



Where are we?

HL7 International and OHDSI Announce Collaboration to Provide Single Common Data Model for Sharing Information in Clinical Care and Observational Research

Health Level Seven International (HL7®) and the Observational Health Data Sciences and Informatics (OHDSI) network today announced a collaboration to address the sharing and tracking of data in the healthcare and research industries by creating a single common data model. The organizations will integrate HL7 Fast Healthcare Interoperability Resources (FHIR®) and OHDSI's Observational Medical Outcomes Partnership (OMOP) common data model to achieve this goal.

HL7 International CEO Dr. Charles Jaffe, M.D., Ph.D., underscored the significance of this partnership. "The Covid-19 pandemic has emphasized the need to share global health and research data with OHDSI is critical to solving this challenge when and where they need it."

The organizations will align their standards well as researchers to pull data from multiple global implications with the potential to penetrate single structure.

"We are excited to have the OHDSI community join this partnership with HL7 to evolve community standards around observational research and clinical care. These standards set the foundation for our mission of global, open-science research, and this partnership will accelerate the development of effective and safe treatments for diseases facing today's global population." - George Hripcsak



Health Level Seven® International

For Immediate Release

Contacts:

Andrea Ribick, HL7, andrea@hl7.org, (734) 677-7777
Craig Sachson, OHDSI, sachson@ohdsi.org



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Leading organizations will integrate products to create a single source for the sharing and tracking of data

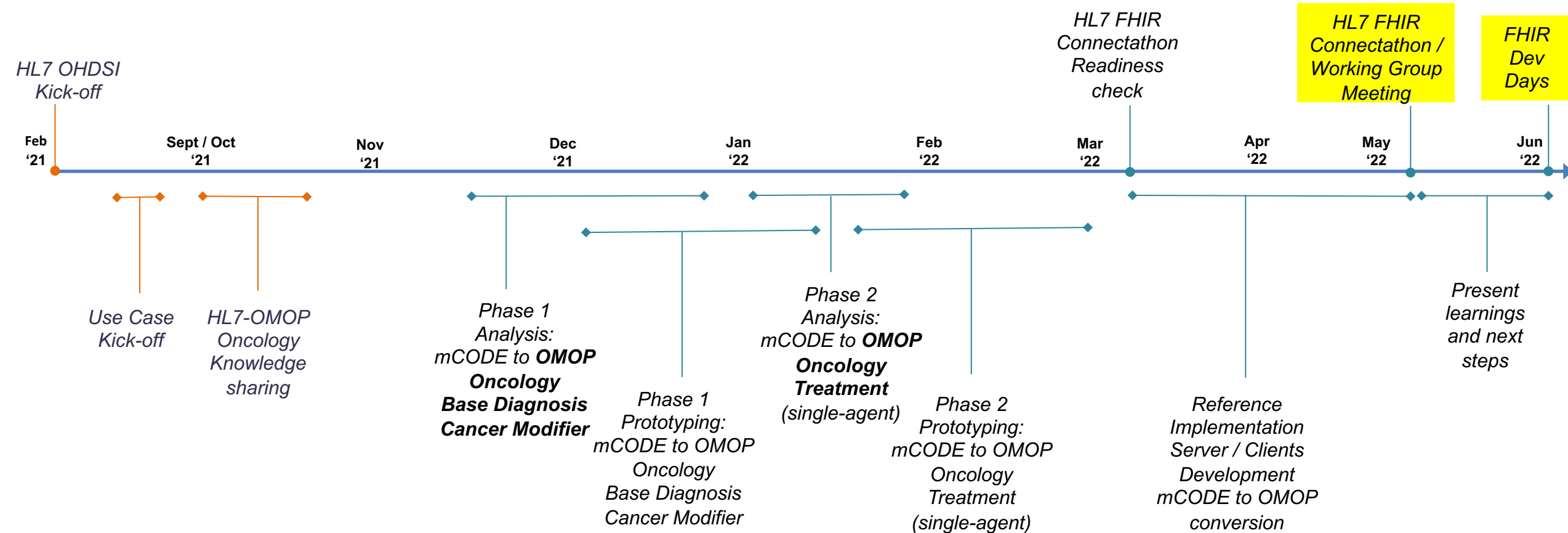
Ann Arbor, Mich. and New York City, N.Y. – March 1, 2021 – [Health Level Seven International \(HL7®\)](#) and the [Observational Health Data Sciences and Informatics \(OHDSI\)](#) today announced a collaboration to address the sharing and tracking of data in the healthcare and research industries by creating a single common data model. The organizations will integrate HL7 Fast Healthcare Interoperability Resources (FHIR®) and OHDSI's Observational Medical Outcomes Partnership (OMOP) common data model to achieve this goal.

