Better together, moving ahead

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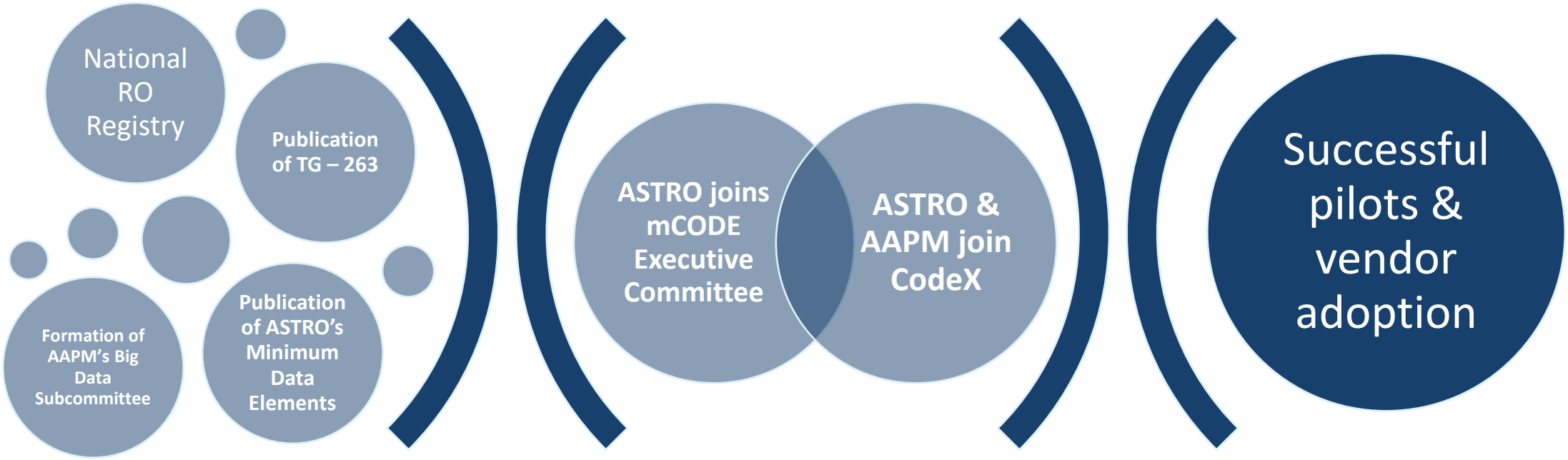


Siloed projects **Alignment** **Outcome**

Minimum Data Elements for Radiation Oncology: An American Society for Radiation Oncology Consensus Paper

James A. Hayman, MD, Andre Dekker, PhD, Mary Feng, MD, Sameer R. Keole, MD, Todd R. McNutt, PhD, Mitchell Machtay, MD, Neil E. Martin, MD, MPH, Charles S. Mayo, PhD, Todd Pawlicki, PhD, Benjamin D. Smith, MD, Randi Kudner, MA, Samantha Dawes, CMD, James B. Yu, MD, MHS

In 2018 ASTRO convened a group to identify a minimum set of data elements that should be required for all radiation oncology use cases.

10 data concepts were recommended including a list of techniques and modalities.

Data Element	Definition	Detail
Treatment Course Data Elements		
Diagnosis	Identify disease(s) relevant to treatment	ICD-10
Modality	Radiation type - Records the list of all modalities used during treatment course (Check all that apply)	Reference Table 2 for detail
Technique	Treatment delivery method - Records the list of all techniques used during treatment course (Check all that apply)	Reference Table 2 for detail
Number of fractions planned	Records the total number of treatments prescribed in a treatment	
Number of fractions delivered	Records the total number of treatments delivered in a treatment course	
Start date of treatment	Indicates the date on which the patient commences course of delivered radiation treatment	MMDDYYYY
End date of treatment	Indicates the date on which the patient ends/completes a course of delivered radiation treatment	MMDDYYYY
Prescribed Dose Level Data Elements (Note: Multiple dose levels are possible for a given treatment. The following elements are completed for each dose level)		
Anatomic site of each prescribed dose level	Indicates the primary anatomic site(s) targets for each dose level	Reference the Standards for Oncology Registry Entry (Supplemental material)
Total dose planned for each prescribed dose level	Dose prescribed to each dose level	cGy
Total dose delivered for each prescribed dose level	Dose delivered to each dose level	cGy

