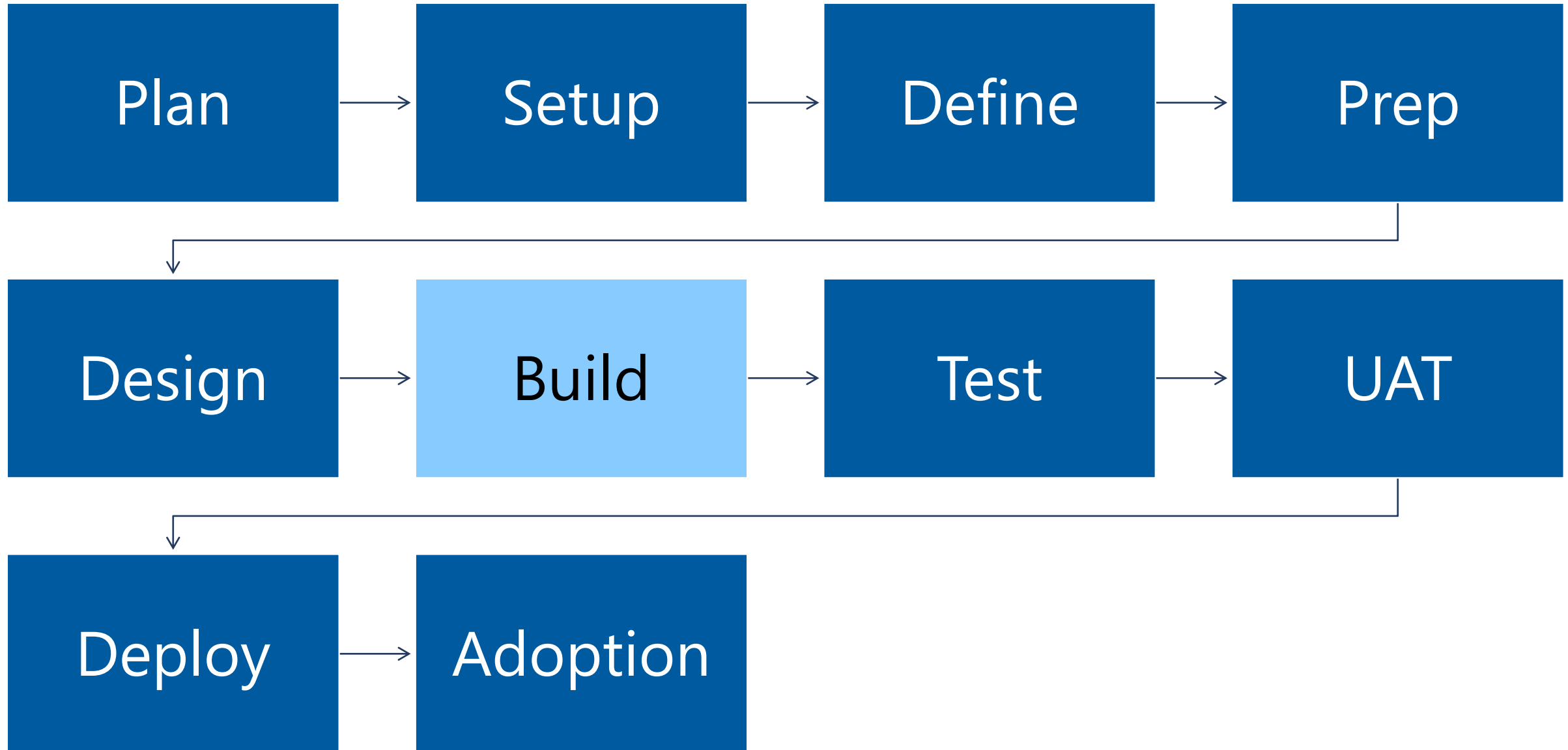


Module 02

Build the Solution Data Ingestion, Unification, Relationships & Measures

Consistent Solution Patterns



Build – with Design and Test, an iterative process

Data

- Ingestion (Subset)
- Define entities
- Define relationships

Unified profile

- Configure map/match/merge rules
- (Optional) Apply self-conflation
- Execute M3

Activities, measures/KPIs, Segments, Outbound

- Configure activities
- Configure measures/KPIs
- Configure segments
- Configure export destinations
- Execute activities and measures/KPIs
- Execute segment creation and export

