NAV TECH DAYS 2016

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# THE POWER OF POWER BI AND DYNAMICS NAV

STEVEN RENDERS – think about IT

# An overview of the Power BI toolset

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# The Self Service Revolution

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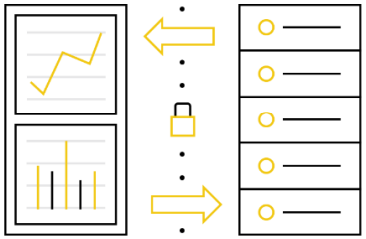
## Analytics solutions for your whole organization

### Your whole business on one dashboard

With Power BI on the web, monitor your important data from across your organization and from all of the apps you rely on.

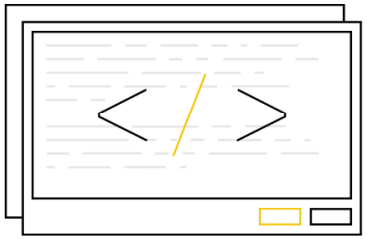
### Create stunning interactive reports

Power BI Desktop gives you tools to transform, analyze, and visualize data. Share reports in seconds with your organization using Power BI on the web.



### Consistent analysis across your organization

With SQL Server Analysis Services you can easily build robust, reusable models over your data to provide consistency across reporting and analysis in your organization.



### Easily embed BI and analytics in your app

Deliver stunning interactive reports in your app with the Power BI Embedded service.

# Connect to what matters to you

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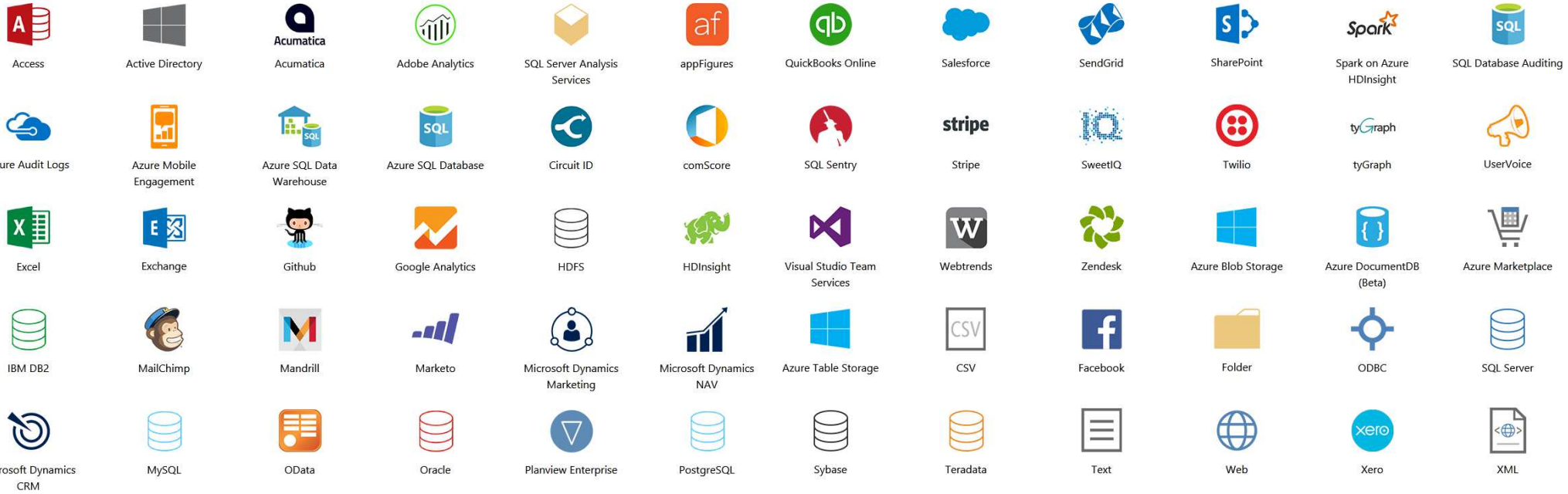
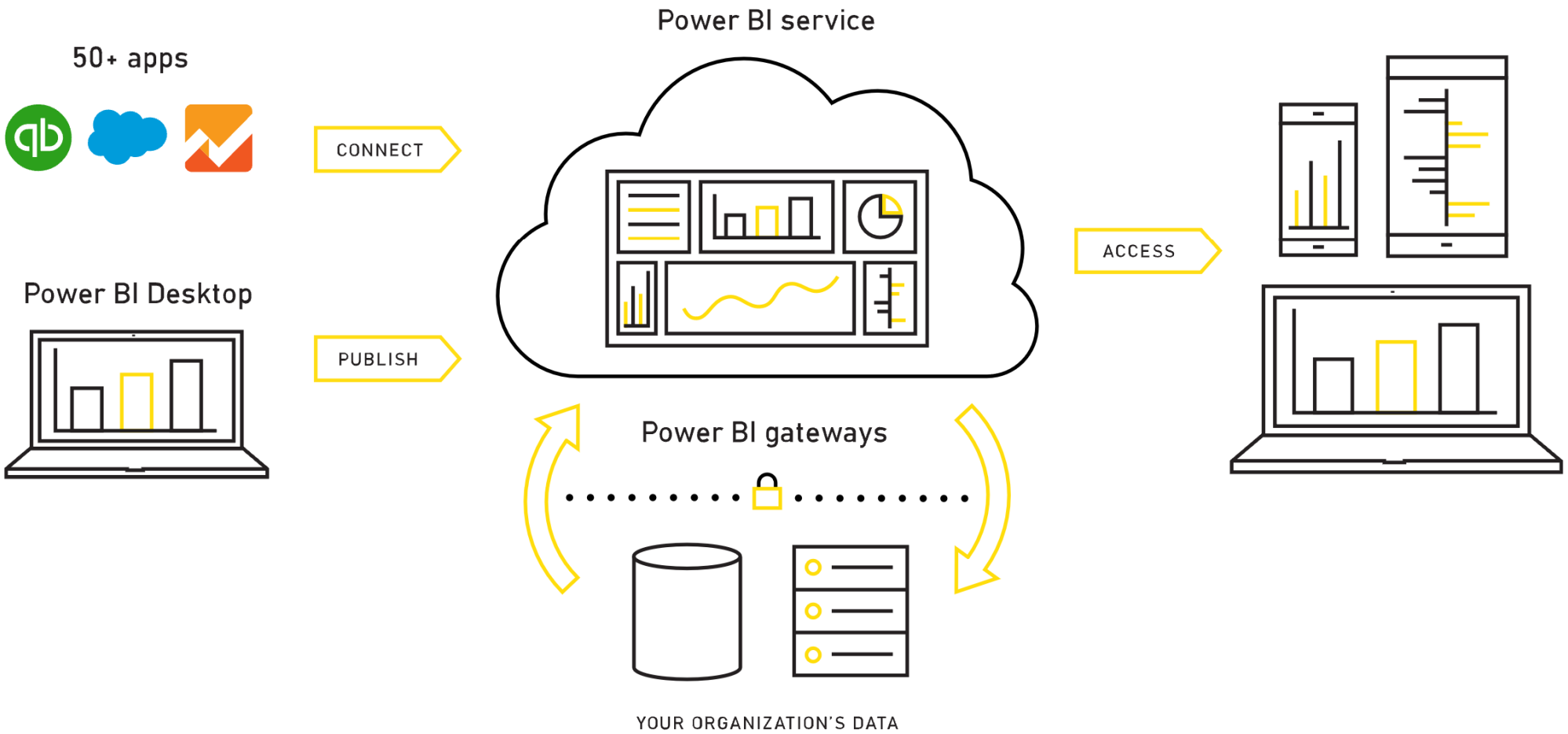