ASTRO joins mCODE Executive Committee

mCODE™ Initiative Collaborators

Many Stakeholders Collaborate to Develop mCODE

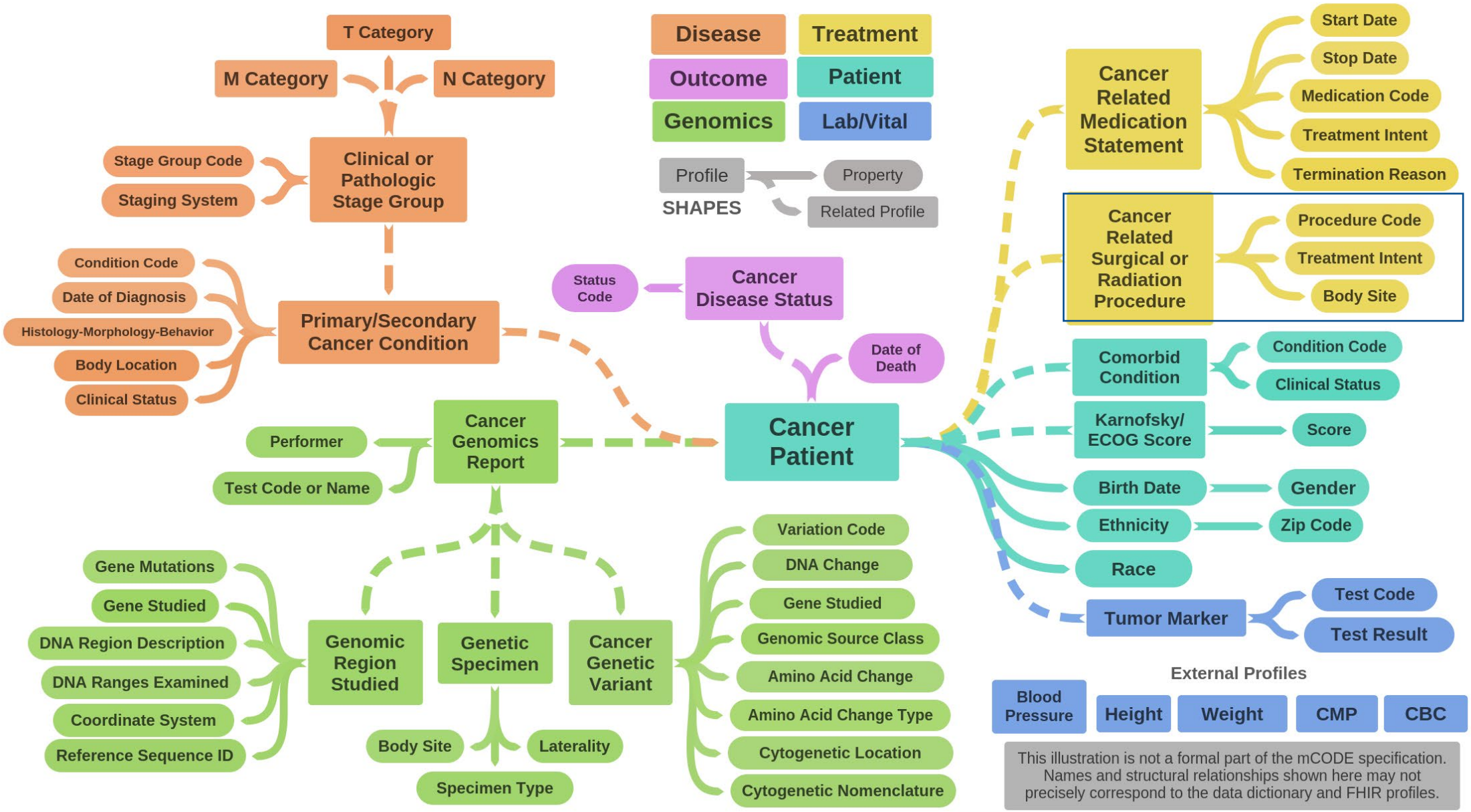
mCODE is governed by the mCODE Executive Committee, a small, agile group of four to seven public and private entities who have voluntarily come together to further mCODE adoption.

The mCODE Executive Committee members include:

- The Alliance for Clinical Trials in Oncology Foundation
- The American Society of Clinical Oncology (ASCO) and its nonprofit subsidiary, CancerLinQ LLC
- The MITRE Corporation
- The American Society for Radiation Oncology (ASTRO)
- The Society of Surgical Oncology

2019

mCODE v1.0



This illustration is not a formal part of the mCODE specification. Names and structural relationships shown here may not precisely correspond to the data dictionary and FHIR profiles.

CodeX Oncology Use-Cases

- 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)
- Quality Measures for Cancer
- Structuring inclusion and exclusion trial matching criteria
- Regulatory grade RWE
- Oncology nurse case manager

