fill', 'Unpivot Columns', 'Unpivot Other Columns', 'Unpivot Only Selected Columns', 'Rename...', 'Move', 'Drill Down', and 'Add as New Query'.
- Tip: use the "Remove Other Columns" option if you always want a specific set**: Provides a tip for managing columns.
- Tip: use the "Remove Duplicates" option to create a new lookup table from scratch**: Provides a tip for managing rows.

Column 1	Column 2	Column 3
1/5/2015	9/19/2001	SO45101
1/5/2015	11/21/2001	SO45100
...

Text Specific Tools

TEXT-SPECIFIC TOOLS

The screenshot shows the Power BI ribbon with the 'Transform' tab selected. A context menu is open over a 'Text Column'. The menu items are:

- Split Column (highlighted with a yellow box)
- Format
- Merge Columns
- ABC Extract
- 123 Extract
- abc Parse
- Text Column

Arrows point from the 'Split Column' item to two sub-options: 'By Delimiter' and 'By Number of Characters'. Another arrow points from the 'Text Column' item to a list of text manipulation functions:

- Length
- First Characters
- Last Characters
- Range
- Text Before Delimiter
- Text After Delimiter
- Text Between Delimiters

Split a text column based on either a specific delimiter or a number of characters

- By Delimiter
- By Number of Characters

- lowercase
- UPPERCASE
- Capitalize Each Word
- Trim
- Clean
- Add Prefix
- Add Suffix

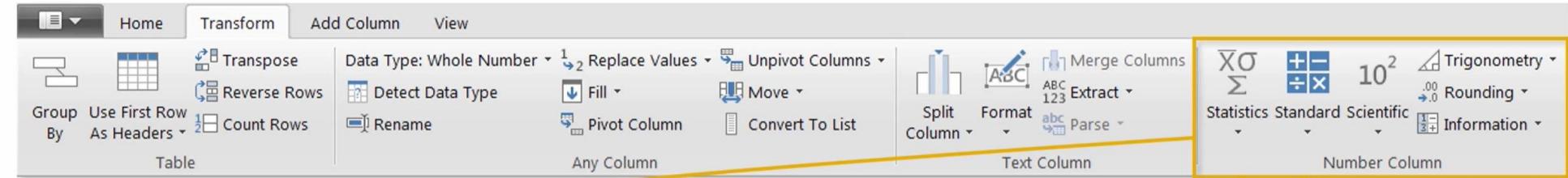
Format a text column to upper, lower or proper case, or add a prefix or suffix

Tip: Use "Trim" to eliminate leading & trailing spaces, or "Clean" to remove non-printable characters

Extract characters from a text column based on fixed lengths, first/last, ranges or delimiters

Tip: Select two or more columns to merge (or concatenate) fields

Number Specific Tools



Sum
Minimum
Maximum
Median
Average
Standard Deviation
Count Values
Count Distinct Values

Statistics functions allow you to evaluate basic stats for the selected column (sum, min/max, average, count, countdistinct, etc)

Note: These tools return a **SINGLE** value, and are commonly used to explore a table rather than prepare it for loading

Add
Multiply
Subtract
Divide
Integer-Divide
Modulo
Percentage
Percent Of

Standard

Absolute Value
Power
Square Root
Exponent
Logarithm
Factorial

Scientific

Sine
Cosine
Tangent
Arcsine
Arccosine
Arctangent

Trigonometry

Is Even
Is Odd
Sign

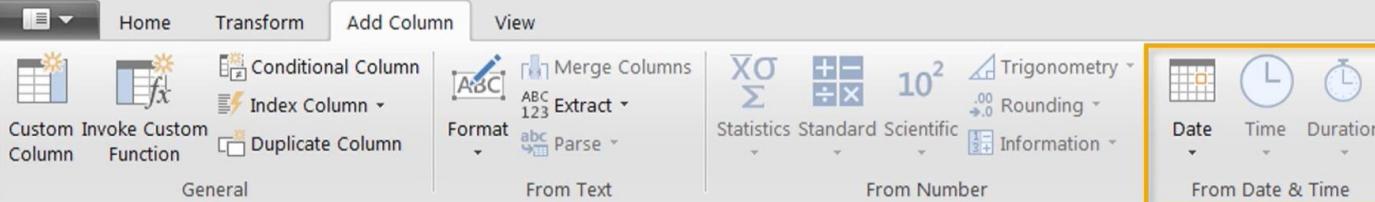
Information tools allow you to define binary flags (*TRUE/FALSE* or *1/0*) to mark each row in a column as even, odd, positive or negative