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

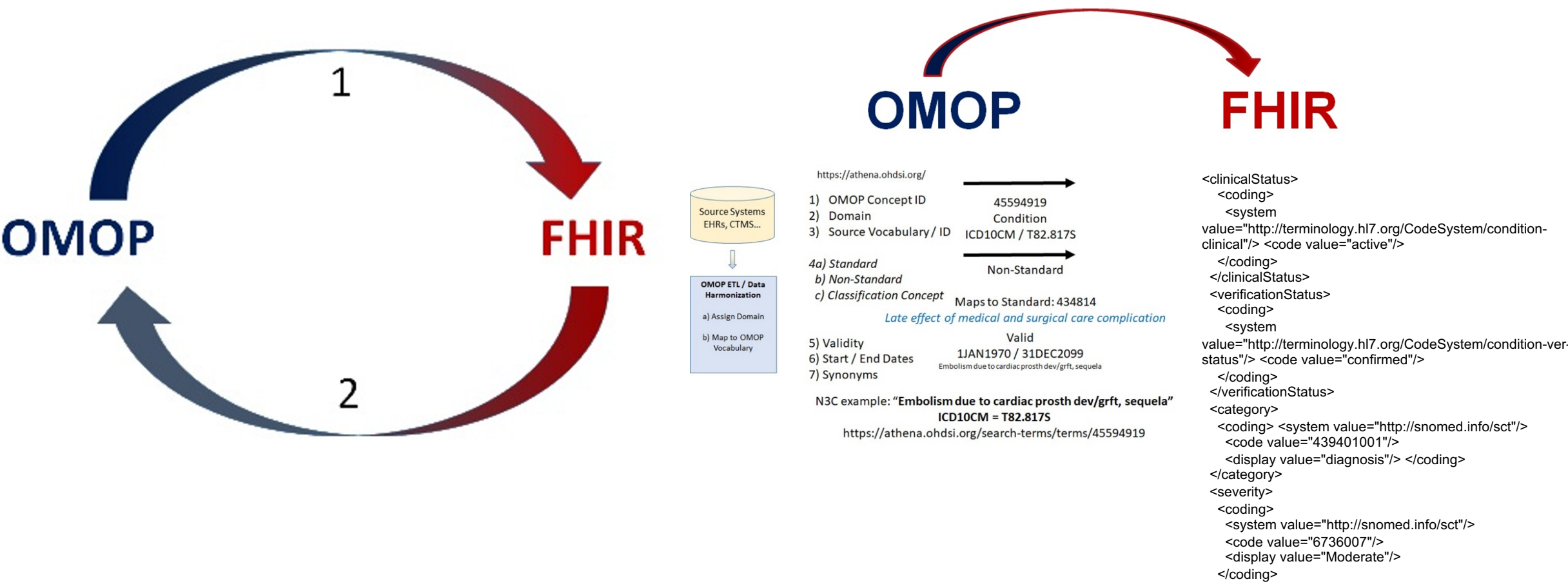


FHIR OMOP Prior Art Catalog

Aa Name	☰ CDMs	☰ Organizations	☰ WG Participants	☰ Support Orgs	☰ SO WG Participants	☰ Resources
 No access	<div>PCORnet</div> <div>BRIDG</div> <div>OMOP</div> <div>FHIR</div> <div>Sentinel</div> <div>i2b2/ACT</div>	- FDA - NIH/NLM - NCATS				- CDMH FHIR IG and mappings - Governance framework
 CIBMTR Data Transformation Initiative	<div>OMOP</div> <div>FHIR</div>	- CIBMTR	- Jane Pollack - Bob Milius	- IQVIA - Principia Health Sciences	- Ben Smith	
 Google Cloud Healthcare	<div>OMOP</div> <div>FHIR</div>	- Google		- Odysseus Data Services		- Google HCLS Data Harmonization
 Georgia Tech OMOP on FHIR <div>↗ OPEN</div>	<div>OMOP</div> <div>FHIR</div>		- Jon Duke			- HAPI server on OMOP
 No access	<div>PCORnet</div> <div>i2b2/ACT</div> <div>OMOP</div> <div>TriNetX</div>					https://github.com/National-COVID-Cohort-Collaborative/Data-Ingestion-and-Harmonization
 CampFHIR	<div>OMOP</div> <div>FHIR</div>	NC TraCS Institute				OMOP2FHIR Working Document - Google Sheets
 DAF Mappings	<div>OMOP</div> <div>FHIR</div>	HL7	Daniella Meeker			OMOP2FHIR Working Document - Google Sheets