Module 2 Agenda

2.1. Data Ingestion

2.2 Data Unification

2.3 Relationships

2.4 Measures

Lab 2



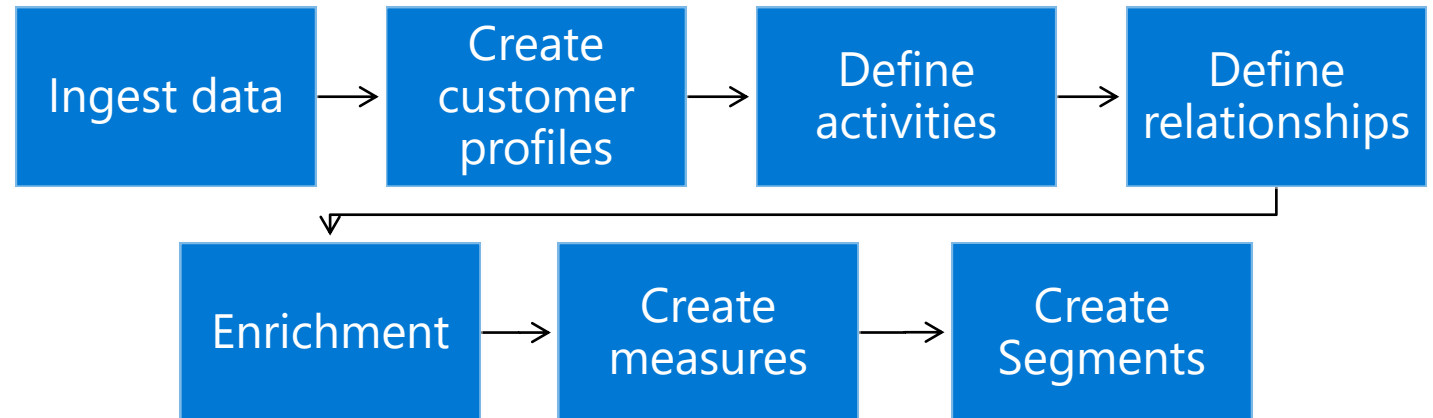
Review – Terms and Processes

Data source – a container for one or more datasets

Dataset – a logical table of data

Entities – created by loading a dataset; a dataset

Customers Page – a consolidated view of your customers



2.1 Data ingestion

Supported data sources

Creating data sources

Supported data sources in addition to CDS

File sources	Database sources	Azure sources	Others
Excel/Access	Redshift, BigQuery	Azure Blobs	Active Directory
JSON	SQL Server, DB2	Azure Data Lake Storage Gen2	OData
Text/CSV/XML	MySQL, PostgreSQL	Azure HDInsight Spark	ODBC
File folder	Oracle, DB2, Sybase, Teradata	Azure SQL Data Warehouse	SharePoint list
Sharepoint folder	Vertica, Impala	Azure SQL database	Spark
PDF		Azure Tables	Web API, Web page

Data Sources

















































Connect to a Common Data Model folder in ADLS

Attach to Dataverse

Import Data using Data Flow Connectors


All categoriesFileDatabasePower PlatformAzureOnline servicesOther

Search


 Excel workbook File	 Folder File	 JSON File	 PDF File	 Parquet File	 SharePoint folder File
 Text/CSV File	 XML File	 Access Database	 Amazon Redshift Database	 Google BigQuery Database	 IBM Db2 database Database
 Impala Database	 MySQL database Database	 Oracle database Database	 PostgreSQL database Database	 SAP BW Application Server Database	 SAP BW Message Server Database
 SAP HANA database Database	 SQL Server Analysis Services Database	 SQL Server database Database	 Snowflake Database	 Teradata database Database	 Azure Analysis Services Azure
 Azure Blobs Azure	 Azure Data Explorer (Kusto) Azure	 Azure Data Lake Storage Gen2 Azure	 Azure HDInsight Spark Azure	 Azure SQL database Azure	 Azure Synapse Analytics (SQL DW) Azure
 Azure Tables Azure	 Adobe Analytics Online services	 Google Analytics Online services	 Microsoft Exchange Online Online services	 Salesforce objects Online services	 Salesforce reports Online services
 SharePoint Online list Online services	 FHIR Other	 OData Other	 Odbc Other	 SharePoint list Other	 Spark Other
 Web API Other	 Web page Other	 Dataflows Power Platform	 Dataverse Power Platform	 Blank table Other	 Blank query Other


