

# Breaking Data Silos: incorporating the DICOM imaging standard into the OMOP CDM to enable multimodal research

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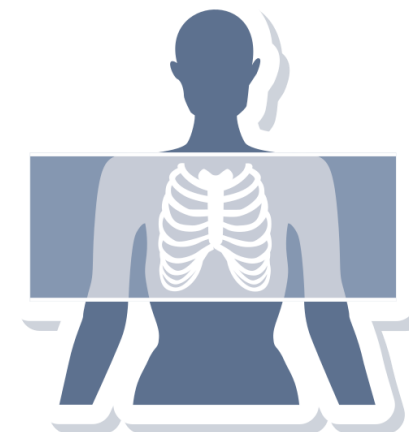
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Date: 9/16/2026

# Motivation & Problem Statement

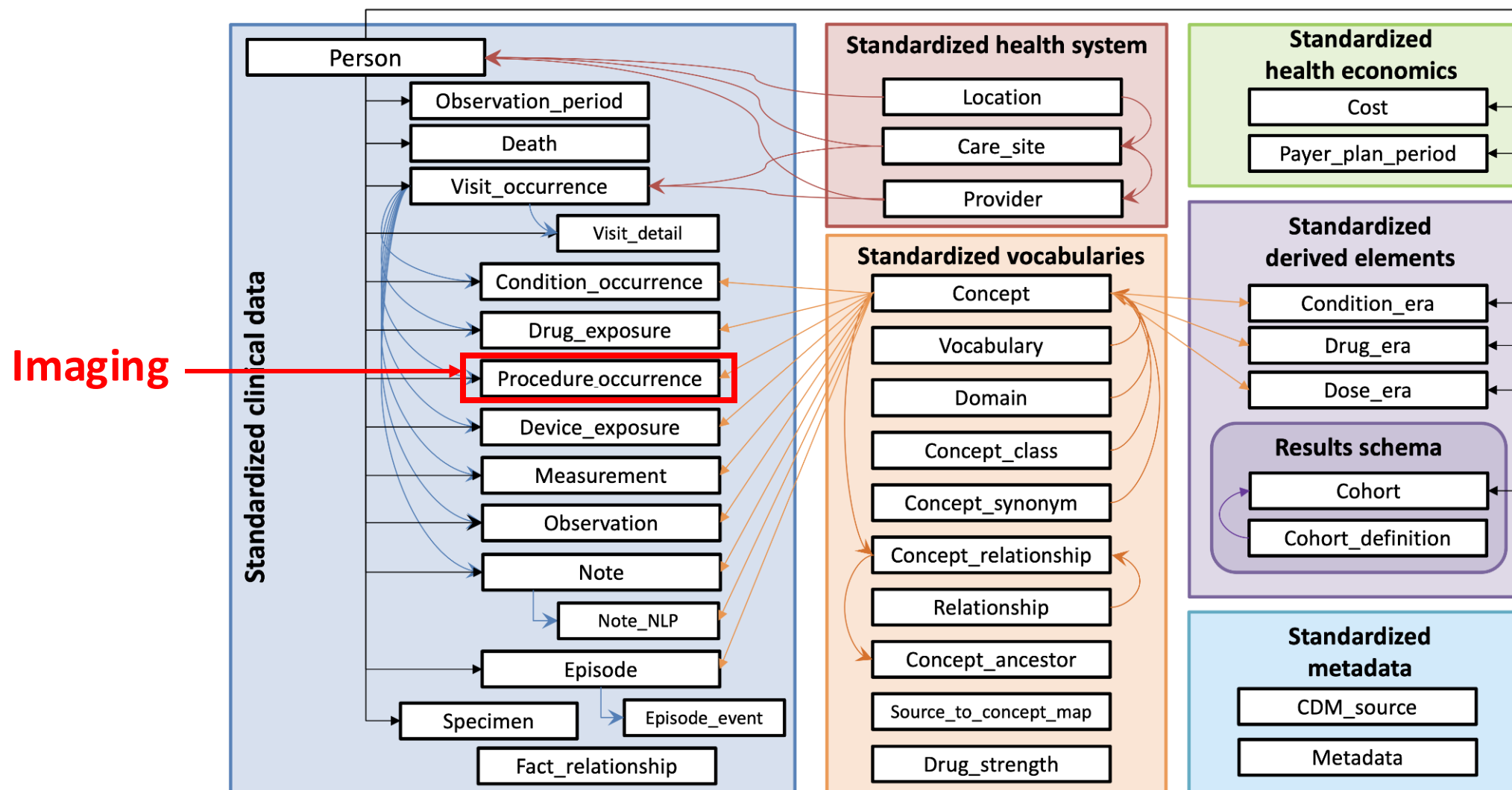


EHR

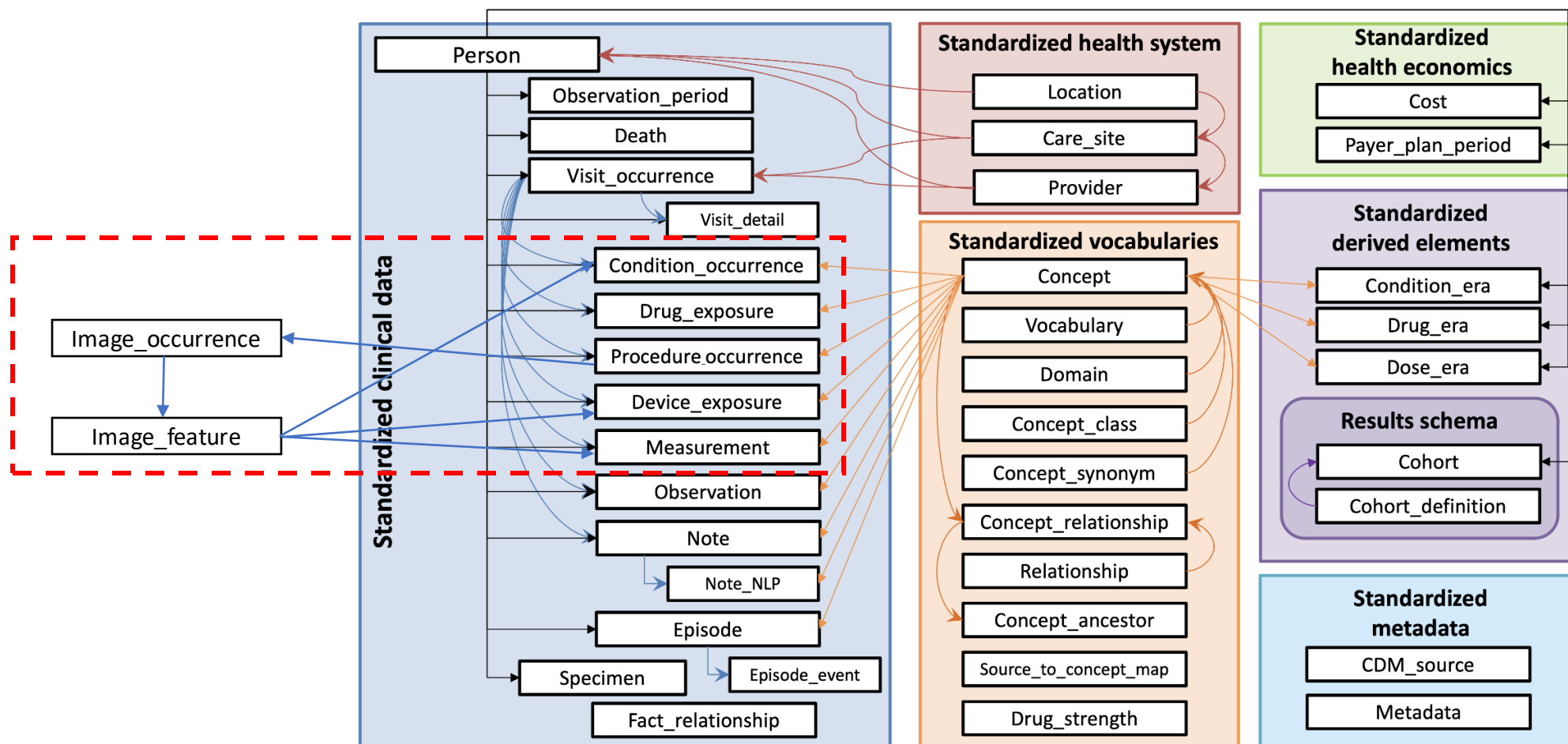


PACS

# OMOP CDM v.5.4



# Medical Imaging Extension