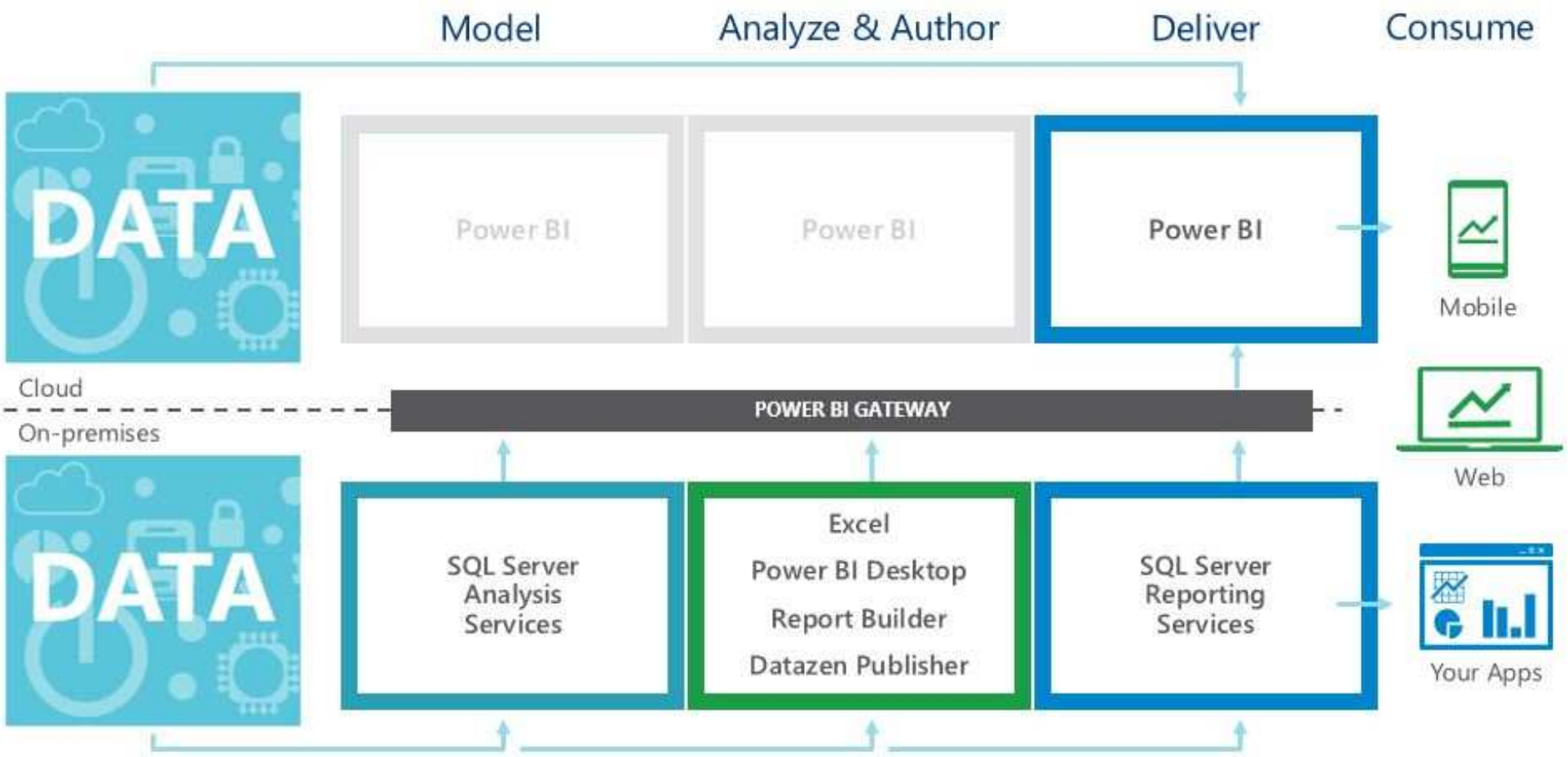
# The Self Service Revolution



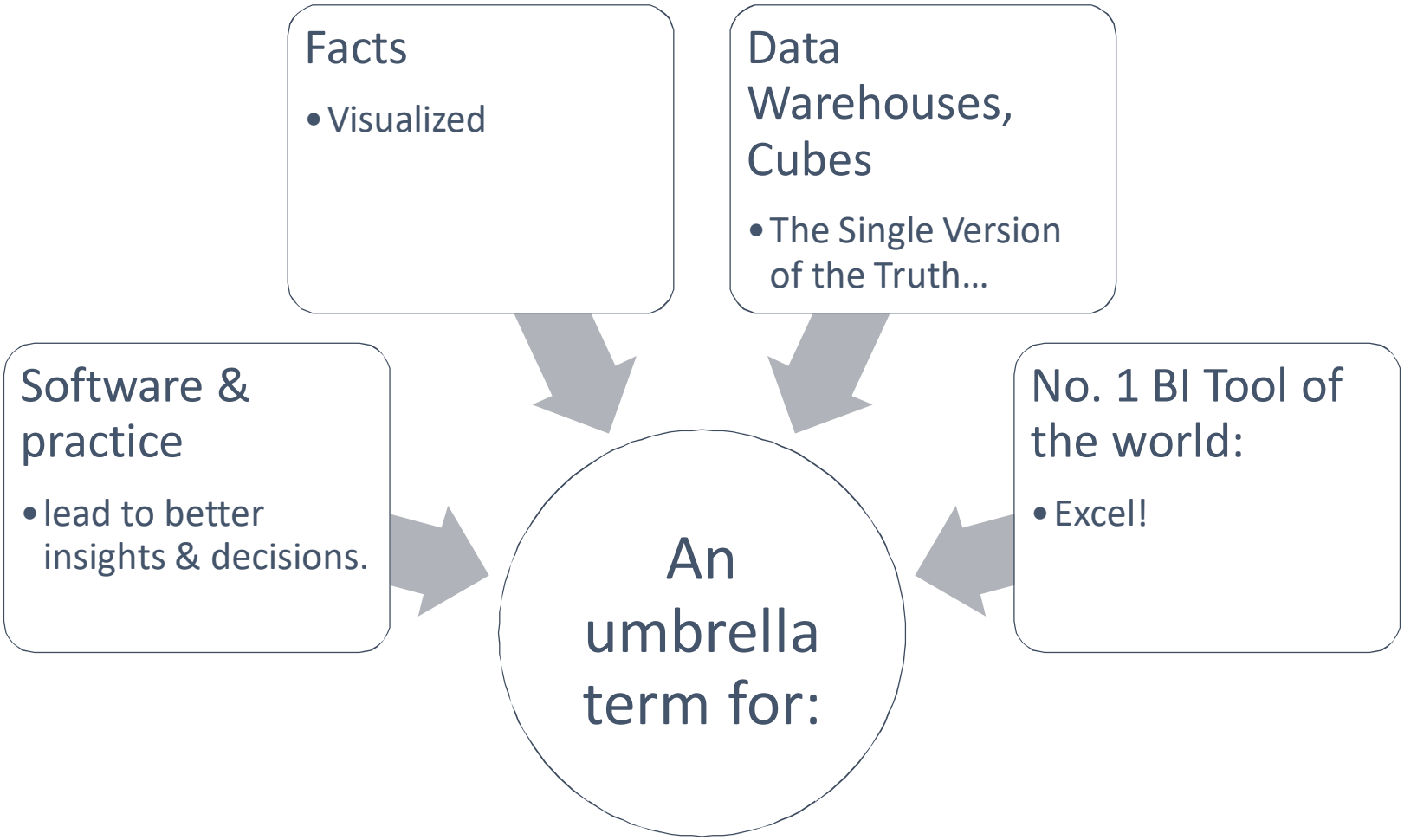


# The Self Service Revolution





# What is Business Intelligence?

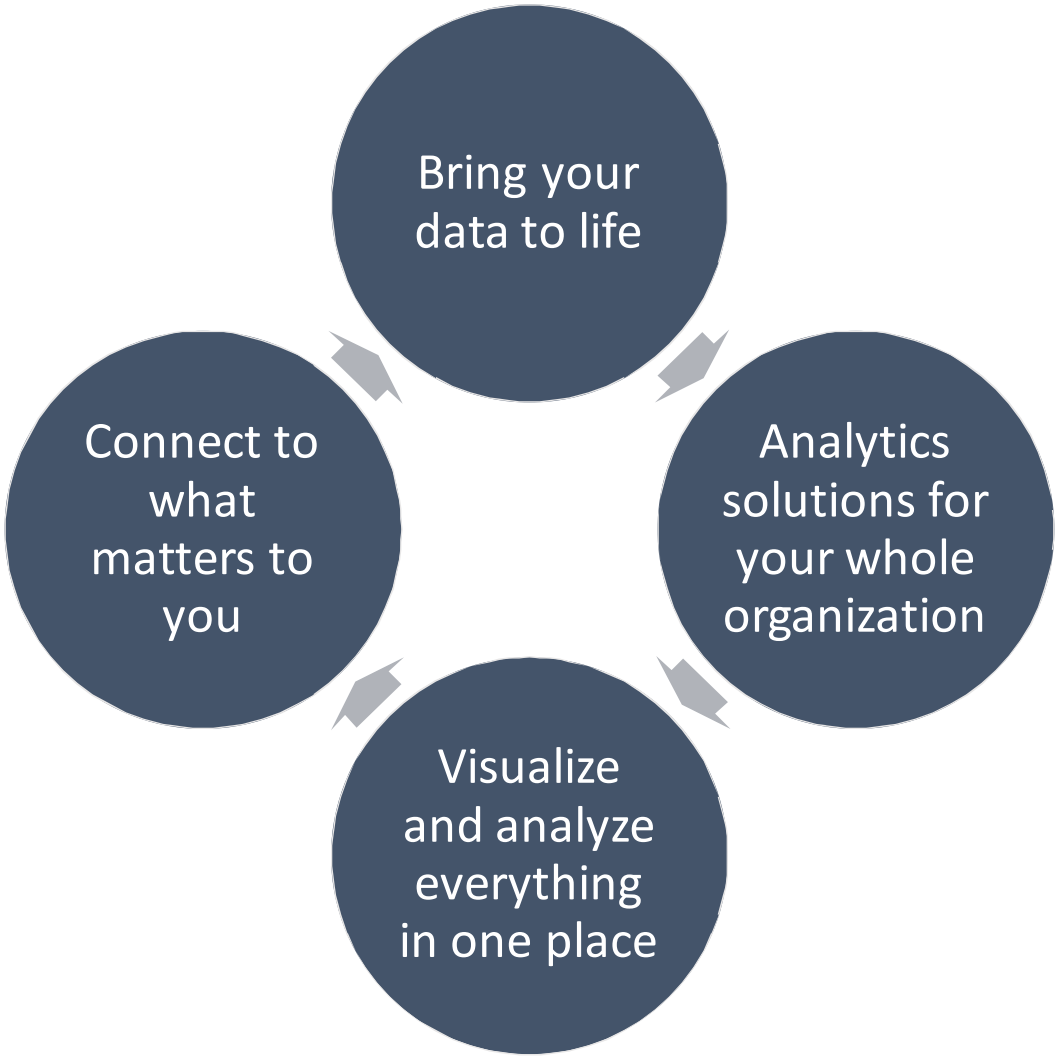


# How Determine What Information to Show?



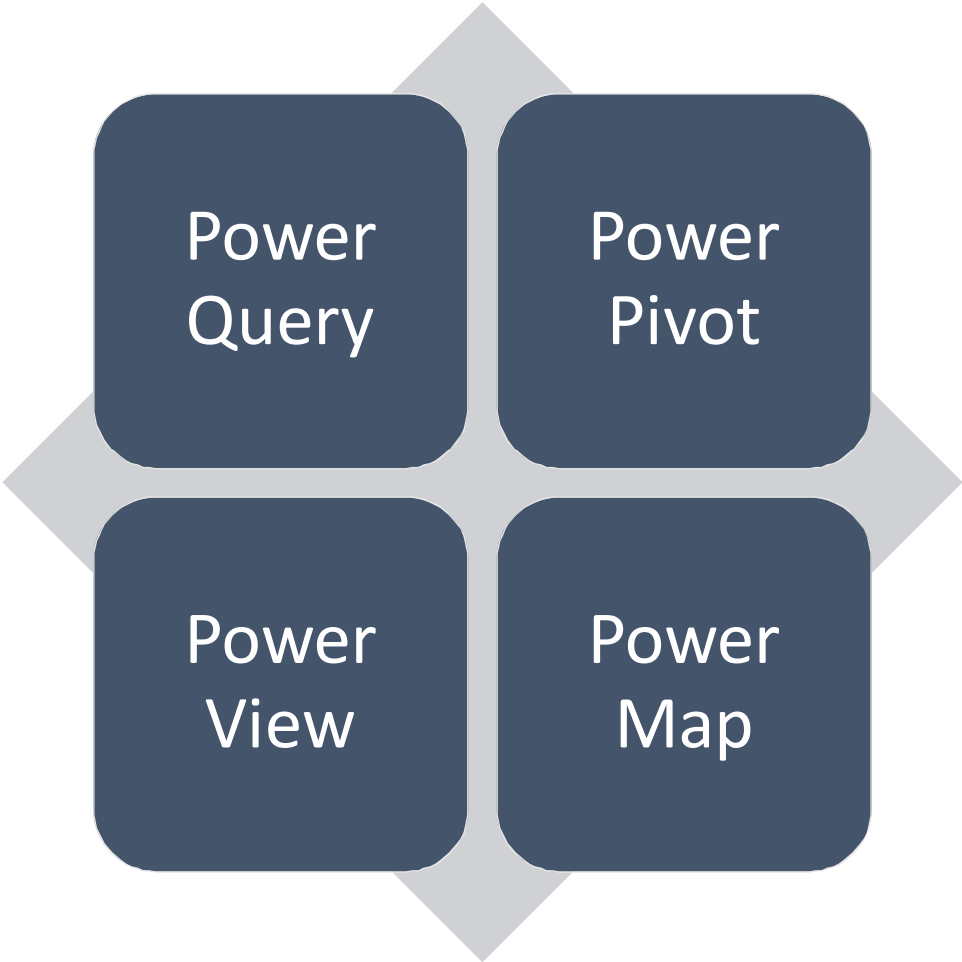
# What is Power BI?





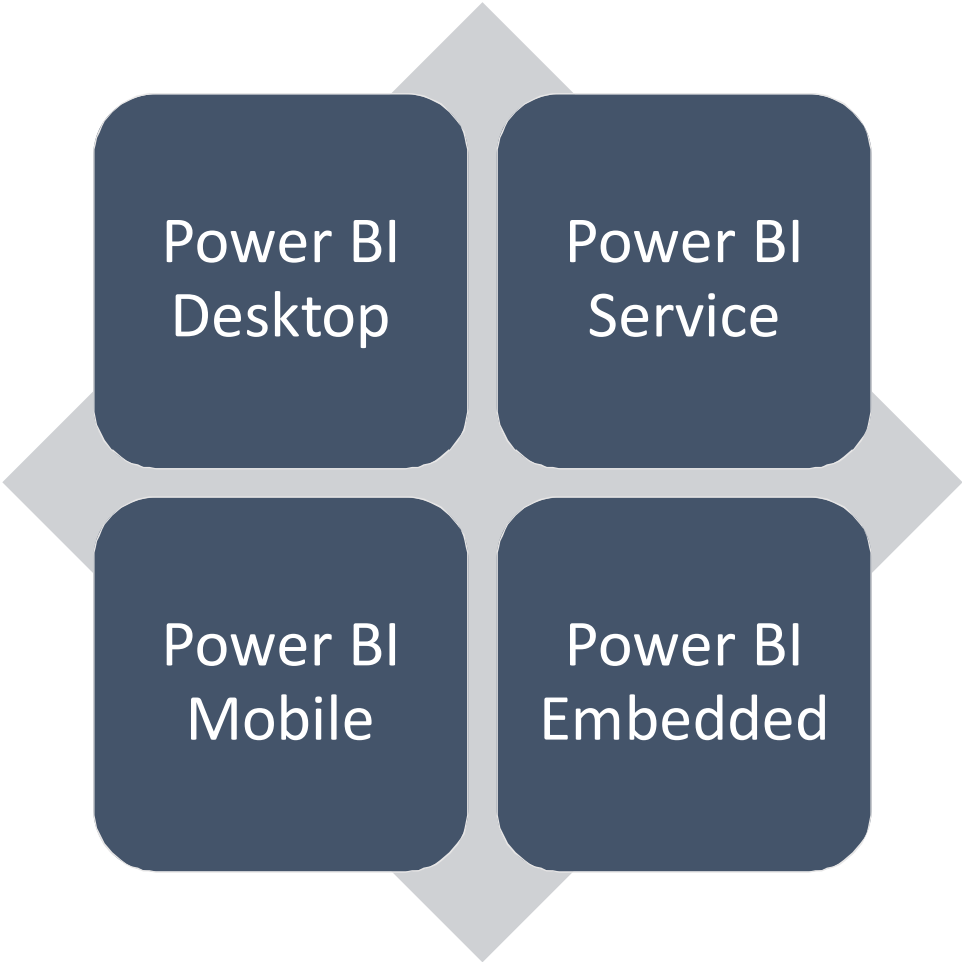
# An overview of the Power BI toolset





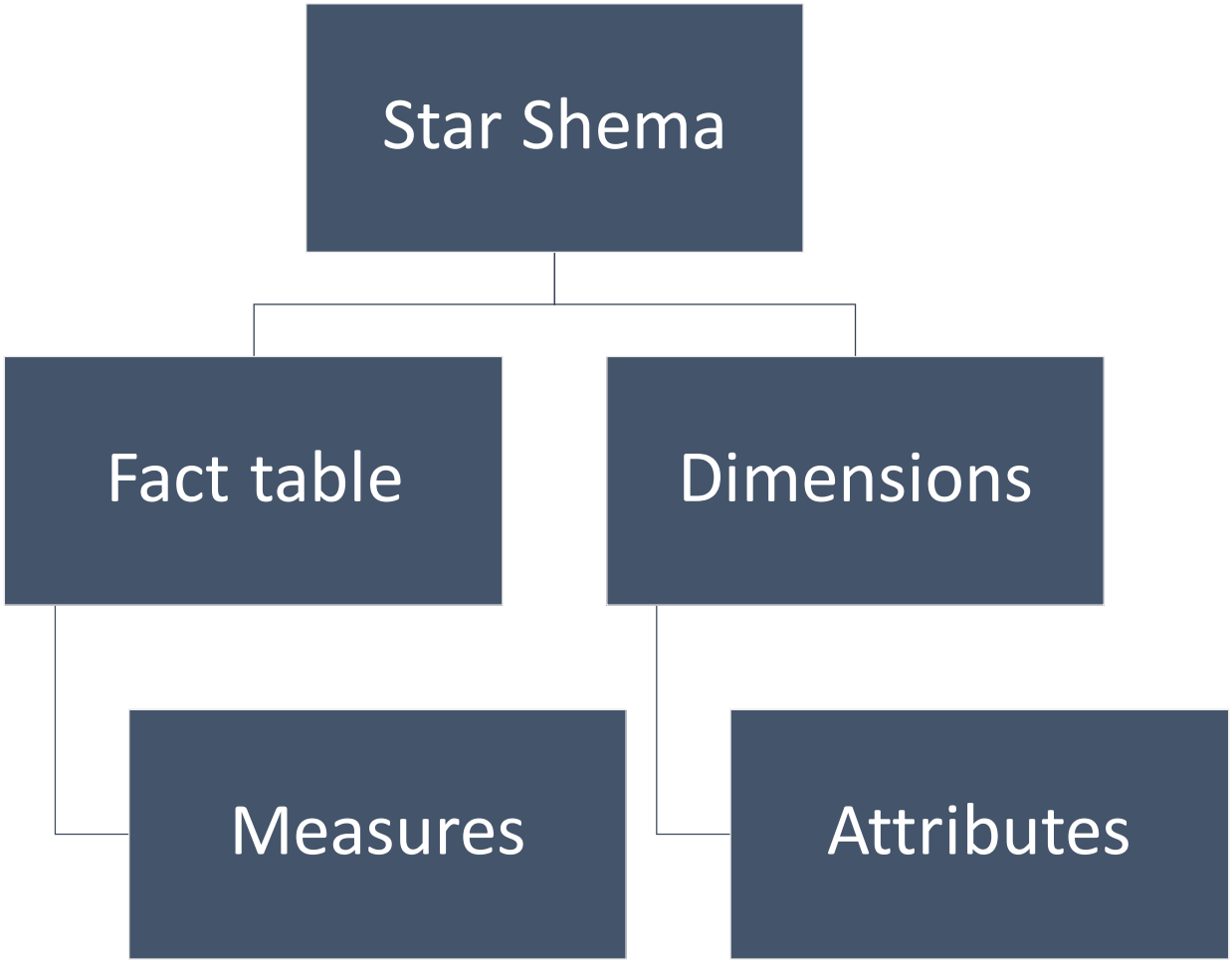
# An overview of the Power BI toolset





# Creating the Data Model





# Languages


- **SQL**
  - SQL Server
  - Power Query in Excel
  - Power Query in Power BI Desktop
- **M**
  - Power Query in Excel
  - Power Query in Power BI Desktop
- **DAX**
  - Power Pivot
  - Power BI Desktop
  - SQL Server Analysis Services Tabular
- **MDX**
  - SQL Server Analysis Services
  - Excel
  - Power Query in Power BI Desktop
- **R**
  - SQL Server
  - Power Query
  - Power BI Designer

# SQL



- **WHEN**?
  - SQL is used **before** your data import.
- **WHY**?
  - to **pre-filter**, **join** or **transform** your data before you start working with it.
- **HOW**?
  - SQL Statement
  - SQL View
  - SQL Stored Procedure
- **DIFFICULTY**?
  - 2 - SQL is fairly pervasive and has a long history so it is generally familiar to a lot of people

# M



- **WHEN**?
  - M is used **during** your data import.
- **WHY**?
  - Use M to **transform** and **cleanup** your data and create **custom columns** during data import.
- **HOW**?
  - M includes a common set of function definitions
  - M functions can be evaluated in the Query Editor in Power Query
- **DIFFICULTY**?
  - 3 - Unless you are already familiar with F# , and odds are you are not
  - You will likely find M a moderately challenging language to pickup and learn.
  - M simply isn't "like" a lot of other languages,
  - You have to think a little **differently** when using it rather than more traditional languages.

# DAX

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- **WHEN**?
  - DAX is used **after** your data has been imported into your data model.
- **WHY**?
  - Use DAX to create **Custom Columns** and **Measures** within a data model.
- **HOW**?
  - The only real "tricky" thing about DAX is getting used to thinking about **context**.
  - In other words, the DAX formula or expression that you create may give different results depending upon the context in which that formula or expression runs.
  - This makes DAX very powerful but can add an element of confusion and forces a different way of thinking about solutions.
- **DIFFICULTY**?
  - 1 - Being very similar to Excel formulas, DAX has a sense of familiarity and is thus the easiest language for beginners to start using.

# MDX

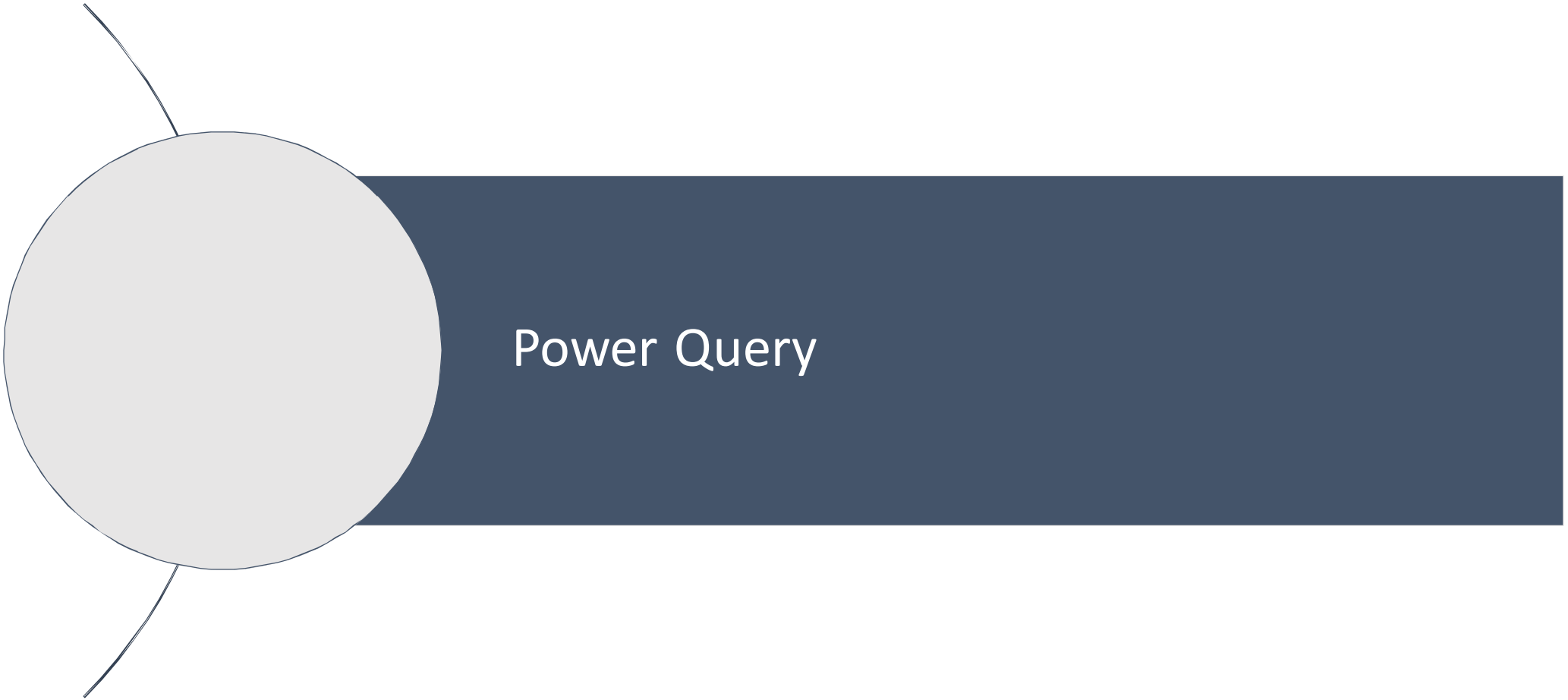


- **WHEN**?
  - MDX is used **before** your data import.
- **WHY**?
  - Use SQL to **pre-filter** and **join** your data before you start working with it.
  - It will generally be more efficient to perform a **complex join** or selection of columns using MDX versus in M or within the data model.
- **HOW**?
  - Multi-Dimensional Expressions (MDX) is the standard language to query multidimensional cubes, such as those created with Microsoft SQL Server Analysis Services.
  - MDX was designed to query OLAP cubes where data is organized in terms of measures, dimensions, hierarchies, and levels.
- **DIFFICULTY**?
  - 3 - MDX is more difficult to wrap your head around than SQL and is somewhat of a **unique** language as far as languages go.

# R



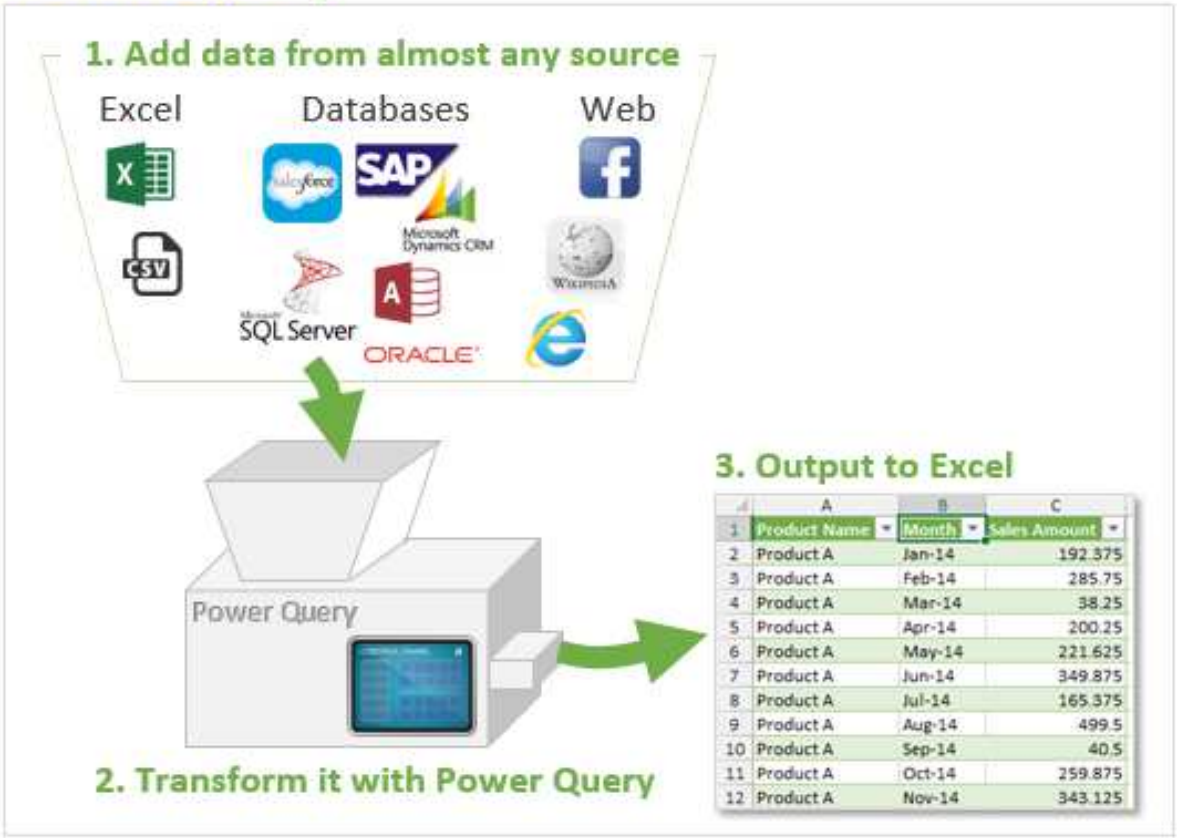
- **WHEN**?
  - R is unique within Power BI as it can be used **before**, **during** and **after** your import of data into your data model.
- **WHY**?
  - The R language has a huge number of **modules** that add a **tremendous** amount of **capabilities** to Power BI.
  - Connecting Power BI to Azure **Machine Learning** can be done in R.
  - R's library of **visualizations** adds hundreds of possible visuals to Power BI's core set of 27 visuals.
  - The uses for R are nearly **endless**.
- **HOW**?
  - As a full fledged programming language, R has its own runtime and environment for coding.
- **DIFFICULTY**?
  - 4 - R gets the highest ranking of the programming languages listed here
  - Based largely upon the facts that it is a **full-fledged** programming language as well as the **vastness** of the language itself when including all of the possible custom **modules**.