Creating data sources


Add new data source or edit existing


 Audience insights


Primary target audience
Individual consumers


 Home

 Customers

 Segments

 Measures

 Intelligence

 Data

Data sources

Entities


Unify


Enrichment

Activities

Relationships

Exports

 Reports (Preview)

 Admin

Choose your import method

☒ Microsoft Power Query
Files, databases, Microsoft Azure services, third-party online services, and on-premise data (gateway required)
[Learn more](#)

☐ Azure data lake storage
Azure Data Lake storage accounts
[Learn more](#)

☐ Microsoft Dataverse
Data sets in the Common Data Service data lake
[Learn more](#)

☐ Customer Insights data library
Get data from Datahub catalog

Data stored in an online service such as Azure Data Lake Storage may be stored in a different location than where data is processed with, Dynamics 365 Customer Insights. Learn more at the [Microsoft Trust Center](#)

Provide a name to identify your data source.

Save data source as: *

Enter a name, starting with a letter (ex: CustomerData2020)

Use both letters and numbers—no spaces or special characters (3-64 characters).

Azure Data Lake source considerations

Data format must conform to [Common Data Model](#)

Azure Data Lake Gen2 storage accounts required

Data lake and CI environment must be in same Azure region to avoid data movement

Access keys and model.json file may be changed after initial setup

Connecting to a CDM folder in Azure Data Lake storage

Customer Insights

Home

Customers

Segments

Measures

Intelligence

Predictions

Custom models

Data

Data sources

Entities

Unify

Enrichment

Activities

Relationships

Admin

+ Add data source

Data sources

Name
eCommerce
LoyaltyScheme
PoS
SubscriptionData
D365CustSvc
ContosoHotel
Website

Add data source

Choose a method to bring in your data

☐ Import data

Files, databases, Microsoft Azure services, and third-party online services

☒ Connect to a Common Data Model folder

Azure Data Lake storage accounts

☐ Connect to a Common Data Service

Data sets in the Common Data Service data lake

Enter storage details

Common Data Model folder

Azure Data Lake

Account name

Access key

Container

Review entities

Common Data Model folder

Azure Data Lake

Entity

Customer

EmailAddress

Organization

Person

PhoneNumber

PhysicalAddress

Connecting to Microsoft Dataverse-managed Data Lake

Admin rights required on the Common Data Service org

Customer Insights

Home

Customers

Segments

Measures

Intelligence

Predictions

Custom models

Data

Data sources

Entities

Unify

Enrichment

Activities

Relationships

Admin

+ Add data source

Data sources

Name

eCommerce

LoyaltyScheme

PoS

SubscriptionData

D365CustSvc

ContosoHotel

Website

☐ Microsoft Power Query

Files, databases, Microsoft Azure services, third-party online services

[Learn more](#)

☐ Azure Synapse Analytics (Preview)

Get data from Azure Synapse Analytics

☐ Azure data lake storage

Azure Data Lake storage accounts

[Learn more](#)

☒ Microsoft Dataverse

Data sets in the Common Data Service data lake

[Learn more](#)

☐ Customer Insights data library

Get data from Datahub catalog

Enter Microsoft Dataverse details

Microsoft Dataverse

Server address *

Configure: D365Marketing

Microsoft Dataverse

Entity

connection

connectionrole

☒ contact

contactleads

contract

Connecting to Text Files in Azure Blob Storage via Import

The screenshot displays the 'Customer Insights' application interface. On the left is a navigation pane with a dark blue header 'Customer Insights' and a menu containing: Home, Customers, Segments, Measures, Intelligence, Predictions, Custom models, Data, Data sources, Entities, Unify, Enrichment, Activities, Relationships, and Admin. The 'Data sources' option is highlighted. The main area is titled 'Add data source' and features a '+ Add data source' button. Below this, a section 'Choose a method to bring in y' lists three options: 'Import data' (selected with a blue radio button), 'Connect to a Common Data Model folder', and 'Connect to a Common Data Service'. The 'Import data' option is described as 'Files, databases, Microsoft Azur third-party online services'. To the right, a 'Data sources' grid shows various file types: Excel File, Folder File, JSON File, Parquet File, SharePoint folder File, and Text/CSV File. The 'Text/CSV File' option is circled in blue. Below this grid, a 'Text/CSV File' section shows a 'File path or URL' field with the value 'https://aka.ms/CI-ILT/Contacts' and 'Connection credentials' fields for 'On-premises data gateway' (set to '(none)') and 'Authentication kind' (set to 'Anonymous').

