Advancing Cancer Data Liquidity

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ONC Health Information Technology Advisory Committee
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Data liquidity from source to consumption

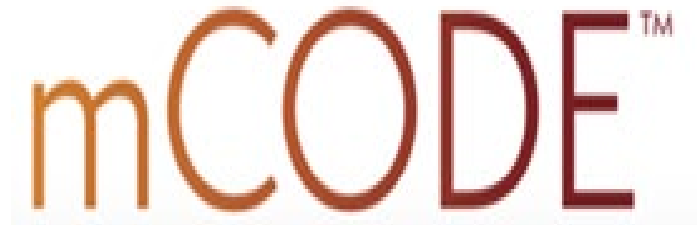**Real World Evidence Outcomes & Value-Based**
Payers
Life Sciences
Pharma
FDA
PCORI
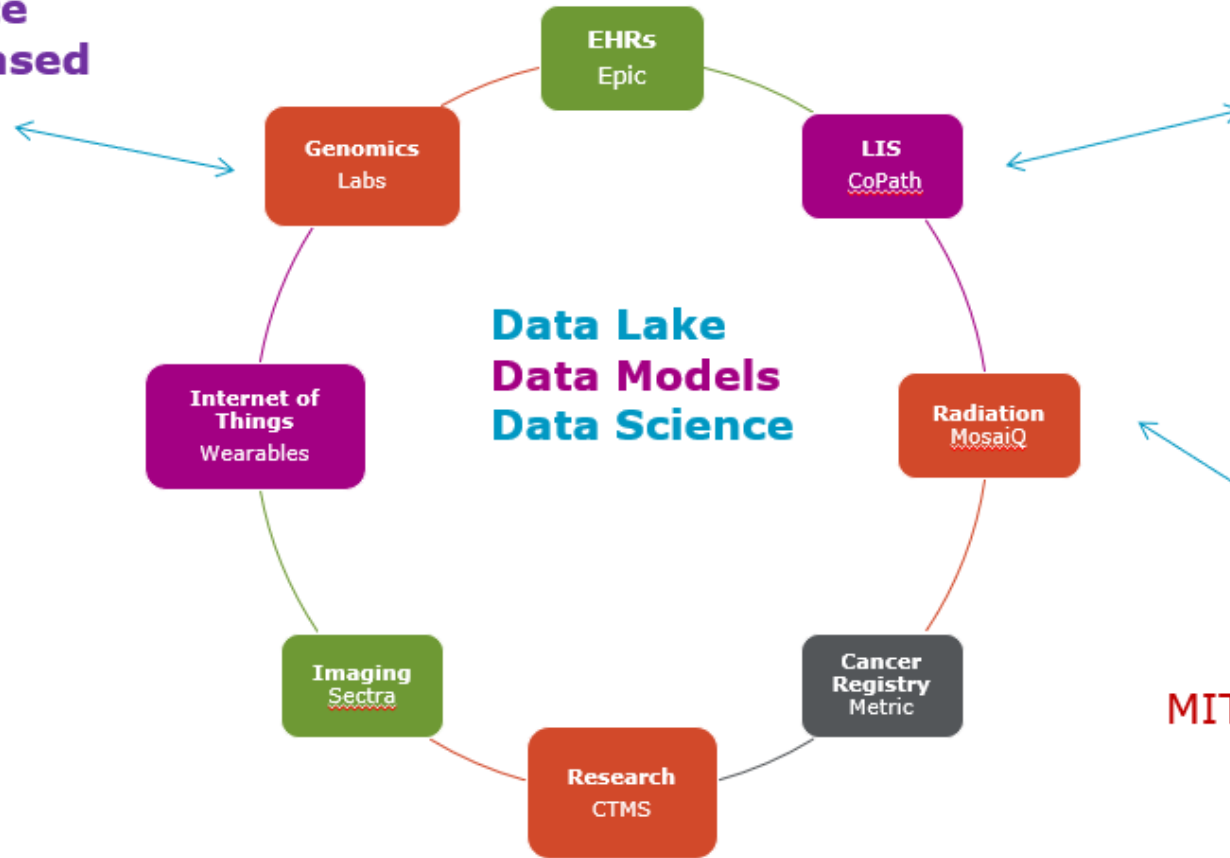
Cancer Registries
CT DPH-CDC
NCI SEER
ACS NCDB
ASCO QOPI

Academic Partners
Memorial Sloan Kettering
MIT Sloan School of Management

EHRs
Epic

LIS
CoPath

Radiation
MosaiQ

Cancer Registry
Metric

Research
CTMS

Imaging
Sectra

Internet of Things
Wearables

Genomics
Labs

Data Lake
Data Models
Data Science

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Two observational data models

