Medical Imaging in OHDSI:
From Standardization to Multimodal Evidence

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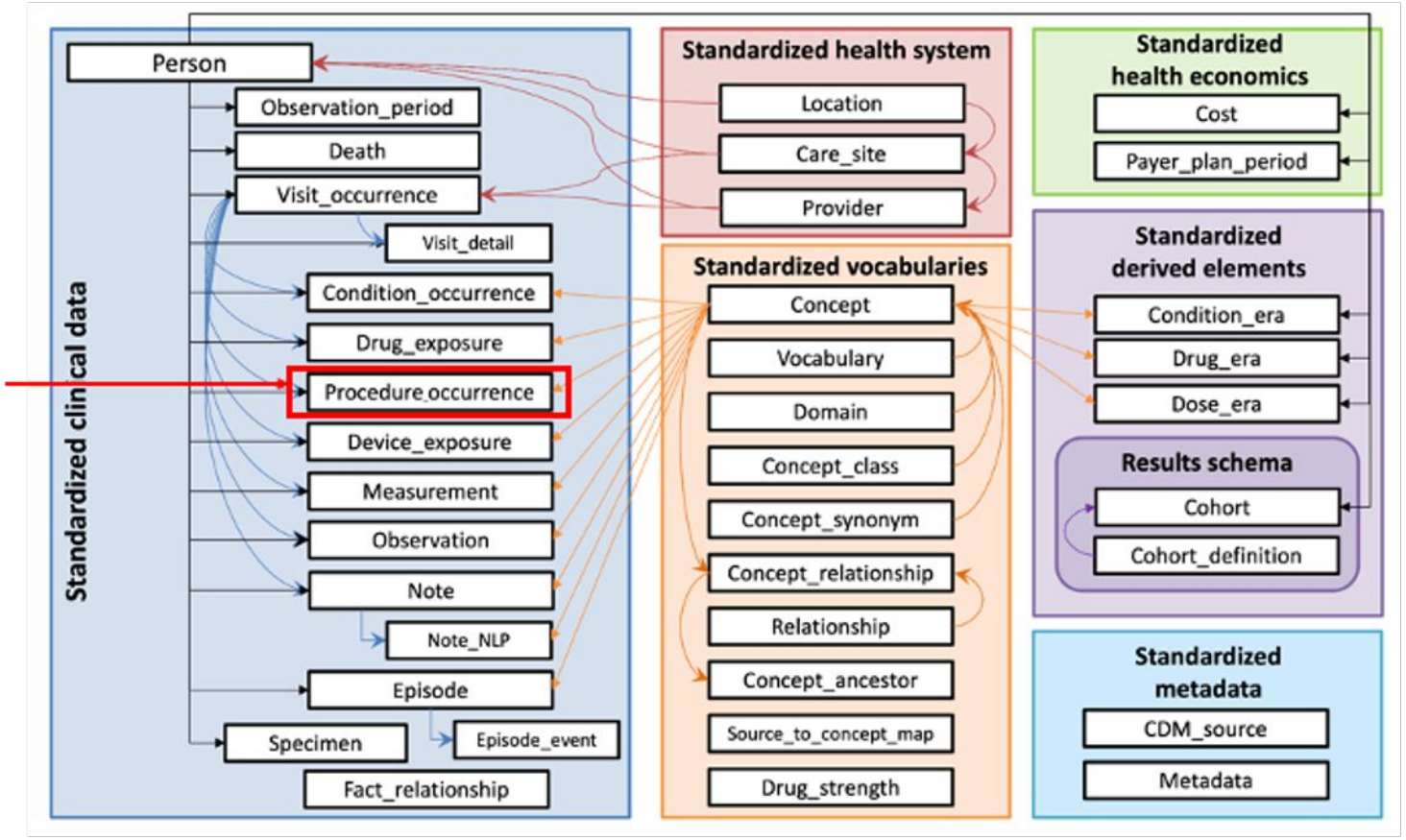
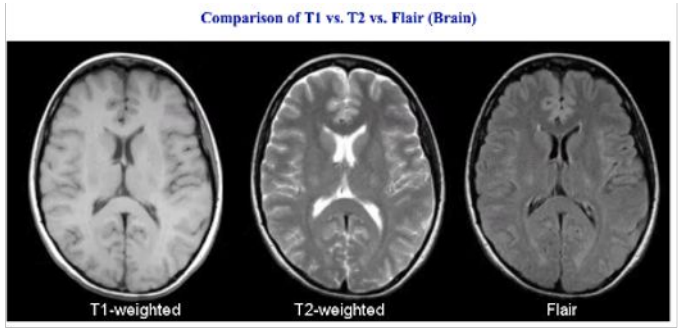
Imaging is more than an imaging procedure