Customer Insights

+ Add data source

Data sources

Add data source

Choose a method to bring in y

- ☒ **Import data**
Files, databases, Microsoft Azur third-party online services
- ☐ Connect to a Common Data Model folder
Azure Data Lake storage accounts
- ☐ Connect to a Common Data Service
Data sets in the Common Data Service data lake

Data sources

- Excel File
- Folder File
- JSON File
- Parquet File
- SharePoint folder File
- Text/CSV File**

Text/CSV File

File path or URL

Connection credentials

On-premises data gateway

Authentication kind

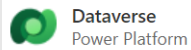
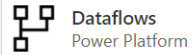
Connecting to Dynamics 365 Apps using Common Data Service

Power Query

Choose data source

Select a connector or directly drag a file from your computer.

All categories File Database **Power Platform** Azure Online services Other



Server Url *

Example: <https://tenant.crm.dynamics.com/>

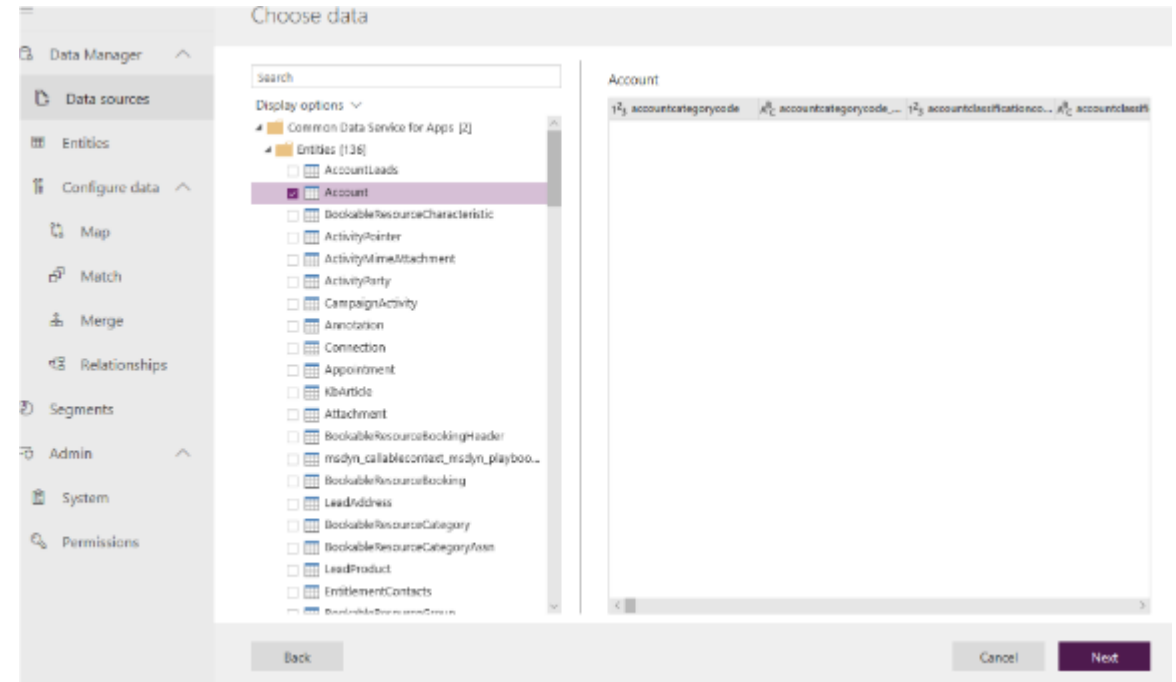
Connection credentials

On-premises data gateway

(none)

Authentication kind

Organizational account



Configuring Incremental Data Refresh

Requires a connection to a data source that supports data refresh (eg Azure SQL DB)

Select entities or tables to ingest

Complete incremental refresh settings (default is full refresh)

- Identify primary key

- Identify “last updated” field

- Configure refresh interval

Real-time data ingestion

The real-time functionality provides data immediately for consumption in Customer Insights, until the subsequent scheduled refresh pulls this data from the data source.

