

# Power Platform Dataflows

Power Query (and more) in the Cloud

Wolfgang Strasser  
@wstrasser





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# Power Platform Dataflows

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# Power Platform

Powerful alone. Better together.

The Microsoft Power Platform is more than the sum of its parts. Connect them together—and to Office 365, Dynamics 365, Azure, and hundreds of other apps—and build end-to-end business solutions.

## Power BI

Make informed, confident business decisions by putting data-driven insights into everyone's hands.

[Learn more >](#)

## Power Apps

Turn ideas into organizational solutions by enabling everyone to build custom apps that solve business challenges.

[Learn more >](#)

## Power Automate

Boost business productivity to get more done by giving everyone the ability to automate organizational processes.

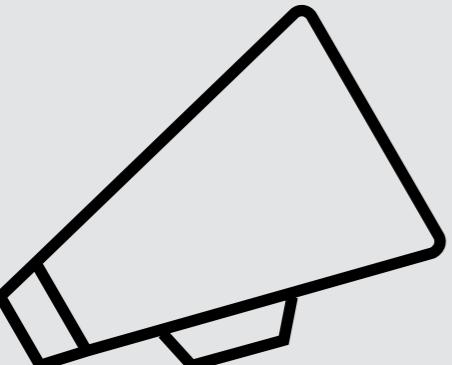
[Learn more >](#)

## Power Virtual Agents

Easily build chatbots to engage conversationally with your customers and employees—no coding required.

[Learn more >](#)

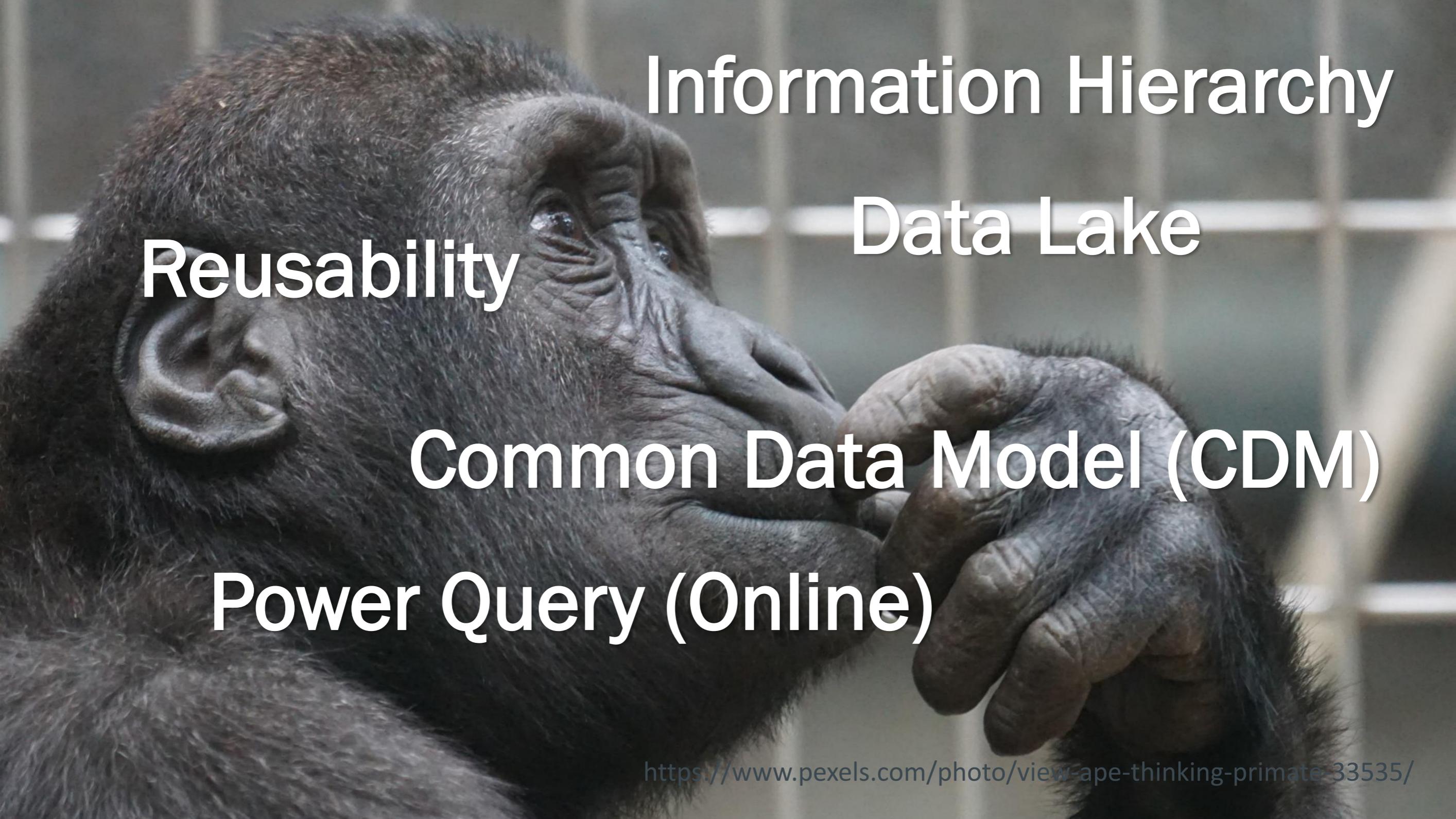




# Power Platform Dataflows

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## Data Integration in the Cloud



# Information Hierarchy

Reusability

Data Lake

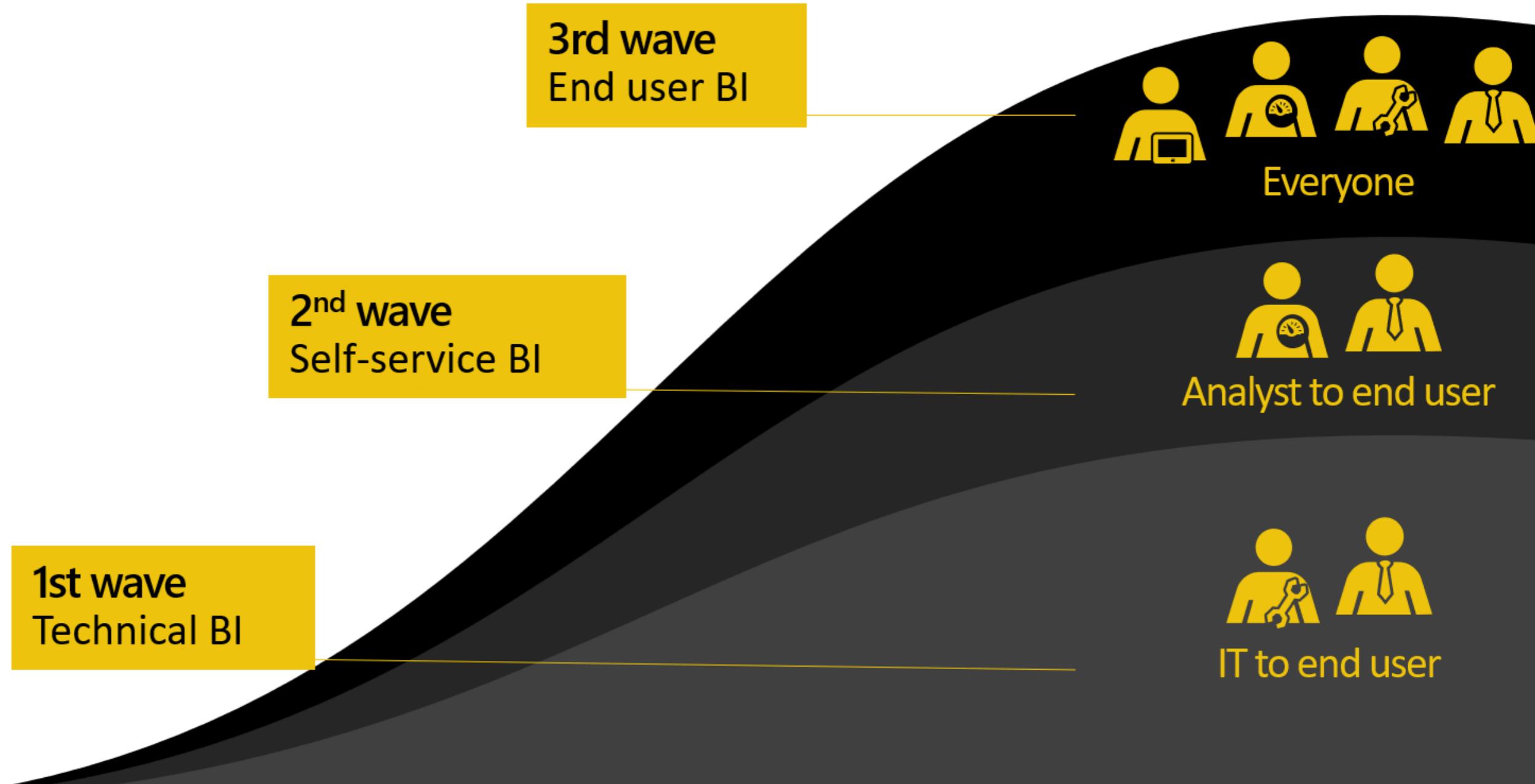
Common Data Model (CDM)

Power Query (Online)

A close-up photograph of a chimpanzee's face. The chimpanzee has dark brown fur and is looking slightly to the right of the camera with a thoughtful expression. Its hands are visible in the lower right, resting near its chin. The background is blurred.