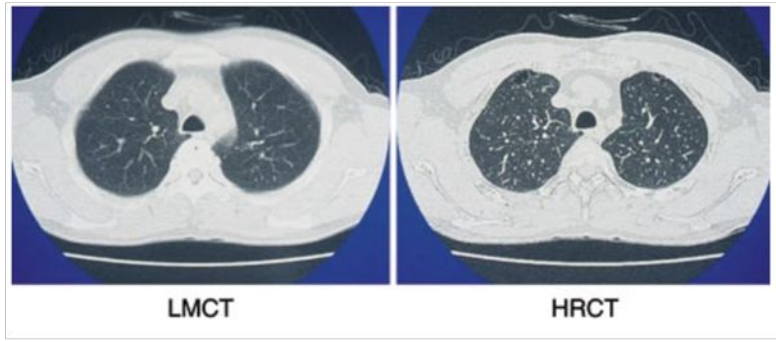
Imaging





MR of Brain

Procedure Concept = 3023655



CT of Chest

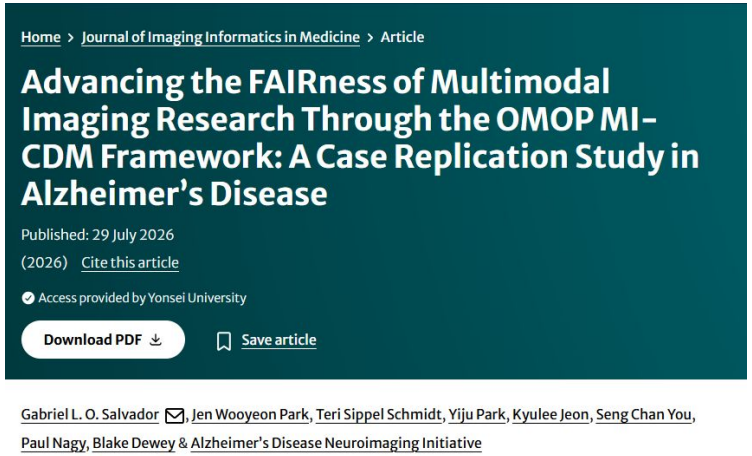
Procedure Concept = 4058335

What questions could we answer?

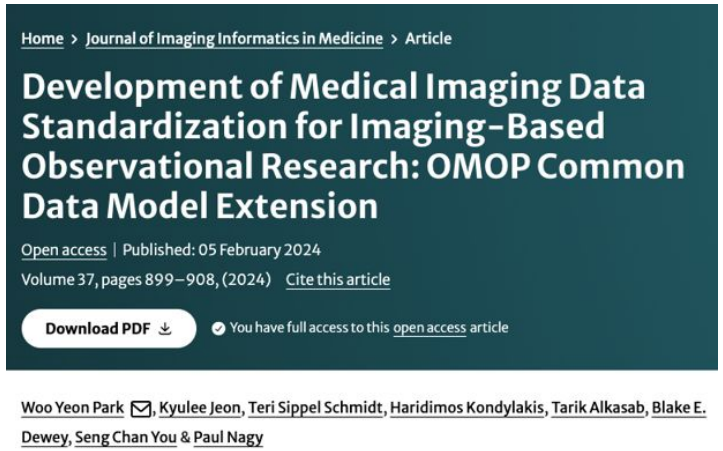
- **Phenotype enhancement**:
  - Can imaging findings improve identification of clinically meaningful phenotypes?
- **Patient stratification**:
  - Can imaging biomarkers identify clinically distinct patient populations?
- **Treatment/outcome research**:
  - How do imaging characteristics relate to treatment and longitudinal outcomes?
- **AI evaluation**:
  - How do imaging AI outputs perform across different populations, acquisition settings, and clinical contexts?
- **Reproducibility**:
  - Can we identify comparable imaging cohorts across institutions?