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

Discovery | Planning | Execution | Pre-Discovery

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

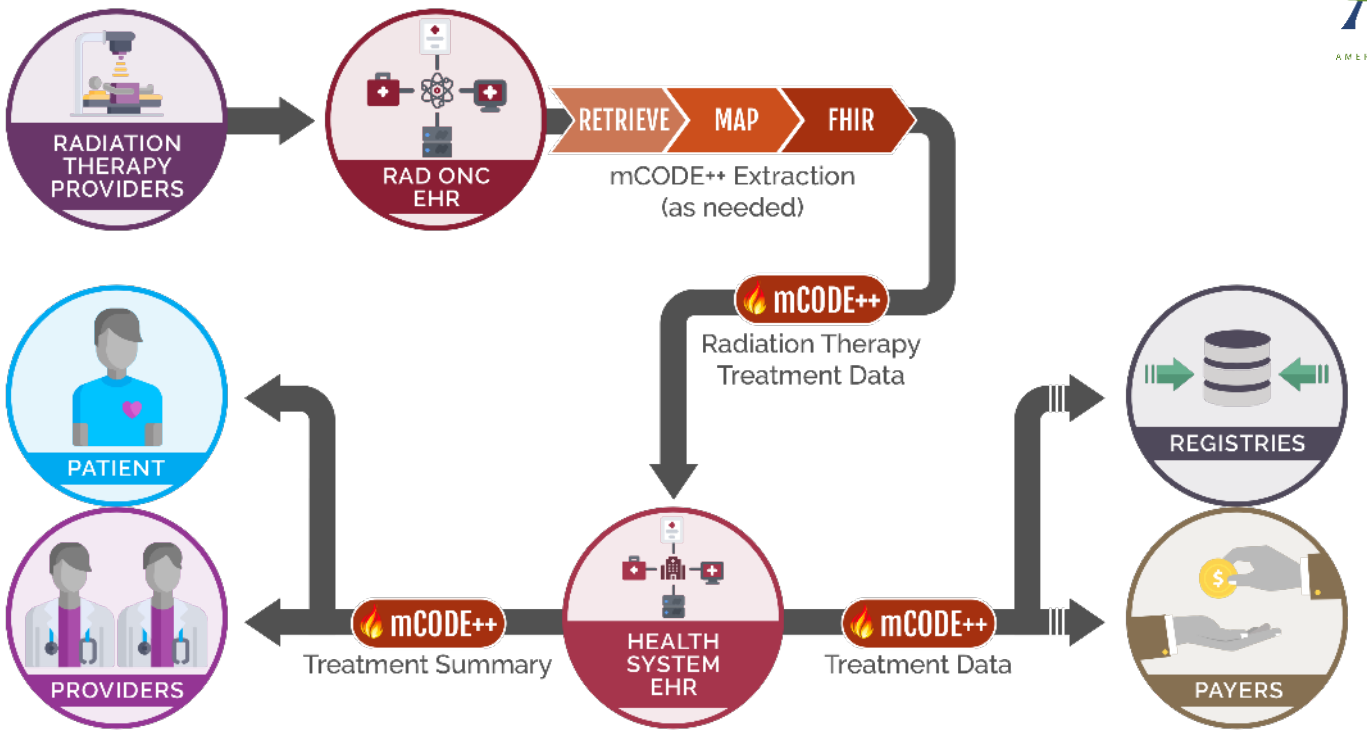
Radiation Therapy Treatment Data for Cancer

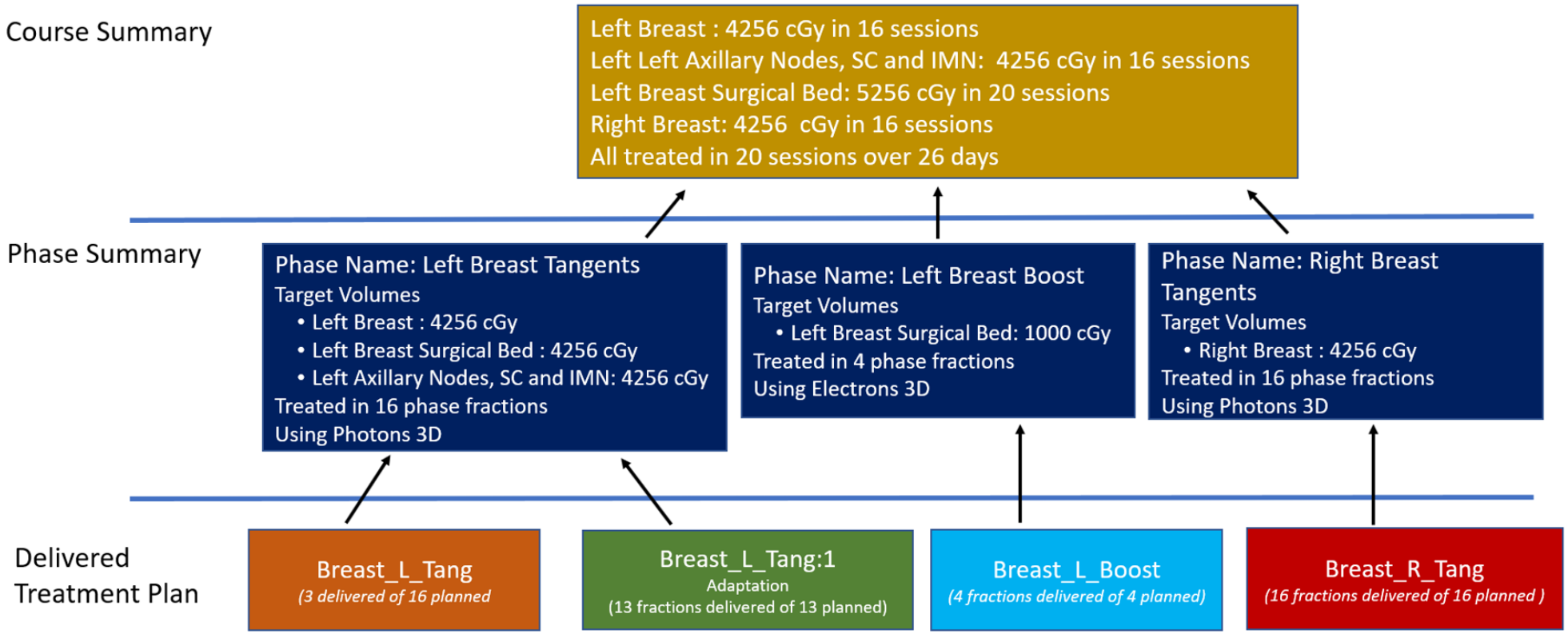
Problem

- Treatment details – critical for care coordination – are not readily available in systems other than radiation oncology EHR modules: data is generally manually entered into summary documents, creating clinical burden and potential patient safety issues