OMOP Common Data Model

Transformation to OMOP common data model

Source 1

Source 2

Source 3

Analysis method

FHIR <-> OHDSI OMOP
Command line mapper

Analysis results

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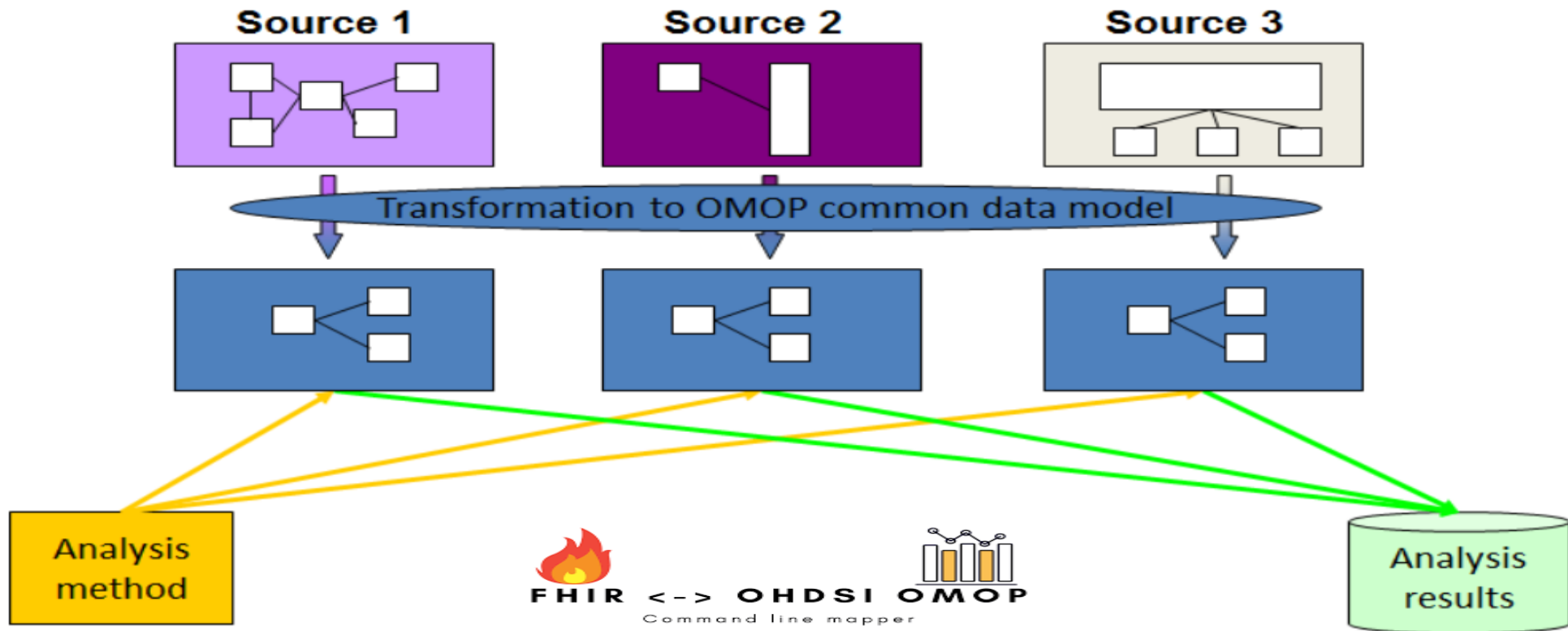
Oncology extension OMOP data model