Building toward standardized multimodal evidence

Launched in 2021



2026



Imaging Evidence Network
OHDSI MEDICAL IMAGING WORKGROUP

Goals of Medical Imaging in OHDSI

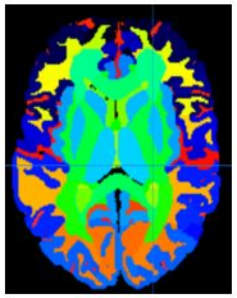
- Bring together the OHDSI and imaging informatics communities
- Develop community conventions for integrating medical imaging with OMOP
- Enable reproducible, multimodal observational research
- Support implementation, research collaboration, and a distributed imaging evidence network
- Call for Imaging Evidence Network CHARTER MEMBERS!

What we have learned

Imaging integration requires more than adding another table

- DICOM **semantics**
- Clinical ↔ imaging **linkage** is critical (Accession/GUID/OrderNum)
- Imaging-derived results need **provenance**
- **Implementation conventions** matter for reproducibility
- Multi-institutional research requires **consistent implementation**
- DICOM tags needs to be **prioritized** for research purposes

MI-CDM at a glance



Image_occurrence

Image_feature

Standardized clinical data

- Person
- Observation_period
- Death
- Visit_occurrence
- Visit_detail
- Condition_occurrence
- Drug_exposure
- Procedure_occurrence
- Device_exposure
- Measurement
- Observation
- Note
- Note_NLP
- Episode
- Specimen
- Episode_event
- Fact_relationship

Standardized health system

- Location
- Care_site
- Provider

Standardized vocabularies

- Concept
- Vocabulary
- Domain
- Concept_class
- Concept_synonym
- Concept_relationship
- Relationship
- Concept_ancestor
- Source_to_concept_map
- Drug_strength

Standardized health economics

- Cost
- Payer_plan_period

Standardized derived elements

- Condition_era
- Drug_era
- Dose_era

Results schema

- Cohort
- Cohort_definition

Standardized metadata

- CDM_source
- Metadata

From DICOM to standardized concepts

- DICOM contains rich acquisition and imaging metadata
  - Raw DICOM values can be vendor- and site-dependent
- Represent relevant DICOM attributes using OMOP concepts
  - Standardize coded values where possible
  - Preserve source values when needed

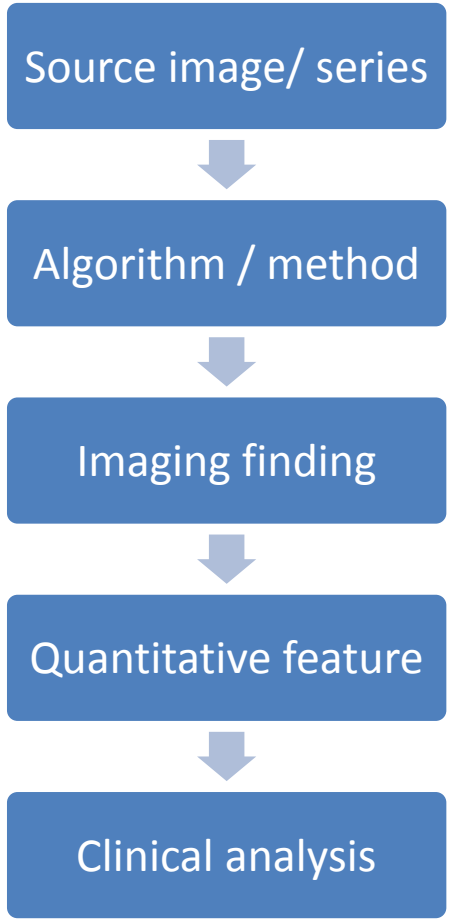
DICOM Tag	DICOM Attribute	DICOM Value
00180015	Body Part Examined	CHEST
00185101	View Position	AP
00180050	Slice Thickness	1.5