Standard, Scientific and Trigonometry tools allow you to apply standard operations (addition, multiplication, division, etc.) or more advanced calculations (power, logarithm, sine, tangent, etc) to each value in a column

Note: Unlike the Statistics options, these tools are applied to each individual row in the table

Date Specific Tools

DATE-SPECIFIC TOOLS



The screenshot shows the Power BI ribbon with the "View" tab selected. In the "Date & Time" section of the ribbon, a dropdown menu is open, highlighted with a yellow border. This menu contains four options: "Date", "Time", "Duration", and "From Date & Time". A yellow arrow points from this dropdown to a detailed description of the "From Date & Time" option, which is shown in a separate callout box.

Date & Time tools are relatively straight-forward, and include the following options:

- **Age:** Difference between the current time and the date in each row
- **Date Only:** Removes the time component of a date/time field
- **Year/Month/Quarter/Week/Day:** Extracts individual components from a date field
(Time-specific options include Hour, Minute, Second, etc.)
- **Earliest/Latest:** Evaluates the earliest or latest date from a column as a single value (can only be accessed from the “Transform” menu)

Note: You will almost always want to perform these operations from the “Add Column” menu to build out new fields, rather than transforming an individual date/time column

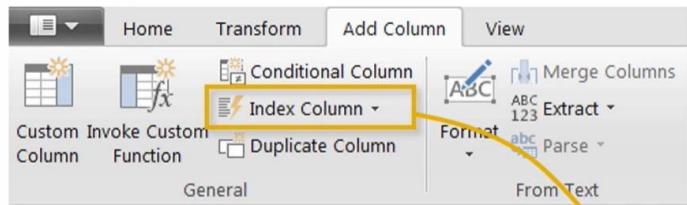


PRO TIP:

Load up a table containing a **single date column** and use Date tools to build out an **entire calendar table**

Index Columns

ADDING INDEX COLUMNS



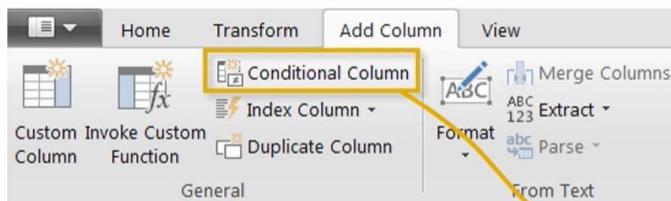
Index Columns contain a list of sequential values that can be used to identify each unique row in a table (*typically starting from 0 or 1*)

These columns are often used to create **unique IDs** that can be used to form relationships between tables (*more on that later!*)

Index	OrderDate	StockDate	OrderNumber	ProductKey	CustomerKey
1	1/1/2015	9/21/2001	SO45080	332	14657
2	1/1/2015	12/5/2001	SO45079	312	29255
3	1/1/2015	10/29/2001	SO45082	350	11455
4	1/1/2015	11/16/2001	SO45081	338	26782
5	1/2/2015	12/15/2001	SO45083	312	14947
6	1/2/2015	10/12/2001	SO45084	310	29143
7	1/2/2015	12/18/2001	SO45086	314	18747
8	1/2/2015	10/9/2001	SO45085	312	18746
9	1/3/2015	10/3/2001	SO45093	312	18906
10	1/3/2015	9/29/2001	SO45090	310	29170
11	1/3/2015	12/11/2001	SO45088	345	11398
12	1/3/2015	10/24/2001	SO45092	313	18899
13	1/3/2015	12/16/2001	SO45089	351	25977
14	1/3/2015	10/26/2001	SO45091	314	18909
15	1/3/2015	9/11/2001	SO45087	350	11388
16	1/3/2015	9/11/2001	SO45094	310	22785
17	1/4/2015	10/30/2001	SO45096	312	12483
18	1/4/2015	10/30/2001	SO45097	313	29151

Conditional Columns

ADDING CONDITIONAL COLUMNS



Conditional Columns allow you to define new fields based on logical rules and conditions (*IF/THEN statements*)

In this case we're creating a new conditional column called "**QuantityType**", which depends on the values in the "**OrderQuantity**" column, as follows:

- If *OrderQuantity = 1*, *QuantityType = "Single Item"*
- If *OrderQuantity > 1*, *QuantityType = "Multiple Items"*
- Otherwise *QuantityType = "Other"*

The 'Add Conditional Column' dialog box is shown. It has a 'New column name' field containing 'QuantityType'. Below it are three rules defined using the 'If' and 'Else If' buttons:

If	Operator	Value	Then
OrderQuantity	equals	ABC 123	1
OrderQuantity	is greater than	ABC 123	1
Otherwise			
ABC 123			
Other			

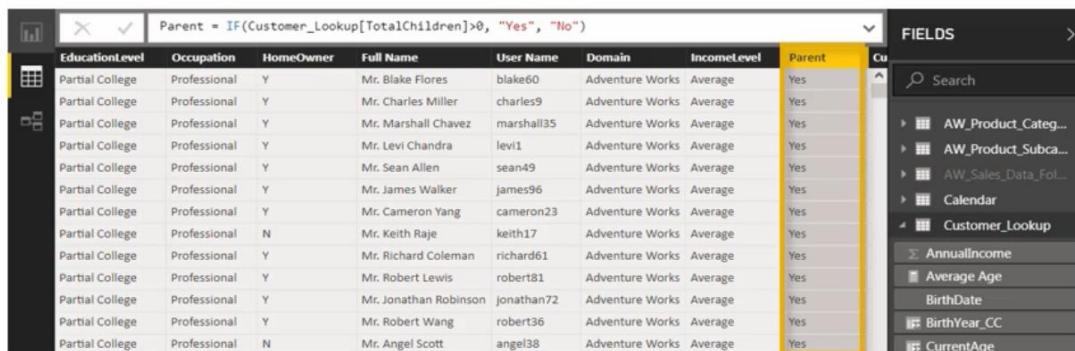
At the bottom right are 'OK' and 'Cancel' buttons.

Data Analysis Expressions, commonly known as **DAX**, is the formula language that drives Power BI. With DAX, you can:

- Add **calculated columns** and **measures** to your model, using intuitive syntax
- Go beyond the capabilities of traditional “grid-style” formulas, with powerful and flexible functions built specifically to work with relational data models

Two ways to use DAX

1) Calculated Columns

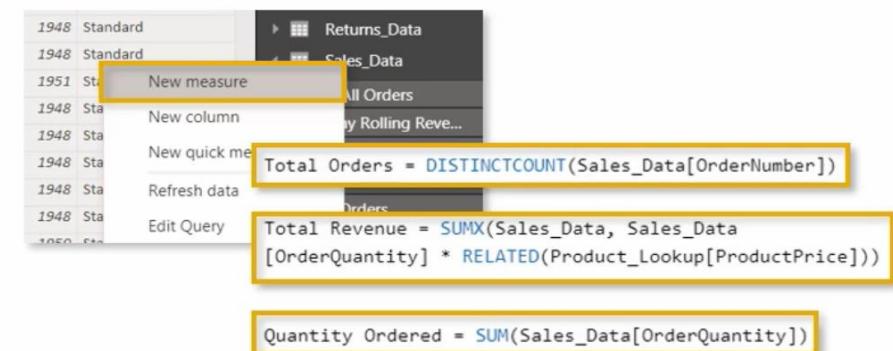


The screenshot shows a Power BI Data View window. A calculated column named 'Parent' is being defined using the following DAX formula:

```
Parent = IF(Customer_Lookup[TotalChildren]>0, "Yes", "No")
```

The table contains columns: EducationLevel, Occupation, HomeOwner, Full Name, User Name, Domain, IncomeLevel, and Parent. The 'Parent' column is highlighted with a yellow border.

2) Measures



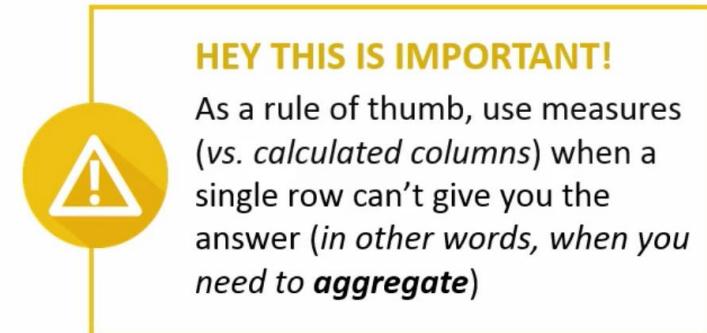
The screenshot shows a Power BI Model View window with a context menu open over a table row. The menu options include 'New measure', 'New column', 'New quick me...', 'Refresh data', and 'Edit Query'. Three specific measures are highlighted with yellow boxes:

- Total Orders = DISTINCTCOUNT(Sales_Data[OrderNumber])
- Total Revenue = SUMX(Sales_Data, Sales_Data[OrderQuantity] * RELATED(Product_Lookup[ProductPrice]))
- Quantity Ordered = SUM(Sales_Data[OrderQuantity])

MEASURES

Measures are DAX formulas used to generate new calculated values

- Like calculated columns, measures reference **entire tables** or **columns** (*no A1-style or “grid” references*)
- *Unlike* calculated columns, **measure** values aren’t visible within tables; they can only be “seen” within a visualization like a chart or matrix (*similar to a calculated field in an Excel pivot*)
- Measures are evaluated based on **filter context**, which means they recalculate when the fields or filters around them change (*like when new row or column labels are pulled into a matrix or when new filters are applied to a report*)



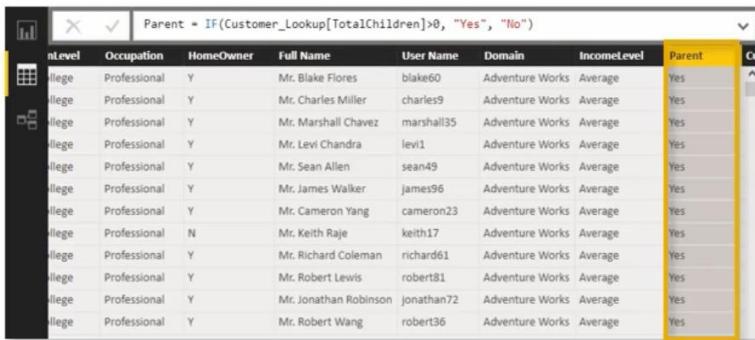
PRO TIP:

*Use measures to create **numerical, calculated values** that can be analyzed in the “**values**” field of a report visual*

Calculated Columns vs Measures

CALCULATED COLUMNS

- Values are calculated based on information from each row of a table (**has row context**)
- Appends static values to each row in a table and stores them in the model (*which increases file size*)
- Recalculate on data source refresh or when changes are made to component columns
- Primarily used as **rows, columns, slicers or filters**

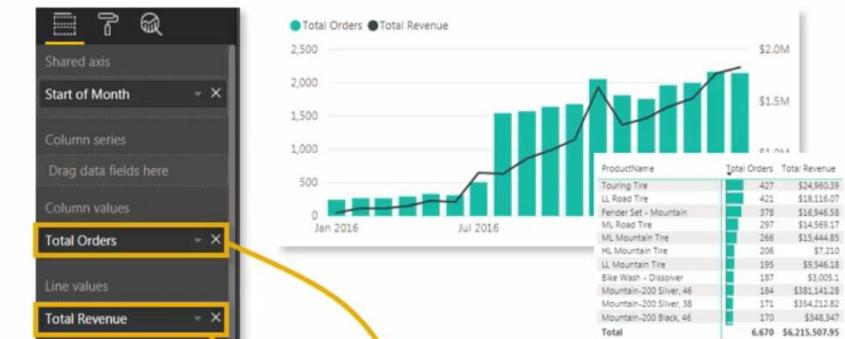


level	Occupation	HomeOwner	Full Name	User Name	Domain	IncomeLevel	Parent
Allege	Professional	Y	Mr. Blake Flores	blake60	Adventure Works	Average	Yes
Allege	Professional	Y	Mr. Charles Miller	charles9	Adventure Works	Average	Yes
Allege	Professional	Y	Mr. Marshall Chavez	marshall35	Adventure Works	Average	Yes
Allege	Professional	Y	Mr. Levi Chandra	levi1	Adventure Works	Average	Yes
Allege	Professional	Y	Mr. Sean Allen	sean49	Adventure Works	Average	Yes
Allege	Professional	Y	Mr. James Walker	james96	Adventure Works	Average	Yes
Allege	Professional	Y	Mr. Cameron Yang	cameron23	Adventure Works	Average	Yes
Allege	Professional	N	Mr. Keith Raje	keith17	Adventure Works	Average	Yes
Allege	Professional	Y	Mr. Richard Coleman	richard61	Adventure Works	Average	Yes
Allege	Professional	Y	Mr. Robert Lewis	robert81	Adventure Works	Average	Yes
Allege	Professional	Y	Mr. Jonathan Robinson	jonathan72	Adventure Works	Average	Yes
Allege	Professional	Y	Mr. Robert Wang	robert36	Adventure Works	Average	Yes