# What?

# Evolution of Business Intelligence





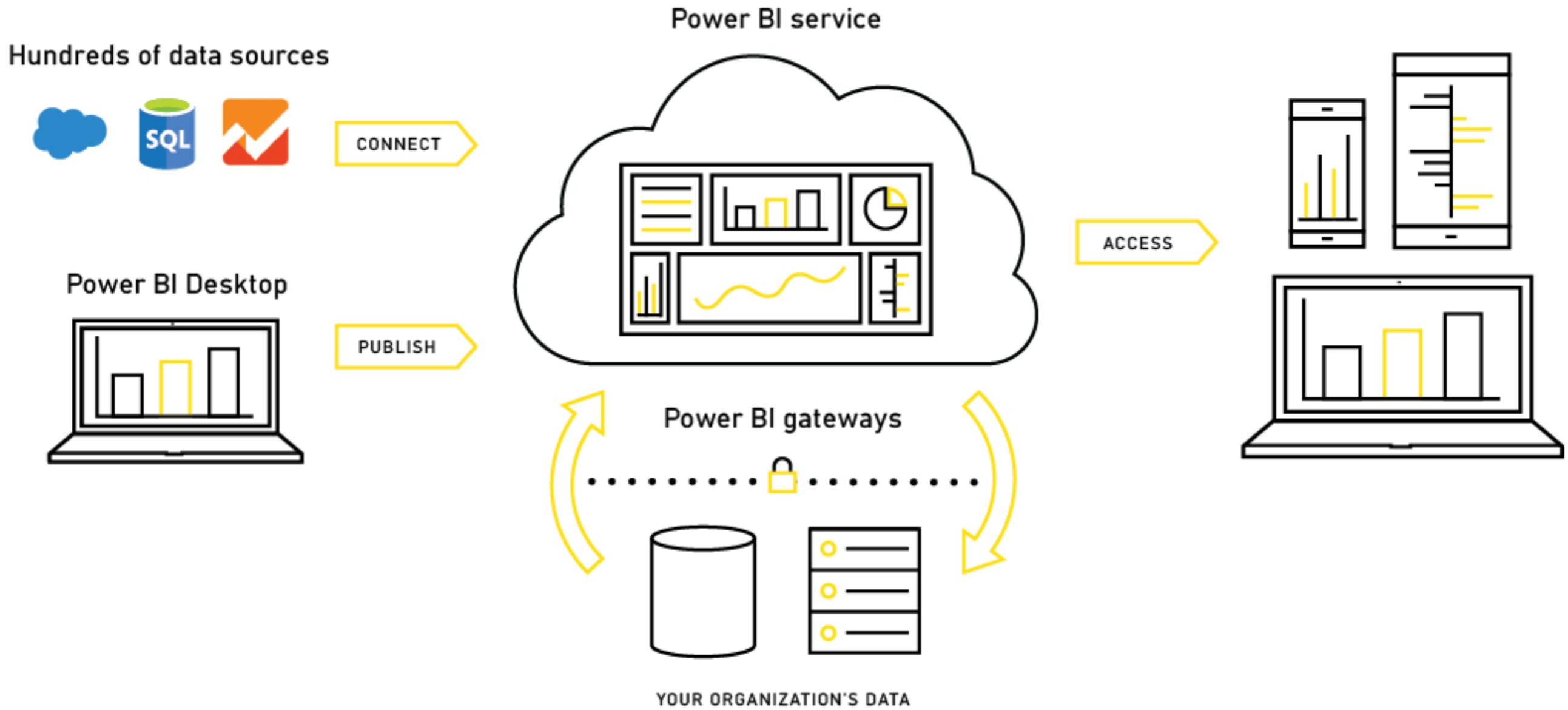
# Self Service BI

BI / Reporting



ETL





# Interactive Reporting

## Sales Report



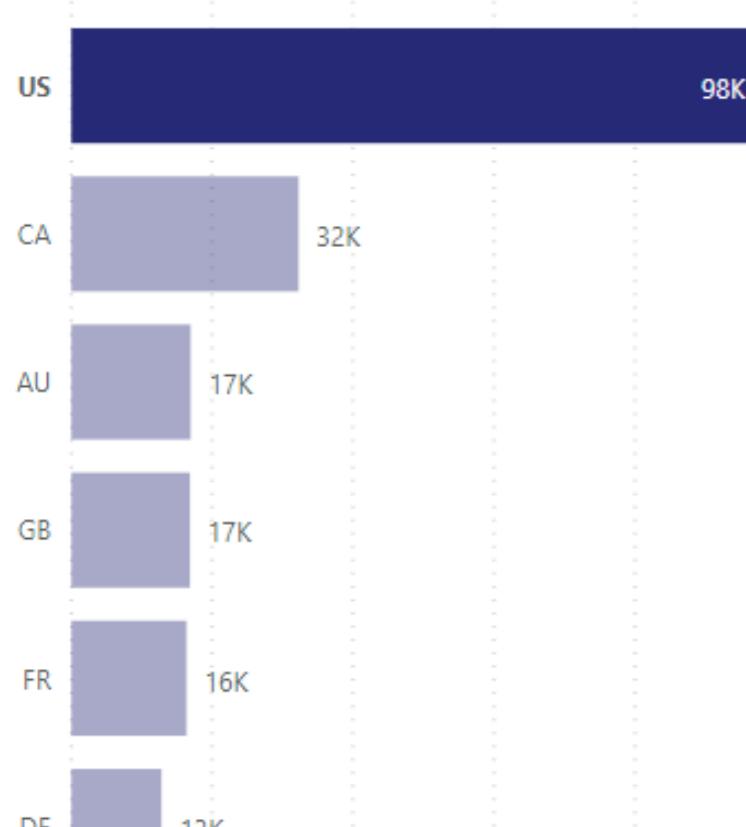
98K

Units Sold

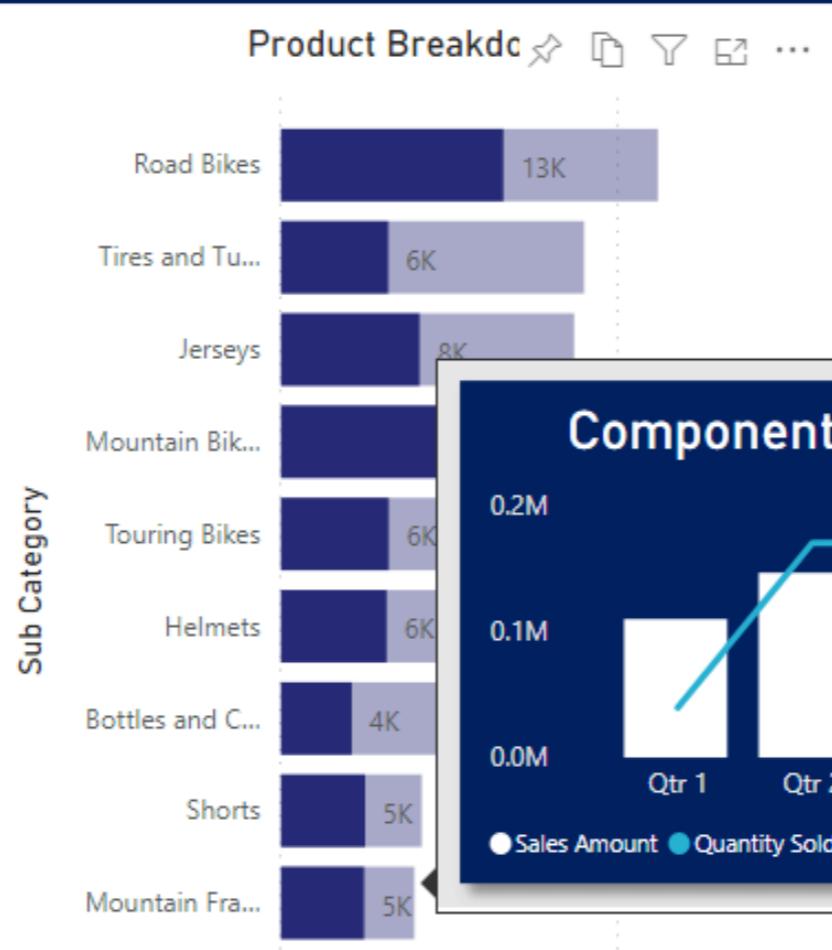
14.79M

Sales Amount

Country Breakdown

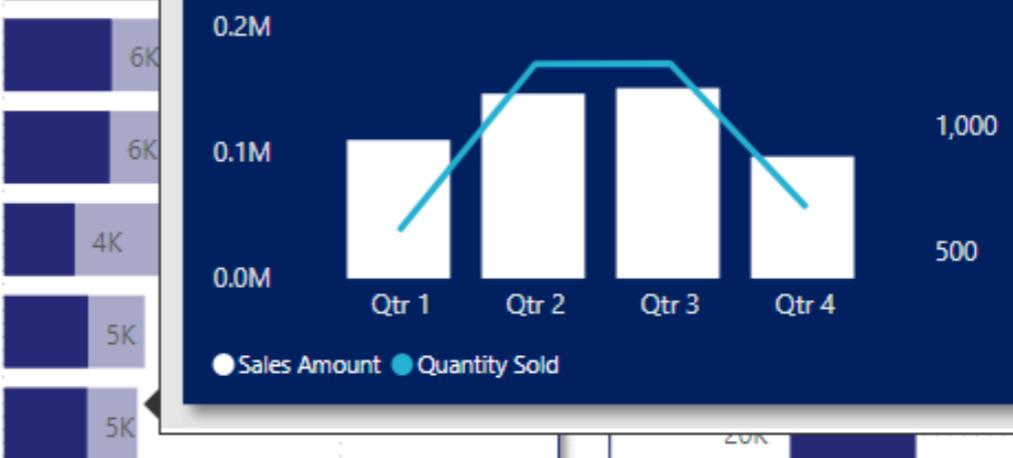


Product Breakdown

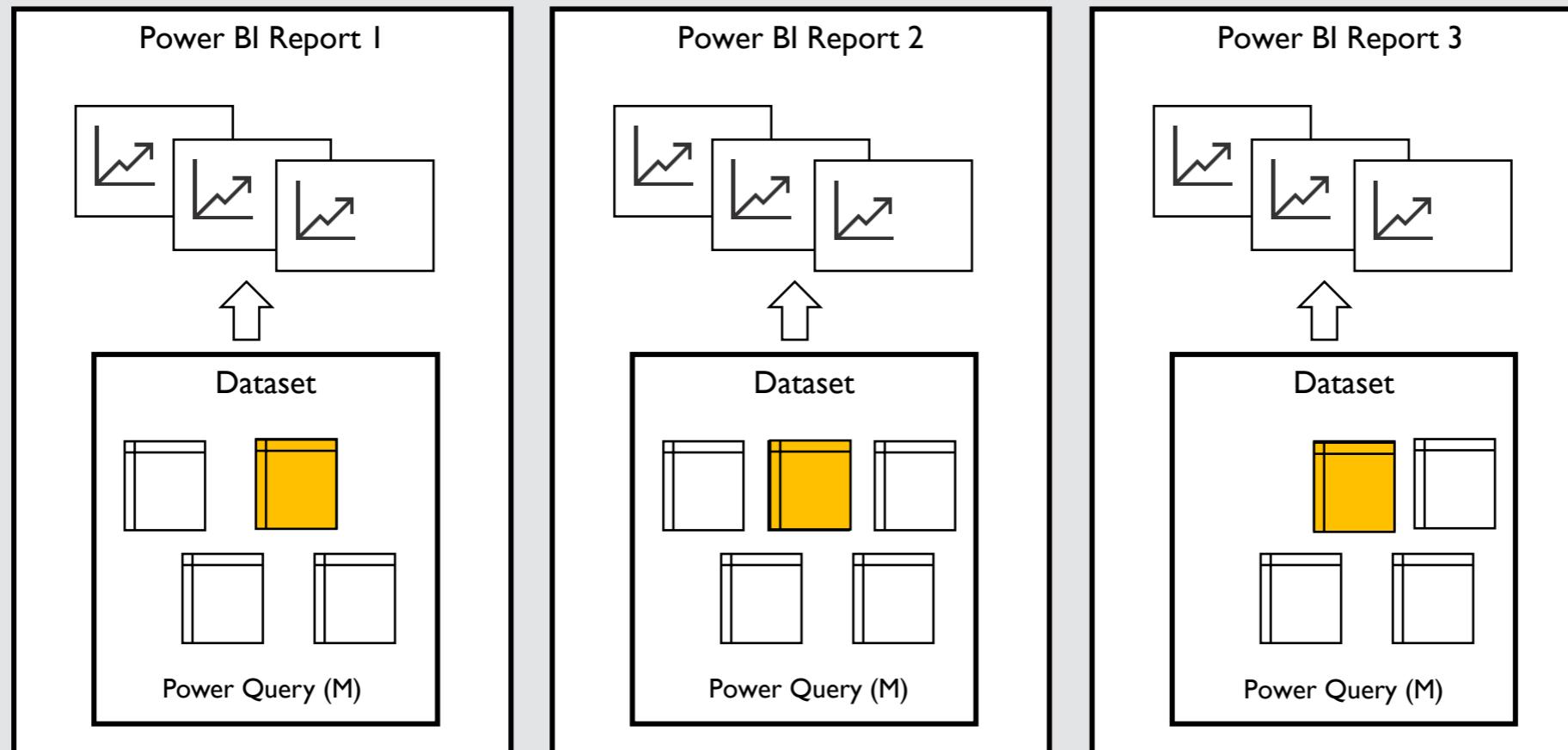


Quantity sold per year as column chart

### Components



# (Reusable) ETL in Power BI



# Power Query

DIAD Final Report - Power Query Editor

File Home Transform Add Column View Help

Close & Apply New Source Recent Enter Data Data source settings Manage Parameters Refresh Preview Advanced Editor Choose Columns Remove Columns Keep Rows Remove Rows Sort Data Type: Text Use First Row as Headers Split Column Group By Replace Values Merge Queries Append Queries Combine Files Text Analytics Vision Combine Files Azure Machine Learning Close New Query Data Sources Parameters Query Manage Columns Reduce Rows Transform AI Insights