concept id	concept name	vocab
2128000792	Body Part Examined	DICOM
2128001098	View Position	DICOM
2128000817	Slice Thickness	DICOM

concept id	concept name	vocab
37303885	Cross-sectional thorax	SNOMED
4161423	Antero-posterior projection	SNOMED

Preserve the path back to the source

- What image generated this result?
- What algorithm generated it?
- Which version?
- When was it generated?
- What finding does the measurement describe?



From proposal to real-world implementation

ADNI / MIMIC-IV

- Initial MI-CDM implementation
- DICOM metadata standardization
- Imaging cohort definition
- Imaging-derived features

Johns Hopkins / Yonsei / Stanford

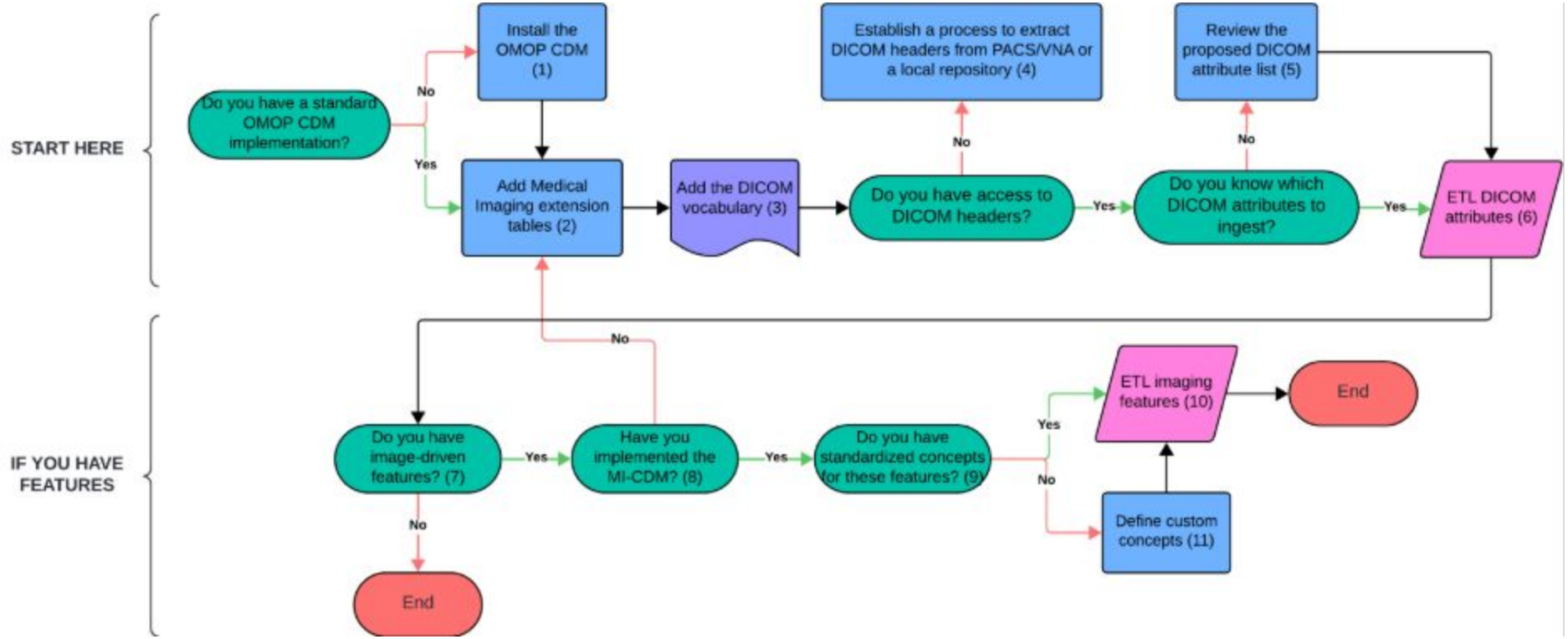
- Real-world clinical imaging data
- Large-scale DICOM ETL
- Clinical ↔ imaging linkage
- Data quality and terminology challenges

What did implementation teach us?