OHDSI

OMOP CDM and Standardised Voc...
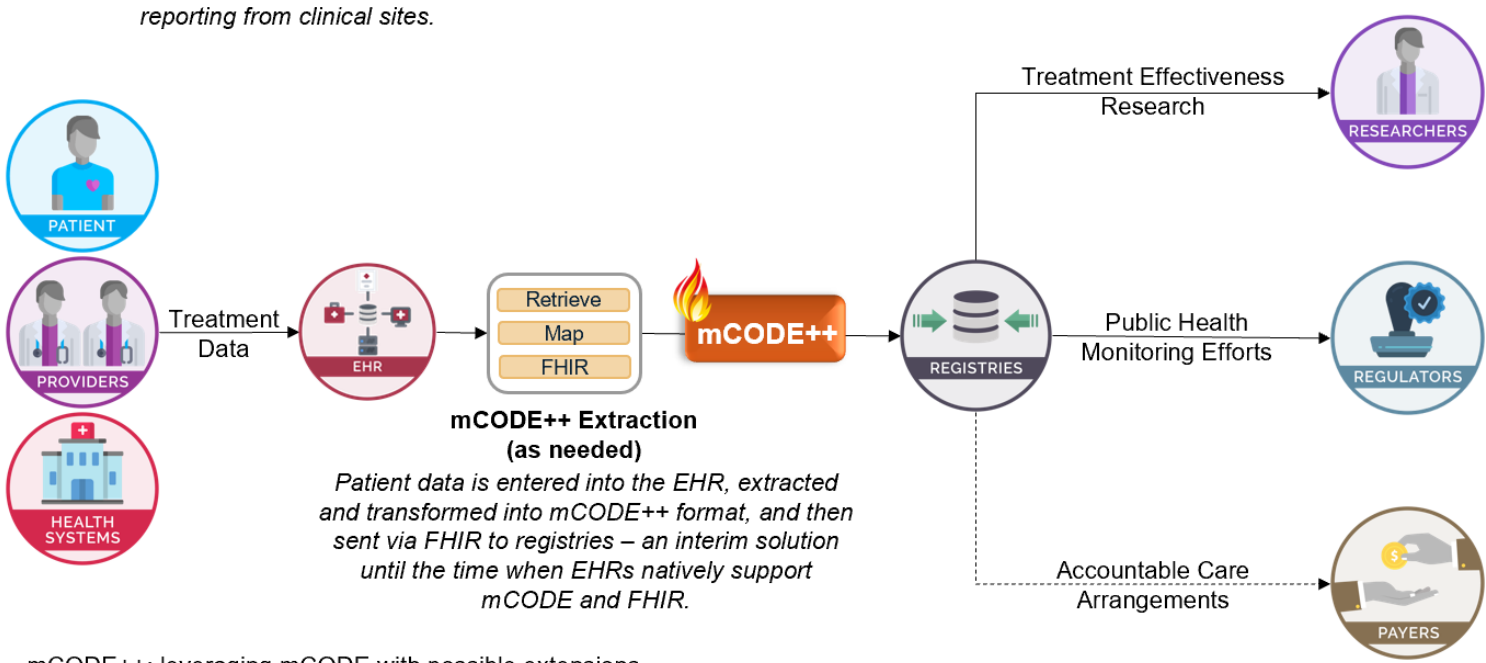
- **Cancer Diagnosis**
  - **SNOMED CT "Standard"**
  - **CAP eCC**
  - **ICD-0-3**
  - **NAACCR**
  - **AJCC V8**

- **Concepts**
  - **Histology**
  - **Anatomic Site**
  - **Grade**
  - **Stage**

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Minimal Common Oncology Data Elements

reporting from clinical sites.

mCODE++ Extraction (as needed)

Patient data is entered into the EHR, extracted and transformed into mCODE++ format, and then sent via FHIR to registries – an interim solution until the time when EHRs natively support mCODE and FHIR.

Treatment Data

Retrieve
Map
FHIR

mCODE++

PATIENT
PROVIDERS
HEALTH SYSTEMS
REGISTRIES

Treatment Effectiveness Research → RESEARCHERS

Public Health Monitoring Efforts → REGULATORS

Accountable Care Arrangements → PAYERS

mCODE++: leveraging mCODE with possible extensions

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mCODE STU 2

Click embedded links to see FHIR artifact definitions

This illustration is not a formal part of the mCODE specification. For brevity and clarity, names and structural relationships shown here may deviate from the specification.

Legend:
- Disease
- Treatment
- Outcome
- Patient
- Genomics
- Assessment
- Profile — Base Resource
- Built-in FHIR Element
- Extension
- reference to another profile (dotted line)
- property of a profile (solid line)
- slice (repeated element that is specialized) (double line)

Disease profiles:
- Primary Tumor (T) Category — Observation
- Distant Metastases (M) Category — Observation
- Regional Nodes (N) Category — Observation
- Stage Group — Observation
  - Staging System
  - Clinical/Pathological
- Primary Cancer Condition — Condition (US Core)
  - Asserted Date
  - Histology/Morphology
  - Body site
  - Laterality
  - Location Qualifier
  - Related Condition
- Secondary Cancer Condition — Condition (US Core)
- Tumor Marker Test — Observation (US Core Lab Result)
  - Test Type
  - Result Value
  - Specimen — Specimen

Genomics profiles:
- Genomic Specimen — Specimen
  - Collection Site
  - Specimen Type
- Genomics Report — DiagnosticReport (US Core)
  - Test Type
  - Result
- Genomic Variant — Observation (US Core Lab Result)
  - Present/Absent
  - Component
    - Variation
    - DNA Change
    - DNA Change Type
    - Amino Acid Change
    - Amino Acid Change Type
    - Molecular Consequence
    - Clinical Significance
    - Gene Studied
    - Genomic Source Class
    - Copy Number
    - Allelic Frequency
    - Allelic State
    - Cytogenic Location
    - Cytogen. Nomenclature
- Genomic Region Studied — Observation (US Core Lab Result)
  - Component
    - Gene Mutations
    - Gene Studied
    - Coordinate System
    - DNA Ranges Examined
    - DNA Region Description
    - Reference Sequence ID