- Real-time customer profile updates
- Real-time activity creation

Power Query

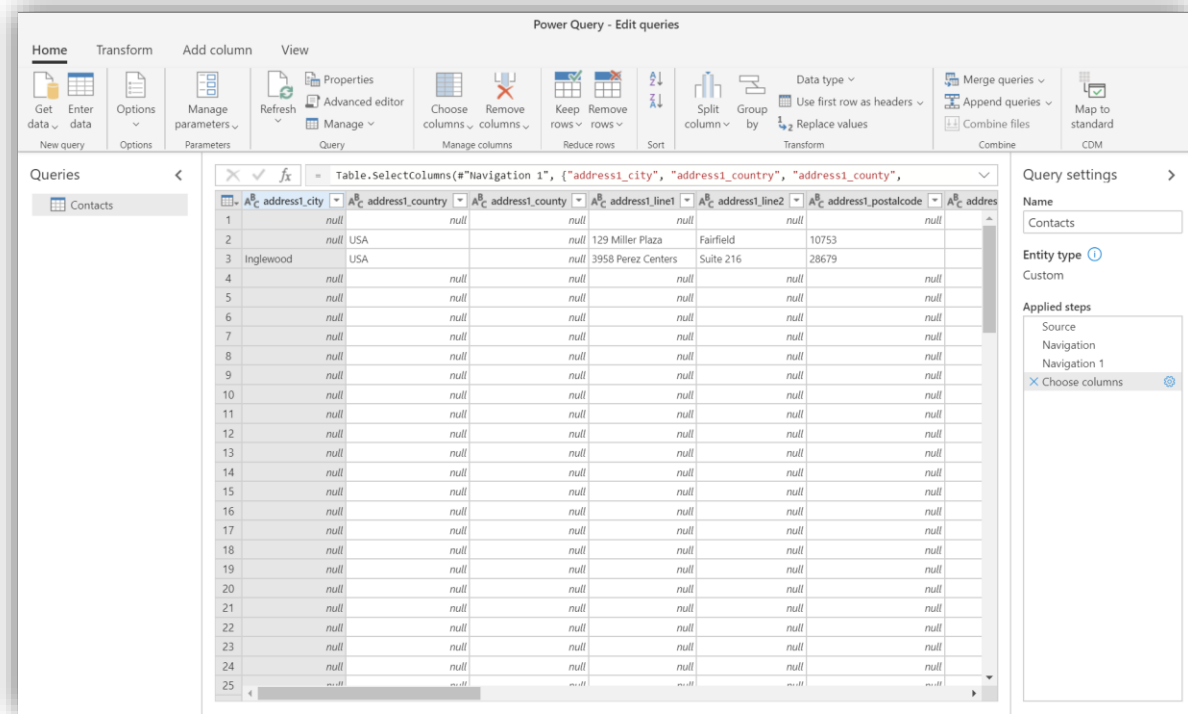
Power Query is used to help with importing your data sources

You can add, review, and transform the datasets when importing

For reference, see:

<https://docs.microsoft.com/en-us/power-query/power-query-what-is-power-query>

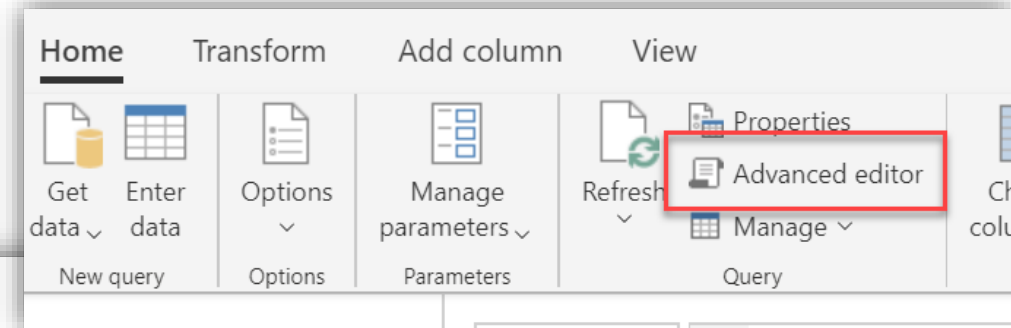
<https://docs.microsoft.com/en-us/power-query/best-practices>



Advanced Query - 'M'

Sometimes there are things you can't do in Power Query In that case you can use the Advanced Editor.