# Power Query

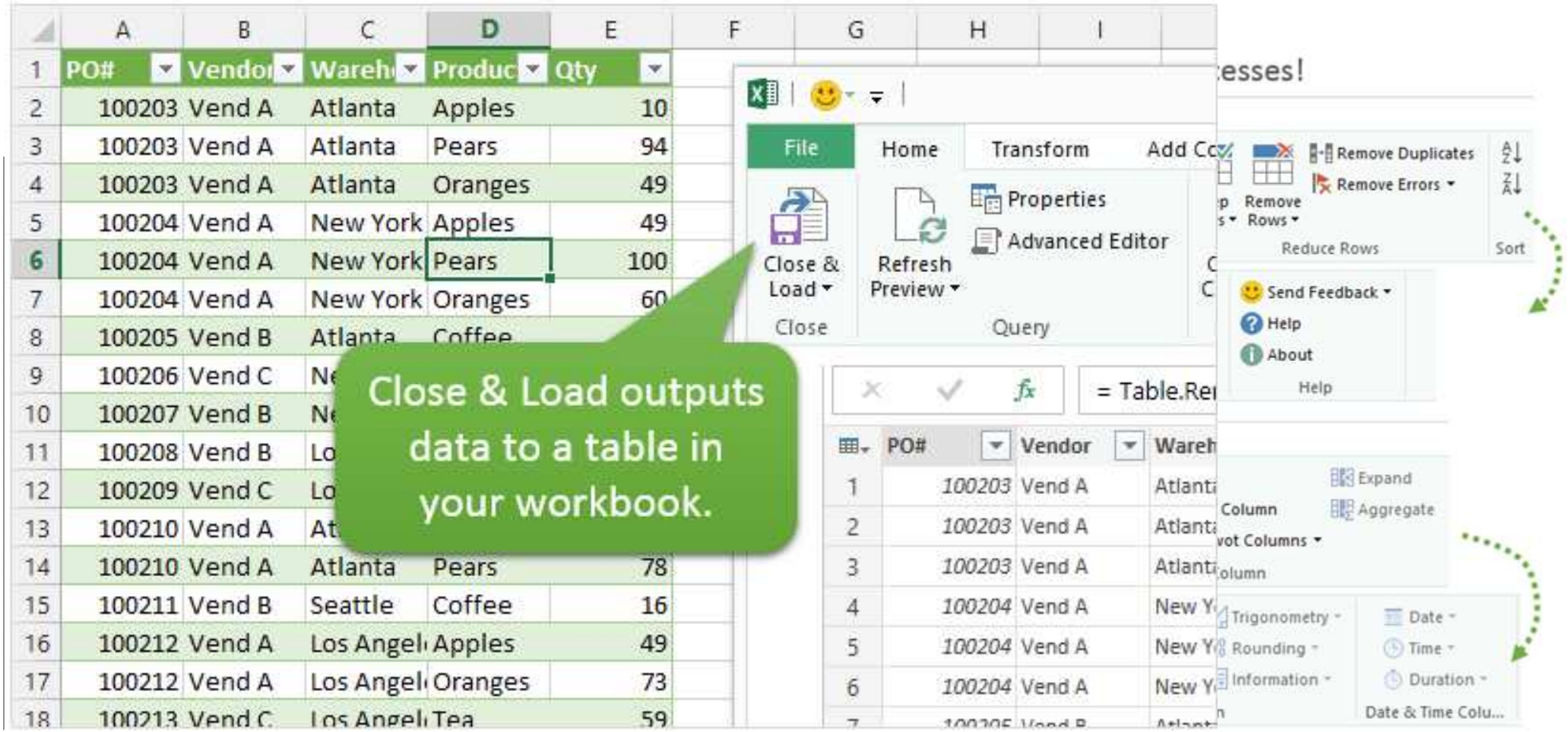


## Power Query Transforms Your Data




| | A | B | C |
|---|---|---|---|
| 1 | Product Name | Month | Sales Amount |
| 2 | Product A | Jan-14 | 192.375 |
| 3 | Product A | Feb-14 | 285.75 |
| 4 | Product A | Mar-14 | 38.25 |
| 5 | Product A | Apr-14 | 200.25 |
| 6 | Product A | May-14 | 221.625 |
| 7 | Product A | Jun-14 | 349.875 |
| 8 | Product A | Jul-14 | 165.375 |
| 9 | Product A | Aug-14 | 499.5 |
| 10 | Product A | Sep-14 | 40.5 |
| 11 | Product A | Oct-14 | 259.875 |
| 12 | Product A | Nov-14 | 343.125 |

# Power Query


PO# Vendor Wareh Produc Qty
100203 Vend A Atlanta Apples 10
100203 Vend A Atlanta Pears 94
100203 Vend A Atlanta Oranges 49
100204 Vend A New York Apples 49
100204 Vend A New York Pears 100
100204 Vend A New York Oranges 60
100205 Vend B Atlanta Coffee
100206 Vend C
100207 Vend B
100208 Vend B
100209 Vend C
100210 Vend A
100210 Vend A Atlanta Pears 78
100211 Vend B Seattle Coffee 16
100212 Vend A Los Angel Apples 49
100212 Vend A Los Angel Oranges 73
100213 Vend C Los Angel Tea 59
Close & Load outputs data to a table in your workbook.
File
Home
Transform
Close & Load
Refresh Preview
Properties
Advanced Editor
Close
Query
Remove Duplicates
Remove Errors
Remove Rows
Reduce Rows
Sort
Send Feedback
Help
About
Help
= Table.Re
PO# Vendor
1 100203 Vend A
2 100203 Vend A
3 100203 Vend A
4 100204 Vend A
5 100204 Vend A
6 100204 Vend A
Expand
Aggregate
Column
Trigonometry
Rounding
Information
Date
Time
Duration
Date & Time Colu...

# Power Query

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## Before: Data Exported to Exce

| | A | B | C | D |
|---|---|---|---|---|
| 1 | Sales Report 2014 | | | |
| 2 | Sales Rep: Jeff Smith | | | |
| 3 | | | | |
| 4 | **Product Name** | **Jan-14** | **Feb-14** | **Mar-14** |
| 5 | Product A | 192.38 | 285.75 | 38 |
| 6 | Product B | 280.13 | 435.38 | 382 |
| 7 | Product C | 498.38 | 151.88 | 424 |
| 8 | Product D | 214.88 | 356.63 | 562 |
| 9 | Product E | 383.63 | 500.63 | 312 |
| 10 | Product F | 158.63 | 87.75 | 60 |
| 11 | Product G | 506.25 | 104.63 | 138 |
| 12 | Product H | 45.00 | 505.13 | 396 |
| 13 | Product I | 222.75 | 60.75 | 492 |
| 14 | Product J | 456.75 | 400.50 | 72 |
| 15 | Product K | 409.50 | 81.00 | 169 |
| 16 | Product L | 92.25 | 110.25 | 129 |
| 17 | **Total** | **3,460.50** | **3,080.25** | **3,179** |
| 18 | | | | |
| 19 | Export Date: 2/1/2015 | | | |
| 20 | | | | |

## After: Use Power Query to Unpivot Data

| | A | B | C |
|---|---|---|---|
| 1 | **Product Name** | **Month** | **Sales Amount** |
| 2 | Product A | Jan-14 | 192.375 |
| 3 | Product A | Feb-14 | 285.75 |
| 4 | Product A | Mar-14 | 38.25 |
| 5 | Product A | Apr-14 | 200.25 |
| 6 | Product A | May-14 | 221.625 |
| 7 | Product A | Jun-14 | 349.875 |
| 8 | Product A | Jul-14 | 165.375 |
| 9 | Product A | Aug-14 | 499.5 |
| 10 | Product A | Sep-14 | 40.5 |
| 11 | Product A | Oct-14 | 259.875 |
| 12 | Product A | Nov-14 | 343.125 |
| 13 | Product A | Dec-14 | 118.125 |
| 14 | Product B | Jan-14 | 280.125 |
| 15 | Product B | Feb-14 | 435.375 |
| 16 | Product B | Mar-14 | 382.5 |
| 17 | Product B | Apr-14 | 191.25 |

Can be used for the source of a Pivot Table.

# Power Query



## Append Multiple Files to One Table with Power Query

File #1

| | A | B | C |
|---|---|---|---|
| 1 | Ship Date | Product | Amount |
| 2 | 4/1/2014 | Coffee | 55.00 |
| 3 | 4/2/ | | 85.00 |
| 4 | 4/3/ | | 65.00 |
| 5 | 4/4/ | | 48.00 |
| 6 | 4/5/2014 | Wine | 54.00 |
| 7 | 4/6/2014 | Coffee | 15.00 |
| 8 | 4/7/2014 | Tea | 14.00 |

File #2

| | A | B | C |
|---|---|---|---|
| 1 | Ship Date | Product | Amount |
| 2 | 5/1/2014 | Tea | 648.00 |
| 3 | 5/2/2014 | Beer | 54.00 |
| 4 | 5/3/ | | 15.00 |
| 5 | 5/4/ | | 45.00 |
| 6 | 5/5/ | | 23.00 |
| 7 | 5/6/2014 | Coffee | 411.00 |
| 8 | 5/7/2014 | Tea | 41.00 |

File #3

| | A | B | C |
|---|---|---|---|
| 1 | Ship Date | Product | Amount |
| 2 | 6/1/2014 | Tea | 540.00 |
| 3 | 6/2/2014 | Beer | 78.00 |
| 4 | 6/3/ | | 55.00 |
| 5 | 6/4/ | | 88.00 |
| 6 | 6/5/ | | 51.00 |
| 7 | 6/6/2014 | Wine | 51.00 |
| 8 | 6/7/2014 | Tea | 67.00 |
| 9 | 6/8/2014 | Coffee | 95.00 |

| | A | B | C | D |
|---|---|---|---|---|
| 1 | File | Ship Date | Product | Amount |
| 2 | File 1 | 4/1/2014 | Coffee | 55 |
| 3 | File 1 | 4/2/2014 | Coffee | 485 |
| 4 | File 1 | 4/3/2014 | Tea | 65 |
| 5 | File 1 | 4/4/2014 | Beer | 248 |
| 6 | File 1 | 4/5/2014 | Wine | 54 |
| 7 | File 1 | 4/6/2014 | Coffee | 15 |
| 8 | File 1 | 4/7/2014 | Tea | 14 |
| 9 | File 2 | 5/1/2014 | Tea | 648 |
| 10 | File 2 | 5/2/2014 | Beer | 54 |
| 11 | File 2 | 5/3/2014 | Tea | 15 |
| 12 | File 2 | 5/4/2014 | Coffee | 445 |
| 13 | File 2 | 5/5/2014 | Coffee | 123 |
| 14 | File 2 | 5/6/2014 | Coffee | 411 |
| 15 | File 2 | 5/7/2014 | Tea | 41 |
| 16 | File 3 | 6/1/2014 | Tea | 540 |
| 17 | File 3 | 6/2/2014 | Beer | 78 |
| 18 | File 3 | 6/3/2014 | Tea | 55 |
| 19 | File 3 | 6/4/2014 | Beer | 488 |
| 20 | File 3 | 6/5/2014 | Beer | 451 |
| 21 | File 3 | 6/6/2014 | Wine | 51 |
| 22 | File 3 | 6/7/2014 | Tea | 67 |
| 23 | File 3 | 6/8/2014 | Coffee | 95 |

# Power Query

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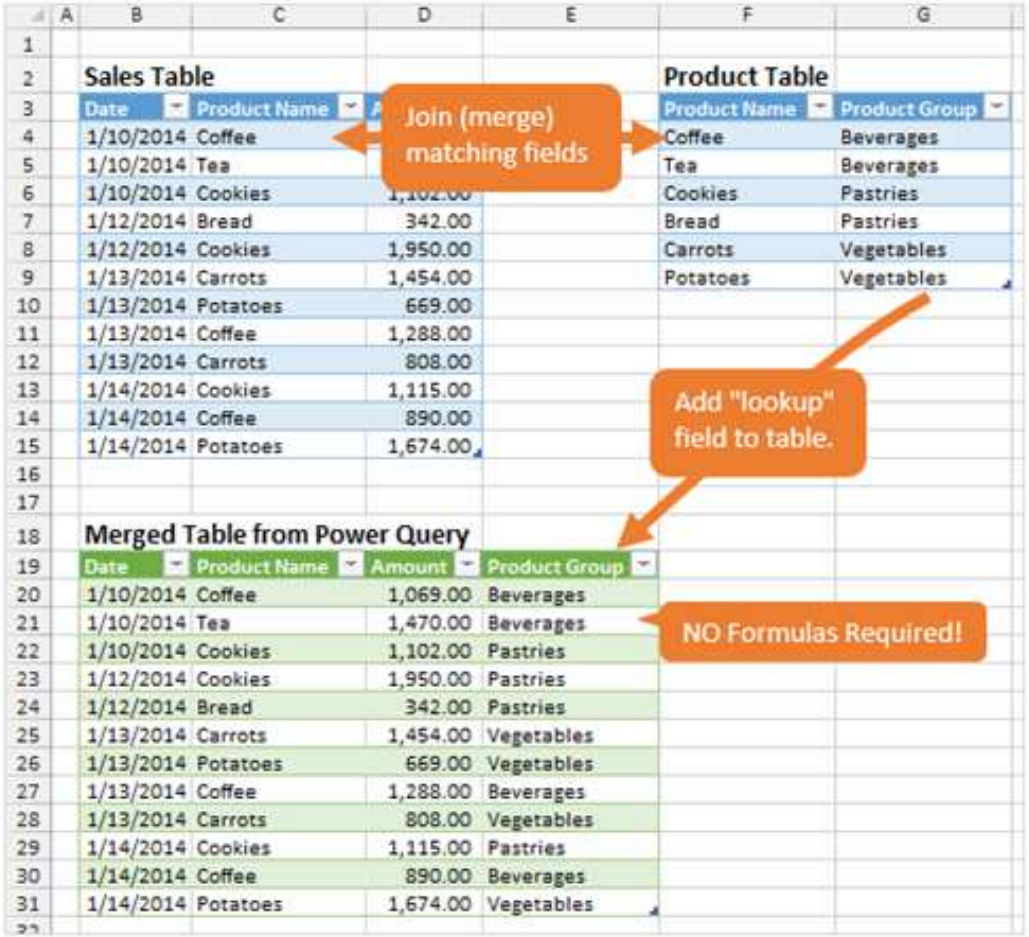
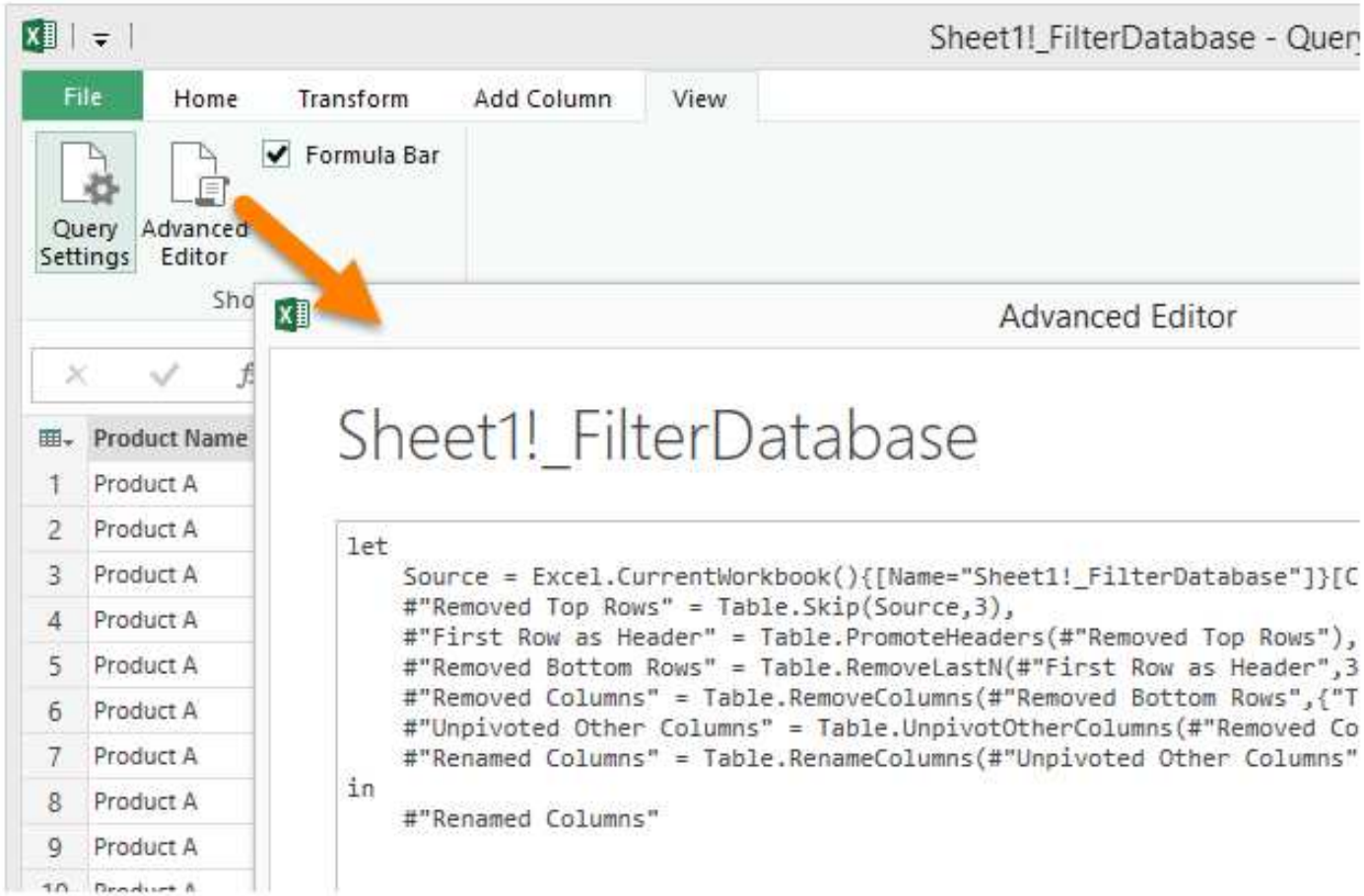
## Merge (join) Tables with Power Query