Queries [9]

- Transform File from International [3]
  - Sample Query [2]
    - Sample File
    - Sample File Parameter1 (Sample Fi...)
  - Transform Sample File from Internat...
    - Transform File from International
- Other Queries [5]
  - Sales
  - Product
  - Geography
  - Manufacturer
  - International

= Table.TransformColumnTypes(#"Promoted Headers",{{"Zip", type text}, {"City", type text}, {"State", type text}, {"Region", type text}})

Query Settings

**PROPERTIES**

Name: Geography  
All Properties

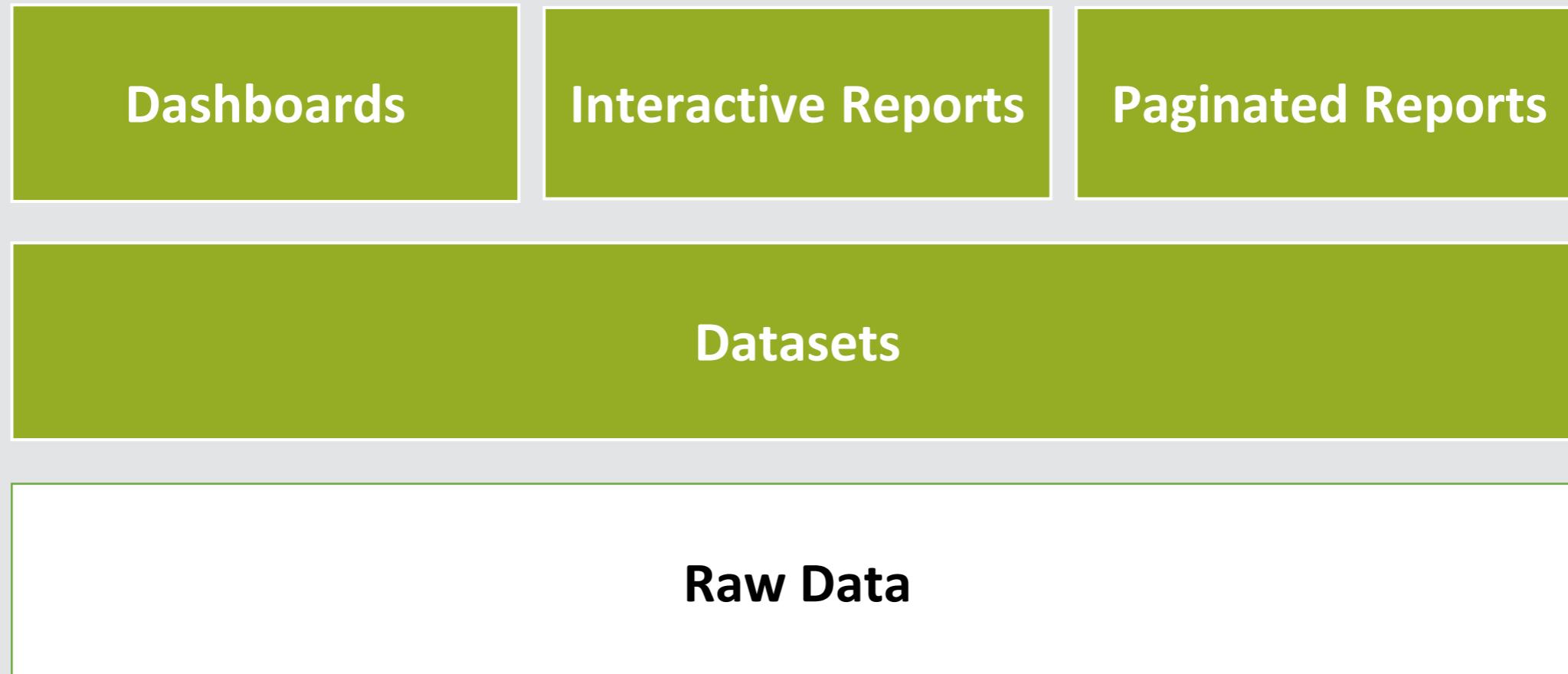
**APPLIED STEPS**

- Source
- Navigation
- Changed Type
- Removed Top Rows
- Promoted Headers
- Changed Type1

Zip City Region District Country

	Zip	City	Region	District	Country
1	22654	Star Tanner	East	District #07	USA
2	22655	Stephens Ci	East	District #07	USA
3	22656	Stephenson	East	District #07	USA
4	22657	Strasburg, V	East	District #07	USA
5	22660	Toms Brook,	East	District #07	USA
6	22663	White Post,	East	District #07	USA
7	22664	Woodstock, V	East	District #07	USA
8	22701	Culpeper, V	East	District #07	USA
9	22709	Aroda, VA, U	East	District #07	USA
10	22711	Banco, VA, U	East	District #07	USA
11	22712	Bealeton, VA	East	District #07	USA
12	22713	Boston, VA,	East	District #07	USA
13	22714	Brandy Stati	East	District #07	USA
14	22715	Brightwood,	East	District #07	USA
15	22716	Castleton, V	East	District #07	USA
16	22718	Elkwood, VA	East	District #07	USA
17	22719	Etlan, VA, U	East	District #07	USA
18	22720	Goldvein, VA, USA	VA	VA	VA
19	22722	Haywood, VA, USA	VA	East	District #07

# Power BI Information Hierarchy (before Dataflows)



# Power BI Information Hierarchy

Dashboards

Interactive Reports

Paginated Reports

Datasets

Dataflows

Raw Data

# DEMO

## Power BI Dataflows

# Power Query Online

Power Query - Choose data source

All categories   File   Database   Power Platform   Azure   Online services   Other    Search

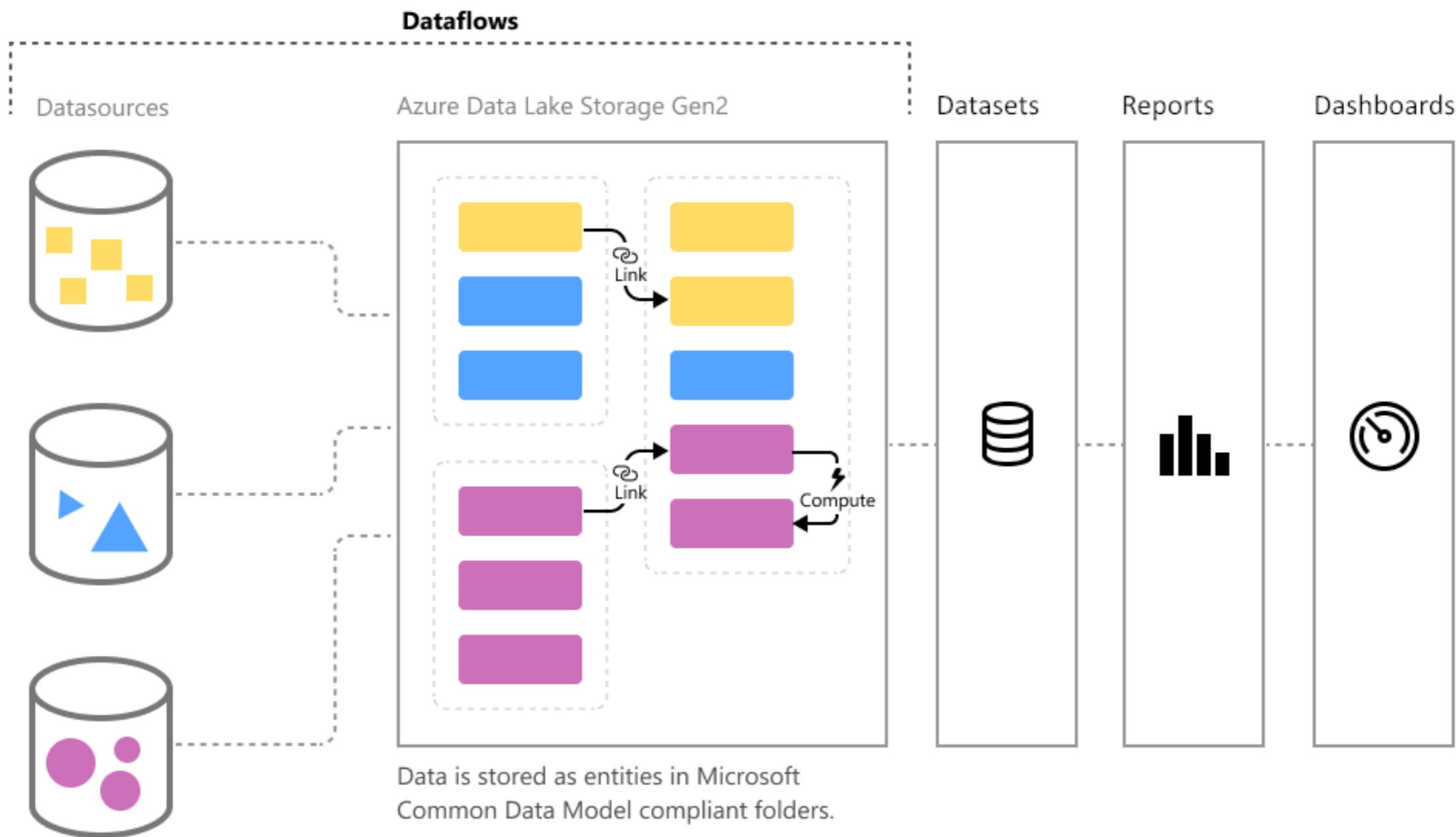
**Data sources**

 Access File	 Excel File	 Folder File	 JSON File	 PDF File	 SharePoint folder File
 Text/CSV File	 XML File	 Amazon Redshift Database	 Google BigQuery Database	 IBM Db2 database Database	 MySQL database Database
 Oracle database Database	 PostgreSQL database Database	 SQL Server database Database	 Sybase database Database	 Teradata database Database	 Vertica Database
 Azure Blobs Azure	 Azure Data Explorer (Kusto) Azure	 Azure Data Lake Storage Gen2 Azure	 Azure HDInsight Spark Azure	 Azure SQL Data Warehouse Azure	 Azure SQL database Azure
 Azure Tables Azure	 Microsoft Exchange Online Online services	 Salesforce objects Online services	 Salesforce reports Online services	 SharePoint Online list Online services	 Smartsheet Online services
 Active Directory Other	 Common Data Service Power Platform	 OData Other	 Odbc Other	 Power BI dataflows Power Platform	 SharePoint list Other
 Spark Other	 Web API Other	 Web page Other	 Blank table Other	 Blank query Other	