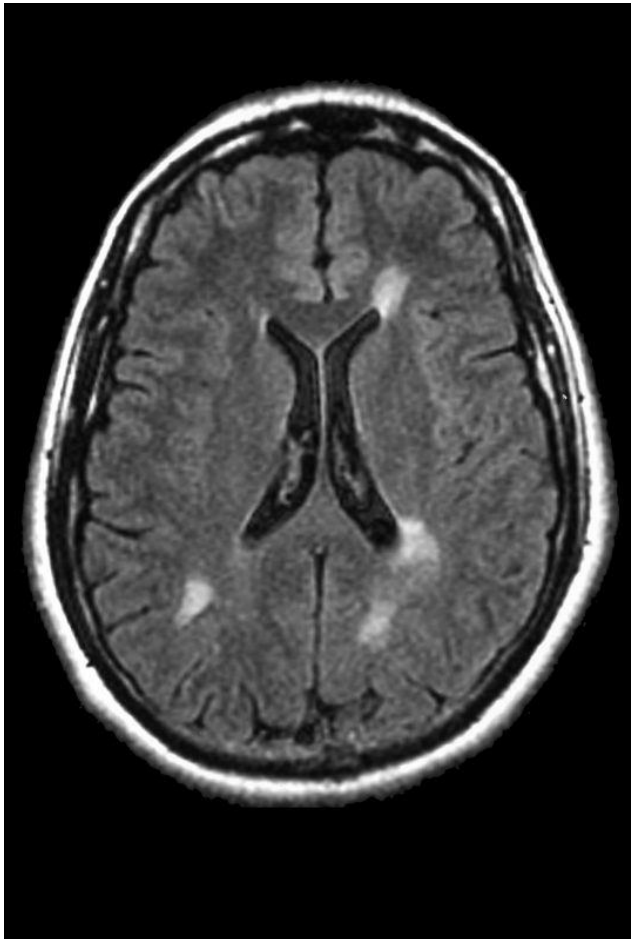
# Objectives

1. Integrate DICOM terminology and relationship into OMOP CDM.
2. Demonstrate feasibility of MI-CDM in real-world multimodal dataset from Alzheimer's Diseases Neuroimaging Initiative