- **Linking** imaging to clinical data
  - Linkage approaches depend on the source environment
  - Need to preserve reliable relationships between imaging and existing OMOP events
- **Not every** DICOM attribute belongs in an analytic data model
  - Select metadata based on research/analytic relevance
  - Different research questions may require different acquisition parameters
  - Need community conventions around what should be standardized
- DICOM is standardized, but source data are not always **standardized**
  - Vendor/site variation
  - Missing/conditional attributes
  - Local terminology requires harmonization
- **Provenance** matters
  - Imaging-derived measurements need to remain connected to:
    - Source image/series, Finding, Algorithm/method, Version/execution information

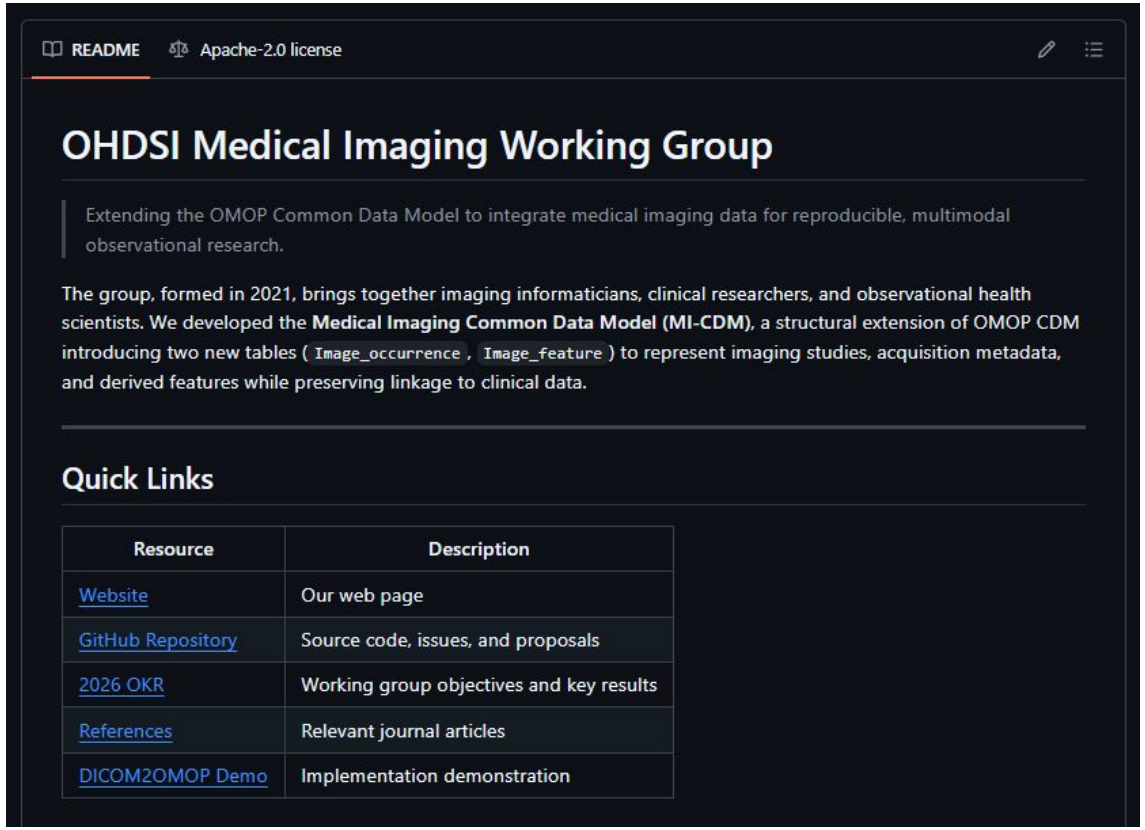
Getting Started

- We won't walk through every decision today, but we've been developing implementation guidance around each of these steps.