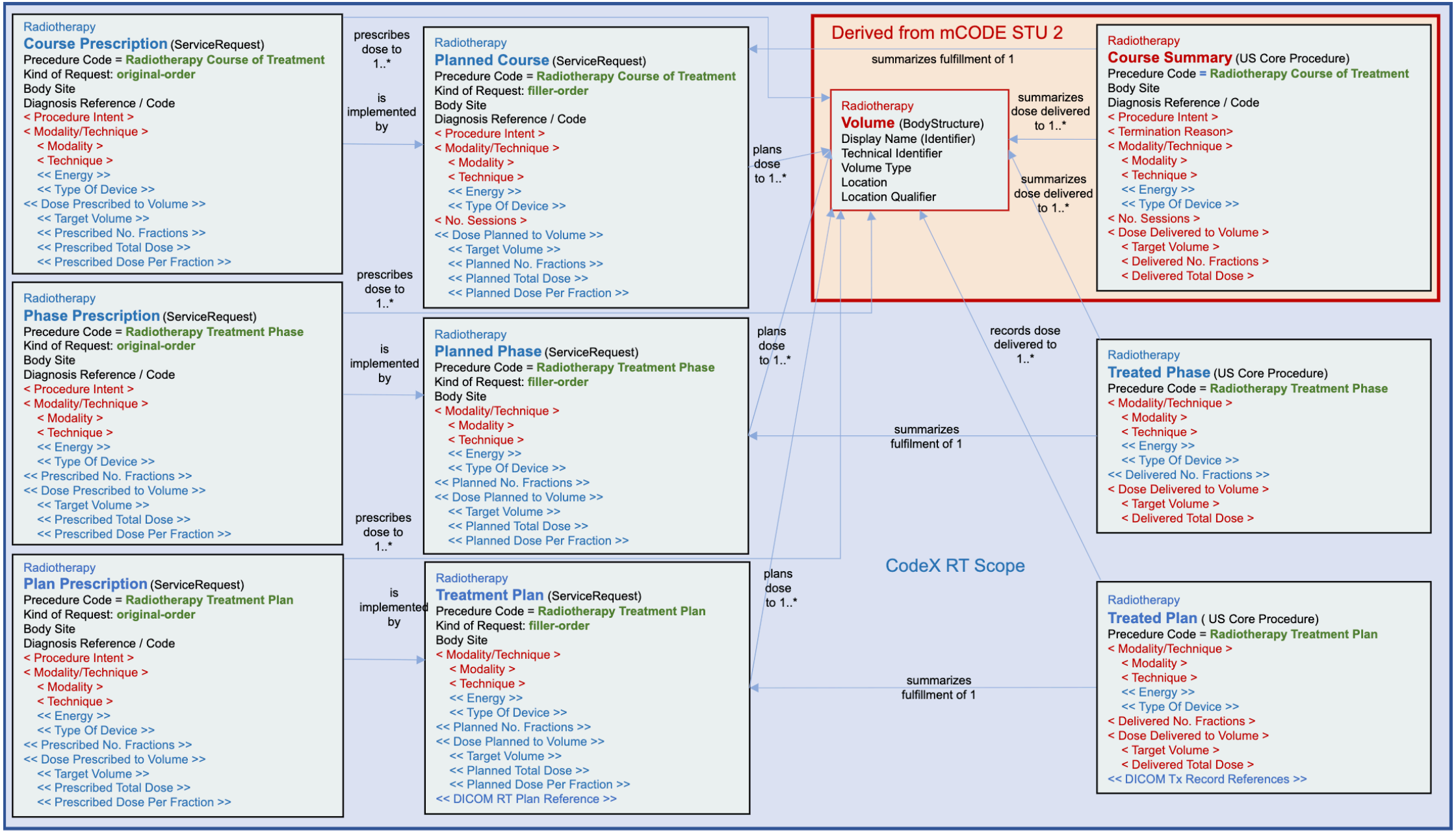
Solution

- To develop, test and deploy open data standards that enable interoperable, multi-purpose exchange of radiation treatment summary data for care coordination and data reuse.