# Power Query

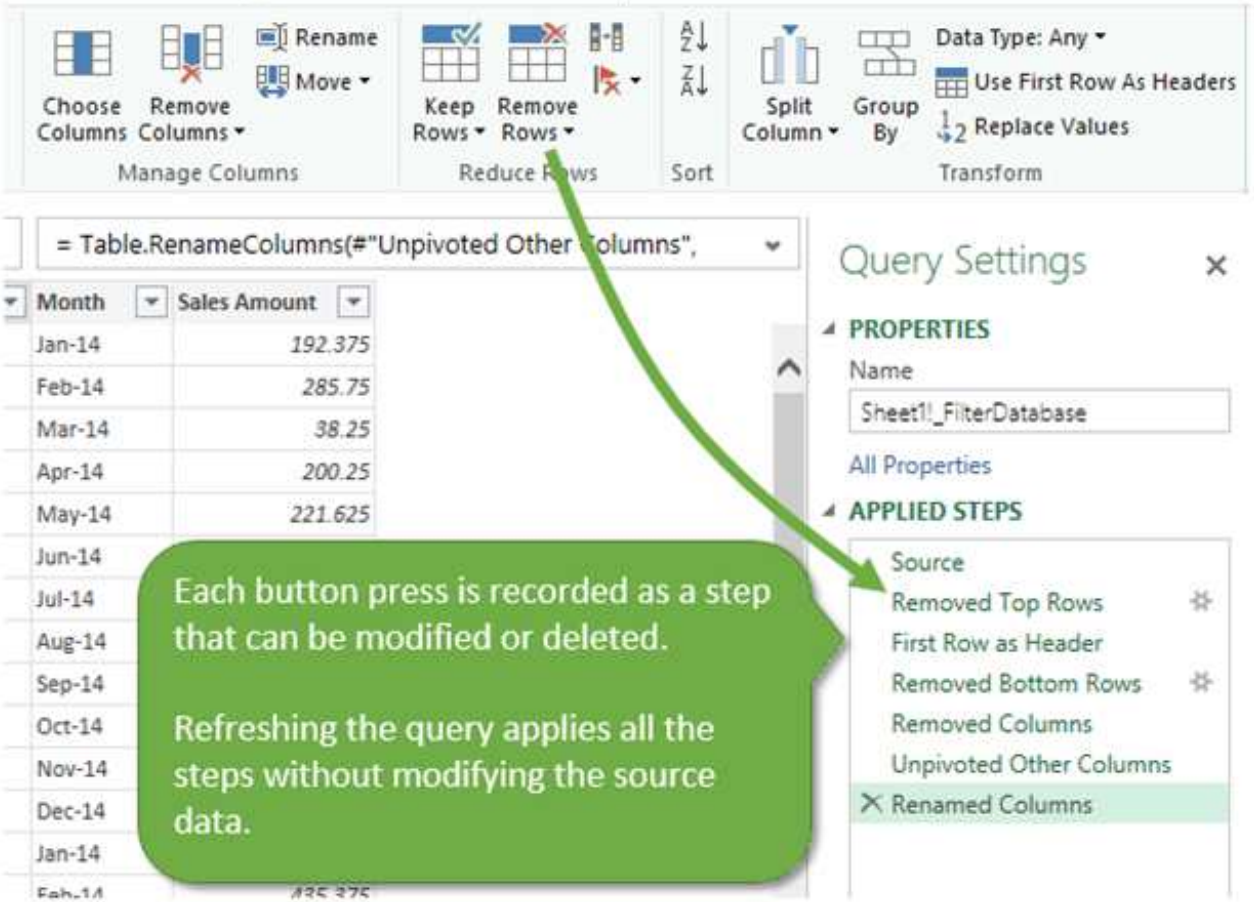
## Advanced Editing Capabilities with the M Code Language



# Power Query



## Power Query Records Your Steps & Automates Processes



# Power Query



## Excel's Power BI Solution is like Baking Cookies... Yum!

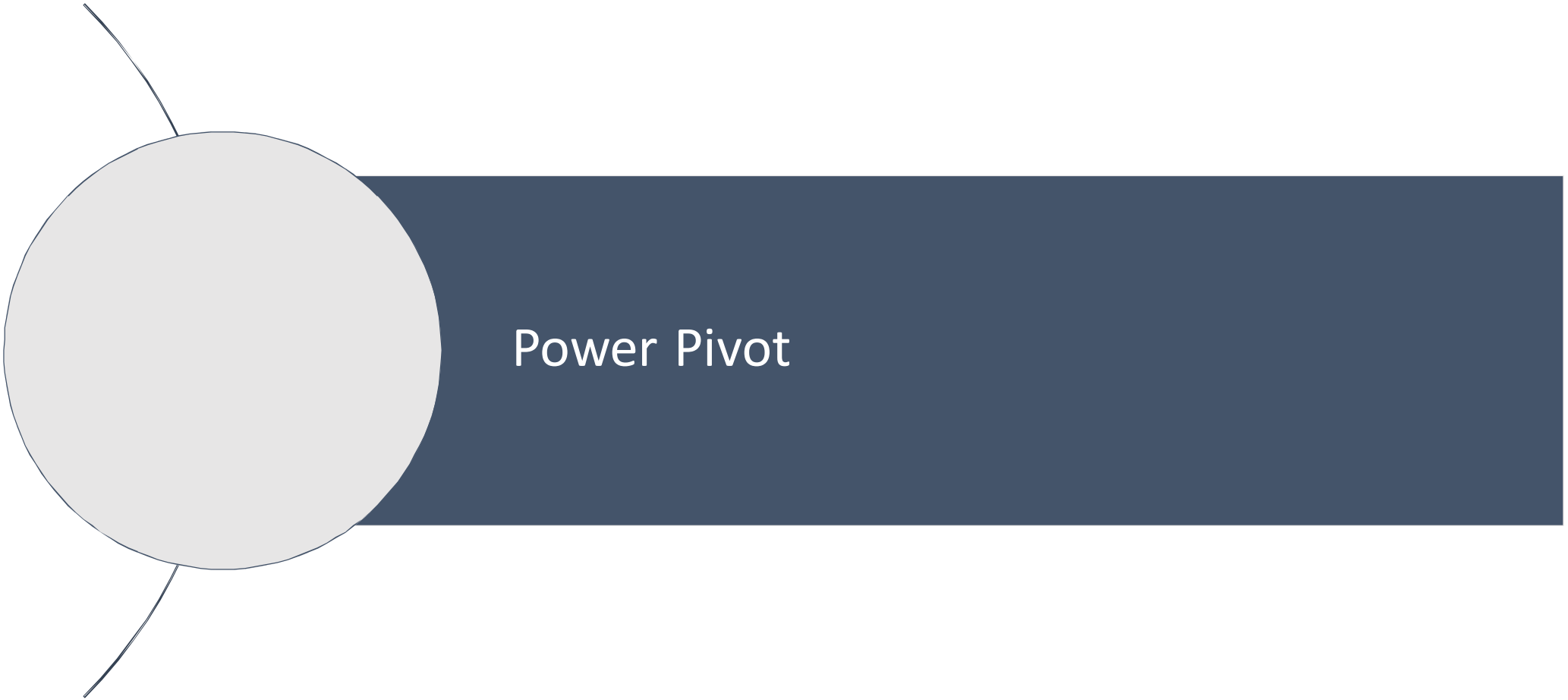
# Power Query


DEMO

(Generating A Date Dimension Table In Power Query,
DateTablePowerQuery.xlsx,
DateTablePowerQuery.bit)

# Power Pivot

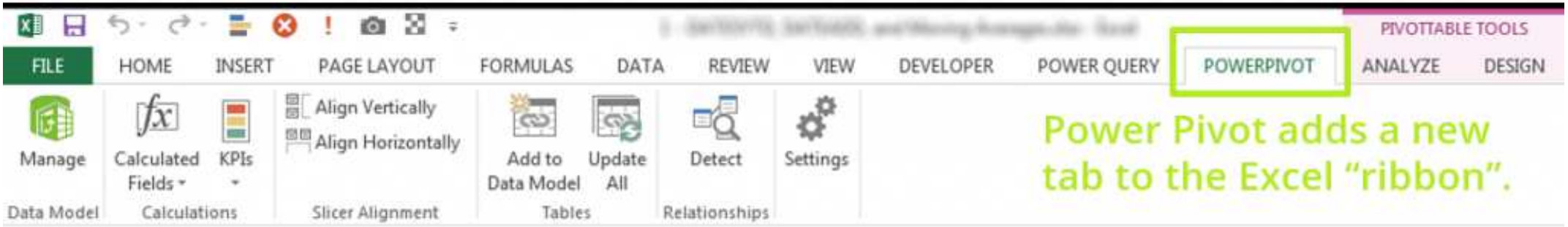




# Power Pivot



Power Pivot is the best new feature to happen to Excel in twenty years!
(Bill Jelen, founder of MrExcel.com)



# Power Pivot

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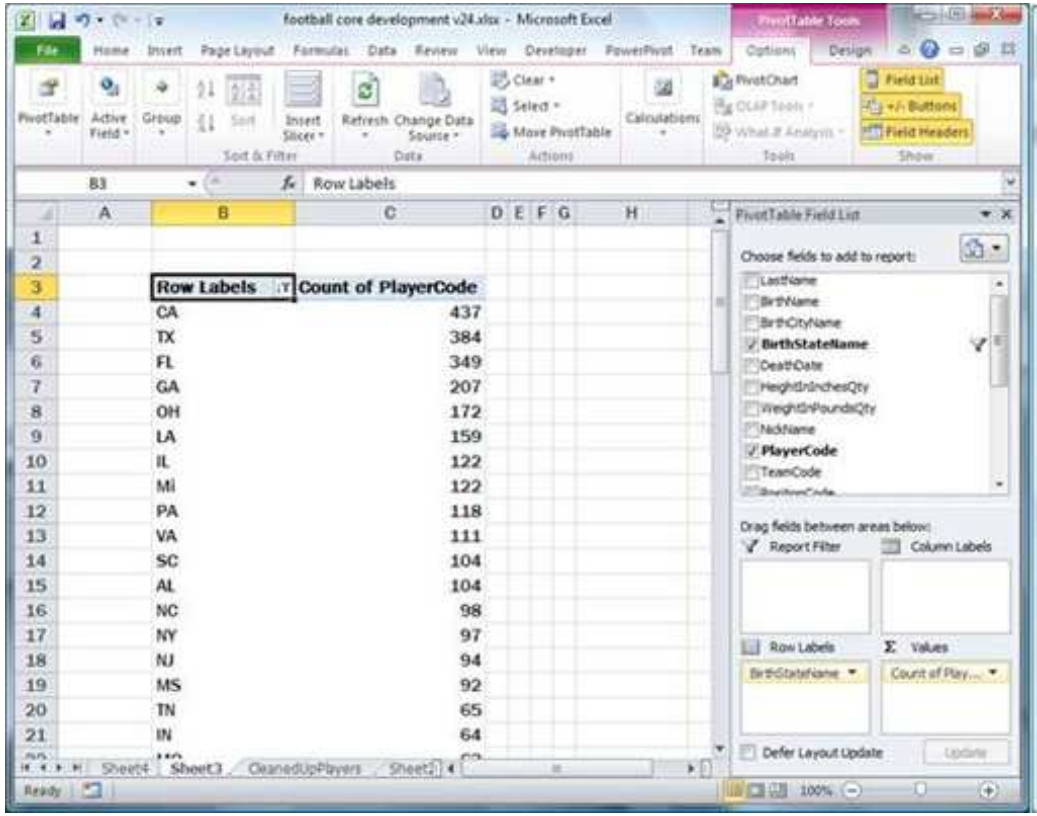
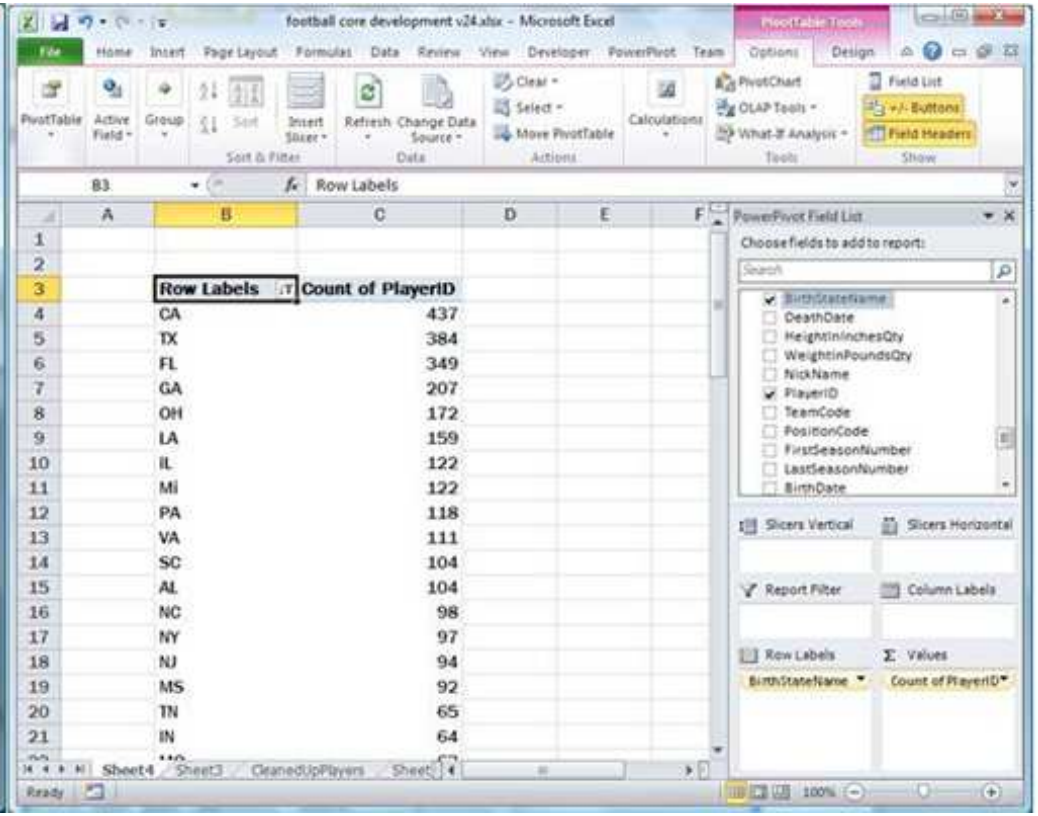
## Normal Pivot Table




## Power Pivot Table



# Power Pivot

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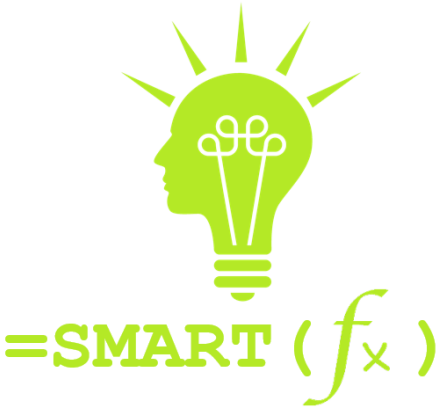
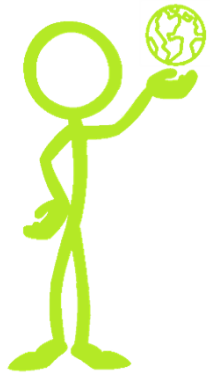
### INSTANT LINKING & SPLICING OF DATA SETS

- Never write a VLOOKUP() again.
- Link entire tables in seconds.
- Produce integrated views of your business that were not feasible before.
- Solve complex problems like “budget vs. actuals” in seconds.




### “SMART” FORMULAS: FAST, POWERFUL, PORTABLE

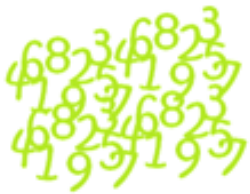
- 100+ new functions (ex: COUNTROWS, SWITCH, TOPN) join old favorites SUM, IF, etc.
- All functions now work in pivots, and auto-adjust as pivots change size & shape.
- Write a formula ONCE, and re-use it everywhere – no more re-writes.



### VIRTUALLY LIMITLESS DATA CAPACITY

- Big, Small, or Medium Data are welcome.
- Work with hundreds of rows or hundreds of MILLIONS of rows the same way.
- Fast calculations, even with multiple, massive, and linked tables.

