Where are we?
OMOP + FHIR Project Subgroups

- Data Model Harmonization
- OMOP + FHIR Terminologies

- FHIR-OMOP Digital Quality Measurement Use Case
- FHIR-OMOP Oncology Use Case
Roadmap: Cancer Harmonization

Phase 1 Analysis: mCODE to OMOP Oncology Base Diagnosis Cancer Modifier

Phase 1 Prototyping: mCODE to OMOP Oncology Base Diagnosis Cancer Modifier

Phase 2 Analysis: mCODE to OMOP Oncology Treatment (single-agent)

Phase 2 Prototyping: mCODE to OMOP Oncology Treatment (single-agent)

Reference Implementation Server / Clients Development mCODE to OMOP conversion

Present learnings and next steps

HL7 FHIR Connectathon Readiness check

HL7 FHIR Connectathon / Working Group Meeting

FHIR Dev Days

Use Case Kick-off

HL7-OMOP Oncology Knowledge sharing

Feb '21

Sept / Oct '21

Nov '21

Dec '21

Jan '22

Feb '22

Mar '22

Apr '22

May '22

Jun '22

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<table>
<thead>
<tr>
<th>Name</th>
<th>CDMs</th>
<th>Organizations</th>
<th>WG Participants</th>
<th>Support Orgs</th>
<th>SO WG Participants</th>
<th>Resources</th>
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<tbody>
<tr>
<td>FHIR OMOP Prior Art Catalog</td>
<td></td>
<td>CIBMTR Data Transformation Initiative</td>
<td>- CIBMTR</td>
<td>- ICVIA</td>
<td>- Ben Smith</td>
<td>- CDMH FHIR IG and mappings - Governance framework</td>
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<td>Google Cloud Healthcare</td>
<td>OMOP</td>
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<td>- Jane Pollack - Bob Miku</td>
<td>- Odysseus Data Services</td>
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<td>- Google HCLS Data Harmonization</td>
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<td>- Jon Duke</td>
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<td>- HAPI server on OMOP</td>
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<td>Guoqian Jiang</td>
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<td>Australian eHealth FHIR Terminology Services for OMOP (OntoServer)</td>
<td>OMOP</td>
<td>CSIRO Australian e-Health Research Centre</td>
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<td>ReToC - Raw EHR TO OMOP Common Data Model</td>
<td>OMOP</td>
<td>Aid 4 Mental Health</td>
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</table>
OMOP + FHIR bidirectional harmonization are two distinct processes.
OMOP + FHIR bidirectional harmonization are two distinct processes

OMOP Concept ID: 434376
Domain: Condition
Concept Class: Clinical Finding
Source Vocabulary / ID: SNOMED
Concept: Standard
Validity: Valid
Start Date: 31JAN2002
End Date: 31DEC2099
Synonyms: Acute myocardial infarction of anterior wall (disorder)
            Acute anterior myocardial infarction

Source: https://athena.ohdsi.org/search-terms/terms/434376

FHIR

<code>
<coding>
<system value="http://snomed.info/sct"/>
<code value="54329005"/>
<display value="Acute myocardial infarction of anterior wall"/>
</coding>
<coding>
<system value="http://id.who.int/icd11/mms"/>
<code value="BA41&A7RE3"/>
<display value="Acute myocardial infarction & Anterior wall of heart"/>
</coding>
</code>

**VISIT_OCCURENCE.visit_concept_id**

- The data only uses 5 standard OMOP concepts
  - 9203: Emergency Room Visit
  - 9201: Inpatient Visit
  - 9202: Outpatient Visit
  - 262: Emergency Room and Inpatient Visit
  - 8863: Skilled Nursing Facility

- **FHIR Encounter**
  - .classHistory.class 0..*
  - .type 0..*

- **US Core Encounter**
  - .type 1..*, binding: [https://www.hl7.org/fhir/us/core/ValueSet-us-core-encounter-type.html](https://www.hl7.org/fhir/us/core/ValueSet-us-core-encounter-type.html) (extensible)
    - Descendants of **SNOMED Patient encounter procedure**
    - CPT
      - 99201-99499 E/M
      - 99500-99600 home health (mainly nonphysician, such as newborn care in home)
      - 99605-99607 medication management
      - 98966-98968 non physician telephone services
FHIR is complicated

FHIR v4.0.1 R4

US Core
9203: Emergency Room Visit

- **.class**
  - ActEncounterCode: EMER

- **.type**
  - SNOMED Emergency department patient visit
  - CPT?
9201: Inpatient visit

- .class
  - ActEncounterCode: IMP
- .type
  - SNOMED Evaluation and management of inpatient
  - CPT?
9202: Outpatient Visit

- **.class**
  - ActEncounterCode: **AMB**

- **.type**
  - Which SNOMED Patient encounter procedure?
  - Patient evaluation and management?
    - Too general?
    - Lossy
    - Subsumes inpatient!
  - CPT?
262 Emergency Room and Inpatient Visit

- .class
  - ActEncounterCode: IMP
- .classHistory.class:
  - ActEncounterCode: EMER
- .type
  - SNOMED Evaluation and management of inpatient
  - SNOMED Emergency department patient visit
  - CPT?
# Data Harmonization: Prior Art Assessment

## FHIM OMOP Prior Art Catalog

<table>
<thead>
<tr>
<th>Name</th>
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<th>Resources</th>
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</thead>
<tbody>
<tr>
<td>Common Data Model Harmonization Project</td>
<td>PCORnet, BRIDG, OMOP, i2b2/ACT</td>
<td>- FDA - NIH/NLM - NCATS</td>
<td>- Jane Pollack - Bob Milius</td>
<td>- IQVIA - Principia Health Sciences</td>
<td>- Ben Smith</td>
<td>- CDHM HFMIL - Governance from HL7F</td>
</tr>
</tbody>
</table>
# Data Harmonization: Mapping Tracker