**Templates**

 Accounts, leads, opportunities Salesforce Online services	 Lead to cash Dynamics 365 Sales Online services	 Leads, opportunities Dynamics 365 Sales Online services	 Quotes, orders, invoices Dynamics 365 Sales Online services
---	---	---	---

# Dataflows are like Excel



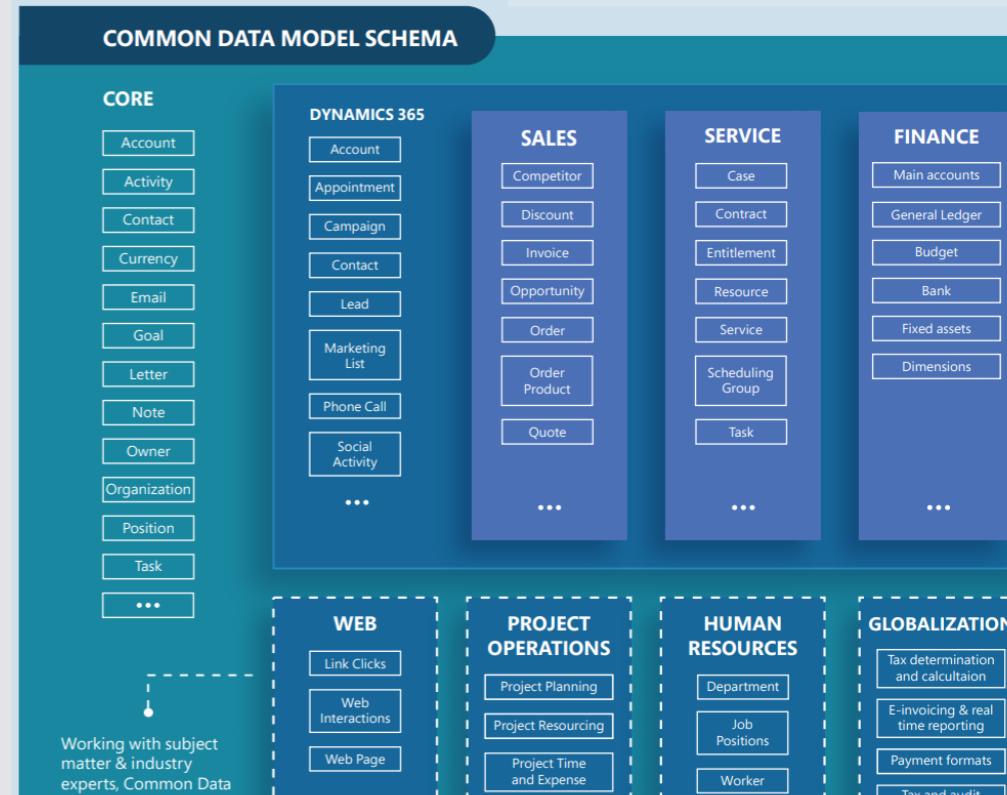
# Common Data Model

## Set of

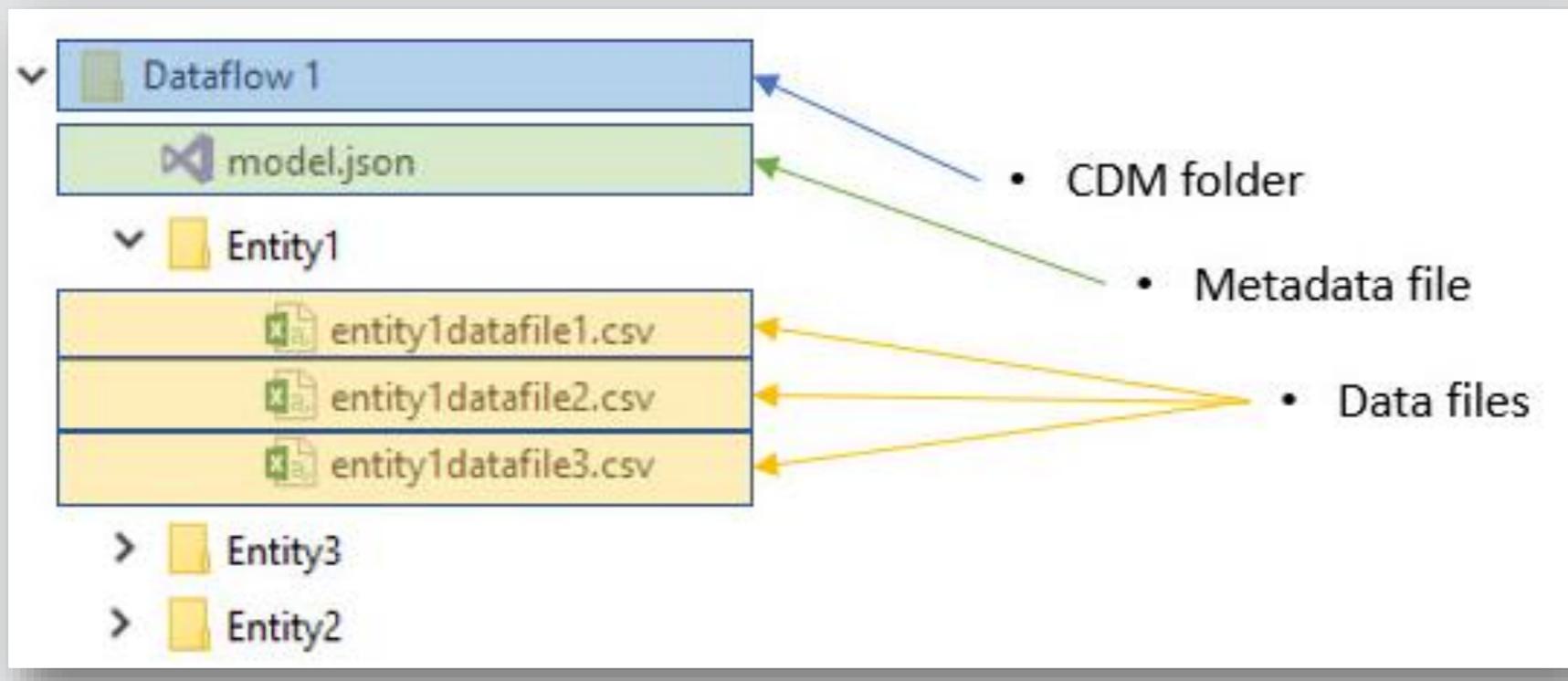
- standardized, extensible data schemas
- Entities
- Attributes
- Semantic Metadata & Relationships

### What's in Common Data Model?

In addition to the metadata system, Common Data Model includes a set of standardized, extensible data schemas that Microsoft and its partners have published. This collection of predefined schemas includes entities, attributes, semantic metadata, and relationships. The schemas represent commonly used concepts and activities, such as **Account** and **Campaign**, to simplify the creation, aggregation, and analysis of data. This graphic shows some elements of the standard entities. More information: [Common Data Model repository on GitHub](#)



# CDM Folders

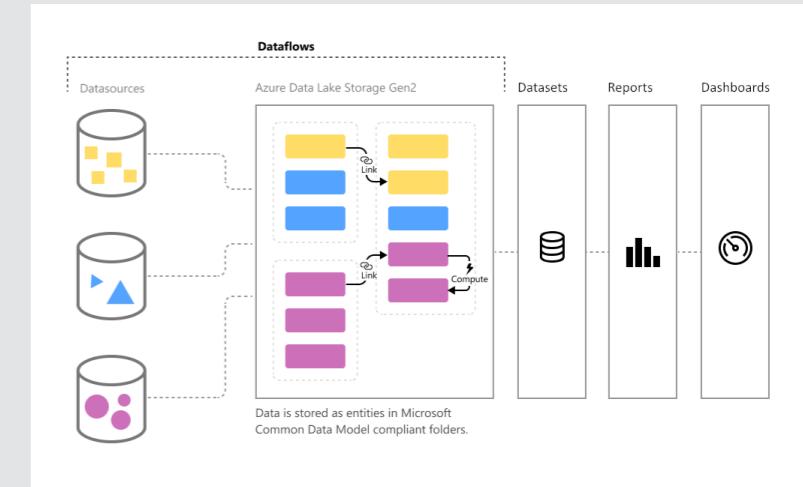


```
{ } Sales From Excel.json • { } First Dataflow.json •  
1 {  
2   "name": "Sales From Excel",  
3   "description": "",  
4   "version": "1.0",  
5   "culture": "en-US",  
6   "pbi:mashup": {  
7     "fastCombine": true,  
8     "allowNativeQueries": false,  
9     "queriesMetadata": {  
10       "Sales": {  
11         "queryId": "40b69972-542b-49ee-ab",  
12         "queryName": "Sales",  
13         "loadEnabled": true  
14       }  
15     },  
16     "document": "section Section1;\r\nshared",  
17   },  
18   "entities": [  
19     {  
20       "$type": "LocalEntity",  
21       "name": "Sales",  
22       "description": "",  
23       "pbi:refreshPolicy": {  
24         "$type": "FullRefreshPolicy",  
25         "location": "Sales.csv"  
26       },  
27       "attributes": [  
28         {  
29           "name": "SalesOrderNumber",  
30           "dataType": "string"  
31         }  
32       ]  
33     }  
34   ]  
35 }
```

# Fact Sheet – PBI Dataflows

## Power Query processes in the cloud

- .. run **independently** of a Power BI report
- .. store output into a data lake (ADLS Gen2)
- .. **entities** (result tables)
- .. use **Common Data Model** for entity definition
- .. not in “my workspace”



# Bring your Own Storage Account (BYOSA)

Dataflow storage (preview)

Your Azure Data Lake Storage account is connected to Power BI

datalake4cdm

Allow workspace admins to assign workspaces to this account [Learn more](#)

Allow

Apply

Cancel

The screenshot shows the Power BI Dataflows interface. In the top navigation bar, there are buttons for Upload, Download, New Folder, Select All, Copy, Paste, Rename, Manage Access, Properties, Delete, and Refresh. The Manage Access button is highlighted. A modal dialog box is open over the interface, titled 'Dataflow storage (preview)'. It displays a single item: 'datalake4cdm'. Below the item, there is a checkbox labeled 'Allow workspace admins to assign workspaces to this account' with the link 'Learn more'. A yellow toggle switch is set to 'Allow'. At the bottom of the dialog are 'Apply' and 'Cancel' buttons.