# Imaging Standard: DICOM<sup>SM</sup>

*Digital Imaging and Communications in Medicine*

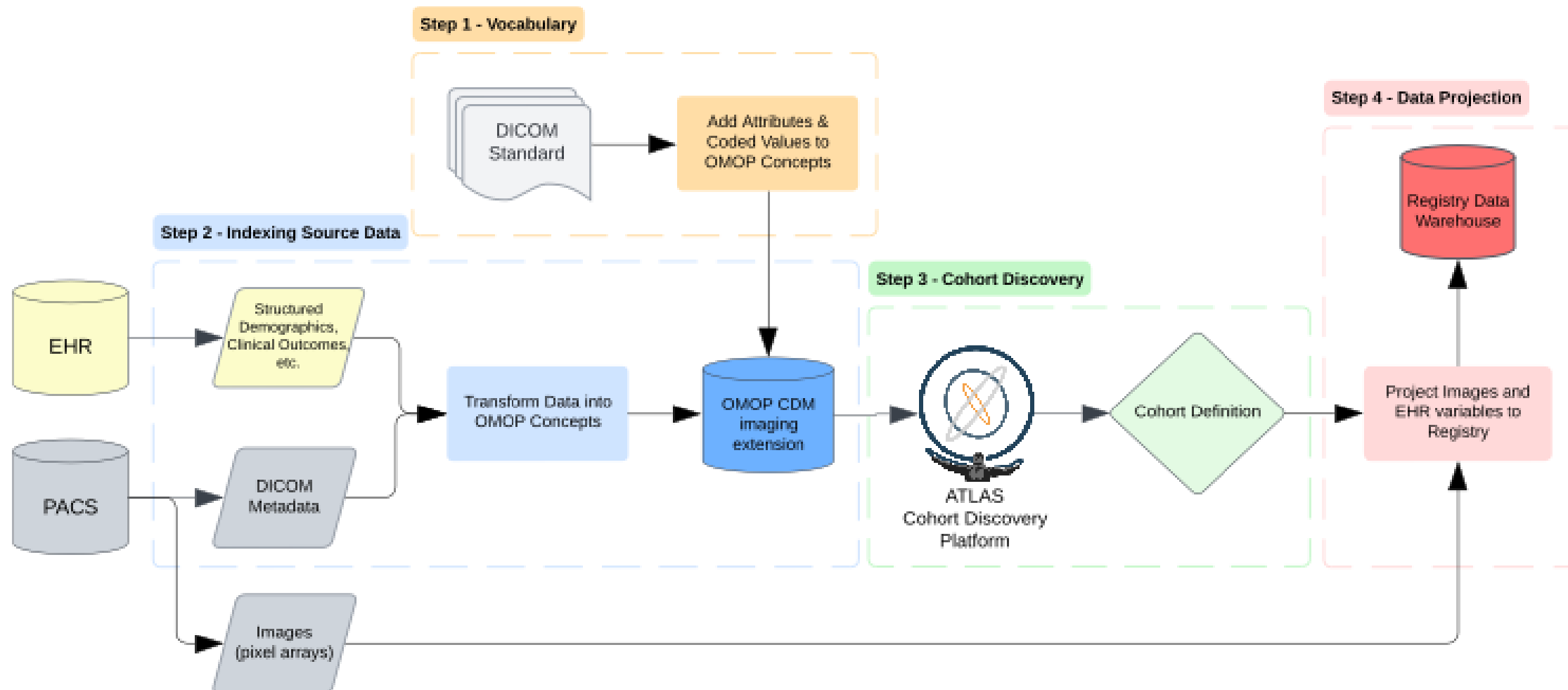
## Pixel



## Metadata

```
{
  "ModalitiesInStudy": "MR",
  "InstanceNumber": 1,
  "CurrentPatientLocation": "JH-000",
  "SeriesInstanceUID": "1.08.1982.10121984.2.0.07.635840622064322050",
  "SeriesDescription": "RadScan",
  "BitsAllocated": 8,
  "ContentDate": "20151125",
  "Manufacturer": "Primordial",
  "StudyCompletionTime": "115729.000",
  "SOPInstanceUID": "1.08.1982.10121984.2.0.07.635840622066022067",
  "BodyPartExamined": null,
  "SOPClassUID": "1.2.840.10008.5.1.4.1.1.7",
  "AdmittingDiagnosesDescription": "EXACERBATION OF MULTIPLE SCLEROSIS/CHRONIC PAIN",
  "PhysiciansOfRecord": "^^^^",
  "HighBit": 7,
  "EthnicGroup": "B",
  "ProcedureCodeSequence": [
    {
      "CodeMeaning": "WHITAKER TEST SI",
      "CodeValue": "70553",
      "CodingSchemeVersion": null,
      "CodingSchemeDesignator": "C4"
    }
  ],
  "StudyDate": "20151125",
  "NumberOfStudyRelatedInstances": 374,
  "PatientName": "LASTNAME^FIRSTNAME",
  "Allergies": "DRUG^SULFAMETHOXAZOLE-TRIMETHOPRIM",
```