**Example: mCODE STU2 to OMOP**

<table>
<thead>
<tr>
<th>STU2 Data Element Name</th>
<th>Profile Title</th>
<th>Required?</th>
<th>OMOP Table</th>
<th>OMOP Column</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifier</td>
<td>Cancer Patient Profile</td>
<td>Required</td>
<td>PERSON</td>
<td>person_id&lt;br&gt;person_source_value</td>
</tr>
<tr>
<td>Name</td>
<td>Cancer Patient Profile</td>
<td>Required</td>
<td>OBSERVATION</td>
<td>observation_concept_id&lt;br&gt;observation_source_concept_id&lt;br&gt;observation_source_value&lt;br&gt;value_as_string</td>
</tr>
<tr>
<td>Name &gt; Family</td>
<td>Cancer Patient Profile</td>
<td>Required if known (conditional on Name)</td>
<td>OBSERVATION</td>
<td>observation_concept_id&lt;br&gt;observation_source_concept_id&lt;br&gt;observation_source_value&lt;br&gt;value_as_string</td>
</tr>
<tr>
<td>Name &gt; Given</td>
<td>Cancer Patient Profile</td>
<td>Required if known (conditional on Name)</td>
<td>OBSERVATION</td>
<td>observation_concept_id&lt;br&gt;observation_source_concept_id&lt;br&gt;observation_source_value&lt;br&gt;value_as_string</td>
</tr>
<tr>
<td>Telecom &gt; System</td>
<td>Cancer Patient Profile</td>
<td>Required (conditional on Telecom)</td>
<td>OBSERVATION</td>
<td>observation_concept_id&lt;br&gt;observation_source_concept_id&lt;br&gt;observation_source_value&lt;br&gt;value_as_string</td>
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# Data Harmonization: Issue Tracker

## FHIR OMOP Topics

<table>
<thead>
<tr>
<th>Topic</th>
<th>Priority</th>
<th>Type</th>
<th>Activity</th>
<th>Mapping</th>
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</thead>
<tbody>
<tr>
<td>FHIR, OMOP, and Value Set Tables</td>
<td>P2</td>
<td>Discussion</td>
<td></td>
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</tr>
<tr>
<td>Dividing fhir elements</td>
<td>P2</td>
<td>Discussion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What to do for the May Connectathon?</td>
<td>P2</td>
<td>Discussion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metadata tracking approach</td>
<td>P3</td>
<td>Discussion</td>
<td>✔️ Schedule meeting with Qi and Davera to talk about metadata requirements</td>
<td></td>
</tr>
<tr>
<td>Deprecated concepts</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Qi's Comments on Prior Art</td>
<td></td>
<td>Issue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What are requirements for prior art?</td>
<td></td>
<td>Discussion</td>
<td></td>
<td>Catalog Prior Art</td>
</tr>
</tbody>
</table>
Terminologies Subgroup Collaborations

- OHDSI Community CDM Vocabulary Working Group
  - FHIR Canonical URI OMOP Vocabulary use case / rationale
    - Example OMOP-to-FHIR maps: requirements for “lossless” data transformation
    - Management requirements for OMOP Vocabulary content
  - Prioritize development of new OMOP vocabulary content
    - Race & Ethnicity, Vaccine Administration
  - Enhancements to OMOP Vocabulary request process

- OMOP + FHIR Digital Quality Measurements
  - Pilot dQM interoperability demonstration architecture (PSS – 1944)

- OMOP + FHIR Data Model Harmonization & Oncology Use Case groups
  - Emerging terminology patterns, Terminology representation & management requirements

- HL7 Vulcan Accelerator “Canonical Core” FHIR-to-OMOP maps
Oncology SG – Use Cases

- exchange of cancer data for large-scale observational studies
- use of study results as actionable data to drive oncology treatment decisions and monitoring
Our Process

- mCODE profile to CDM mappings
- mCODE Issue Tracker
- FHIR to OMOP mapping design Patterns
- mCODE to OMOP "IG placeholder"
- Prototype
Use Cases Discussed:

- **Synchronous**
  - Trigger data submission and transformation from FHIR to OMOP based on data capture in clinical software
    - See FHIR to OMOP Connectathon 30 use case for details

- **Asynchronous (OMOP to FHIR)**
  - Request all patients meeting cohort criteria: OMOP cohort definition with SQL expression converted to FHIR with CQL expression for data retrieval
    - Identify all patients meeting criteria for a clinical guideline or measure and point-in-time compliance
  - Request new data to determine measure / guideline compliance and defined in OMOP as a bulk data import for a known patient dataset (cohort) from a FHIR data store
    - Identify patients with gaps in care to enable clinical decision support and patient outreach to improve performance

NOTE: For this discussion, the terms cohort and phenotype are used synonymously
Digital Quality Measurement

Status:

- Use cases defined

Next steps:

Possibly initiate in NCQA/HL7 July Digital Quality Summit and follow in HL7 September FHIR Connectathon:

- Automate value set mapping to OMOP (e.g., Value Set Authority Center value sets mapping to OMOP)
- Convert Atlas expressions (OMOP-SQL) to FHIR-CQL
- Compare retrieves from synthetic patients in OMOP data store and identical synthetic patients in FHIR data store to compare concordance
Take home message

• X-community initiative active
• Things harder than on first glance
• Please contribute to:
  – Harmonization
  – Terminology
  – Oncology
  – Quality

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