powerbi > Dataflow2Lake > Product dataflow

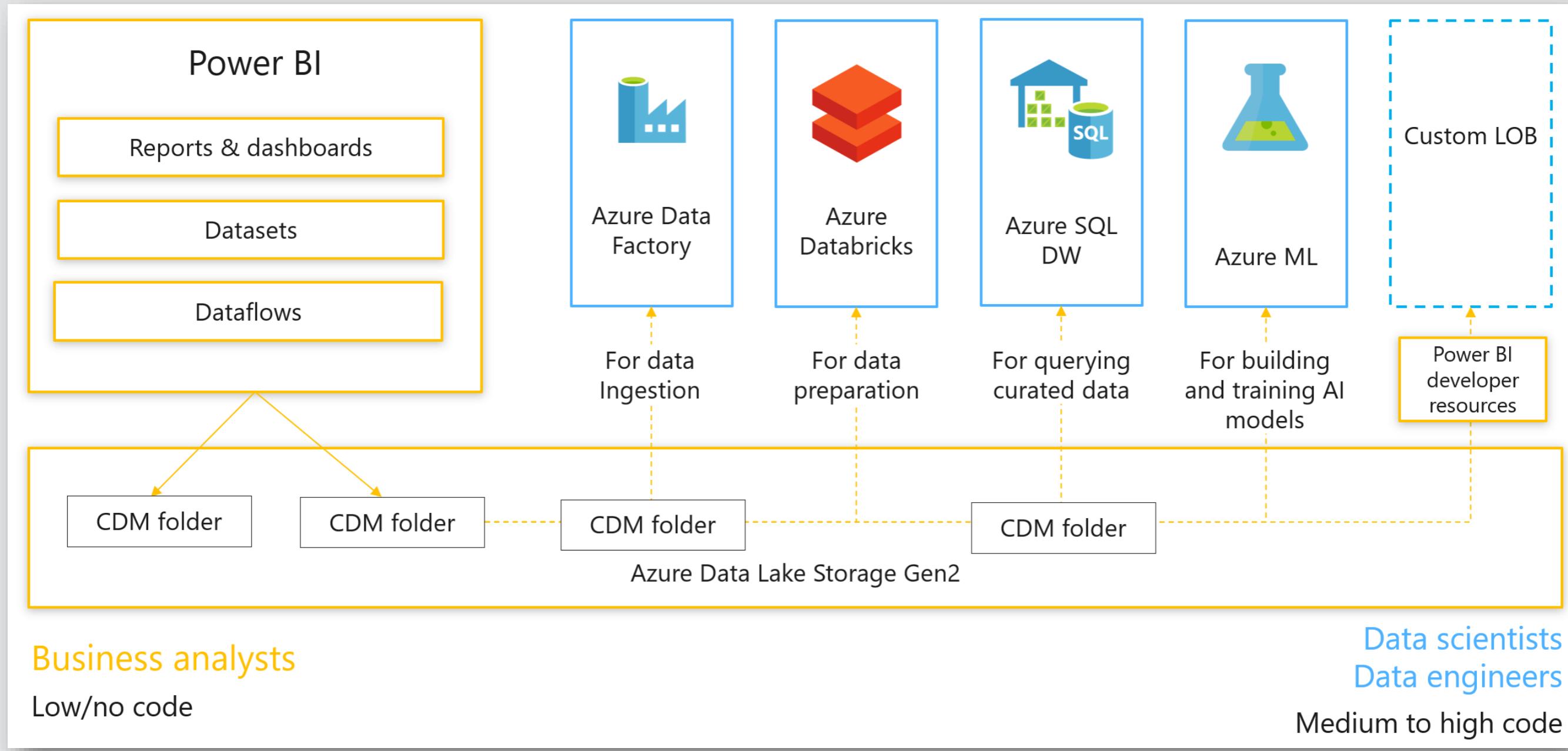
Name Access Tier

- model.json.snapshots Hot (inferred)
- model.json

```
z: > Track 2 BI > Dataflows > Product dataflow > model.json > [ ] entities > {} 0 > [ ] attributes > ()
```

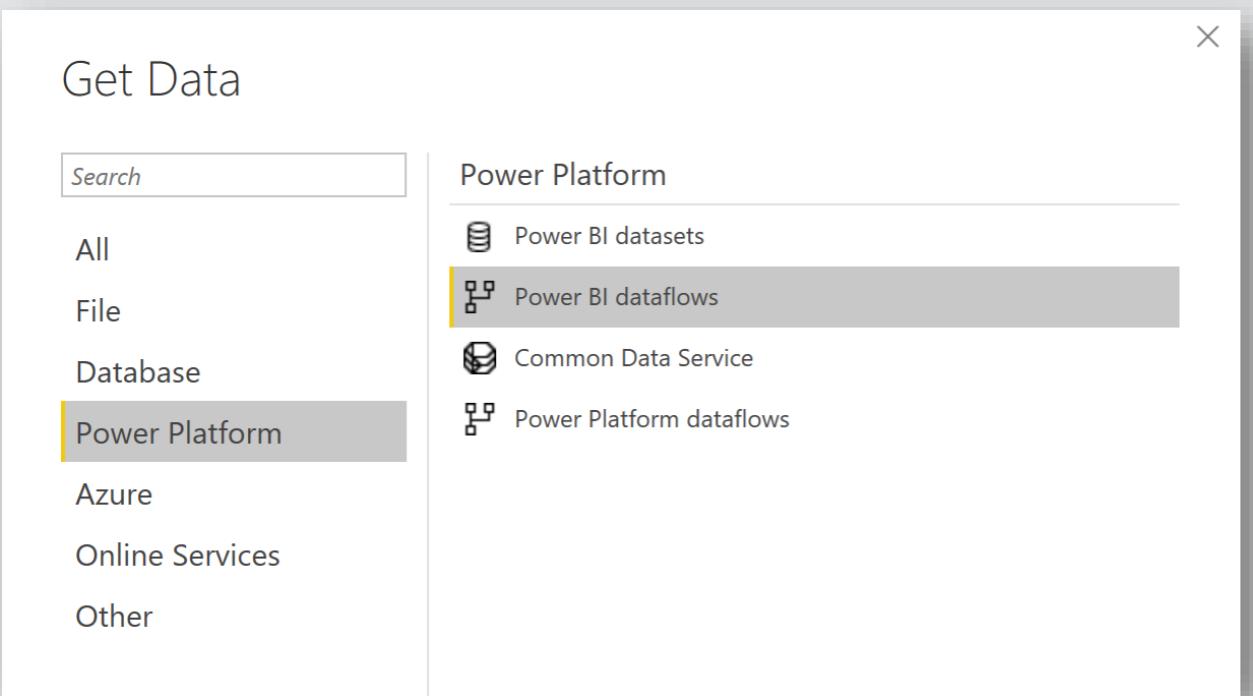
```
1 {  
2   "name": "Product dataflow",  
3   "description": "",  
4   "version": "1.0",  
5   "culture": "en-US",  
6   "modifiedTime": "2019-12-02T20:34:28.5677753+00:00",  
7   "pbi:mashup": {  
8     "fastCombine": false,  
9     "allowNativeQueries": false,  
10    "queriesMetadata": {  
11      "Products": {  
12        "queryId": "eed1d3a0-543f-48fd-bd2a-e5938d922b08",  
13        "queryName": "Products",  
14        "loadEnabled": true  
15      }  
16    },  
17    "document": "section Section1;\r\nshared Products = let\r\nSource  
18  },  
19  "entities": [  
]
```