 FHIR Ontop OHDSI	<div>OMOP</div> <div>FHIR</div>		Guoqian Jiang			GitHub - BD2KOnFHIR/FHIROntopOHDSI: An FHIR Ontology Based Data Access Framework with the OHDSI Data Repositories
 EHDEN Harmonisation Fund		EHDEN				Harmonisation Fund – ehden.eu
 MIRACUM	<div>OMOP</div> <div>FHIR</div>					Design for a Modular Clinical Trial Recruitment Support System Based on FHIR and OMOP - PubMed (nih.gov)
 Simplifier	<div>OMOP</div> <div>FHIR</div>					The FHIR collaboration platform - SIMPLIFIER.NET
 Australian eHealth FHIR Terminology Services for OMOP (OntoServer)	<div>OMOP</div> <div>FHIR</div>	CSIRO Australian e-Health Research Centre				FHIR Terminology Services for OMOP – Australian e-Health Research Centre (csiro.au)
 ReToC - Raw EHR TO OMOP Common Data Model	<div>OMOP</div> <div>FHIR</div>	Aid 4 Mental Health				ReToC - Raw EHR TO OMOP Common Data Model AID 4 Mental health

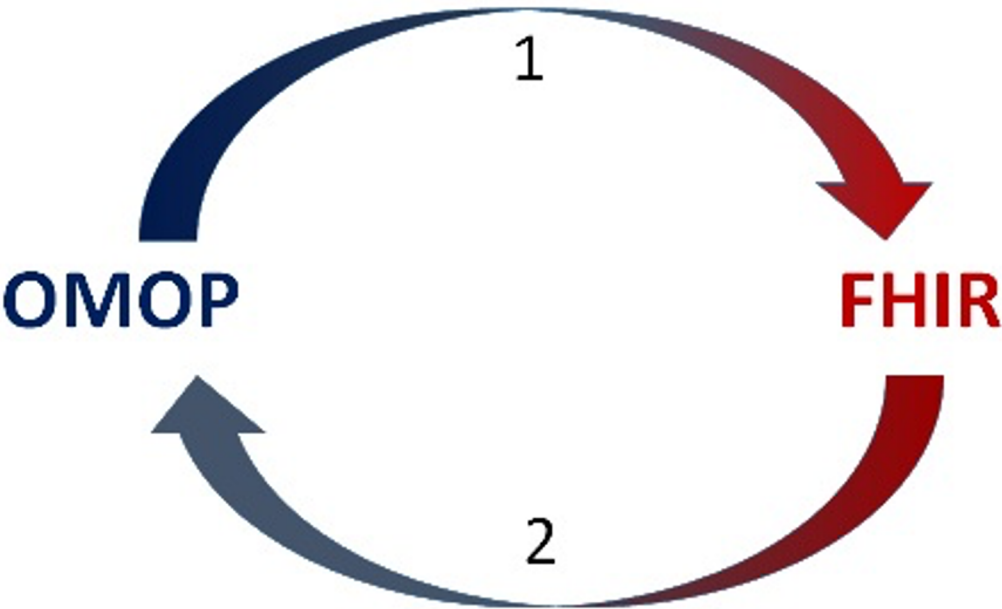


OMOP + FHIR bidirectional harmonization are two distinct processes





OMOP + FHIR bidirectional harmonization are two distinct processes



OMOP

FHIR

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>

```
<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&XA7RE3"/>  
  <display value="Acute myocardial  
infarction & Anterior wall of heart"/>  
</coding>  
</code>
```