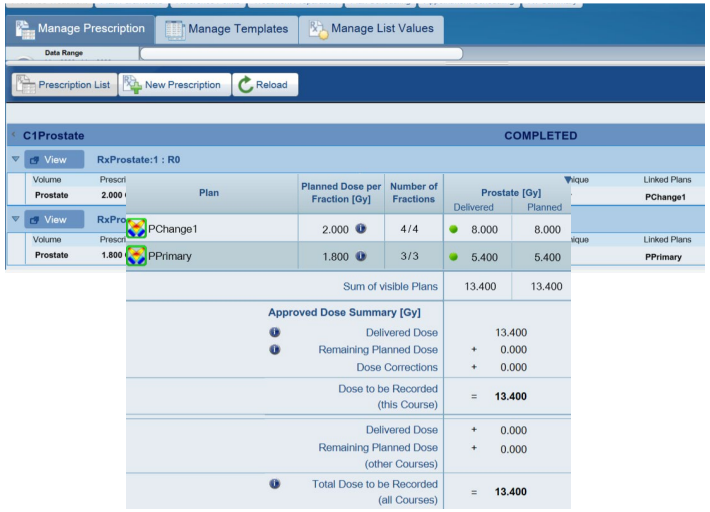


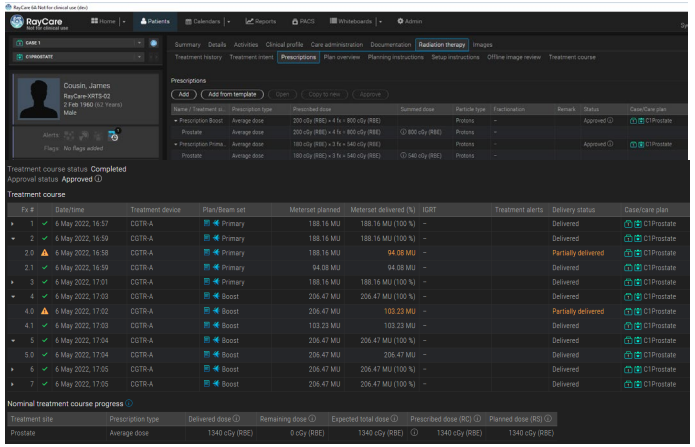


Concept	Name																					Numbering
Course	Bilateral Breast w Boost	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Sessions
Phase	Left Breast Tangents	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					Phase Fractions
Treatment Plans	Breast_L_Tang (3 delivered of 16 planned)	1	2	3																		Plan Fractions
	Breast_L_Tang:1 (Adaptation)				1	2	3	4	5	6	7	8	9	10	11	12	13					Plan Fractions
Phase	Left Breast Boost																	1	2	3	4	Phase Fractions
Treatment Plan	Breast_L_Boost																	1	2	3	4	Plan Fractions
Phase	Right Breast Tangents					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Phase Fractions
Treatment Plan	Breast_R_Tang					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Plan Fractions


Radiotherapy
Course Prescription (ServiceRequest)
Precedure Code = Radiotherapy Course of Treatment
Kind of Request: original-order
Body Site
Diagnosis Reference / Code
< Procedure Intent >
< Modality/Technique >
< Modality >
< Technique >
<< Energy >>
<< Type Of Device >>
<< Dose Prescribed to Volume >>
<< Target Volume >>
<< Prescribed No. Fractions >>
<< Prescribed Total Dose >>
<< Prescribed Dose Per Fraction >>
prescribes dose to 1..*
is implemented by
Radiotherapy
Planned Course (ServiceRequest)
Precedure Code = Radiotherapy Course of Treatment
Kind of Request: filler-order
Body Site
Diagnosis Reference / Code
< Procedure Intent >
< Modality/Technique >
< Modality >
< Technique >
<< Energy >>
<< Type Of Device >>
< No. Sessions >
<< Dose Planned to Volume >>
<< Target Volume >>
<< Planned No. Fractions >>
<< Planned Total Dose >>
<< Planned Dose Per Fraction >>
plans dose to 1..*
Derived from mCODE STU 2
summarizes fulfillment of 1
Radiotherapy
Volume (BodyStructure)
Display Name (Identifier)
Technical Identifier
Volume Type
Location
Location Qualifier
summarizes dose delivered to 1..*
summarizes dose delivered to 1..*
Radiotherapy
Course Summary (US Core Procedure)
Precedure Code = Radiotherapy Course of Treatment
Body Site
Diagnosis Reference / Code
< Procedure Intent >
< Termination Reason>
< Modality/Technique >
< Modality >
< Technique >
<< Energy >>
<< Type Of Device >>
< No. Sessions >
< Dose Delivered to Volume >
< Target Volume >
< Delivered No. Fractions >
< Delivered Total Dose >
Radiotherapy
Phase Prescription (ServiceRequest)
Precedure Code = Radiotherapy Treatment Phase
Kind of Request: original-order
Body Site
Diagnosis Reference / Code
< Procedure Intent >
< Modality/Technique >
< Modality >
< Technique >
<< Energy >>
<< Type Of Device >>
<< Prescribed No. Fractions >>
<< Dose Prescribed to Volume >>
<< Target Volume >>
<< Prescribed Total Dose >>
<< Prescribed Dose Per Fraction >>
prescribes dose to 1..*
is implemented by
Radiotherapy
Planned Phase (ServiceRequest)
Precedure Code = Radiotherapy Treatment Phase
Kind of Request: filler-order
Body Site
< Modality/Technique >
< Modality >
< Technique >
<< Energy >>
<< Type Of Device >>
<< Planned No. Fractions >>
<< Dose Planned to Volume >>
<< Target Volume >>
<< Planned Total Dose >>
<< Planned Dose Per Fraction >>
plans dose to 1..*
records dose delivered to 1..*
Radiotherapy
Treated Phase (US Core Procedure)
Precedure Code = Radiotherapy Treatment Phase
< Modality/Technique >
< Modality >
< Technique >
<< Energy >>
<< Type Of Device >>
<< Delivered No. Fractions >>
< Dose Delivered to Volume >
< Target Volume >
< Delivered Total Dose >
summarizes fulfilment of 1
Radiotherapy
Plan Prescription (ServiceRequest)
Precedure Code = Radiotherapy Treatment Plan
Kind of Request: original-order
Body Site
Diagnosis Reference / Code
< Procedure Intent >
< Modality/Technique >
< Modality >
< Technique >
<< Energy >>
<< Type Of Device >>
<< Prescribed No. Fractions >>
<< Dose Prescribed to Volume >>
<< Target Volume >>
<< Prescribed Total Dose >>
<< Prescribed Dose Per Fraction >>
prescribes dose to 1..*
is implemented by
Radiotherapy
Treatment Plan (ServiceRequest)
Precedure Code = Radiotherapy Treatment Plan
Kind of Request: filler-order
Body Site
< Modality/Technique >
< Modality >
< Technique >
<< Energy >>
<< Type Of Device >>
<< Planned No. Fractions >>
<< Dose Planned to Volume >>
<< Target Volume >>
<< Planned Total Dose >>
<< Planned Dose Per Fraction >>
<< DICOM RT Plan Reference >>
plans dose to 1..*
CodeX RT Scope
Radiotherapy
Treated Plan (US Core Procedure)
Precedure Code = Radiotherapy Treatment Plan
< Modality/Technique >
< Modality >
< Technique >
<< Energy >>
<< Type Of Device >>
< Delivered No. Fractions >
< Dose Delivered to Volume >
< Target Volume >
< Delivered Total Dose >
<< DICOM Tx Record References >>
summarizes fulfillment of 1
Standard FHIR Elements
< Extension defined in mCODE >
<< Extension defined in CodeX RT >>