# Power BI Dataflows and the Data Lake



# DEMO

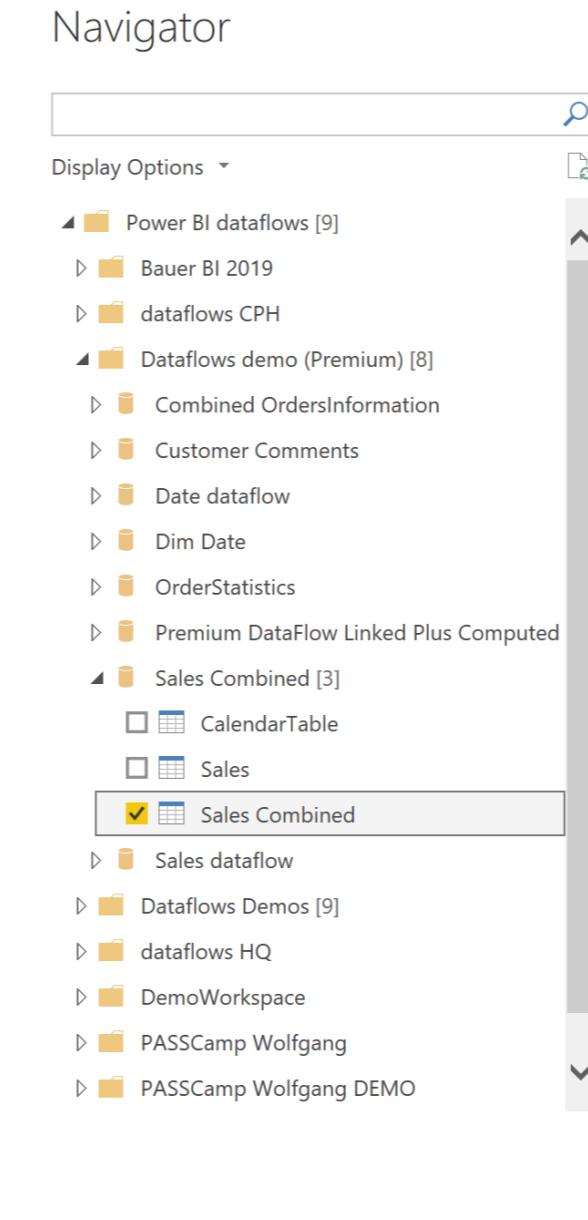
## Consume Dataflow Entities



**Navigator**

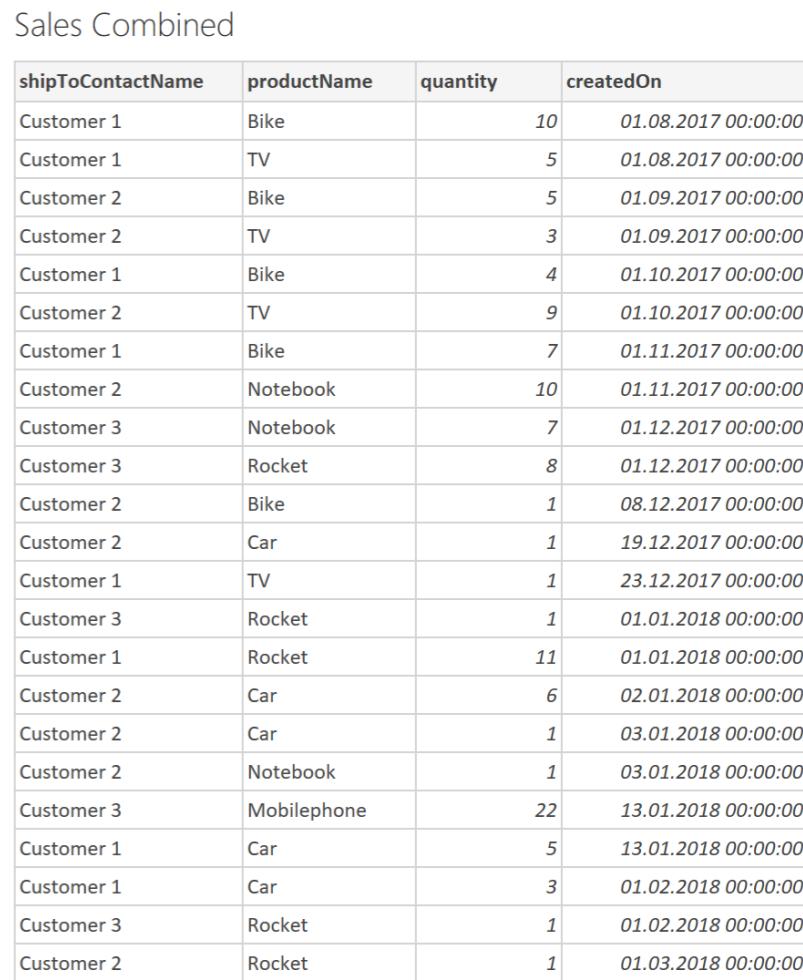
Display Options

- ▲ Power BI dataflows [9]
  - ▷ Bauer BI 2019
  - ▷ dataflows CPH
  - ▲ Dataflows demo (Premium) [8]
    - ▷ Combined OrdersInformation
    - ▷ Customer Comments
    - ▷ Date dataflow
    - ▷ Dim Date
    - ▷ OrderStatistics
    - ▷ Premium DataFlow Linked Plus Computed
  - ▲ Sales Combined [3]
    - CalendarTable
    - Sales
    - Sales Combined
  - ▷ Sales dataflow
- ▷ Dataflows Demos [9]
- ▷ dataflows HQ
- ▷ DemoWorkspace
- ▷ PASSCamp Wolfgang
- ▷ PASSCamp Wolfgang DEMO



**Sales Combined**

shipToContactName	productName	quantity	createdOn
Customer 1	Bike	10	01.08.2017 00:00:00
Customer 1	TV	5	01.08.2017 00:00:00
Customer 2	Bike	5	01.09.2017 00:00:00
Customer 2	TV	3	01.09.2017 00:00:00
Customer 1	Bike	4	01.10.2017 00:00:00
Customer 2	TV	9	01.10.2017 00:00:00
Customer 1	Bike	7	01.11.2017 00:00:00
Customer 2	Notebook	10	01.11.2017 00:00:00
Customer 3	Notebook	7	01.12.2017 00:00:00
Customer 3	Rocket	8	01.12.2017 00:00:00
Customer 2	Bike	1	08.12.2017 00:00:00
Customer 2	Car	1	19.12.2017 00:00:00
Customer 1	TV	1	23.12.2017 00:00:00
Customer 3	Rocket	1	01.01.2018 00:00:00
Customer 1	Rocket	11	01.01.2018 00:00:00
Customer 2	Car	6	02.01.2018 00:00:00
Customer 2	Car	1	03.01.2018 00:00:00
Customer 2	Notebook	1	03.01.2018 00:00:00
Customer 3	Mobilephone	22	13.01.2018 00:00:00
Customer 1	Car	5	13.01.2018 00:00:00
Customer 1	Car	3	01.02.2018 00:00:00
Customer 3	Rocket	1	01.02.2018 00:00:00
Customer 2	Rocket	1	01.03.2018 00:00:00



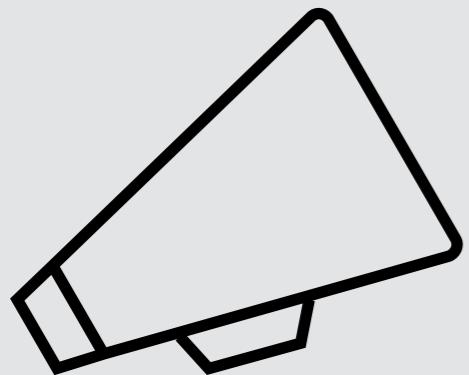
Load

Transform Data

# Power Platform Dataflows



# **Power Platform Dataflows**



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**Data Integration in the Cloud**  
**Self-Service Data Preparation**

# 80%

“Data Analysts spend *up to 80% of their time on data preparation* delaying the time to analysis and decision making.”

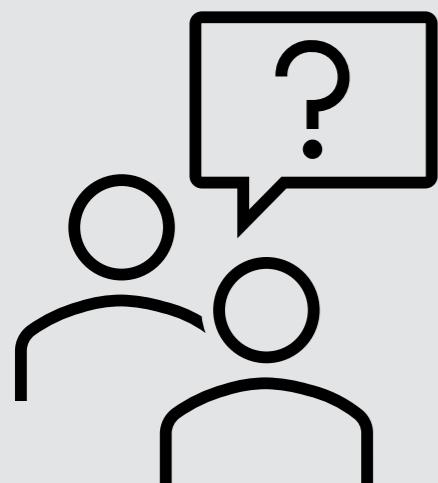
- Gartner

# 75%

“Three-quarters of companies are ***not able to act on the majority of data*** they collect...”

Harvard Business Review, Closing the Customer Experience Gap

# How can Dataflows help?



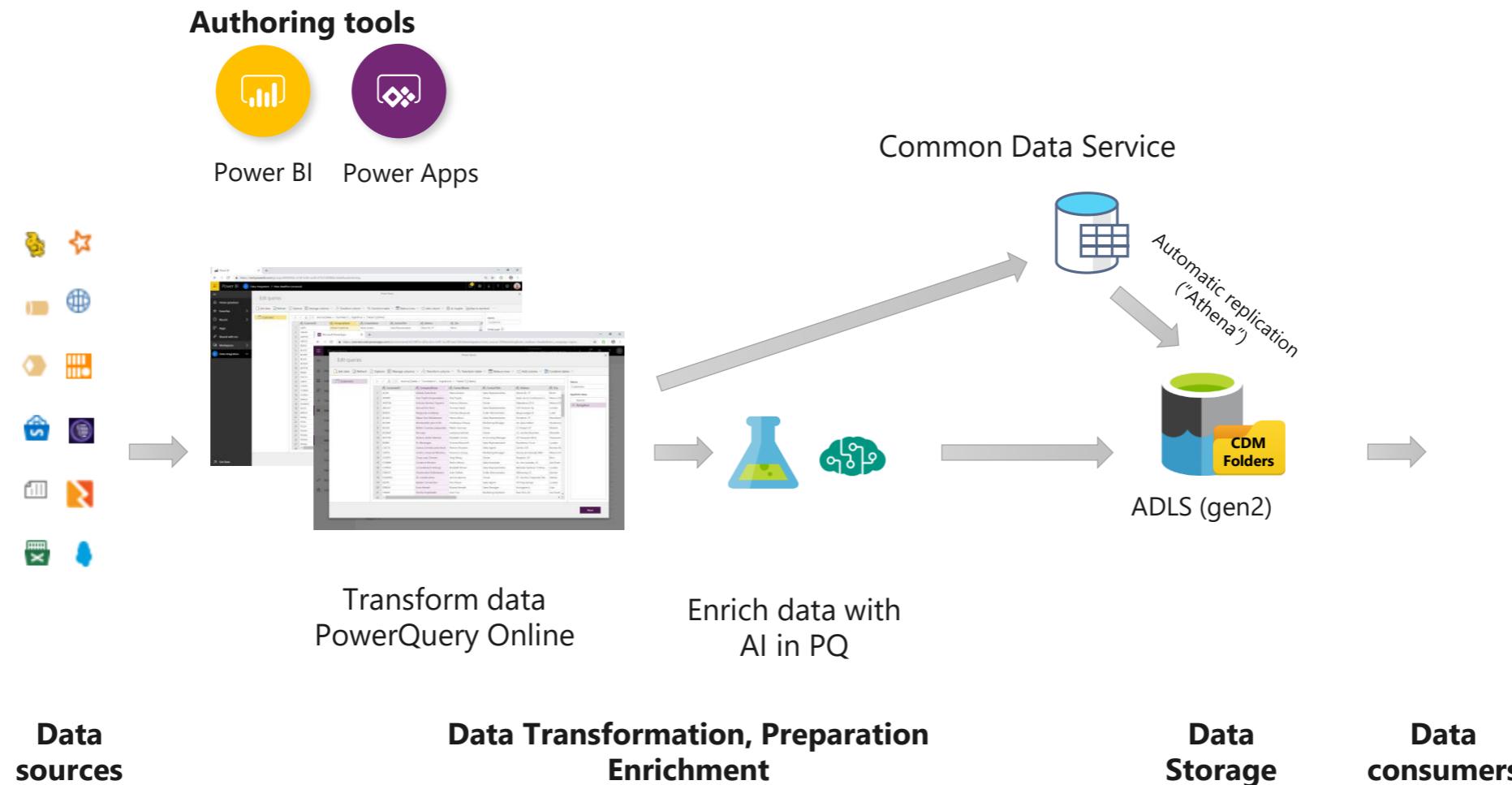
**Connectors**

**Interactive & intuitive**

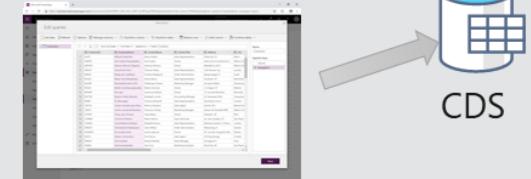
**Consistency of experience**

**Semantic understanding and data consistency**

# Power Platform Dataflows overview

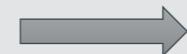


# Load Data into CDS



Data

- Entities
- Option Sets
- Dataflows**
- Export to data lake
- Connections
- Custom Connectors
- Gateways



New Dataflow

Name \*  
First DataFlow

Options  
 Analytical entities only i

Create Cancel

Dataflows allow users to extract, transform and load data from a wide range of data sources that can be used from Power Apps, Flow and analytics. [Learn more](#)

# “Standard” versus Analytic Entities

New Dataflow



Dataflows allow users to extract, transform and load data from a wide range of data sources that can be used from Power Apps, Flow and analytics. [Learn more](#)

Name \*

Options

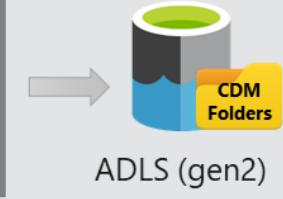
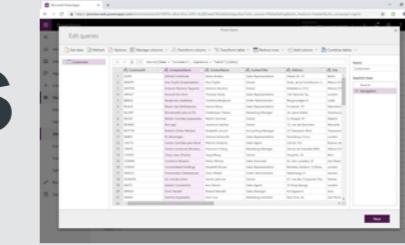
 Analytical entities only ⓘ