Resources from the WG

- Join Imaging WG meetings
  - https://github.com/OHDSI/ImageWG



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OHDSI Medical Imaging Working Group

> Extending the OMOP Common Data Model to integrate medical imaging data for reproducible, multimodal observational research.

The group, formed in 2021, brings together imaging informaticians, clinical researchers, and observational health scientists. We developed the **Medical Imaging Common Data Model (MI-CDM)**, a structural extension of OMOP CDM introducing two new tables (`Image_occurrence` , `Image_feature`) to represent imaging studies, acquisition metadata, and derived features while preserving linkage to clinical data.

Quick Links

Resource	Description
Website	Our web page
GitHub Repository	Source code, issues, and proposals
2026 OKR	Working group objectives and key results
References	Relevant journal articles
DICOM2OMOP Demo	Implementation demonstration

OHDSI Imaging Evidence Network

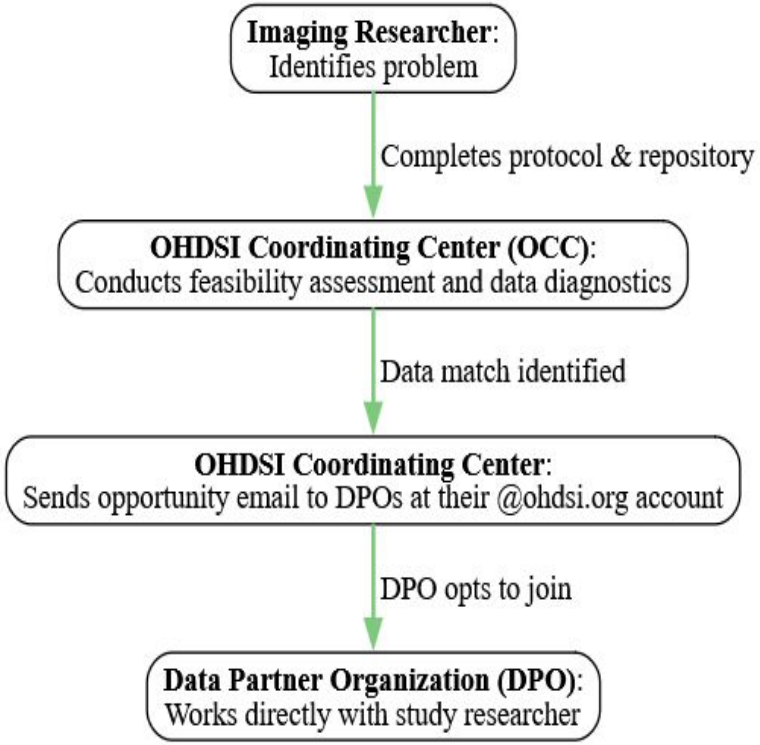
- Open network of observational health databases with imaging
- Common representation using OMOP + Imaging Extension
- Connect researchers with data partners capable of addressing imaging research questions
- Enable distributed, reproducible multimodal research