# Implementation Steps

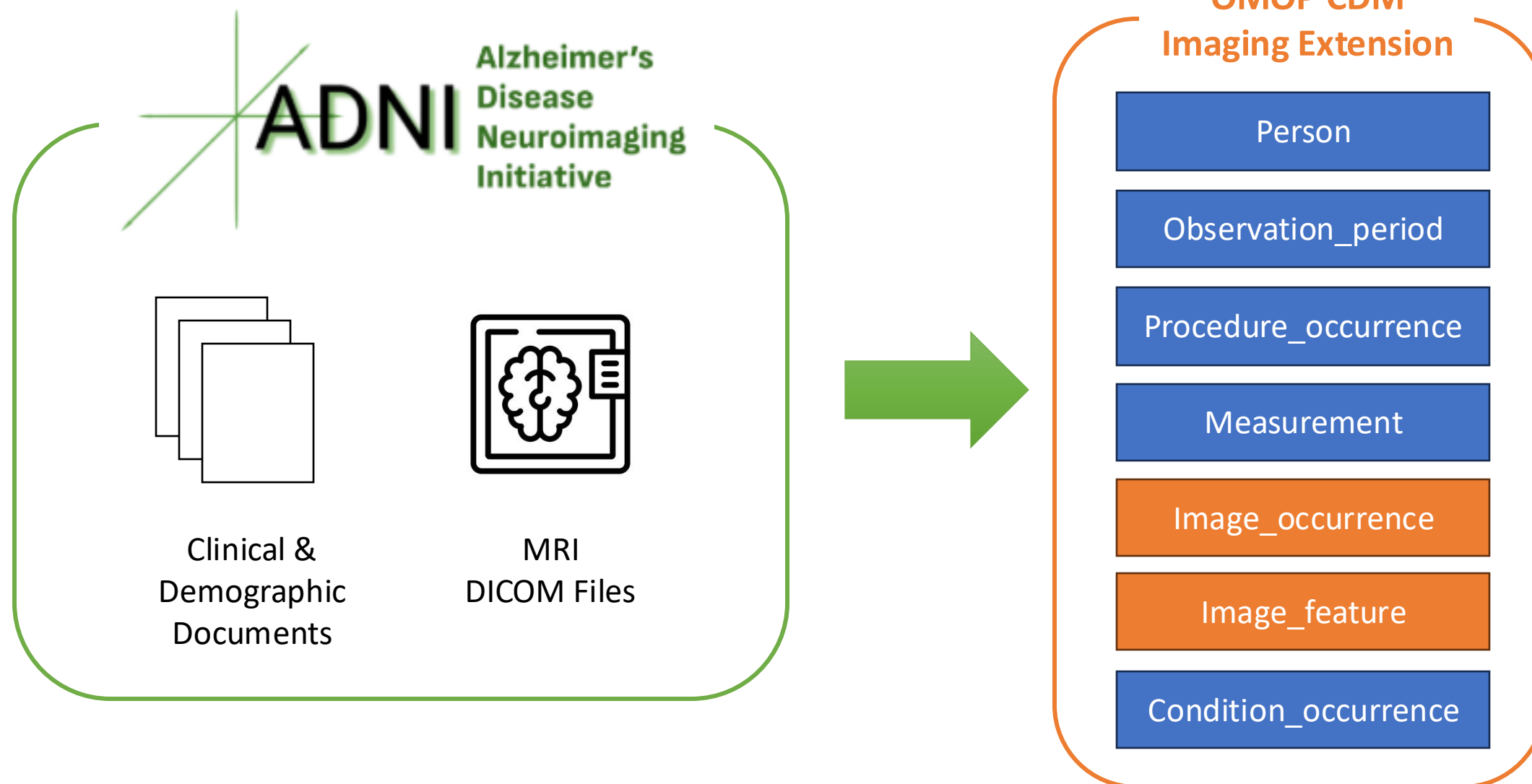


# 1. DICOM to OMOP Vocabulary

Data type	Data source	Data subtype	Inclusion criteria	No. of OMOP concepts
Attributes	Parts 6	DICOM Data Elements	All	5183
Total Attributes				5183
Coded values	Part 16	Context Identifiers (CID)	Coding system equals to DCM	3281
		Body Part Examined	DICOM code string not missing	318
	Part 3	Defined Terms	Modality	5
			Patient Position	16
			Lossy Image Compression Method	8
	Total Coded Values			3628
	Relationships	Part 3	Attribute to Coded Values	
DICOM Value to Standard Coding System			307	
Total Relationship concepts			8147	
Total OMOP Concepts for DICOM				16 958



## 2. Index Source Data



# 3. ATLAS Cohort Definition

**ATLAS**

Home

Data Sources

Search

Concept Sets

**Cohort Definitions**

Characterizations

Cohort Pathways

Incidence Rates

Profiles

Estimation

Prediction

Reusables

Jobs

Configuration

Feedback

English

Cohort #137

created by anonymous on 2024-06-18 16:31, modified by anonymous on 2024-10-22 16:04

[Cohort 1] Brain MRI T1 Volumetric

Definition

Concept Sets

Generation

Samples

Reporting

Export

Versions

Messages 5

Enter a cohort definition description here

Cohort Entry Events

?

Events having any of the following criteria:

+ Add Initial Event...

a procedure occurrence of

MRI BRAIN

OMOP Procedure concept

+ Add attribute...

Delete Criteria

with continuous observation of at least 0 days before and 0 days after event index date

Limit initial events to: earliest event per person.

Restrict initial events

Inclusion Criteria

?

New inclusion criteria

1. Repetition Time

2. Inversion Time

3. Echo Time

DICOM concepts

Limit qualifying events to: all events per person.

# Summary

## Highlights:

- Integrated DICOM terminology into OMOP CDM vocabulary
- Enables precise, reproducible imaging phenotypes
- Compatible with existing OMOP tools (ATLAS)

## Limitations:

- Data quality variability in DICOM metadata
- ADNI dataset is a research database.