Source: <http://hl7.org/fhir/uv/ips/STU1/Condition-eumfh-39-07-1.xml.html>

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
 - .class 1..1, binding: <http://hl7.org/fhir/R4/v3/ActEncounterCode/vs.html> (extensible)
 - .classHistory.class 0..*
 - .type 0..*
- US Core Encounter
 - .type 1..*, binding: <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

```
Domain provides codes that qualify the ActEncounterClass (ENC)

{
  "resourceType": "ValueSet",
  "id": "v3-ActEncounterCode",
  "meta": {
    "lastUpdated": "2019-11-01T09:29:23.356+11:00",
    "profile": ["http://hl7.org/fhir/StructureDefinition/shareablevalueset"]
  },
  "text": {
    "status": "generated",
    "div": "<div>... Snipped for Brevity --></div>"
  },
  "extension": [
    {
      "url": "http://hl7.org/fhir/StructureDefinition/structureddefinition-standards-status",
      "valueCode": "trial-use"
    }
  ],
  {
    "url": "http://hl7.org/fhir/StructureDefinition/structureddefinition-fmm",
    "valueInteger": 2
  },
  {
    "url": "http://hl7.org/fhir/StructureDefinition/structureddefinition-wg",
    "valueCode": "pa"
  },
  },
  "url": "http://terminology.hl7.org/ValueSet/v3-ActEncounterCode",
  "identifier": [
    {
      "system": "urn:ietf:rfc:3986",
      "value": "urn:oid:2.16.840.1.113883.1.11.13955"
    }
  ],
  "version": "2014-03-26",
  "name": "v3-ActEncounterCode",
  "title": "V3 Value SetActEncounterCode",
  "status": "active",
  "experimental": false,
  "publisher": "HL7 v3",
  "contact": [
    {
      "telecom": [
        {
          "system": "url",
          "value": "http://www.hl7.org"
        }
      ]
    }
  ],
  "description": "Domain provides codes that qualify the ActEncounterClass (ENC)",
  "immutable": false,
  "compose": {
    "include": [
      {
        "system": "http://terminology.hl7.org/CodeSystem/v3-ActCode",
        "filter": [
          {
            "property": "concept",
            "op": "is-a",
            "value": "_ActEncounterCode"
          }
        ]
      }
    ],
    "exclude": [
      {
        "system": "http://terminology.hl7.org/CodeSystem/v3-ActCode",
        "concept": [
          {
            "code": "_ActEncounterCode"
          }
        ]
      }
    ]
  }
}
```

US Core

```
{
  "resourceType": "ValueSet",
  "id": "us-core-encounter-type",
  "text": {
    "status": "generated",
    "div": "<div xmlns='http://www.w3.org/1999/xhtml'><p>This value set includes codes b
  },
  "url": "http://hl7.org/fhir/us/core/ValueSet/us-core-encounter-type",
  "version": "4.0.0",
  "name": "USCoreEncounterType",
  "title": "US Core Encounter Type",
  "status": "active",
  "date": "2019-05-21",
  "publisher": "HL7 International - US Realm Steering Committee",
  "contact": [
    {
      "name": "HL7 International - US Realm Steering Committee",
      "telecom": [
        {
          "system": "url",
          "value": "http://www.hl7.org/Special/committees/usrealm/index.cfm"
        }
      ]
    }
  ],
  "description": "The type of encounter: a specific code indicating type of service provide
  "jurisdiction": [
    {
      "coding": [
        {
          "system": "urn:iso:std:iso:3166",
          "code": "US"
        }
      ]
    }
  ],
  "copyright": "This value set includes content from:\n 1. SNOMED CT, which is copyright 0
  "compose": {
    "include": [
      {
        "system": "http://snomed.info/sct",
        "filter": [
          {
            "property": "concept",
            "op": "is-a",
            "value": "308335008"
          }
        ]
      }
    ],
    {
      "system": "http://www.ama-assn.org/go/cpt"
    }
  ]
}
```

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

FHIR OMOP Prior Art Catalog ...						
Aa Name	CDMs	Organizations	WG Participants	Support Orgs	SO WG Participan...	Resources
 Common Data Model Harmonization Project  OPEN	PCORnet BRIDG OMOP FHIR Sentinel i2b2/ACT	- FDA - NIH/NLM - NCATS				- CDMH FHIR I - Governance f
 CIBMTR Data Transformation Initiative	OMOP FHIR	- CIBMTR	- Jane Pollack - Bob Milius	- IQVIA - Principia Health Sciences	- Ben Smith	
 Google Cloud Healthcare	OMOP FHIR	- Google		- Odysseus Data Services		- Google HCLS
 Georgia Tech OMOP on FHIR	OMOP FHIR		- Jon Duke			- HAPI server c
 The National COVID Cohort Collaborative (N3C)	PCORnet i2b2/ACT OMOP TriNetX					https://github.com/N3C-Collaborative/D
 CampFHIR	OMOP FHIR	NC TraCS Institute				OMOP2FHIR W
 DAE Mappings	OMOP FHIR	HL 7	Daniella Meeker			OMOP2FHIR W