Uses the 'M' formula language



Advanced editor

```
1 let
2 Source = Cds.Entities("https://jwiesedemo.crm.dynamics.com", null),
3 Navigation = Source[[Group = "entities"]][Data],
4 #"Navigation 1" = Navigation[[EntitySetName = "contacts"]][Data],
5 #"Choose columns" = Table.SelectColumns(#"Navigation 1", {"address1_city", "address1_country", "address1_county", "address1_line1",
6 "address1_line2", "address1_postalcode", "address1_stateorprovince", "contactid", "emailaddress1", "entityimage_url",
7 "entityimageid", "firstname", "fullname", "gendercode_display", "lastname", "telephone1"})
8 in
9 #"Choose columns"
```

Entities (1 of 2)

Each dataset you load creates an entity

Multiple capabilities of Customer Insights are built around these entities

Entities

Search entities

▼ Name	Source	Updated	Status
> Activities (1)			
> Enrichment (2)			
> Intelligence (3)			
▼ Measures (3)			
AverageStorePurchaseValue	Customer Insights	5 days ago	✓ Successful
AverageWebPurchaseValue	Customer Insights	5 days ago	✓ Successful
Customer_Measure	Customer Insights	5 days ago	✓ Successful
▼ Profiles (1)			
Customer	Customer Insights	5 days ago	✓ Successful
> Segments (6)			
> System (1)			
> User (12)			

Entities (2 of 2)

Drill down into an Entity to see its structure

Type column maps to CDM definition

[← Back to Entities](#)[↓ Download](#)