# Power Pivot



Raw Data

**POWER QUERY**
(Data Grabber/Shaper)

**POWER PIVOT**
(Data Cruncher / The Brain)

**EXCEL PIVOTS/CHARTS/GRID**
(Versatile, Ubiquitous, and Underrated)

**POWER VIEW**
(Interactive Explorer)

**Q AND A**
(Question Answerer)

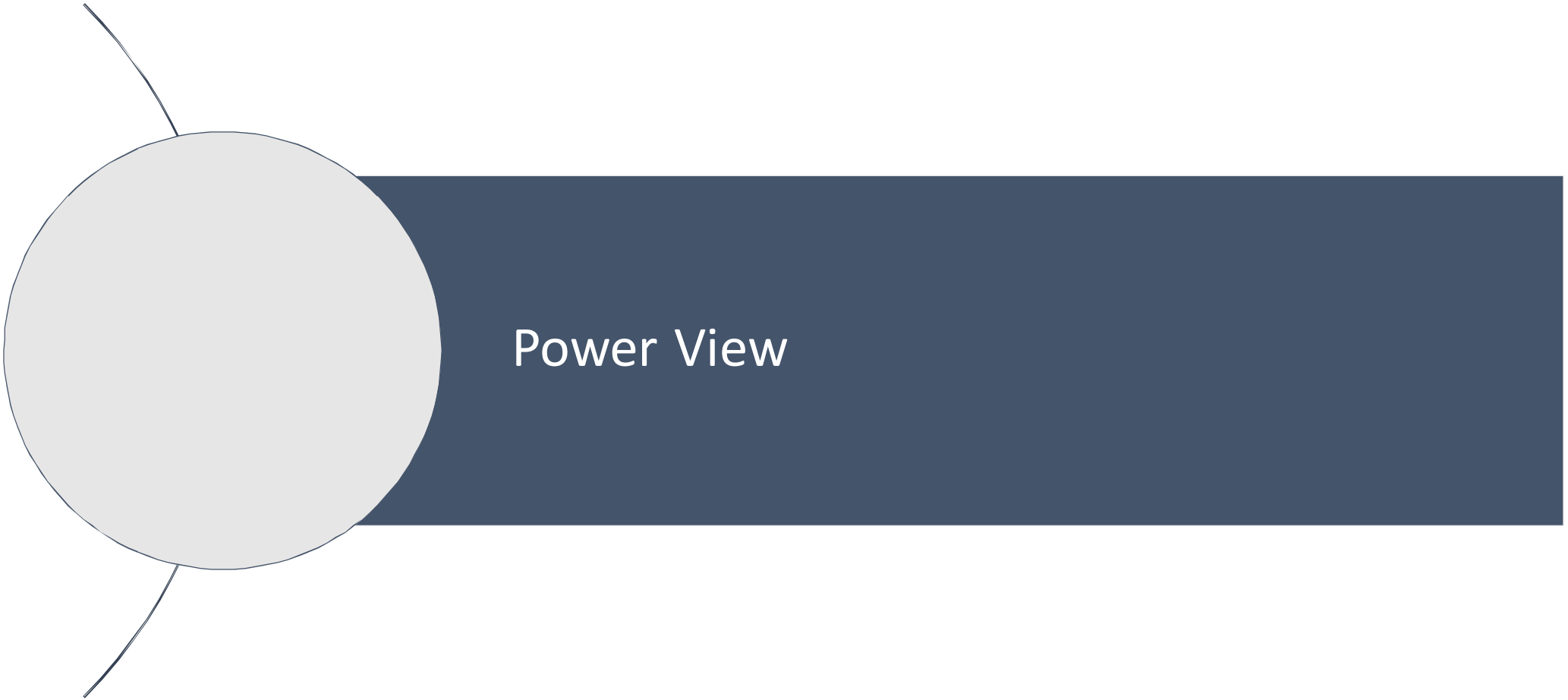
**POWER MAP**
(Map Charter / Creator of "Tours")

# Power Pivot


DEMO

(Create a date table & data model in PowerPivot)

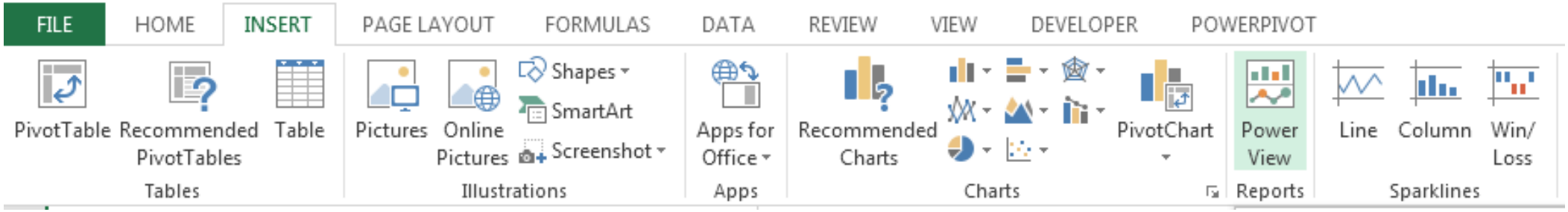
# Power View

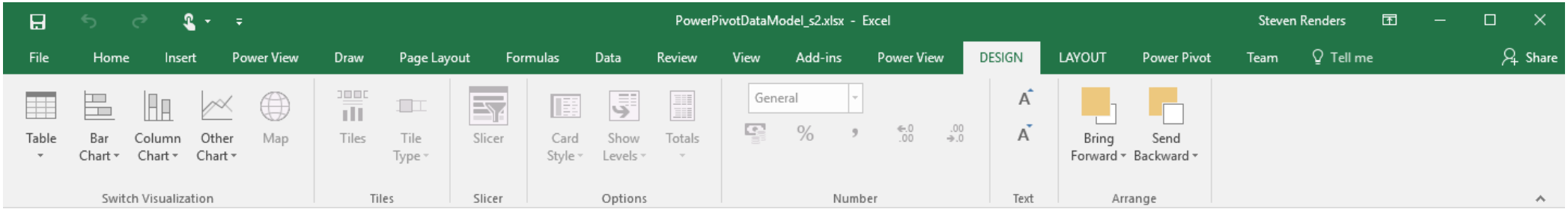


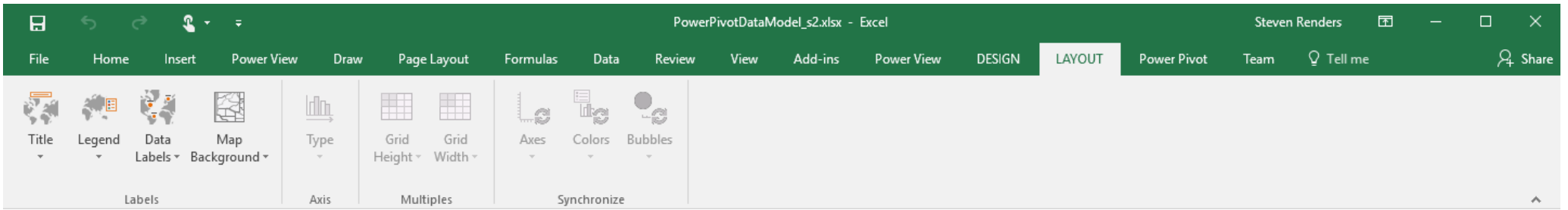
# Power View



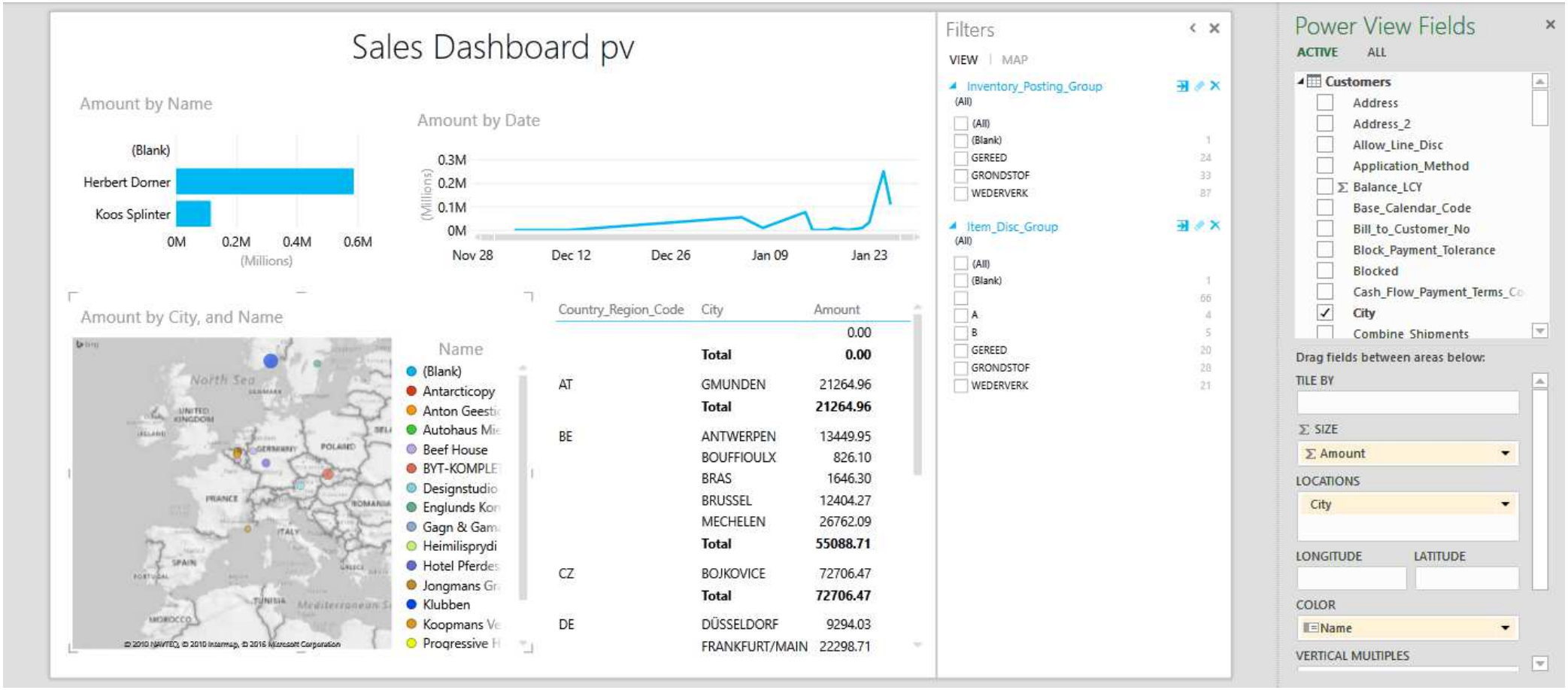
Explore, visualize, and present your data



# Power View


Sales Dashboard pv
Amount by Name
(Blank)
Herbert Dorner
Koos Splinter
0M
0.2M
0.4M
0.6M
(Millions)
Amount by Date
0.3M
0.2M
0.1M
0M
(Millions)
Nov 28
Dec 12
Dec 26
Jan 09
Jan 23
Amount by City, and Name
North Sea
Name
(Blank)
Antarcticopy
Anton Geesti
Autohaus Mi
Beef House
BYT-KOMPLE
Designstudio
Englunds Kor
Gagn & Gam
Heimilisprydi
Hotel Pferde
Jongmans Gr
Klubben
Koopmans Ve
Progressive H
Country_Region_Code
City
Amount
0.00
Total
0.00
AT
GMUNDEN
21264.96
Total
21264.96
BE
ANTWERPEN
13449.95
BOUFFIOULX
826.10
BRAS
1646.30
BRUSSEL
12404.27
MECHELEN
26762.09
Total
55088.71
CZ
BOJKOVICE
72706.47
Total
72706.47
DE
DÜSSELDORF
9294.03
FRANKFURT/MAIN
22298.71
Filters
VIEW
MAP
Inventory_Posting_Group
(All)
(All)
(Blank)
GEREED
GRONDSTOF
WEDERVERK
Item_Disc_Group
(All)
(All)
(Blank)
A
B
GEREED
GRONDSTOF
WEDERVERK
Power View Fields
ACTIVE
ALL
Customers
Address
Address_2
Allow_Line_Disc
Application_Method
Balance_LCY
Base_Calendar_Code
Bill_to_Customer_No
Block_Payment_Tolerance
Blocked
Cash_Flow_Payment_Terms_Co
City
Combine_Shipments
Drag fields between areas below:
TILE BY
SIZE
Amount
LOCATIONS
City
LONGITUDE
LATITUDE
COLOR
Name
VERTICAL MULTIPLES

# Power View


DEMO

(PowerView.xlsx)

# Power Map



# Power Map


- Creating a story about geographic data.

- A **3D** visualization add-in for Excel for
  - Mapping
  - Exploring
  - Interacting
  - with geographical data.

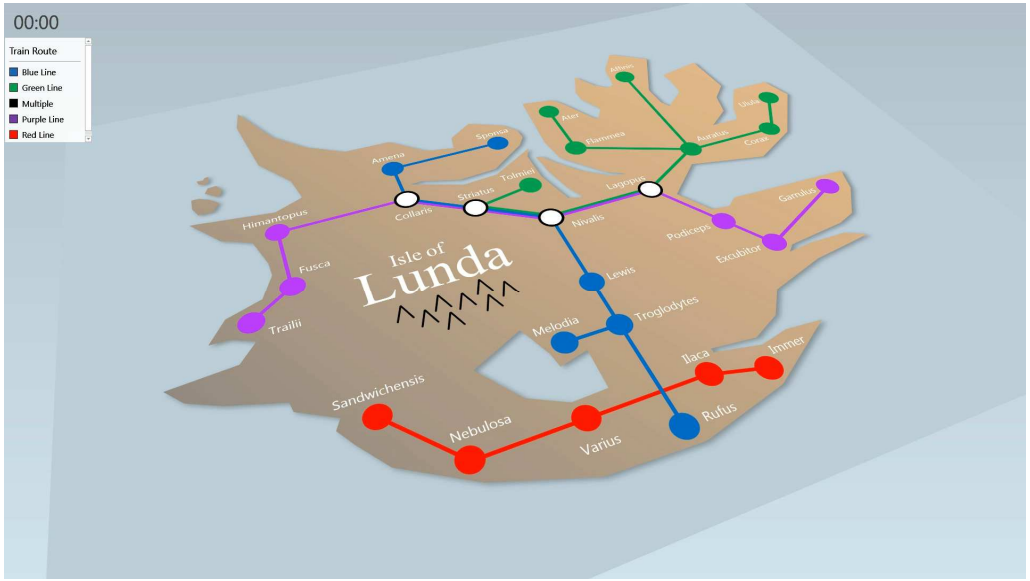
- Enabling people to:
  - discover and share new insights.

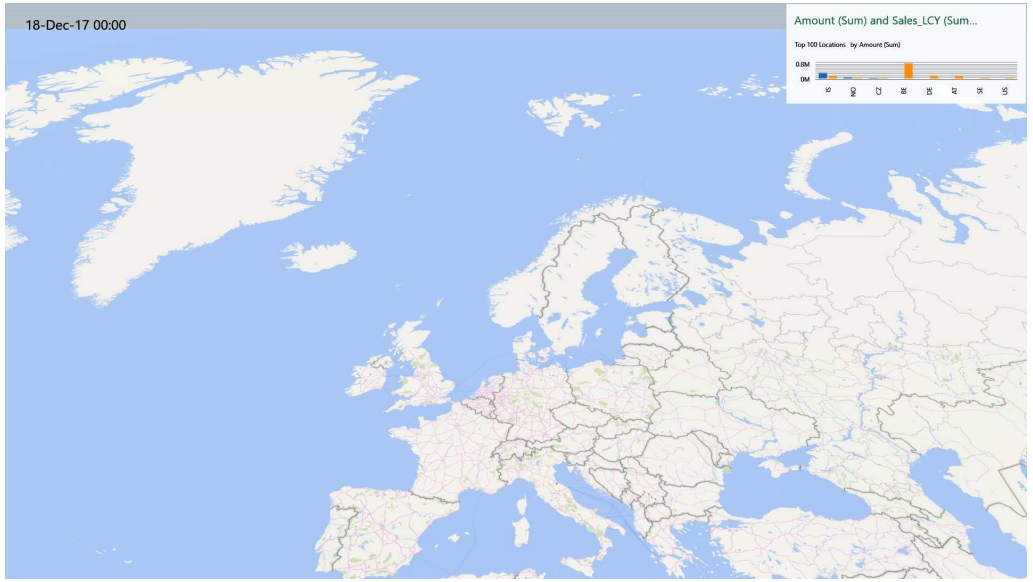
# Power Map



- **Tour**
  - made up of one or more **scenes**
- **Scene**
  - displays a **map**
  - contains one or more layers
- **Layer**
  - a geographic mapping with a specific type of **visualization**
  - can be bound to a **date** field

# Power Map


00:00
Train Route
Blue Line
Green Line
Multiple
Purple Line
Red Line
Isle of
Lunda
Himantopus
Fusca
Trailii
Collaris
Skiatus
Tolmiei
Sparrio
Antenna
Nivalis
Lagopus
Alfinis
Ister
Flammea
Auratus
Ulula
Cooperi
Podiceps
Excubitor
Gambelii
Lewis
Troglodytes
Melodia
Iliaca
Immer
Rufus
Varius
Nebulosa
Sandwichensis


18-Dec-17 00:00
Amount (Sum) and Sales_LCY (Sum...
Top 100 Locations by Amount (Sum)
0.8M
0M
US
NO
CZ
BE
DE
AT
SE
US

# Power Map


DEMO

(PowerMap.xlsx)

# Power BI Desktop

# Power BI Desktop


Power BI Desktop puts visual analytics at your **fingertips** with **intuitive** report authoring.