Outcome profiles:
- Tumor Size — Observation
  - Method
  - Component
    - Longest Dimension
    - Other Dimension
- Tumor Specimen — Specimen
- Tumor — BodyStructure
  - Body Structure Identifier — Identifier
  - Location
- Disease Status — Observation
  - Evidence Type
- Death Date

Patient profile:
- Cancer Patient — Patient (US Core)
  - Name
  - Contact Info
  - Birth Date
  - Gender
  - Zip Code
  - US Core Race
  - US Core Ethnicity

Treatment profiles:
- Cancer-Related Medication Request — MedicationRequest (US Core)
  - Medication
  - Reason
  - Procedure Intent
  - Termination Reason
- Cancer-Related Medication Administration — MedicationAdministration
  - Medication
  - Reason
  - Procedure Intent
  - Termination Reason
- Cancer-Related Surgical Procedure — Procedure (US Core)
  - Procedure Code
  - Body Site
  - Laterality
  - Location Qualifier
- Radiotherapy Course Summary — Procedure (US Core)
  - No. Sessions
  - Modality/Technique
    - Modality
    - Technique
  - Doses Delivered
    - Total Dose
    - No. Fractions
    - Body Volume
- Radiotherapy Volume — BodyStructure
  - Volume Type
  - Location
  - Location Qualifier

Assessment profiles:
- Karnofsky Performance Status — Observation
  - Score
  - Interpretation
- Comorbidities (Elixhauser) — Observation
  - Risk Score
  - Component
    - Comorbidity Type (38 types)
      - Present/Absent
      - Condition Code
      - Condition Reference
- ECOG Performance Status — Observation
  - Score
  - Interpretation

External Profiles:
- Blood Pressure
- Height
- Weight
- CMP
- CBC

mCODE IG version 2.0.0
11/12/2021

CodeX Use-Cases

Discovery -> Planning -> Execution

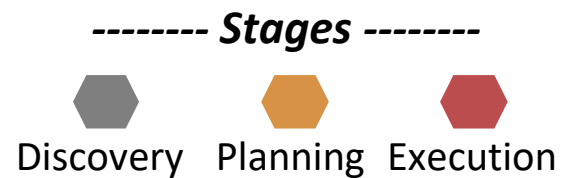https://confluence.hl7.org/display/COD/CodeX+Use+Cases

Oncology

⬡ mCODE++ Extraction

⬡ EHR Endpoints for Cancer Clinical Trials
(including, future extensions of the ICAREdata study)

⬡ Integrated Trial Matching for Cancer Patients and Providers

⬡ Cancer Registry Reporting

⬡ Radiation Therapy Treatment Data for Cancer

⬡ Prior Authorization in Oncology

⬡ Risk Evaluation and Mitigation Strategies (REMS)

Cardiovascular

⬡ CardX - Hypertension Management

Genomics

⬡ GenomeX - Genomics Data Exchange

⬡ GenomeX - Genomics Operations

-------- *Stages* --------

⬡ Discovery   ⬡ Planning   ⬡ Execution

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Common Oncology Data Elements eXtensions

98 CAP digital synoptic cancer reports with structured data elements and values. U.S. adoption rate 50%

College of American Pathologists

cap

The CAP electronic Cancer Checklists (eCC)

Introduction for CHCF

December 2, 2013

www.cap.org

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21st Century Cures Act: SDC on FHIR

SDC on FHIR for pathology

SDC specification provides a standard format to move synoptic pathology data captured in CAP eCC forms by utilizing **FHIR resources**

FHIR RESOURCES*

SDC data will be transmitted using **USCDI FHIR Resources**. The eCC Q&A data will be sent as **FHIR Observations** bundled with **Patient** demographics in a **DiagnosticReport attachment.**

TRANSMISSION FORMAT

The message will be transmitted as a **XML**. A **data dictionary of the CAP eCC templates** used to render the SDC XML is also available to aid data processing

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SDC on FHIR Data Format at Hartford HealthCare

Implementation Considerations

Key Benefit

SDC on FHIR is an **emerging national standard** as part of ONC's CURES act whose implementation would **support future interoperability efforts** with other FHIR based systems

Key Limitation

FHIR messages adds technical complexity to store, queue and process data.

Dependency and Complexity

Vendor dependency. mTuitive vendor extracts eCC data but SDC is not yet part of their product and **will require partnership with HHC** to develop and launch.

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Key Takeaways

- Cancer registry reporting is a component of system data architecture

- Health systems data is reliant on ITS vendor product integration

- Data liquidity requires data representation & transmission standards

- Common data models support data liquidity & data science

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