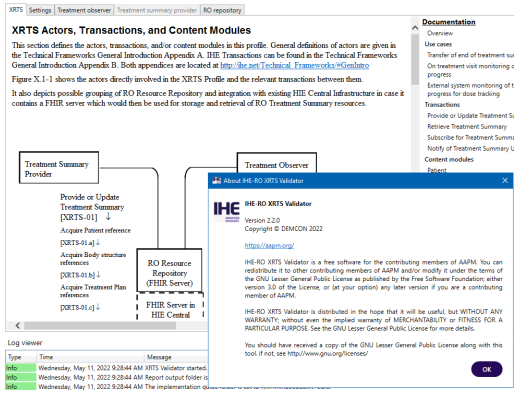
May 2022 – IHE-RO Connect-a-thon





RAD ONC EHR TEST

Varian; RaySearch

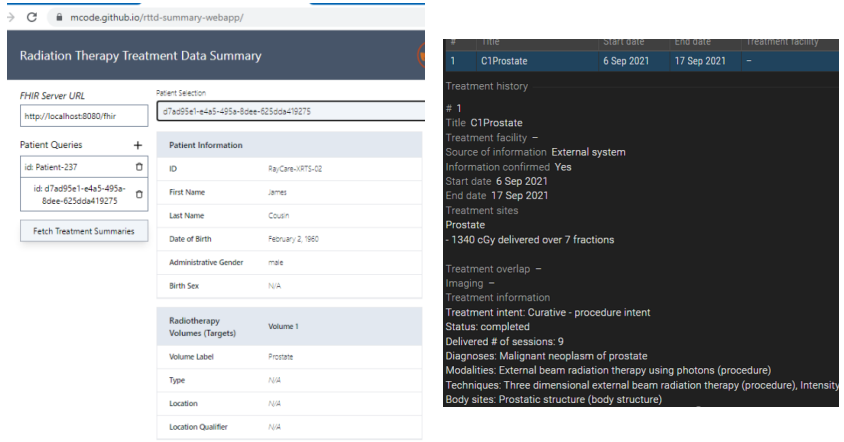


[Epic's Repository – unable to share screenshots due to copyright restrictions]