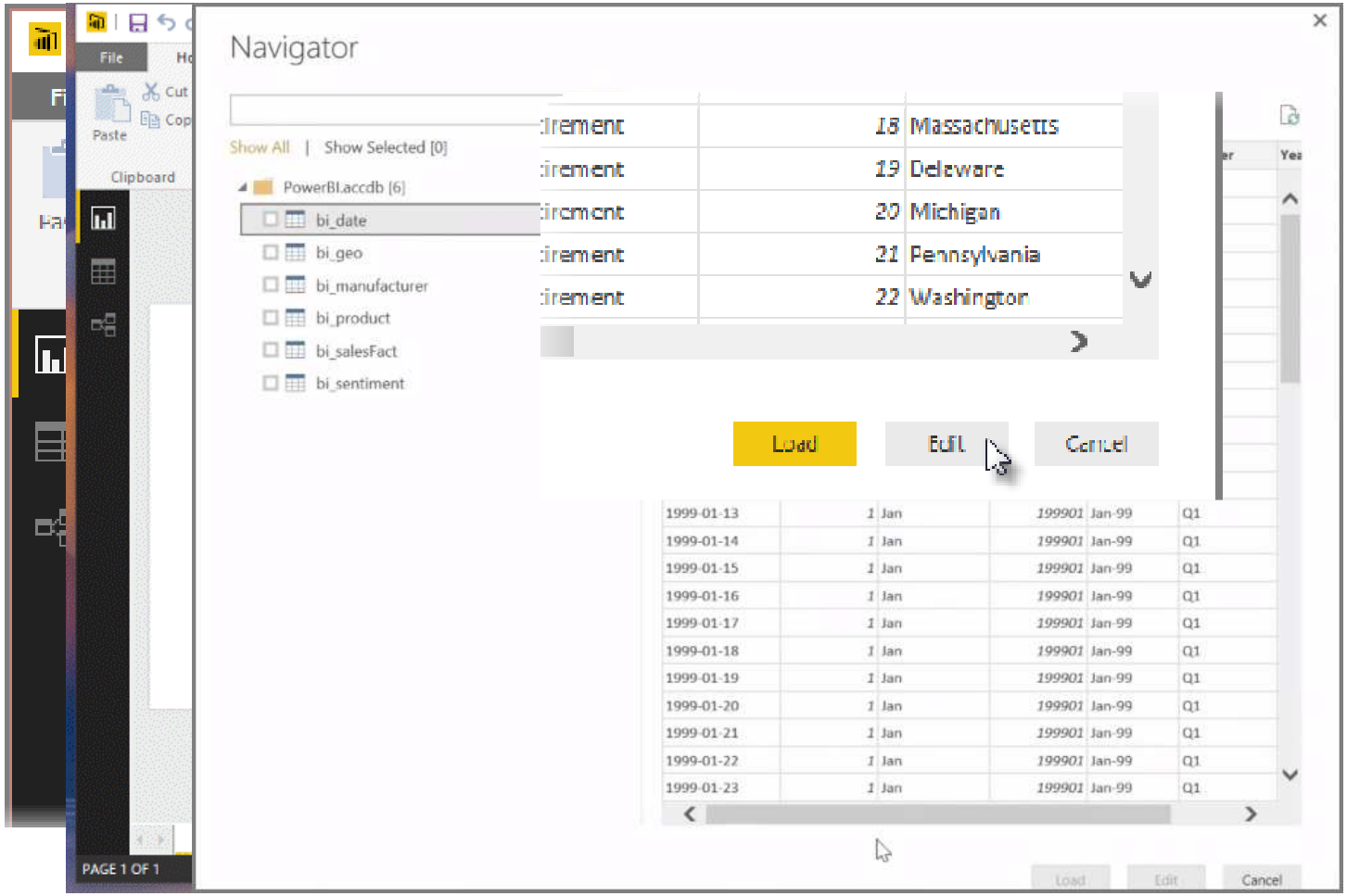
**Drag-and-drop** to place content exactly where you want it on the **flexible** and fluid canvas.

**Quickly** discover patterns as you explore a single unified view of linked, **interactive visualizations**.

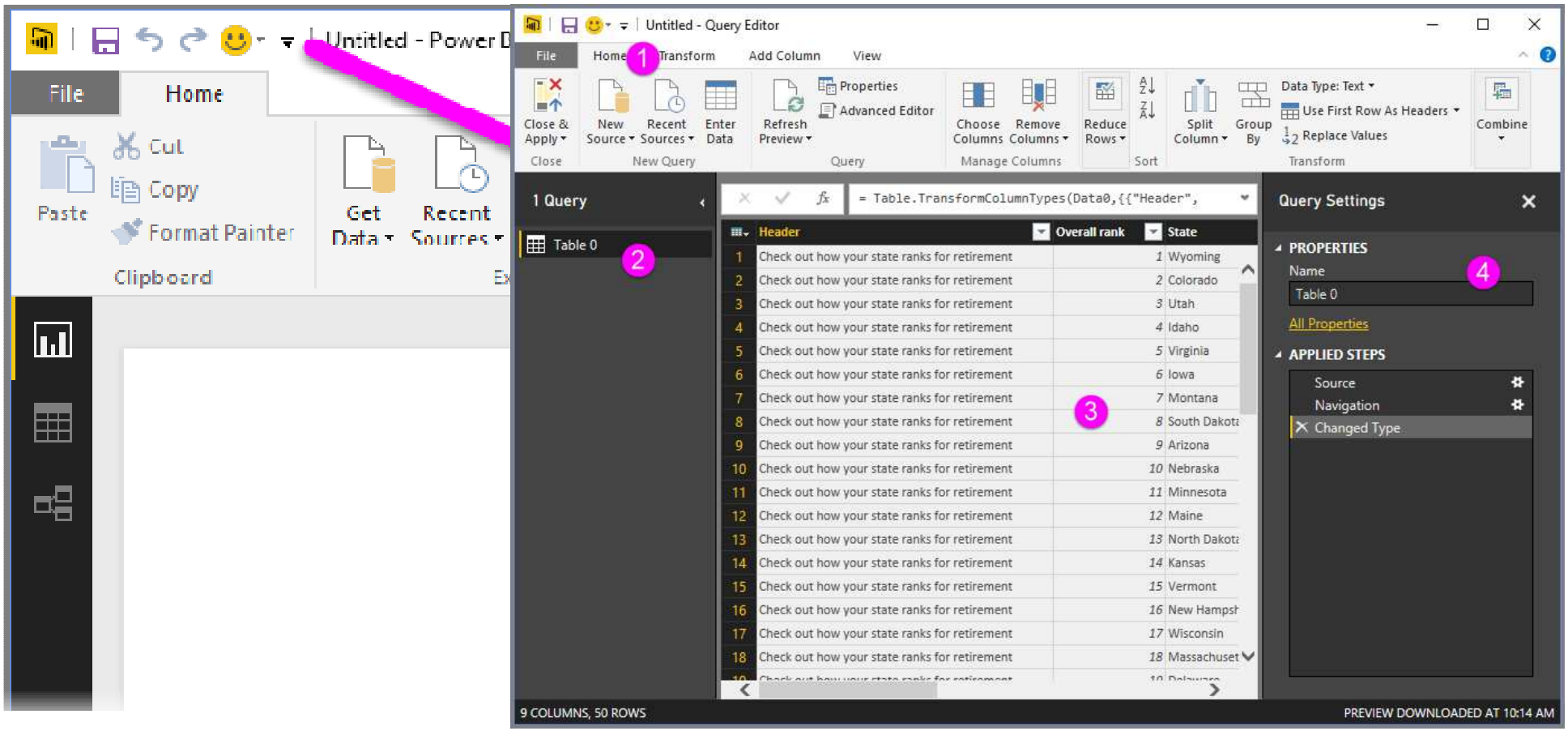
# Power BI Desktop

NAV TECH DAYS 2016
mibuso.com

# Connect to Data Sources

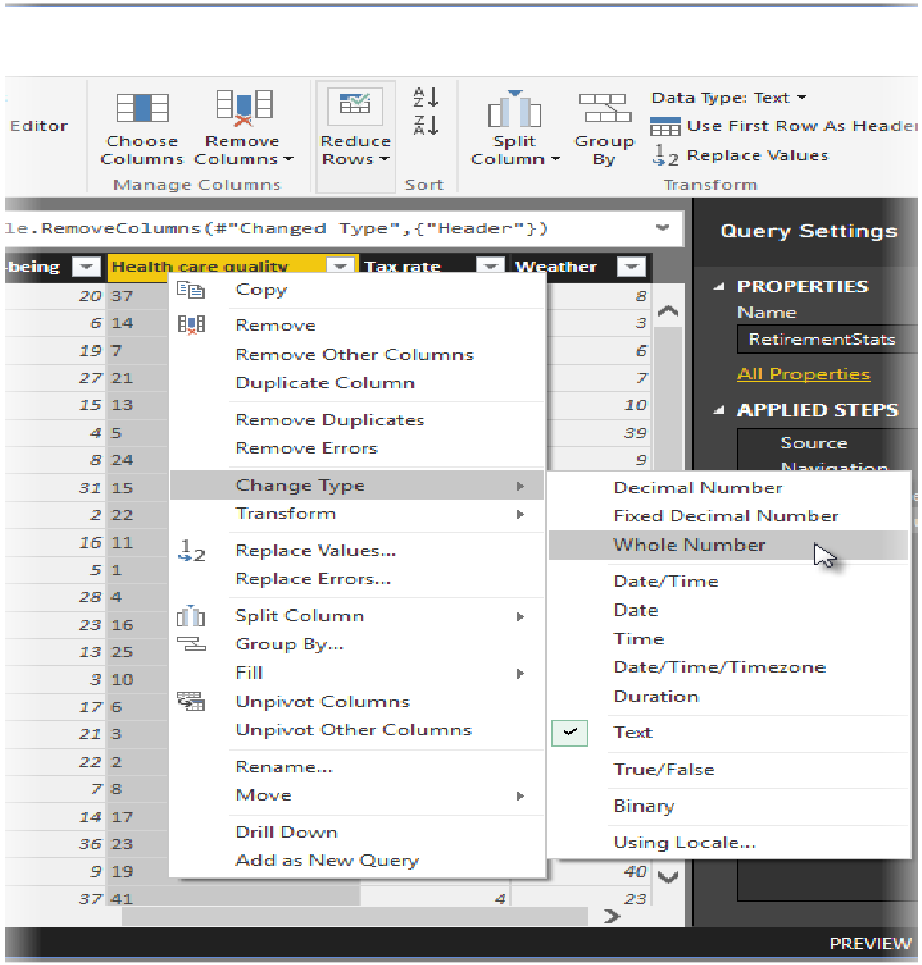


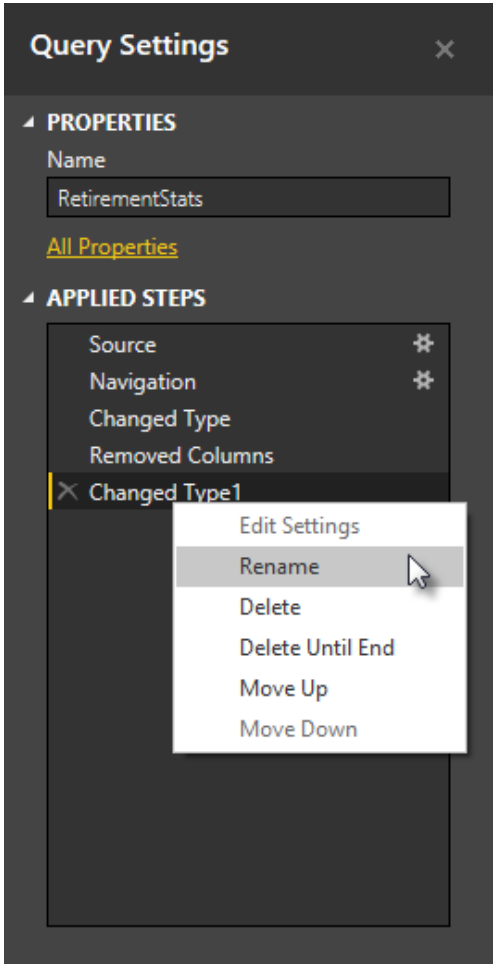
# Clean and Transform Your Data



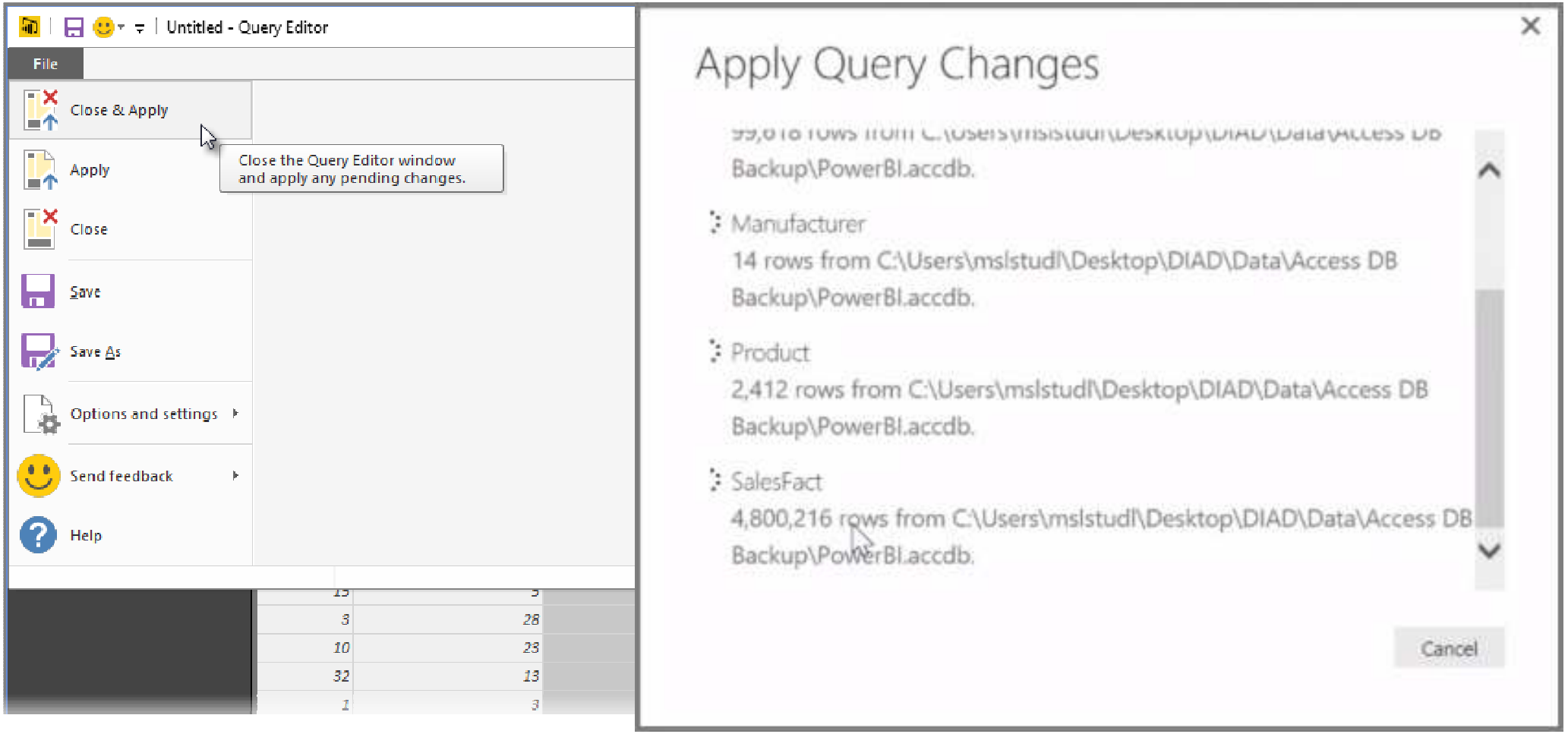
# Clean and Transform Your Data





# Clean and Transform Your Data



# Power BI Desktop


DEMO

01 Inventory Stock (SQL Query)
02 Sales Sql (SQL View)
03 NoOfCustomersByAgent (STP)
04 Posted Sales (ODATA)
05 CustomerSalesCube (Cube)
06 ABC Pattern (Patterns)
07 R ExponentialSmoothing (R)