Queries	Load settings	Field mapping																																				
Products	<input type="radio"/> Load to new entity <input checked="" type="radio"/> Load to existing entity <input type="radio"/> Do not load Destination entity cdmtmp_Product	<b>Key fields</b> cdmtmp_ProductNumber  <table border="1"><tbody><tr><td>(none)</td><td>cdmtmp_DefaultBuyingUnitOfMeasure</td></tr><tr><td>(none)</td><td>cdmtmp_DefaultSellingQuantity</td></tr><tr><td>(none)</td><td>cdmtmp_DefaultSellingQuantity_UOM</td></tr><tr><td>(none)</td><td>cdmtmp_DefaultStockingUnitOfMeasure</td></tr><tr><td>(none)</td><td>cdmtmp_Description</td></tr><tr><td>(none)</td><td>cdmtmp_IsStocked</td></tr><tr><td>Name</td><td>cdmtmp_Name</td></tr><tr><td>(none)</td><td>cdmtmp_OrganizationId.cdmtmp_OrganizationNumber</td></tr><tr><td>(none)</td><td>cdmtmp_ProductCategoryId.cdmtmp_CategoryId</td></tr><tr><td>ArticleID</td><td>cdmtmp_ProductNumber</td></tr><tr><td>Category</td><td>cdmtmp_ProductType</td></tr><tr><td>(none)</td><td>cdmtmp_SellingUnitPrice</td></tr><tr><td>(none)</td><td>cdmtmp_SellingUnitPrice_CurrencyCode</td></tr><tr><td>(none)</td><td>cdmtmp_StandardCostAmount</td></tr><tr><td>(none)</td><td>cdmtmp_StandardCostAmount_CurrencyCode</td></tr><tr><td>(none)</td><td>cdmtmp_Status</td></tr><tr><td>(none)</td><td>cdmtmp_UnitOfMeasureScale</td></tr><tr><td>(none)</td><td>EntityImage</td></tr></tbody></table>	(none)	cdmtmp_DefaultBuyingUnitOfMeasure	(none)	cdmtmp_DefaultSellingQuantity	(none)	cdmtmp_DefaultSellingQuantity_UOM	(none)	cdmtmp_DefaultStockingUnitOfMeasure	(none)	cdmtmp_Description	(none)	cdmtmp_IsStocked	Name	cdmtmp_Name	(none)	cdmtmp_OrganizationId.cdmtmp_OrganizationNumber	(none)	cdmtmp_ProductCategoryId.cdmtmp_CategoryId	ArticleID	cdmtmp_ProductNumber	Category	cdmtmp_ProductType	(none)	cdmtmp_SellingUnitPrice	(none)	cdmtmp_SellingUnitPrice_CurrencyCode	(none)	cdmtmp_StandardCostAmount	(none)	cdmtmp_StandardCostAmount_CurrencyCode	(none)	cdmtmp_Status	(none)	cdmtmp_UnitOfMeasureScale	(none)	EntityImage
(none)	cdmtmp_DefaultBuyingUnitOfMeasure																																					
(none)	cdmtmp_DefaultSellingQuantity																																					
(none)	cdmtmp_DefaultSellingQuantity_UOM																																					
(none)	cdmtmp_DefaultStockingUnitOfMeasure																																					
(none)	cdmtmp_Description																																					
(none)	cdmtmp_IsStocked																																					
Name	cdmtmp_Name																																					
(none)	cdmtmp_OrganizationId.cdmtmp_OrganizationNumber																																					
(none)	cdmtmp_ProductCategoryId.cdmtmp_CategoryId																																					
ArticleID	cdmtmp_ProductNumber																																					
Category	cdmtmp_ProductType																																					
(none)	cdmtmp_SellingUnitPrice																																					
(none)	cdmtmp_SellingUnitPrice_CurrencyCode																																					
(none)	cdmtmp_StandardCostAmount																																					
(none)	cdmtmp_StandardCostAmount_CurrencyCode																																					
(none)	cdmtmp_Status																																					
(none)	cdmtmp_UnitOfMeasureScale																																					
(none)	EntityImage																																					

Entity display name  
Product

Entity description  
An item that is available for sale.

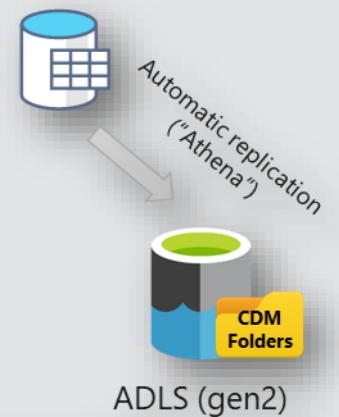
Delete rows that no longer exist in the query output



# DEMO

## Power Platform Dataflows

# Export to Data Lake – Project “Athena”



Data

Entities

Option Sets

Dataflows

**Export to data lake**

Connections

Custom Connectors

Gateways

New link to data lake   Import from solution   Refresh

Export to data lake

You haven't linked the Common Data Service environment to a data lake  
Before you can export to data lake, link the Common Data Service environment to a data lake

New link to data lake

# wolfgangcdsexportstorage - Configuration

Storage account

Search (Ctrl+ /)

Save Discard

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Data transfer

Events

Storage Explorer (preview)

## Settings

Access keys

Geo-replication

CORS

Configuration

Encryption

Shared access signature

Firewalls and virtual networks

Private endpoint connection...

Advanced security

Properties

Locks

### Account kind

StorageV2 (general purpose v2)

### Performance

Standard  Premium

### Secure transfer required \*

Disabled  Enabled

### Access tier (default)

Cool  Hot

### Replication

Read-access geo-redundant storage (RA-GRS)

### Large file shares

Disabled  Enabled

i The current combination of storage account kind, performance

[Learn more.](#)

### Identity-based access for file shares

### Azure Active Directory Domain Service (AAD DS)

Disabled  Enabled

### Data Lake Storage Gen2

### Hierarchical namespace

Disabled  Enabled

## New link to data lake

### Select Storage Account

wolfgangcdsexportstorage

### Add Entities

### Select Storage Account

Select the storage account that you want link to the Common Data Service environment. The storage account must be located in the same region as your environment.

Your environment is located in: **West Europe**

Please attach a storage account in one of the following location(s): **West Europe**

### Subscription \*

Microsoft Azure Sponsorship

### Resource group \*

MVP\_Demos-rg

### Storage account \*

wolfgangcdsexportstorage

As part of linking the Common Data Service environment to a data lake, you are granting the Export to data lake service additional roles to your storage account. By using the Export to data lake service, you agree that Power Apps' compliance boundary. For more information, see the Privacy Notice in the [technical service](#).

## New link to data lake

### Select Storage Account

wolfgangcdsexportstorage

### Add Entities

1 of 107 selected

### Add Entities

Select the entities that you want to export to data lake. Only entities enabled for change tracking will be visible in the list below.

Filter by keyword



## Manage entities for wolfgangcdsexportstorage

### Manage entities

2 of 107 selected

Filter by keyword



<input type="radio"/>	Approval Request	msdyn_flow_approvalrequest
<input type="radio"/>	Approval Response	msdyn_flow_approvalresponse
<input checked="" type="radio"/>	Article	kbarticle
<input type="radio"/>	Attachment	attachment
<input type="radio"/>	Attachment	activitymimeattachment
<input type="radio"/>	Attribute Map	attributemap
<input type="radio"/>	AttributelImageConfig	attributeimageconfig
<input type="radio"/>	Await All Approval Model	msdyn_flow_awaitallapprovalmodel
<input type="radio"/>	Basic Approval Model Data	msdyn_flow_basicapprovalmodel
<input checked="" type="radio"/>	Business Unit	businessunit
<input type="radio"/>	Canvas App	canvasapp
<input type="radio"/>	Category	category