RO RESOURCE REPOSITORY

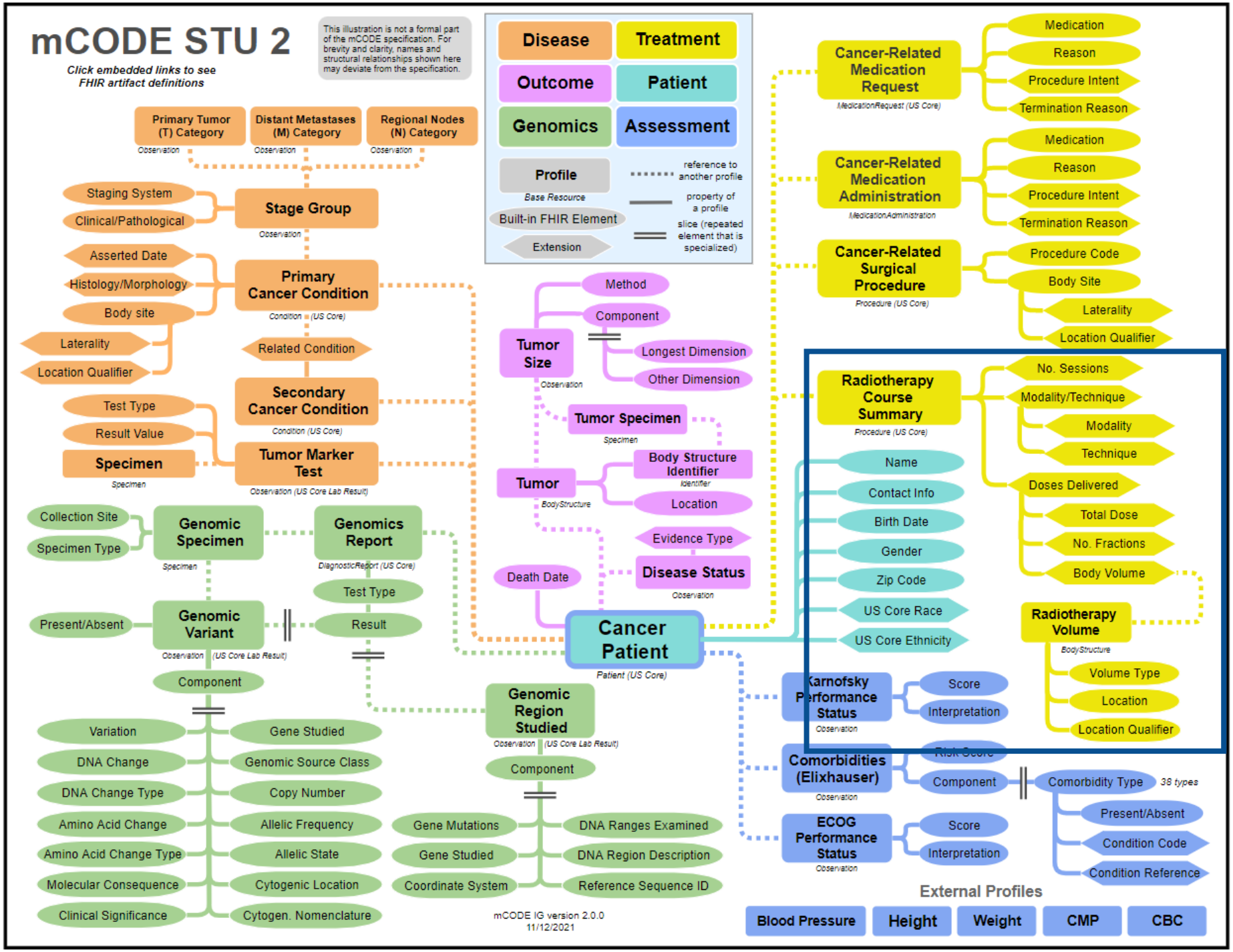
Epic; FHIR Server

[Epic's Radiation Therapy Summary Module – unable to share screenshots due to copyright restrictions]