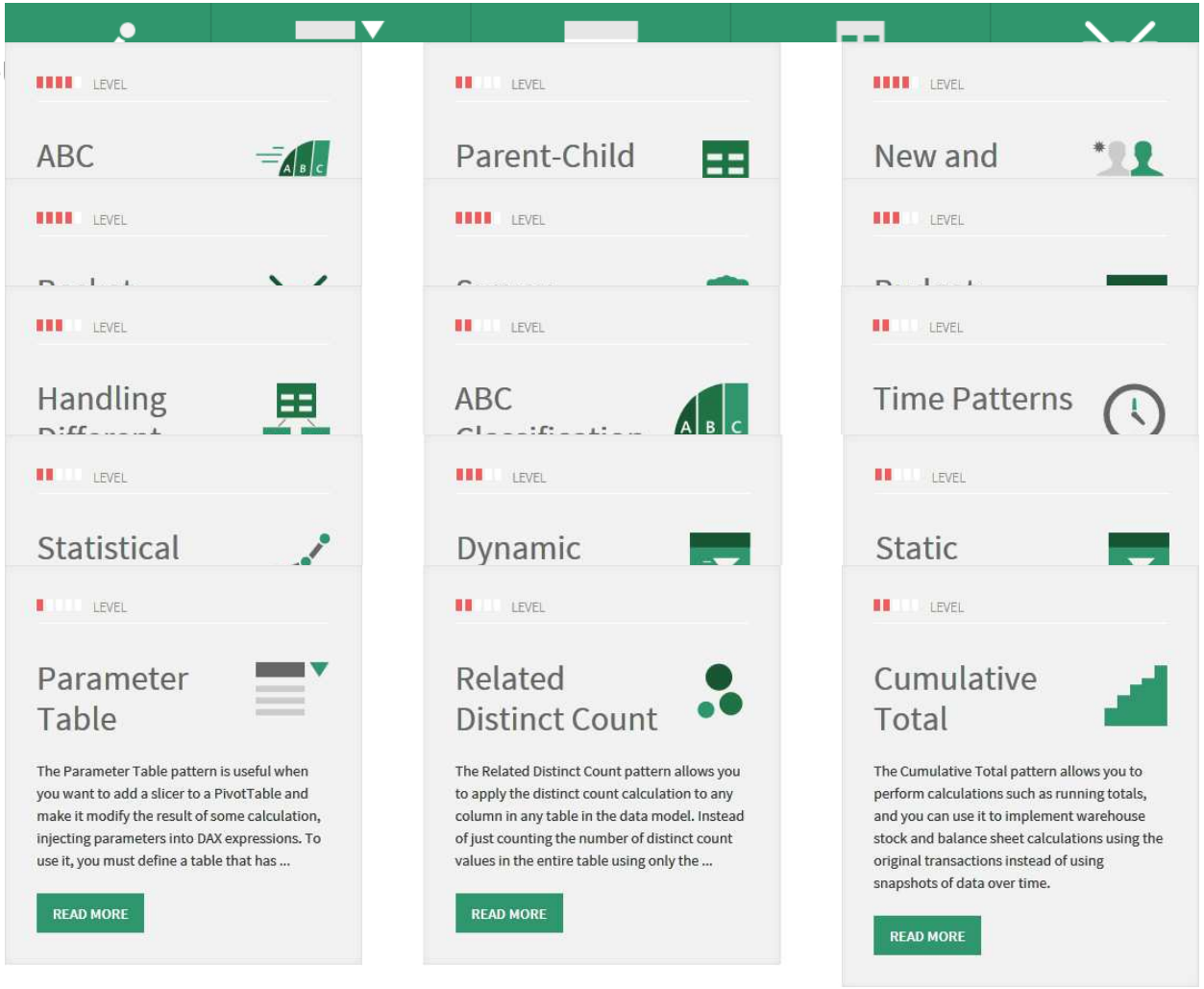
# Power BI Patterns

A pattern is a general re

DAX Patterns
- Power Pivot
- Power BI Desktop

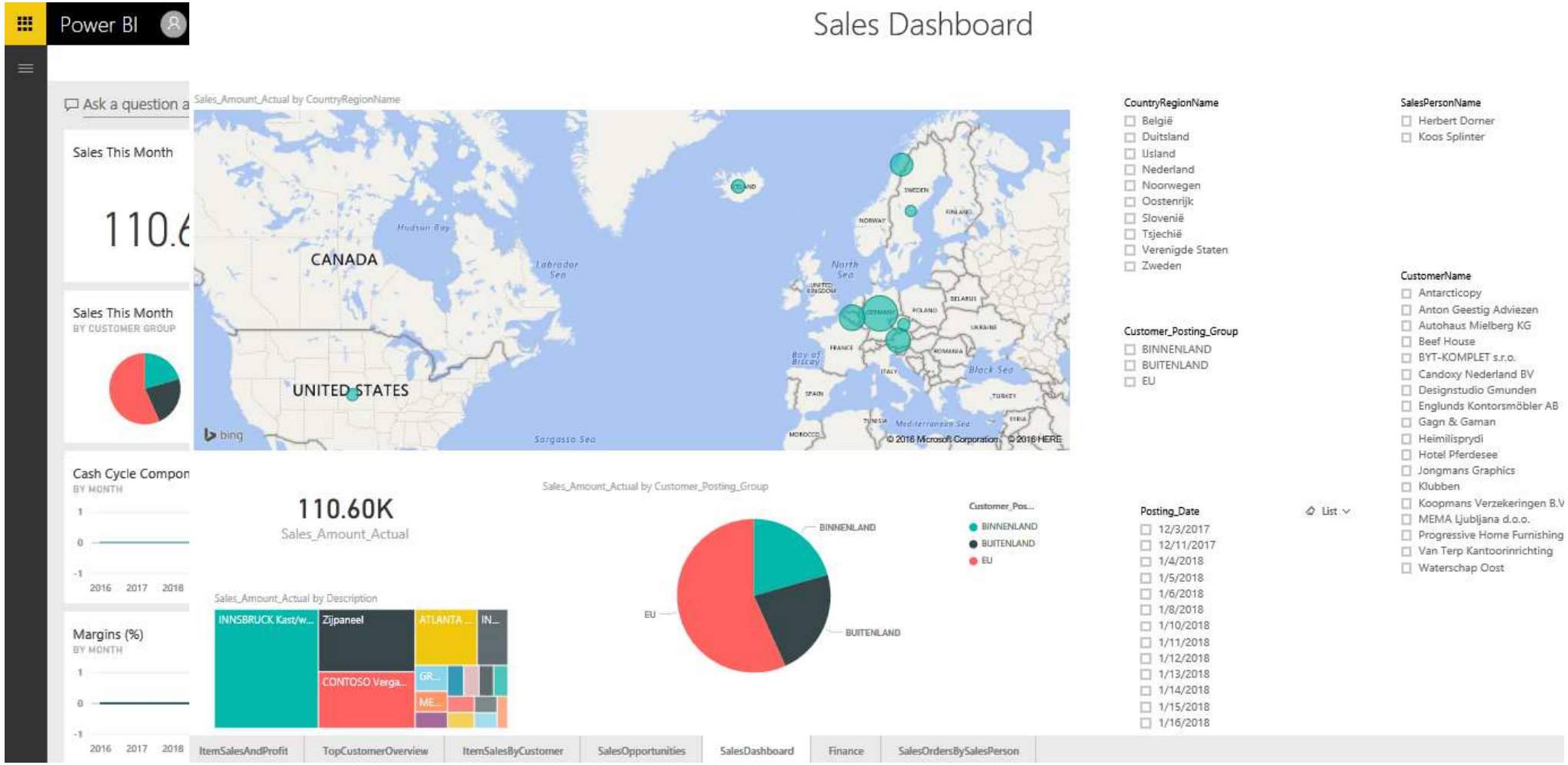
DAX Patterns

http://www.daxpatterns.com

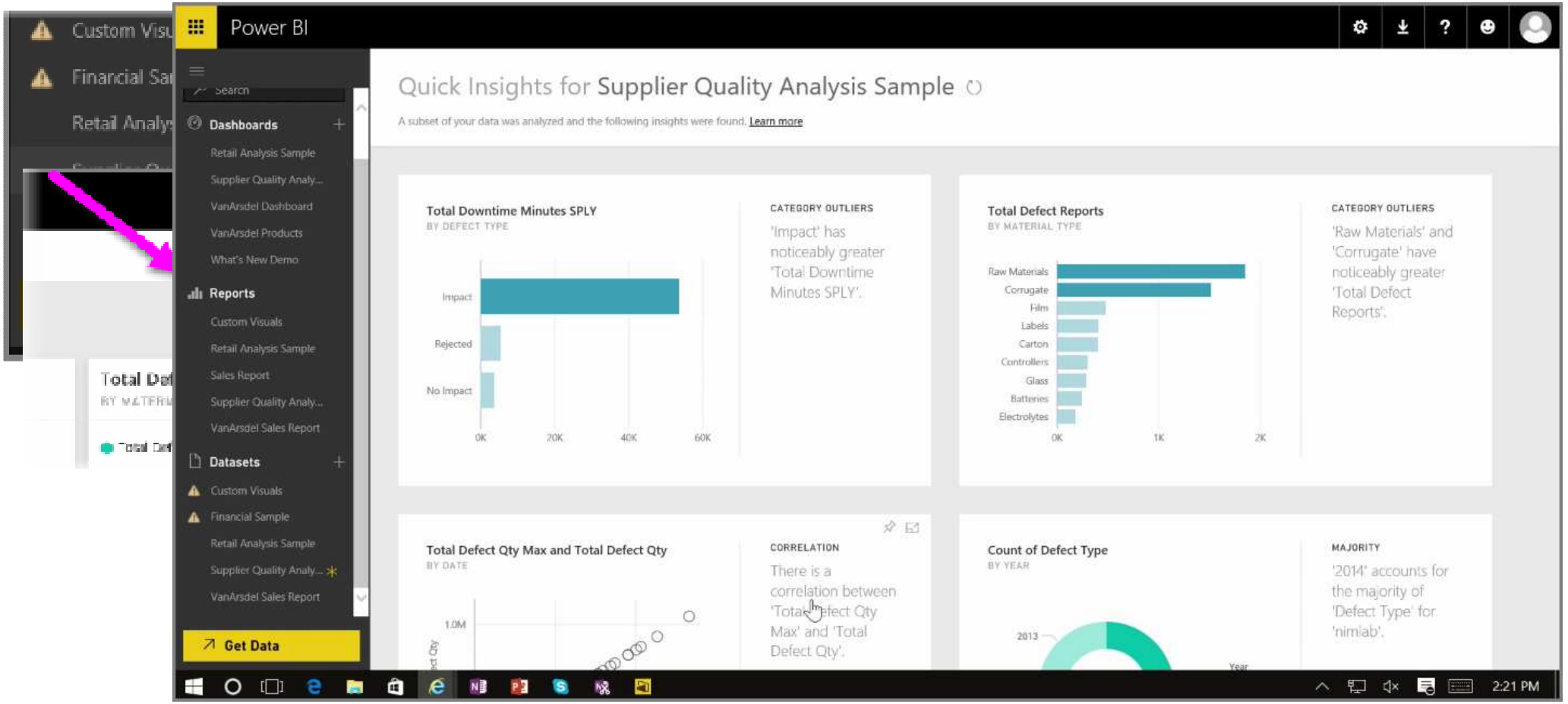


# Power BI Service

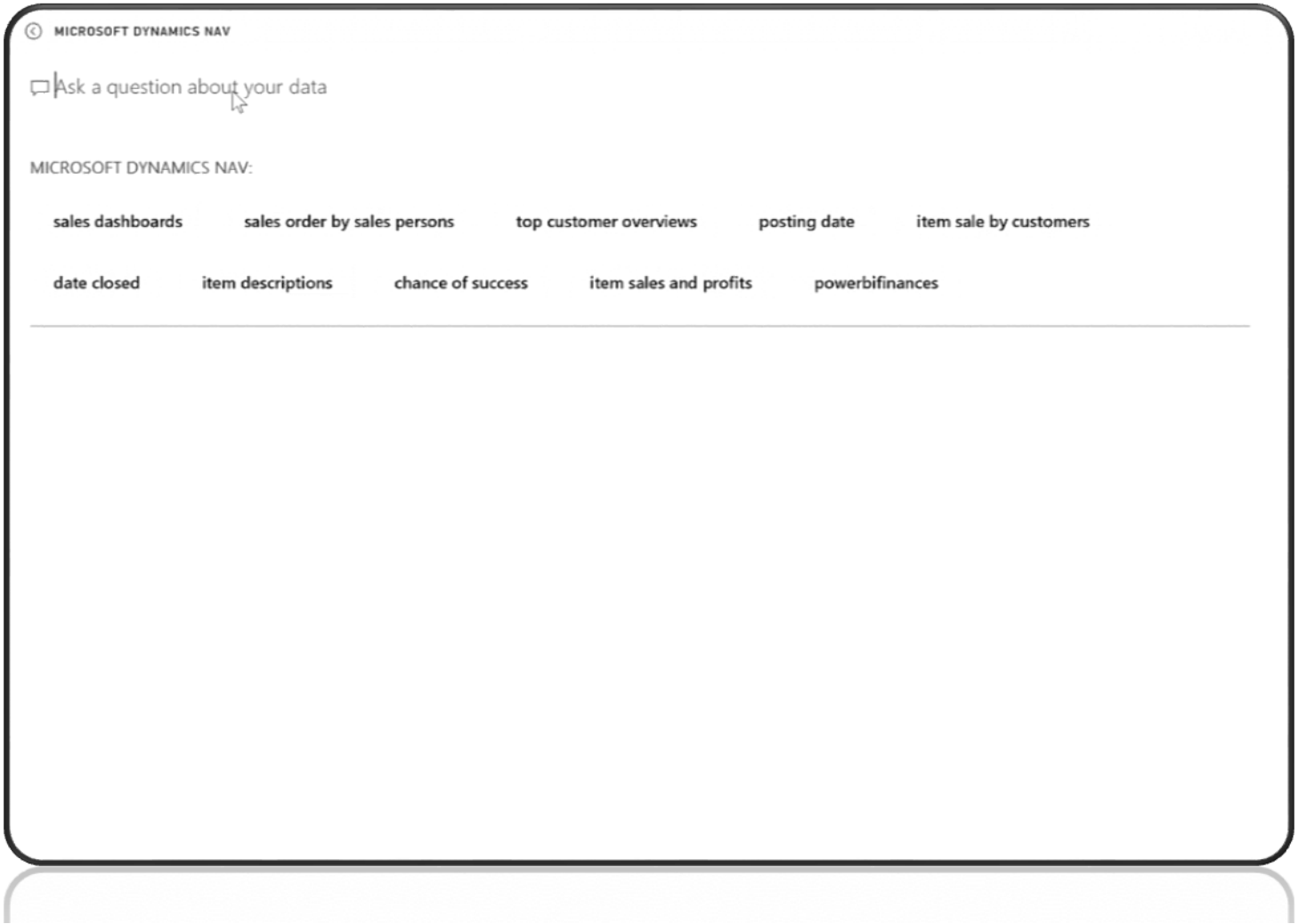
# Power BI Service



# Quick Insights in Power BI



# Ask Questions



# Power BI Service

DEMO

# Power BI Mobile

# Power BI Mobile

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**Make sure your data travels as well as you do**

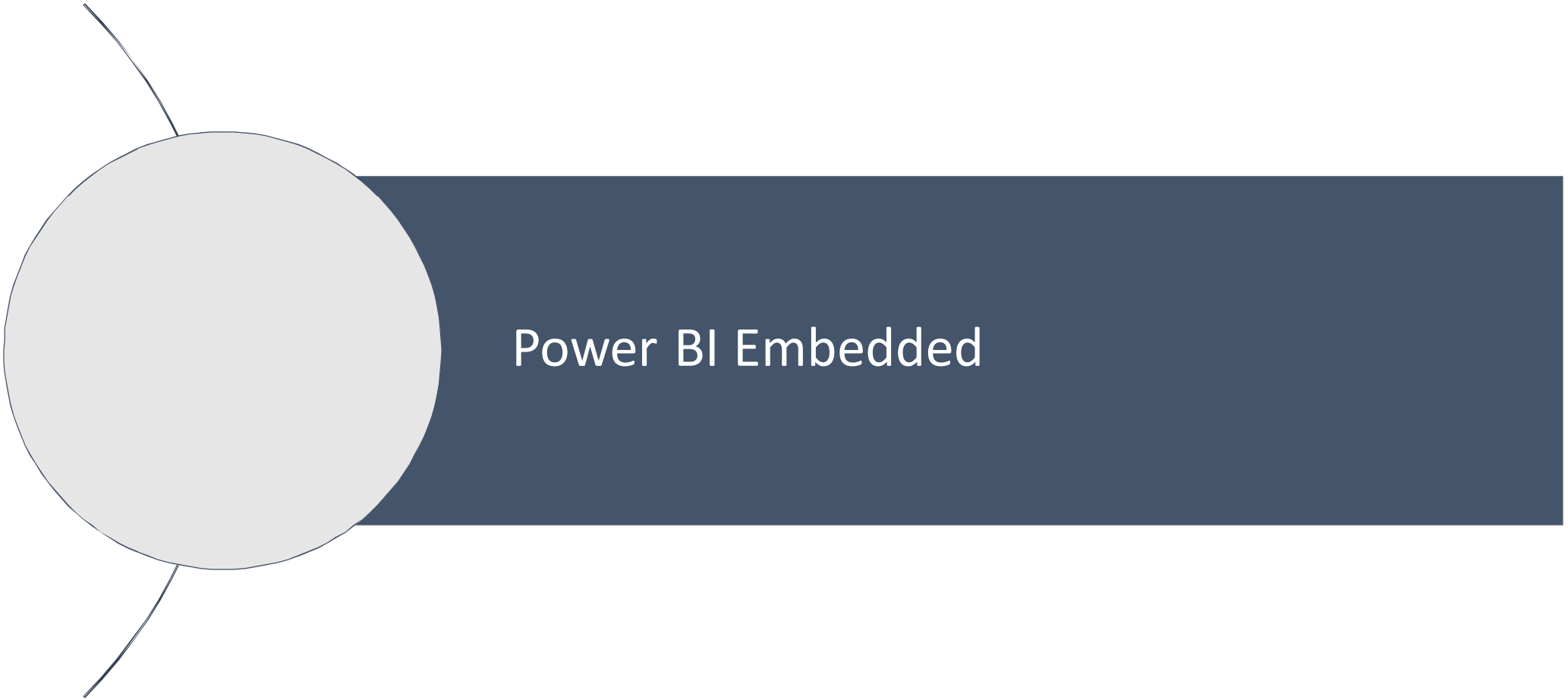
Stay connected to your data from anywhere, anytime with the Power BI app for Windows, iOS, and Android. Get a 360° view of your business data on the go - at the touch of your fingertips.

Download from Windows store | Download from App store | Download from Google Play

# Power BI Mobile



# Power BI Embedded



# Power BI Embedded

DEMO

# Power BI Embedded

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## Power BI Reports

There are no enabled reports. Choose Select Report to see a list of reports that you can display.

VIEW - ASSISTED SETUP

| Name | | Status |
|---|---|---|
| Migrate business data | ··· | Not Completed |
| Set up Cash Flow Forecast | ··· | Not Completed |
| Set up approval workflows | ··· | Not Completed |
| Set up a customer approval workflow | ··· | Not Completed |
| Set up email | ··· | Not Completed |
| Set up Email Logging | ··· | Not Completed |
| Set up Outlook for Financials | ··· | Not Completed |
| Set up reporting | ··· | Not Completed |
| Set up an item approval workflow | ··· | Not Completed |
| Set up Azure Active Directory | ··· | **Completed** |
| Set up a payment approval workflow | ··· | Not Completed |
| Set up Dynamics CRM connection | ··· | Not Completed |