# What's in my Data Lake?

← → ▼ ↑

commondataservice-powerofbiatdefaultupgrade-orgbfa74bd0

Name

businessunit

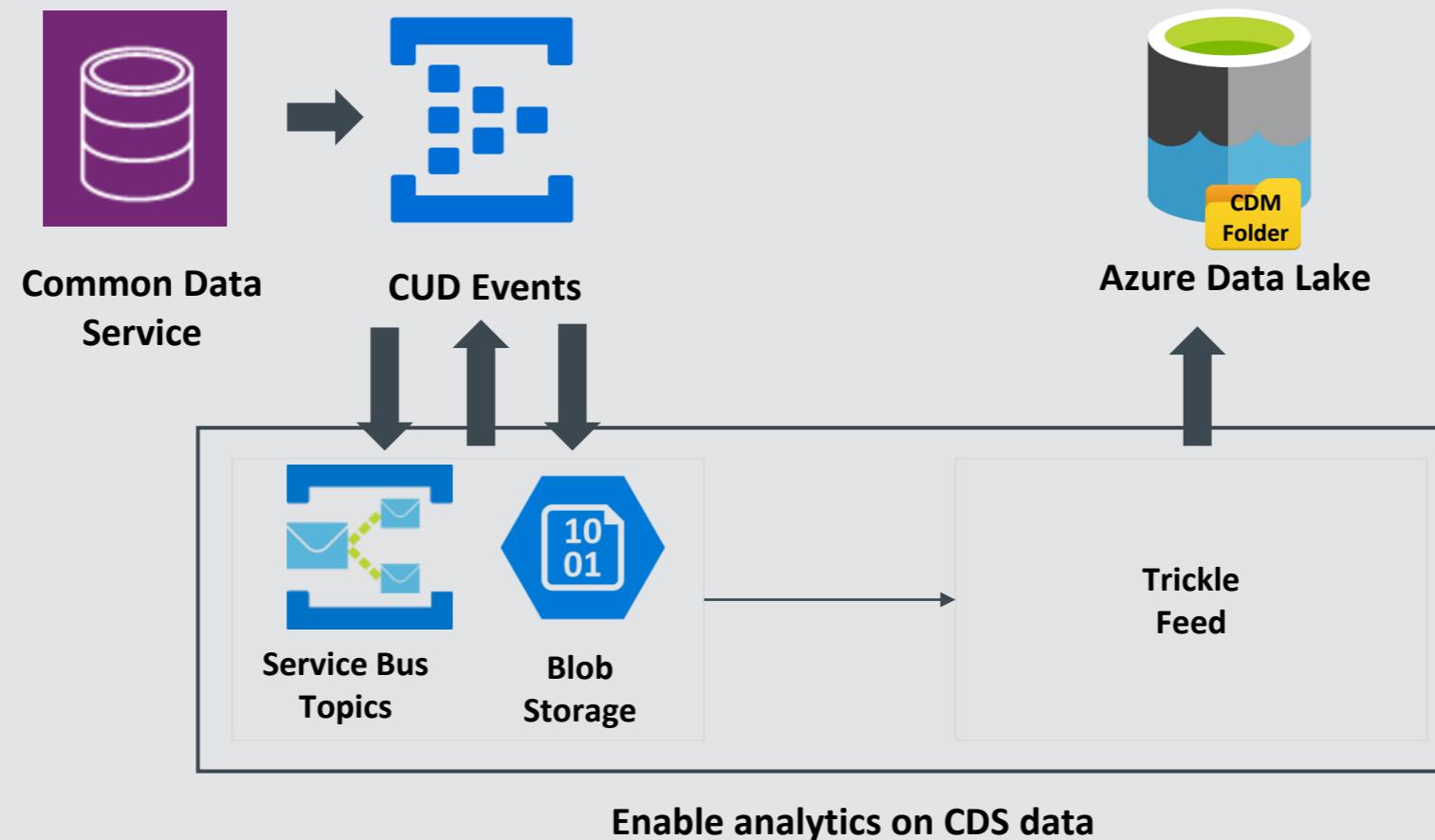
Microsoft.Athena.TrickleFeedService

model.json

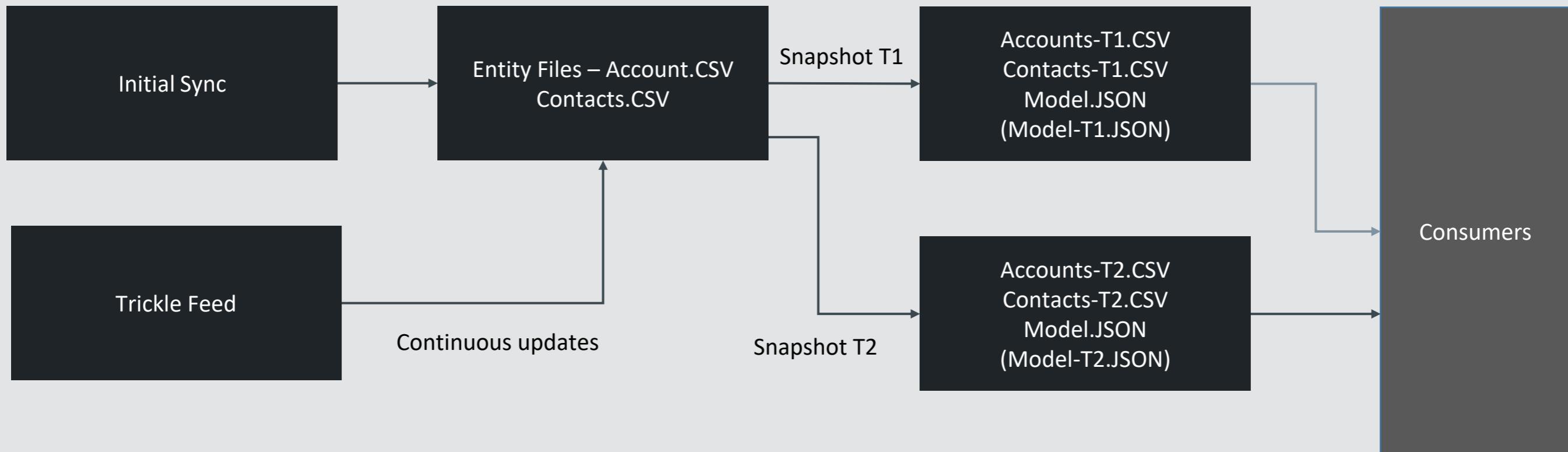
```
{  
  "name": "cdm",  
  "description": "cdm",  
  "version": "1.0",  
  "entities": [  
    {  
      "$type": "LocalEntity",  
      "name": "businessunit",  
      "description": "businessunit",  
      "annotations": [  
        {  
          "name": "Athena:PartitionGranularity",  
          "value": "Year"  
        },  
        {  
          "name": "Athena:InitialSyncState",  
          "value": "Completed"  
        },  
        {  
          "name": "Athena:InitialSyncDataCompletedTime",  
          "value": "3/1/2020 5:58:33 PM"  
        }  
      ]  
    }  
  ]  
}
```

# Behind the Scenes

# Support for full and incremental Trickle feed to write data to ADLS Gen2



# Consistent Data & Metadata Updates



# Consume in Power BI (Option 1)

Get Data

Search

All

File

Database

Power Platform

Azure

Online Services

Other

Azure

- Azure SQL database
- Azure SQL Data Warehouse
- Azure Analysis Services database
- Azure Blob Storage
- Azure Table Storage
- Azure Cosmos DB
- Azure Data Lake Storage Gen2
- Azure Data Lake Storage Gen1
- Azure HDInsight (HDFS)
- Azure HDInsight Spark
- HDInsight Interactive Query
- Azure Data Explorer (Kusto)
- Azure Cost Management
- Azure Time Series Insights (Beta)

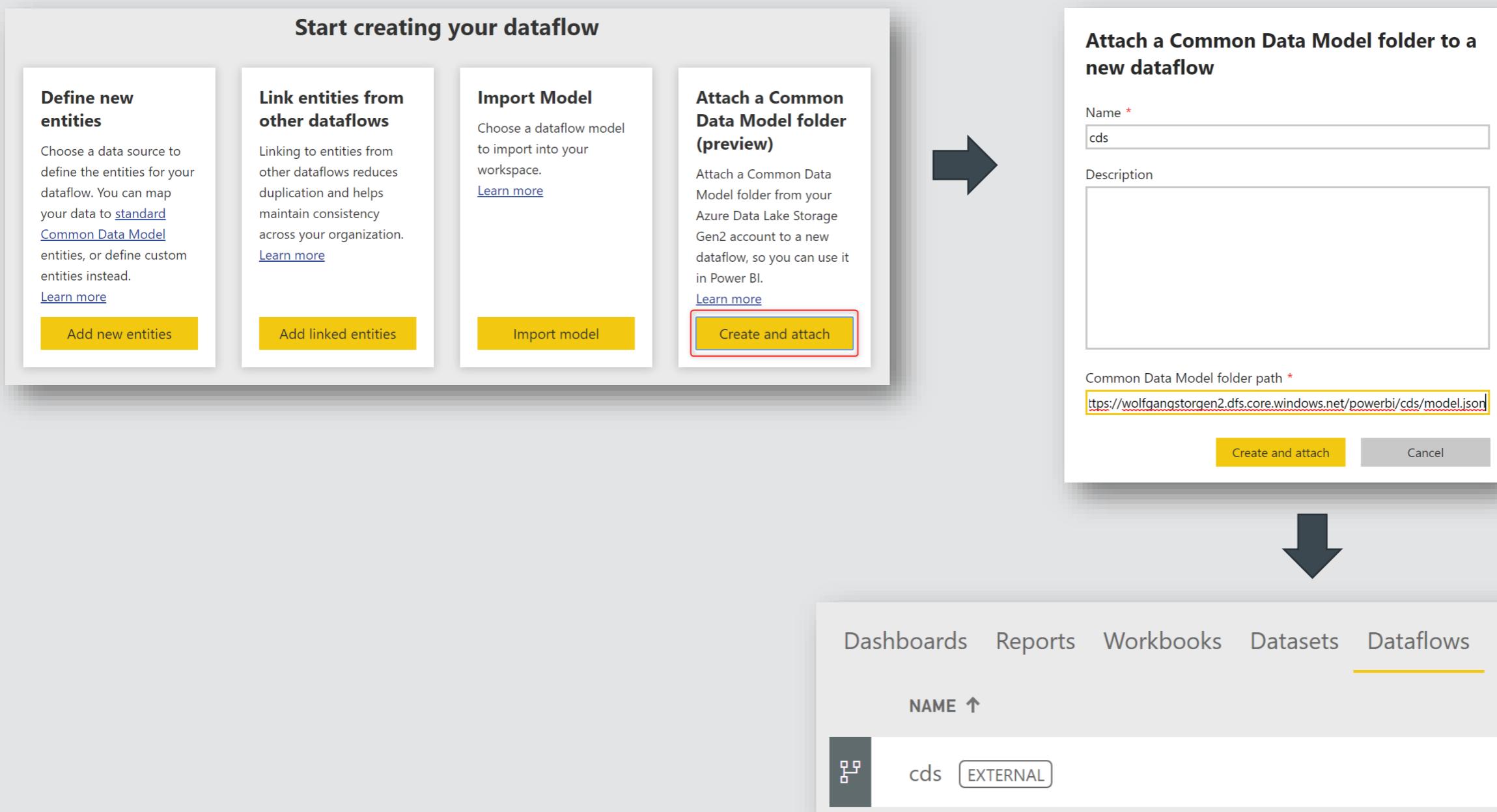
https://wolfgangcdsexportstorage.dfs.core.windows.net/commondataservice-po...

Content	Name	Extension	Date accessed	Date modified	Date created	Attributes	Folder Path
Binary	2019.csv	.csv	null	01.03.2020 18:17:54	null	Record	https://wolfgangcdsexportstorage.dfs.core.windows.net/commondataservice-po...
Binary	model.json	.json	null	01.03.2020 18:00:27	null	Record	https://wolfgangcdsexportstorage.dfs.core.windows.net/commondataservice-po...

< >

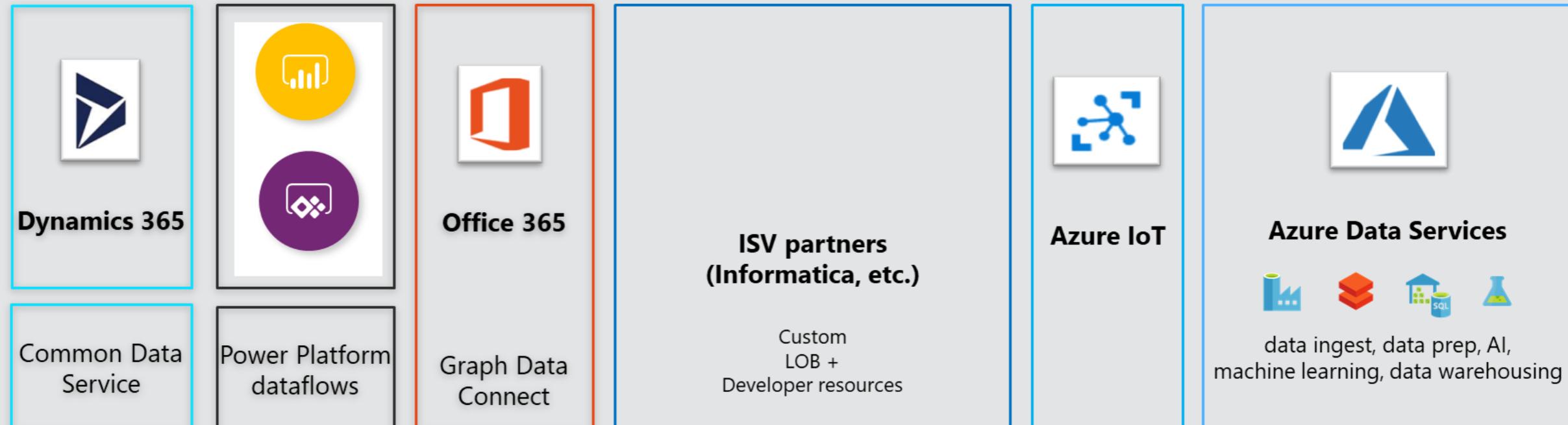
Combine & Transform Data    Transform Data    Cancel

# Consume in Power BI (Option 2)



# Power Platform Dataflows and the Data Lake

Decision Makers, Business analysts ← → Data scientists, Data engineers  
No code, low code Low to high code



Transactional business data



...



# Power Platform Dataflows...



Data Integration & Preparation in the Cloud

Data Lake

Common Set of Technology

Connectors

Power Query

CDM Folders

Data Exchange made easy

# Wolfgang Strasser

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