Data Harmonization: Mapping Tracker

Example: mCODE STU2 to OMOP

STU2 Data Element Name	Profile Title	Required?	OMOP Table	OMOP Column
Identifier	Cancer Patient Profile	Required	PERSON	person_id person_source_value
Name	Cancer Patient Profile	Required	OBSERVATION	observation_concept_id observation_source_concept_id observation_source_value value_as_string
Name > Family	Cancer Patient Profile	Required if known (conditional on Name)	OBSERVATION	observation_concept_id observation_source_concept_id observation_source_value value_as_string
Name > Given	Cancer Patient Profile	Required if known (conditional on Name)	OBSERVATION	observation_concept_id observation_source_concept_id observation_source_value value_as_string
Telecom > System	Cancer Patient Profile	Required (conditional on Telecom)	OBSERVATION	observation_concept_id observation_source_concept_id

Data Harmonization: Action Tracker

▼ 2. Actions

 Board View  Table + Add view

 No Status 1 ... +

 Prioritize FHIR Resources to map

+ New

Assigned 3

✓ Sprint 1

April 7, 2022

 Ben Smith

P2

 observation_concept_id (measure...

 measurement_type_concept_id, o...

 stop_reason and/or drug_exposur...

 condition_start_date, condition_e...

 range_low, range_high

✓ Update Video Walkthroughs

In Progress 2

✓ Create routine process for meeting promotion

 Jessica Manzyuk

P2

 Create 2022 DMH WG roadmap

February 22, 2022

 Ben Smith  Jessica Manzyuk

+ New

Complete 4

✓ Update Confluence correct Zoom link

March 2, 2022

 Jessica Manzyuk

P1

✓ Catalog Prior A



















February 9, 2022

 Jessica Manzyuk

 Catalog Prior A

Data Harmonization: Issue Tracker

FHIR OMOP Topics ...

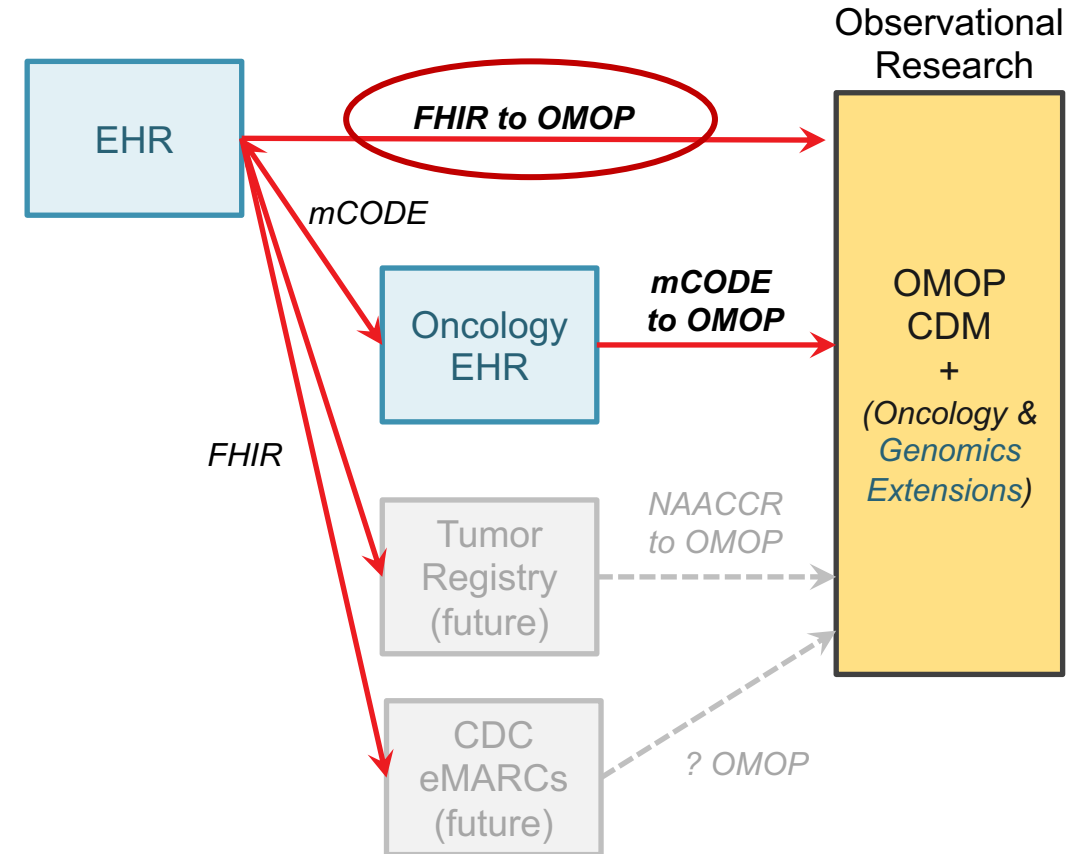
 Topic	 Priority	 Type	 Activity	 Mapping
 FHIR, OMOP, and Value Set Tables  2	P1			
 Dividing fhir elements	P2			
 What to do for the May Connectathon?	P2	Discussion		
 Metadata tracking approach  OPEN	P3	Discussion	 Schedule meeting with Qi and Davera to talk about metadata requirements	 race_concept_id3  prefix_name, suff
 Deprecated concepts				
 Qi's Comments on Prior Art		Issue		
 What are requirements for prior art?		Discussion	 Catalog Prior Art	