# Power BI Embedded

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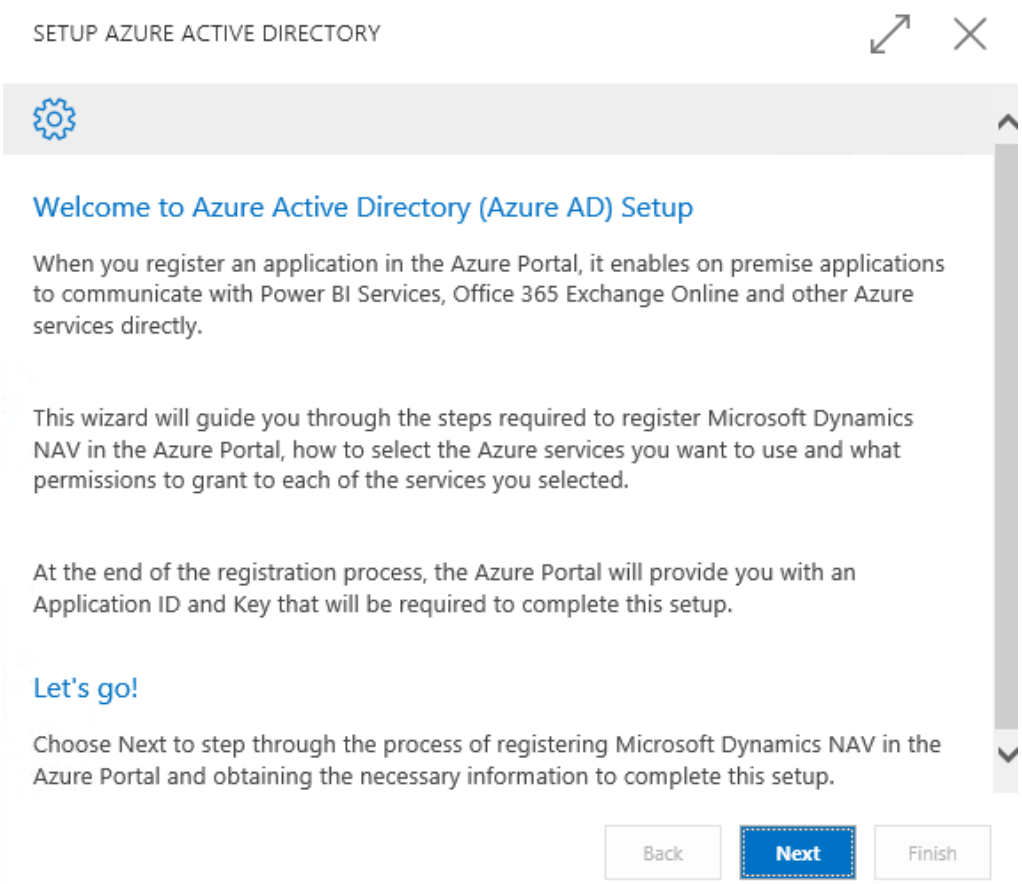
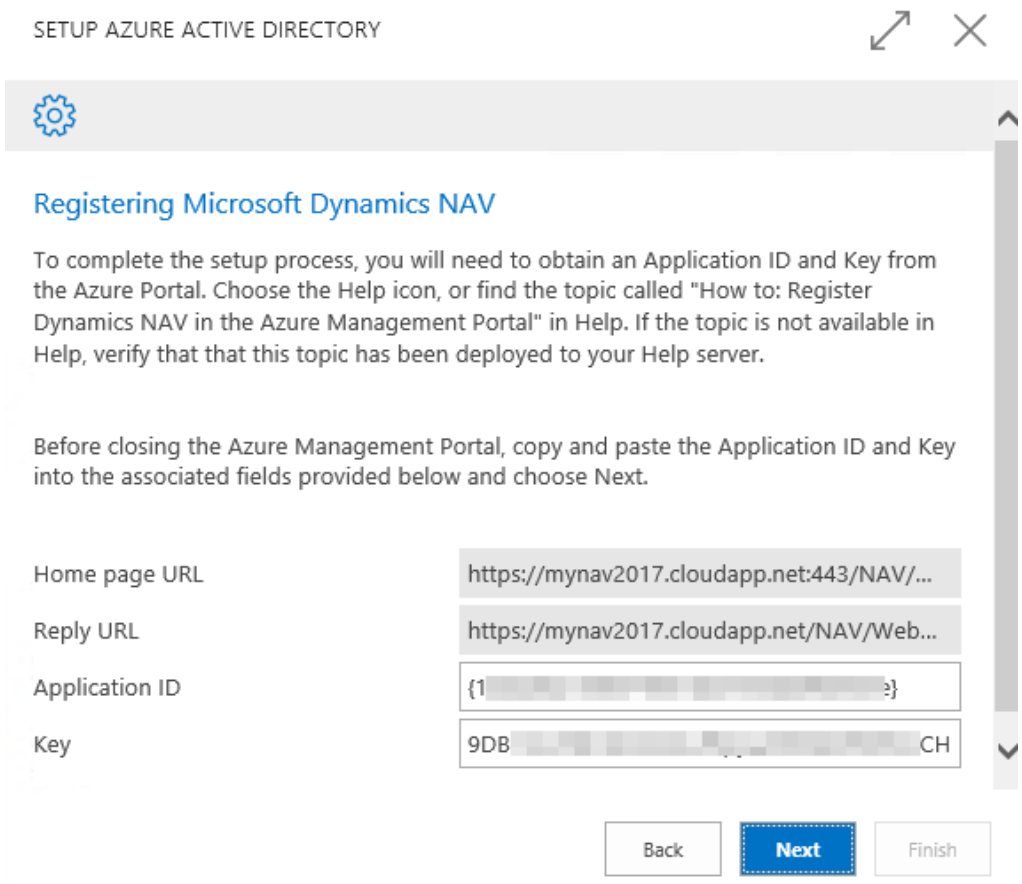


# Power BI Embedded


Log into your account.

- https://portal.azure.com

Select More Services > **App registrations**

In the App registrations blade, choose **Add**

# Power BI Embedded


In the Create blade, enter:

- **Name**
  - provide a name for your app. (NAV17)
- **Application Type**
  - select **Web app** / **API**.
- **Sign-on URL**
  - enter the URL for the **OAuthLanding.htm** page of your Dynamics NAV **Web Client**.
  - Example: <http>://<webserver>(:<port>)/<webserverinstance>/WebClient/OAuthLading.htm

# Power BI Embedded


Select 'NAV17'
- Azure Portal will display the 'Essentials' and '**Settings**' blades to the right.

Select '**Required Permissions**'
- Select 'Add'

Choose the 'Select an **API**' option
- Choose 'Select' when completed.

# Power BI Embedded


Select '**Power BI Service**' option
- Chose the 'Select' command at the bottom of the blade.

Select the 'Select Permissions' option.
- Note: **View Reports** is the only permission required.

Choose 'Select' when completed.

# Power BI Embedded


Choose `Done' and navigate back to the `Settings' blade.

Select `**Keys**' from the Settings blade.

Copy the Key

# Power BI Embedded

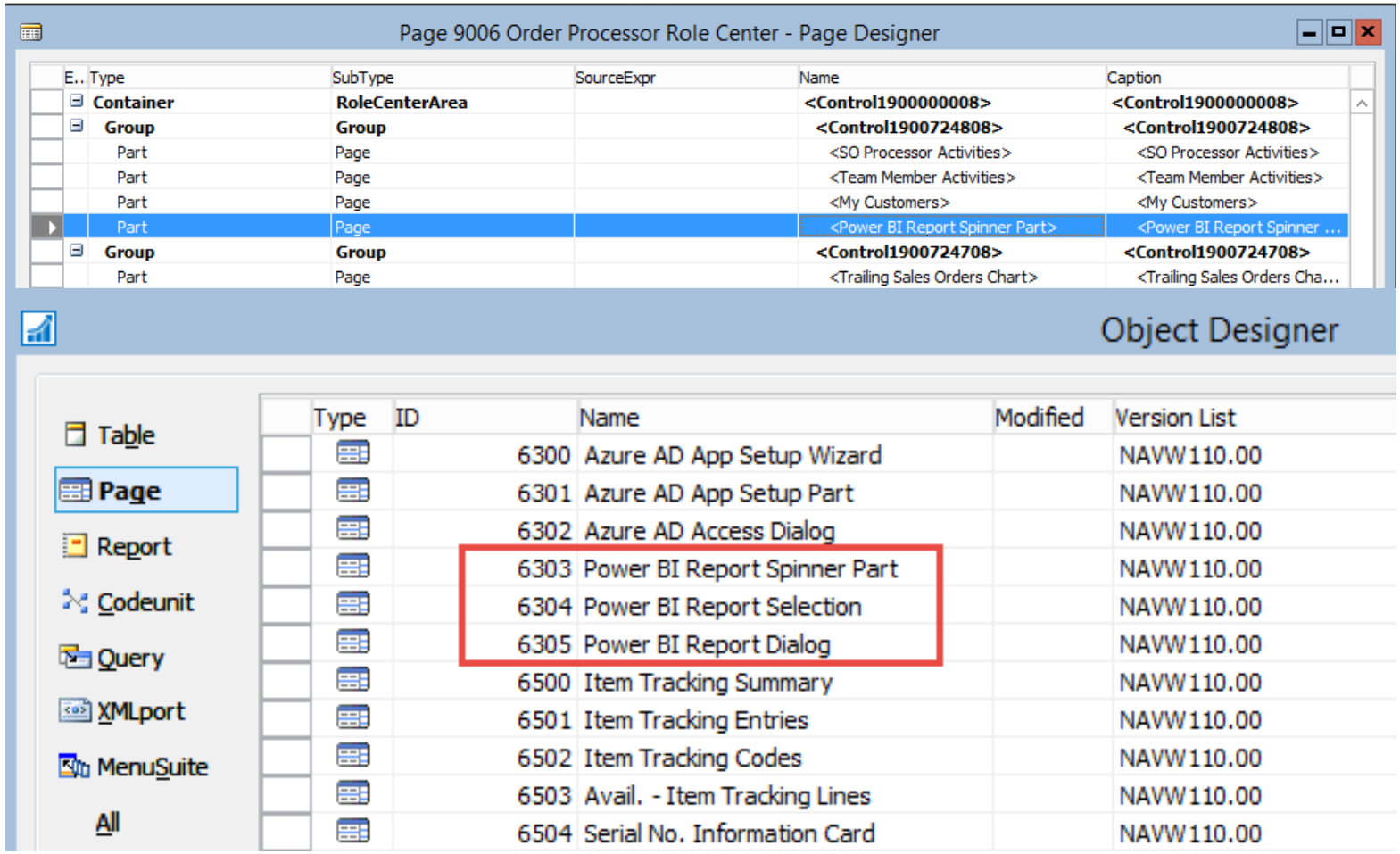

Select `Properties'

Highlight the `**Application ID**' key

Select copy

# Power BI Embedded





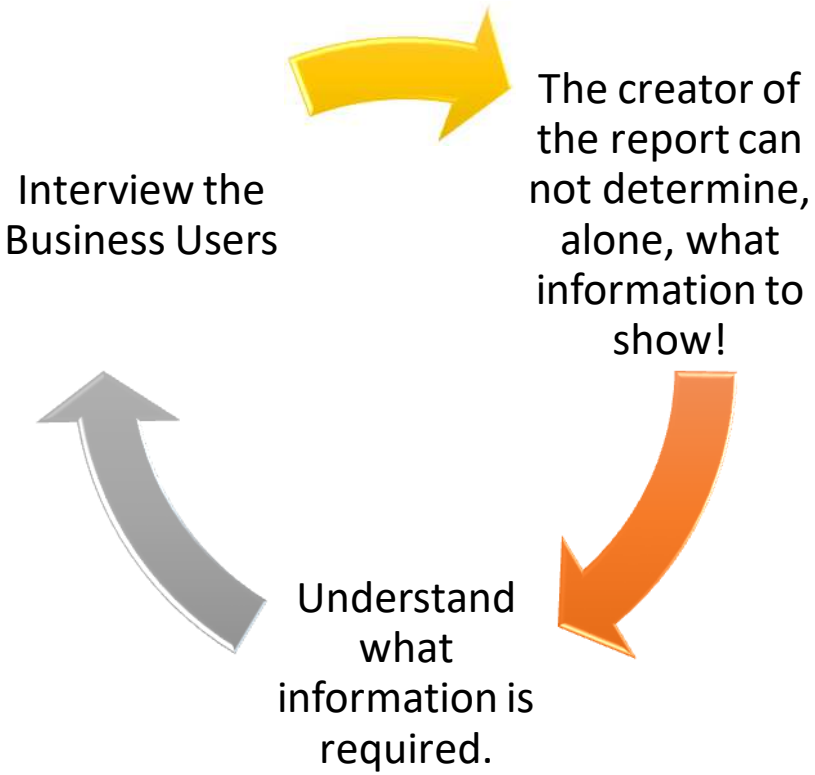
# How Do I Get Started?

# Where to begin?

Interview the Business Users

Plan Dashboards & Reports

Obtain the Data



# Interviewing the Business Users

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What are the core numbers?

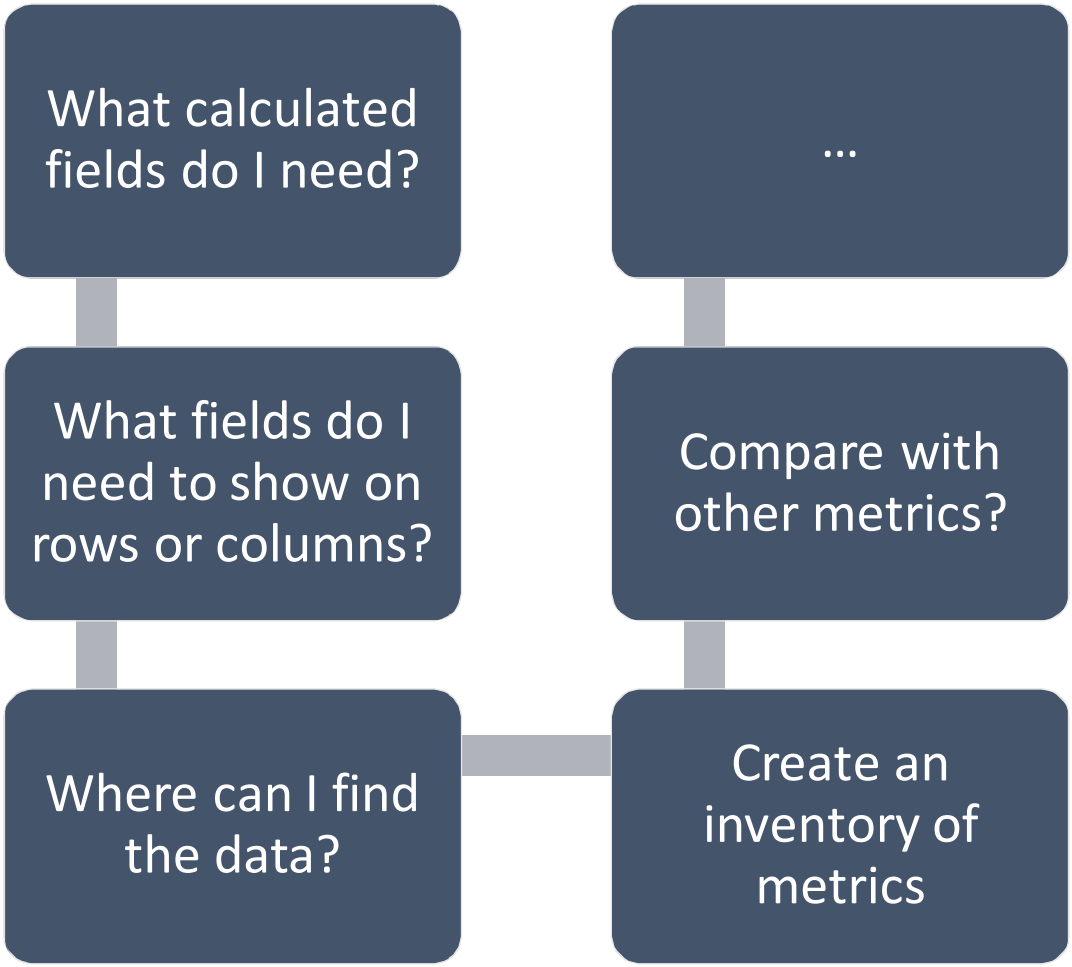
- For example:
  - *Overall revenue*
  - *Numbers of units sold*
  - *Usage of devices*
  - *Number of subscribers*

Management wants to compare these with targets.

- Short term:
  - *To react immediately*
- Long term:
  - *To see trends and predict problems*

# Planning Dashboards & Reports



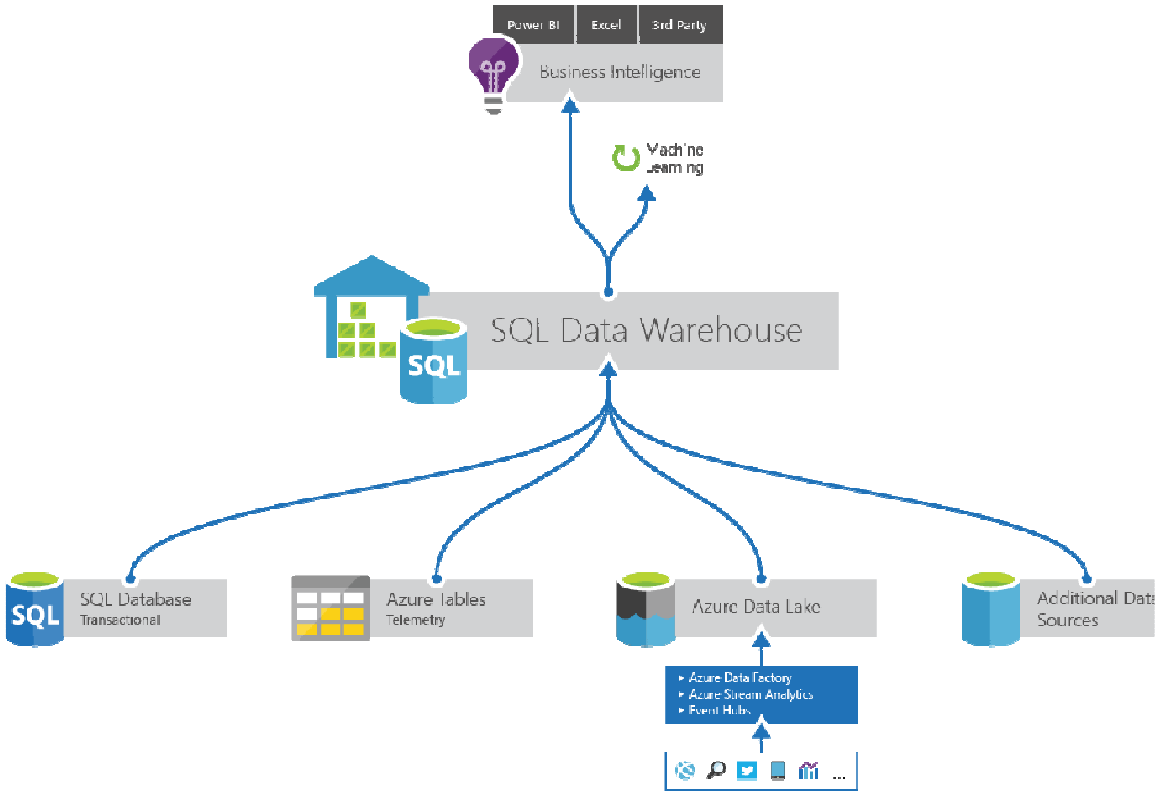


# Planning Dashboards & Reports



# Obtaining the Data

- The best practice is to create an **external** data repository.
  - The **power** to report on **any** aspect of your operational system, **now** and in the **future**
  - To **integrate** data from multiple systems



# The Power of Power BI

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| Business User | Business Analyst | BI Professional | Developer |
| --- | --- | --- | --- |
| • **Import** your own data<br>• Work with your **organization** | • Import, **reshape**, and **model** your data<br>• Create stunning reports and **visualizations**<br>• Create **content packs** to share your insights | • Connect your **on-premises** Analysis Services Server<br>• **Empower** your colleagues to create their own reports | • **Integrate** your applications with Power BI<br>• Create real-time **dashboards** |

# The Power of Power BI


Whatever your role, Power BI brings all your data together!

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# THE POWER OF POWER BI AND DYNAMICS NAV

STEVEN RENDERS – think about IT