Customer Insights

Customer

Fields

Data

Name

Data type

Type

Summary ↓

CustomerId

String

Customer

FirstName

String

Person.FirstName

LastName

String

Person.LastName

✔ Successful

U₁

Entity summary details



Click the chart icon to see a summary of the data itself

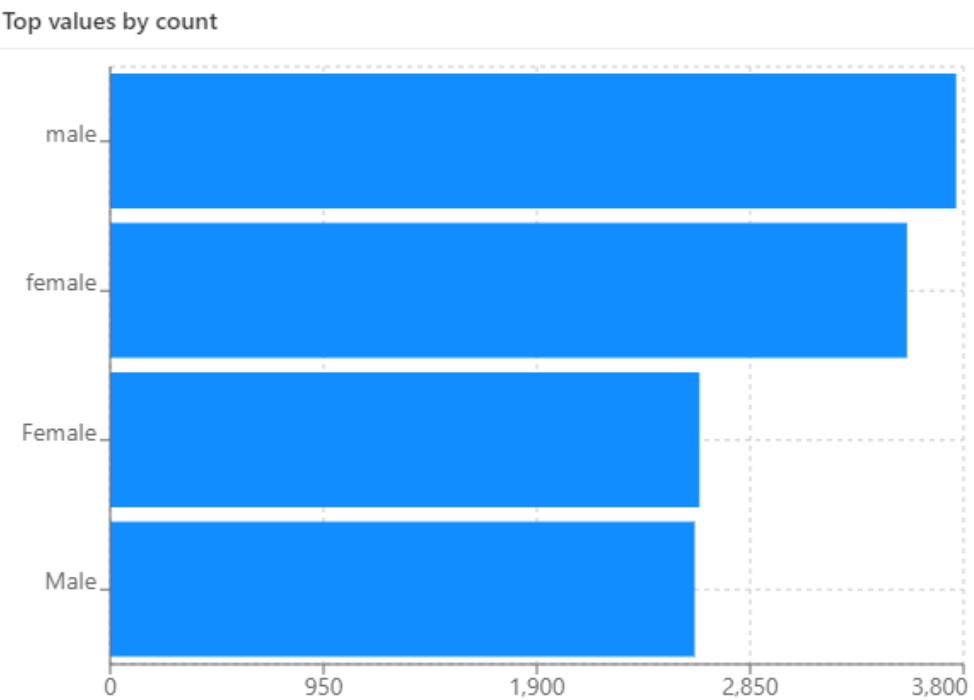
Overview of Gender

Updated: 5 days ago

Last run Successful

Attribute info	
Unique	4 (0%)
Error	0
Missing	16,830 (57.3%)
Total	29,372

Predict missing values



2.2 Unifying Data

Map

Match

Merge

Viewing the unified profile in the Customers Page

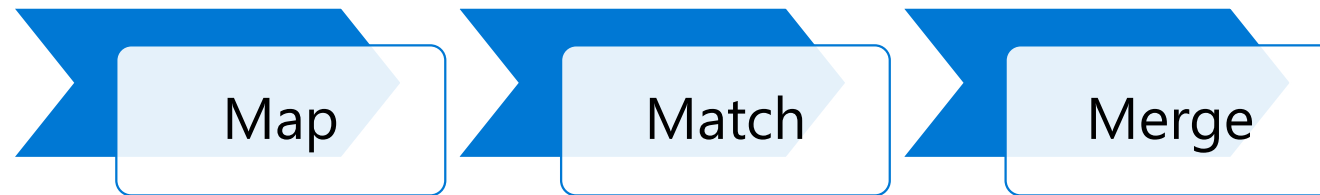
Unification Process

The data unification process:

Unifies data sources that were once disparate into a single customer dataset

Provides a holistic view of your customers: a unified customer profile.

Unification stages are mandatory and performed in the following order:



After unification is complete, you will proceed to set up relationships between entities, enrich your data, and define activities from some of the attributes (fields)

Map (1 of 2)

Mapping is the first stage in unification. It consists of 3 phases:

- Entity selection: identify the entities that can be combined

- Attribute selection: identify the fields/columns to combine and reconcile

- Key and type selection: identify each entity's primary key, and a type for each attribute

Note: it is important to select appropriate profile information for mapping. Focus on identifying attributes, not activities taken

Map (2 of 2)

Unify

Map

Match

Merge

To unify customer data, define the fields found in your datasets.

Imported data

Edit fields

Entities ↑

D365CustSvc

Contacts

eCommerce

eCommerceContacts

ContosoHotel

HotelCustomers

LoyaltyScheme

loyCustomers

Fields

Select the primary key

contactid

⌵

ⓘ

Review mapped fields

Column ↑	Type
address1_city	<div>Location.City</div> <div>⌵</div>
address1_country	<div>Location.Country</div> <div>⌵</div>
address1_county	<div>Location.County</div> <div>⌵</div>
address1_line1	<div>Location.Address</div> <div>⌵</div>

Be sure to map a field to the type Person.FullName to populate the Customer Card

Match

Match specifies how datasets will be combined into the unified customer profile

Requires at least 2 mapped entities

Set Match Order in the Unify page

Identify the Primary entity

Primary becomes the basis for unified profile. Other entities are added to it

Define Match rules: identify matching attributes between entities

Run and validate the match

Match order

Set order of entities

If you include all records, every record in the entity will be a unique customer and matched to every following entity.

Entity order	Entity name	Include all records	
Primary ⓘ	eCommerceContacts : ... ▾	<input checked="" type="checkbox"/>	×
2	loyCustomers : Loyalty... ▾	<input checked="" type="checkbox"/>	×

Identify the unique customers in your entities by matching records of customers.

Unique customers ⓘ

29,372

Matched records

5,002

[View last run](#)

Done

Cancel

Match rules

At least one rule is required

Match rules specify the logic by which a specific pair of entities will be matched

Review and Validate your matches

Custom Match – Allows you to specify that certain records *Always* match, or *Never* match

Self-conflation – Removes duplicates in an entity

Edit rule

Set conditions on how you will match by choosing equivalent fields in entities.

Name *

Name+Email

You can change this later.

Conditions

Condition 1

Entity

CRM_Contact : CRMSystem

Field

Name

Entity

ERP_Customer : ERPSystem

Field

Name

Normalize

Select options

Precision level

Basic

Precision

Low Medium High Exact

Merge

Merge is the third and last phase in data unification

Reconciles conflicting data

ex: Customer name appearing differently in each dataset

Merging is performed on an attribute-by-attribute basis.

Merge process

View the merged attributes

Unmerge attributes

Add or Remove attributes

Include or exclude attributes

Set the Rank importance

Reconcile conflicting data

Profile attributes + Add merged attribute

Name	Entity	Source	
CalendarDate (2)			
Attributes in CalendarDate			
Rank	Name	Entity	Source
1	DateOfBirth	ContactCSV	
2	DateOfBirth	WebAccountCSV	
LocationAddressStreet (2)			
LocationCity (2)			

Rank	Name	Entity	Source
1	FirstName	eCommerceContacts	eCommerce
2	FirstName	loyCustomers	LoyaltyScheme
3	FirstName	HotelCustomers	ContosoHotel
4	firstname	Contacts	D365CustSvc