Imaging Evidence Network

OHDSI MEDICAL IMAGING WORKGROUP

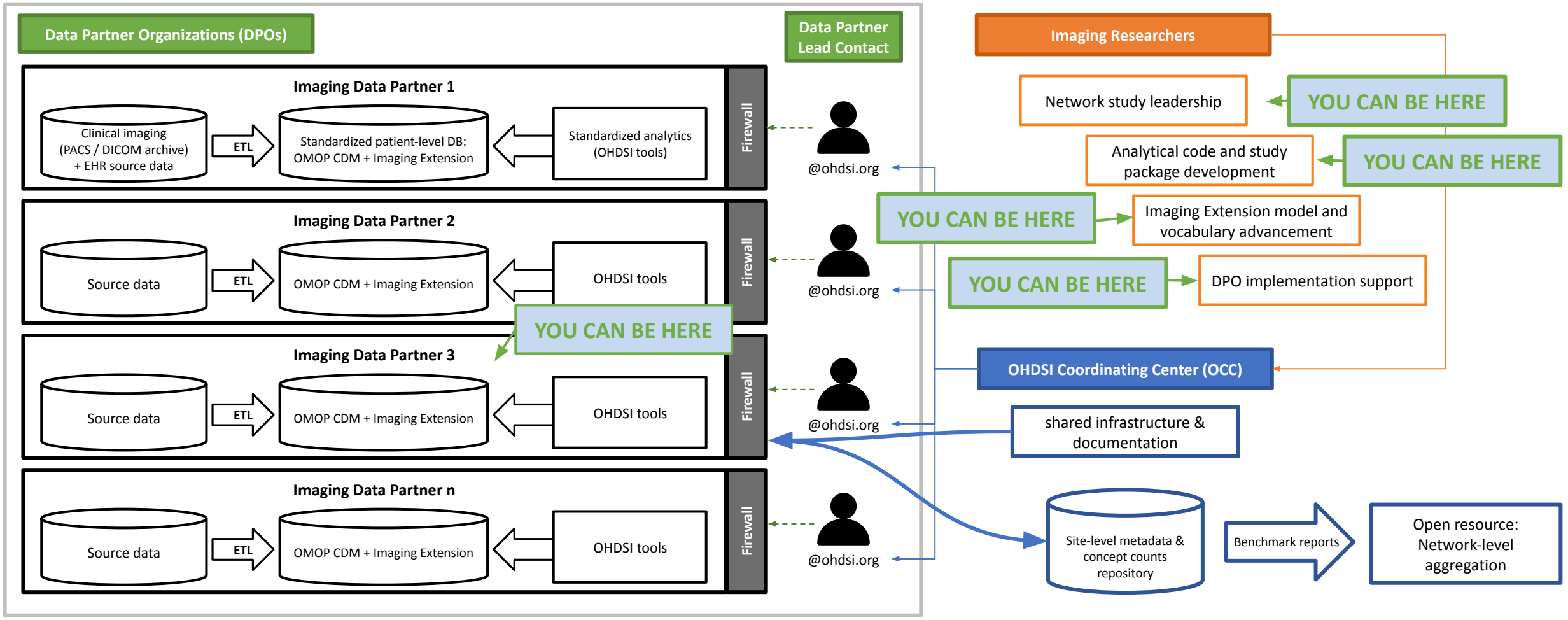
How does the network work?

1. **Data Partners Join**
   - OMOP + imaging readiness
2. **Profile the Data**
   - Metadata + aggregate concept counts
3. **Understand Network Capabilities**
   - What imaging data are available across the network?
4. **Researcher Proposes Study**
   - Protocol + analysis package
5. **Feasibility Assessment**
   - Identify potentially suitable data partners
6. **Sites Opt in**
   - Local execution + collaboration



There are multiple ways to participate

OHDSI Imaging Evidence Network



Continue the conversation at the Symposium

Tutorial on **Oct 20 Tue (8AM-12PM)**

"Learn how to get started"

- Imaging + OMOP
- DICOM fundamentals
- MI-CDM implementation walkthrough
- ETL conventions
- Implementation experiences
- Reproducible research examples

Workgroup Meeting on **Oct 22 Thu**

"Help shape what comes next"

- Imaging Evidence Network
- Network use cases
- Data partner onboarding
- Implementation experiences
- Current roadblocks
- Research priorities
- New collaborators

Continue the conversation at the Symposium!

2026 OHDSI GLOBAL SYMPOSIUM

by **Observational Health Data Sciences & Informatics**
709 followers • 22 events • 7y hosting • 7.8k total attendees

Follow

Hyatt Regency Hotel · New Brunswick, NJ
Tuesday, October 20-Thursday, October 22 • 7 AM-5 PM

$500 - $900
Oct 20-22

Get tickets

REGISTER HERE

✔️ Medical Imaging in Morning Tutorial? *Yes!*
✔️ Medical Imaging Workgroup? *Yes!*