Terminologies Subgroup Collaborations

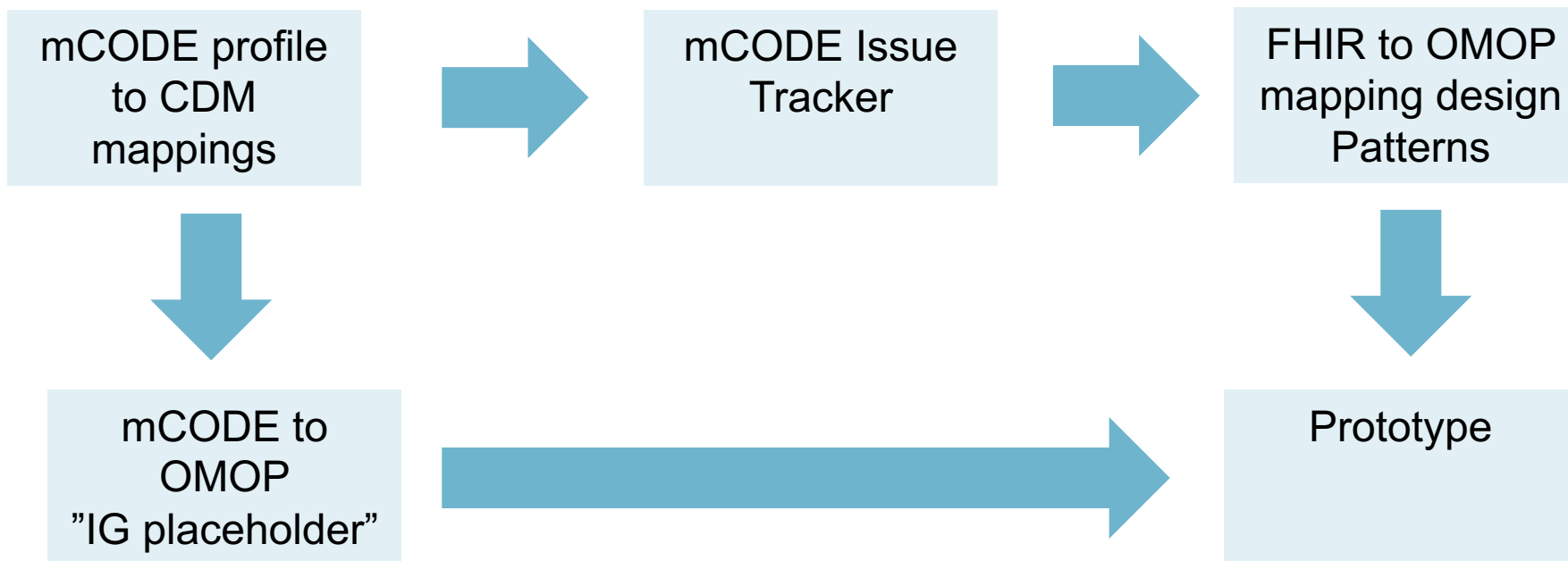
- OHDSI Community CDM Vocabulary Working Group
 - FHIR Canonical URI OMOP Vocabulary use case / rationale
 - Example OMOP-to-FHIR maps: requirements for “lossless” data transformation
 - Management requirements for OMOP Vocabulary content
 - Prioritize development of new OMOP vocabulary content
 - Race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



Digital Quality Measurement

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

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