Review the Unified Customer Profiles

Customers Page

Consolidated view of your customers

Available once you create the unified Customer entity

Search and Filter

Useful for a quick data check

2.3 Relationships

Relationships between entities

Relationship types

Custom relationships

Relationships

Name	Source entity	Source cardinality	Target entity
<div><div></div><div>Subscribers</div><div><div></div><div></div></div></div>	SubscriptionData SubscriberHistory	Many	SubscriptionData Subscribers
CustomerPurchasesPOS	PoS posPurchases	Many	Customer Insights Customer
CustomerWebReview	Website webReviews	Many	eCommerce eCommerceContacts
PoS Purchases	PoS posPurchases	Many	LoyaltyScheme loyCustomers
OnlinePurchases	eCommerce eCommercePurchases	Many	eCommerce eCommerceContacts
Logs	SubscriptionData UserLogs	Many	SubscriptionData Subscribers
CustomerPurchasesEcom	eCommerce eCommercePurchases	Many	Customer Insights Customer

Relationships: what are they?

Connect entities

Create a graph of the data

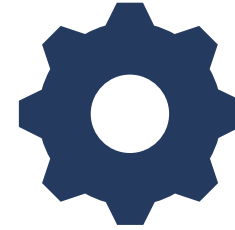
Help define segments and measures based on multiple data sources

Two type of relationships



Non-Editable

System relationships, created automatically



Custom

Created manually by the user

Relationships

Created during match and merge process
(system-generated)

Additional relationships can be defined
(custom)

Cardinality defines 1 : 1 or 1 : many
relationships

many : many can be modeled
see docs

New relationship ✕

To create a new relationship, specify how two entities are connected to each other.

Name *

Start with a letter. Use letters and numbers only.

Description

Source details

Entity *

Cardinality *

Target details

Entity *

Cardinality *

Equivalent fields

Source field *

Target field *

2.4 Creating Measures

Measures represent key performance indicators (KPIs)

Reflect the performance and health of specific business areas.

Measures

Track your organization's performance on a business and customer level.

Display name	Type	State
Total Online Spend	Customer attribute	Active
Total Club Points	Customer attribute	Active
Average Web Purchase (\$)	Customer attribute	Active
Average Store Purchase (\$)	Customer attribute	Active
Lifetime Spend (\$)	Customer attribute	Active
Average Web Purchase Value (\$)	Business measure	Active
Average Store Purchase Value (\$)	Business measure	Active

What are Measures?

KPIs reflecting health and performance

Measures

Track your organization's performance on a bus

Display name	Type
Avg survey score	Business measure
Avg sale price	Business measure
Avg spend	Customer attribute
Total transactions	Customer attribute

Insights

Avg sale price

7,110.273

1/7/20, 7:51 AM

Avg survey score

8.391

1/7/20, 7:51 AM

Measure Types

Customer Attribute

A single field per customer that reflects a score, value, or state for the customer. Customer attributes are created as attributes in a new system-generated entity called **Customer_Measure**.

Customer Measure

Insights on customer behavior with breakdown by selected dimensions. A new entity is generated for each measure, potentially with multiple records per customer.

Business Measure

Tracks your business performance and health of the business. Business measures can have two different outputs: a numeric output that shows on the **Home** page or a new entity that you find on the **Entities** page.

Creating Measures

To create a new measure:

Identify the Type: Customer attribute, Customer measure, Business measure

Provide name, display name

Select source entity/entities

Restricted to entities that have relationships to your starting entity.

Optionally, add arithmetic calculations with variables and expressions

(or with SQL)

Optionally, add aggregation functions (adds new value in Measures)

Measure example

Total Club Points

Entities

Select entities that have a relationship with your starting entity.

Customer : CustomerInsights

posPurchases : PoS (Customer : Custom...

X

Measure definition *

Function *	Entity/variable *	Field	As	Display name
Sum	posPurchases : PoS	RewardPointsAdded	TotalClubPoints	Total Club Points

Lab 2

In this lab, you will use the environment you configured in Lab 1. You will:

Ingest data from high priority data sources from within the business:

- Point-of-Sale (POS)

- Loyalty Data

- eCommerce Customers and Web Purchases

Configure and realize a unified customer profile from ingested data

Configure business and customers measures in Customer Insights to identify customers with higher than average spend in store and online.

Estimated time: 90 mins.