Calculated columns "live" in tables

MEASURES

- Values are calculated based on information from any filters in the report (**has filter context**)
- Does not create new data in the tables themselves (*doesn't increase file size*)
- Recalculate in response to any change to filters within the report
- Almost *always* used within the **values** field of a visual



Measures "live" in visuals

DAX Syntax

DAX SYNTAX

MEASURE NAME

- **Note:** Measures are always surrounded in brackets (i.e. `[Total Quantity]`) when referenced in formulas, so spaces are OK

Total Quantity: =**SUM(Transactions[quantity])**

FUNCTION NAME

- Calculated columns don't always use functions, but measures do:
 - In a **Calculated Column**, `=Transactions[quantity]` returns the value from the quantity column in each row (*since it evaluates one row at a time*)
 - In a **Measure**, `=Transactions[quantity]` will return an **error** since Power BI doesn't know how to translate that as a single value (*you need some sort of aggregation*)

Referenced
TABLE NAME

Referenced
COLUMN NAME

Note: This is a “fully qualified” column, since it’s preceded by the table name -- table names with spaces must be surrounded by **single quotes**:

- Without a space: `Transactions[quantity]`
- With a space: `'Transactions Table'[quantity]`

PRO TIP:



For **column** references, use the fully qualified name (i.e. `Table[Column]`)
For **measure** references, just use the measure name (i.e. `[Measure]`)

DAX Operators

DAX OPERATORS

Arithmetic Operator	Meaning	Example
+	Addition	2 + 7
-	Subtraction	5 - 3
*	Multiplication	2 * 6
/	Division	4 / 2
^	Exponent	2 ^ 5

Comparison Operator	Meaning	Example
=	Equal to	[City] = "Boston"
>	Greater than	[Quantity] > 10
<	Less than	[Quantity] < 10
>=	Greater than or equal to	[Unit_Price] >= 2.5
<=	Less than or equal to	[Unit_Price] <= 2.5
<>	Not equal to	[Country] <> "Mexico"

Text/Logical Operator	Meaning	Example
&	Concatenates two values to produce one text string	[City] & " " & [State]
&&	Create an AND condition between two logical expressions	([State] = "MA") && ([Quantity] > 10)
(double pipe)	Create an OR condition between two logical expressions	([State] = "MA") ([State] = "CT")
IN	Creates a logical OR condition based on a given list (using curly brackets)	'Store Lookup'[State] IN { "MA", "CT", "NY" }

Common Function categories

COMMON FUNCTION CATEGORIES

MATH & STATS Functions

Basic aggregation functions as well as "iterators" evaluated at the row-level

Common Examples:

- SUM
- AVERAGE
- MAX/MIN
- DIVIDE
- COUNT/COUNTA
- COUNTROWS
- DISTINCTCOUNT

Iterator Functions:

- SUMX
- AVERAGEX
- MAXX/MINX
- RANKX
- COUNTX

LOGICAL Functions

Functions for returning information about values in a given conditional expression

Common Examples:

- IF
- IFERROR
- AND
- OR
- NOT
- SWITCH
- TRUE
- FALSE

TEXT Functions

Functions to manipulate text strings or control formats for dates, times or numbers

Common Examples:

- CONCATENATE
- FORMAT
- LEFT/MID/RIGHT
- UPPER/LOWER
- PROPER
- LEN
- SEARCH/FIND
- REPLACE
- REPT
- SUBSTITUTE
- TRIM
- UNICHAR

FILTER Functions

Lookup functions based on related tables and filtering functions for dynamic calculations

Common Examples:

- CALCULATE
- FILTER
- ALL
- ALLEXCEPT
- RELATED
- RELATEDTABLE
- DISTINCT
- VALUES
- EARLIER/EARLIEST
- HASONEVALUE
- HASONEFILTER
- ISFILTERED
- USERELATIONSHIP

DATE & TIME Functions

Basic date and time functions as well as advanced time intelligence operations

Common Examples:

- DATEDIFF
- YEARFRAC
- YEAR/MONTH/DAY
- HOUR/MINUTE/SECOND
- TODAY/NOW
- WEEKDAY/WEEKNUM

Time Intelligence Functions:

- DATESYTD
- DATESQTD
- DATESMTD
- DATEADD
- DATESINPERIOD

Date & Time Functions

BASIC DATE & TIME FUNCTIONS

DAY/MONTH/YEAR()	<i>Returns the day of the month (1-31), month of the year (1-12), or year of a given date</i>	= DAY/MONTH/YEAR (Date)
HOUR/MINUTE/SECOND()	<i>Returns the hour (0-23), minute (0-59), or second (0-59) of a given datetime value</i>	= HOUR/MINUTE/SECOND (Datetime)
TODAY/NOW()	<i>Returns the current date or exact time</i>	= TODAY/NOW ()
WEEKDAY/WEEKNUM()	<i>Returns a weekday number from 1 (Sunday) to 7 (Saturday), or the week # of the year</i>	= WEEKDAY/WEEKNUM (Date, [ReturnType])
EOMONTH()	<i>Returns the date of the last day of the month, +/- a specified number of months</i>	= EOMONTH (StartDate, Months)
DATEDIFF()	<i>Returns the difference between two dates, based on a selected interval</i>	= DATEDIFF (Date1, Date2, Interval)

Logical Functions

BASIC LOGICAL FUNCTIONS (IF/AND/OR)

IF()

Checks if a given condition is met, and returns one value if the condition is TRUE, and another if the condition is FALSE

=**IF(LogicalTest, ResultIfTrue, [ResultIfFalse])**

IFERROR()

Evaluates an expression and returns a specified value if the expression returns an error, otherwise returns the expression itself

=**IFERROR(Value, ValueIfError)**

AND()

Checks whether both arguments are TRUE, and returns TRUE if both arguments are TRUE, otherwise returns FALSE

=**AND(Logical1, Logical2)**

OR()

Checks whether one of the arguments is TRUE to return TRUE, and returns FALSE if both arguments are FALSE

=**OR(Logical1, Logical2)**

Note: Use the **&&** and **||** operators if you want to include more than two conditions!

Text Functions

TEXT FUNCTIONS

LEN()

Returns the number of characters in a string

=**LEN**(Text)

Note: Use the & operator as a shortcut,
or to combine more than two strings!

CONCATENATE()

Joins two text strings into one

=**CONCATENATE**(Text1, Text2)

**LEFT/MID/
RIGHT()**

*Returns a number of characters from the
start/middle/end of a text string*

=**LEFT/RIGHT**(Text, [NumChars])

=**MID**(Text, StartPosition, NumChars)

**UPPER/LOWER/
PROPER()**

*Converts letters in a string to
upper/lower/proper case*

=**UPPER/LOWER/PROPER**(Text)

SUBSTITUTE()

*Replaces an instance of existing text with
new text in a string*

=**SUBSTITUTE**(Text, OldText, NewText,
[InstanceNumber])

SEARCH()

*Returns the position where a specified string
or character is found, reading left to right*

=**SEARCH**(FindText, WithinText,
[StartPosition], [NotFoundValue])

Math Functions

BASIC MATH & STATS FUNCTIONS

SUM()

Evaluates the sum of a column

=**SUM**(ColumnName)

AVERAGE()

Returns the average (arithmetic mean) of all the numbers in a column

=**AVERAGE**(ColumnName)

MAX()

Returns the largest value in a column or between two scalar expressions

=**MAX**(ColumnName) or =**MAX**(Scalar1, [Scalar2])

MIN()

Returns the smallest value in a column or between two scalar expressions

=**MIN**(ColumnName) or =**MIN**(Scalar1, [Scalar2])

DIVIDE()

Performs division and returns the alternate result (or blank) if div/0

=**DIVIDE**(Numerator, Denominator, [AlternateResult])

Count Functions

COUNT()

Counts the number of cells in a column that contain numbers

=**COUNT**(ColumnName)

COUNTA()

Counts the number of non-empty cells in a column (numerical and non-numerical)

=**COUNTA**(ColumnName)

DISTINCTCOUNT()

Counts the number of distinct or unique values in a column

=**DISTINCTCOUNT**(ColumnName)

COUNTROWS()

Counts the number of rows in the specified table, or a table defined by an expression

=**COUNTROWS**(Table)