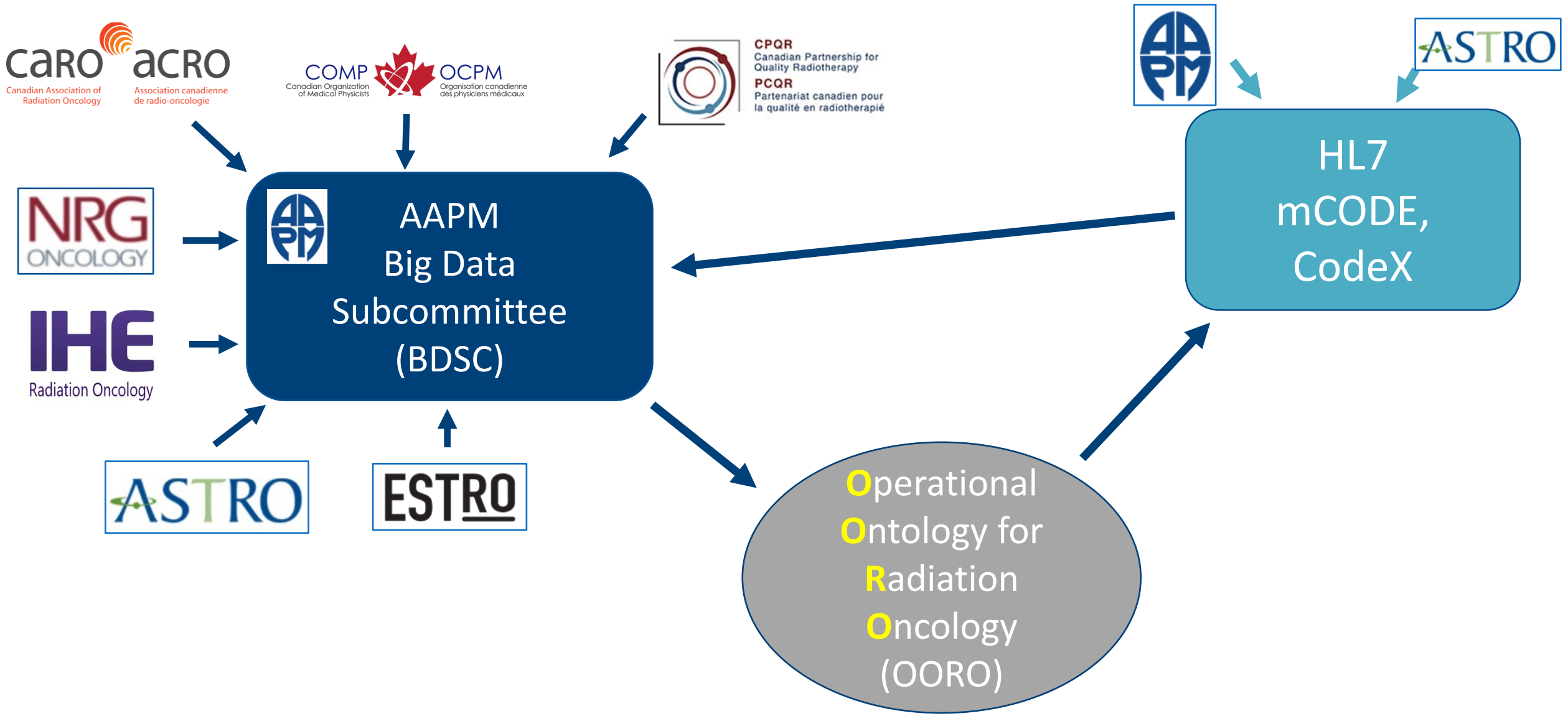


HEALTH SYSTEM EHR TEST

Epic; RaySearch; RTTD Tool

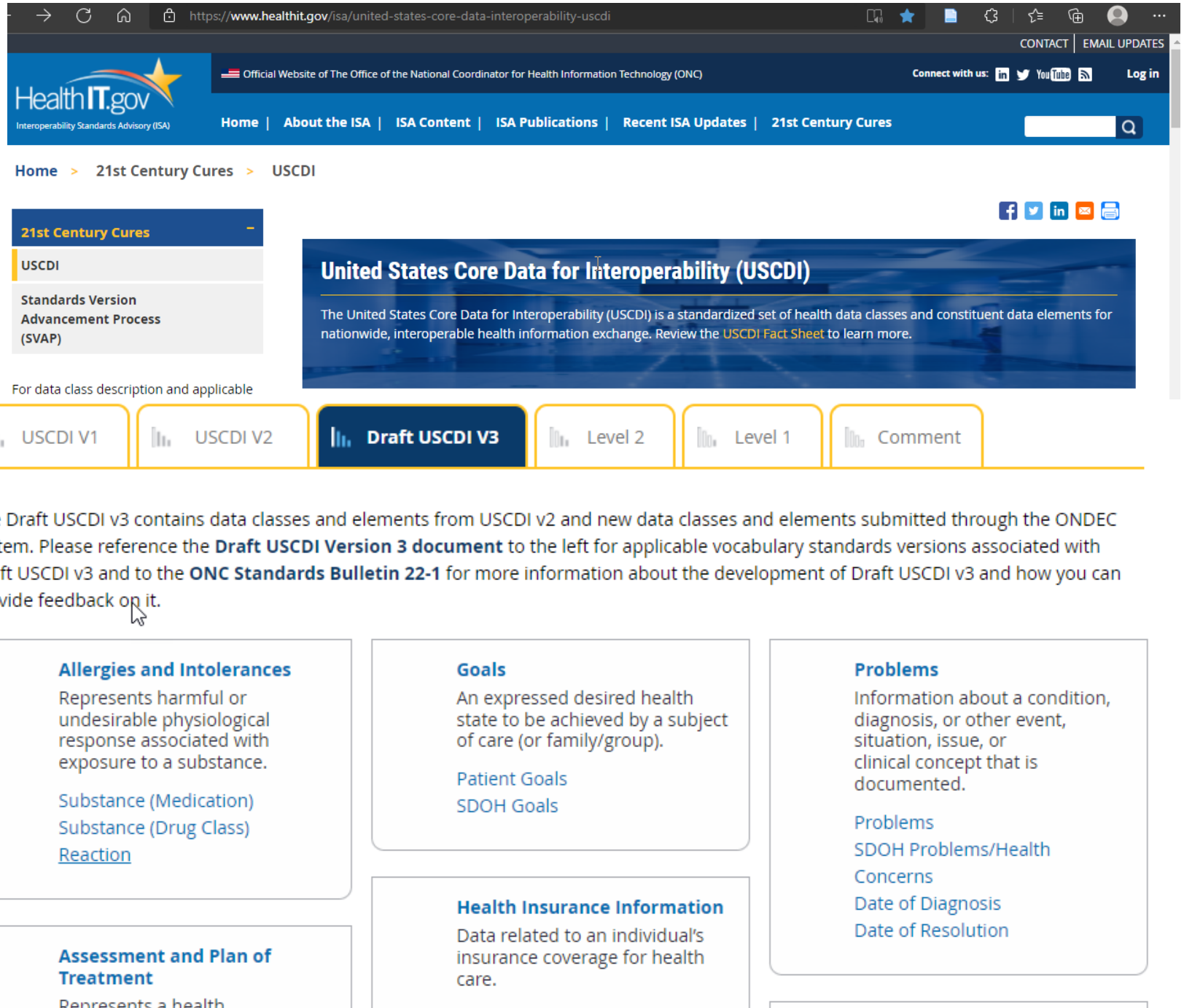

mCODE STU 2
Click embedded links to see FHIR artifact definitions
This illustration is not a formal part of the mCODE specification. For brevity and clarity, names and structural relationships shown here may deviate from the specification.
Disease
Treatment
Outcome
Patient
Genomics
Assessment
Profile
Base Resource
Built-in FHIR Element
Extension
reference to another profile
property of a profile
slice (repeated element that is specialized)
Primary Tumor (T) Category
Distant Metastases (M) Category
Regional Nodes (N) Category
Observation
Staging System
Clinical/Pathological
Stage Group
Asserted Date
Histology/Morphology
Body site
Laterality
Location Qualifier
Primary Cancer Condition
Condition (US Core)
Related Condition
Secondary Cancer Condition
Test Type
Result Value
Specimen
Tumor Marker Test
Observation (US Core Lab Result)
Method
Component
Tumor Size
Longest Dimension
Other Dimension
Tumor Specimen
Tumor
BodyStructure
Body Structure Identifier
Identifier
Location
Evidence Type
Disease Status
Death Date
Collection Site
Specimen Type
Genomic Specimen
Genomics Report
DiagnosticReport (US Core)
Present/Absent
Genomic Variant
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
Gene Mutations
Gene Studied
Coordinate System
DNA Ranges Examined
DNA Region Description
Reference Sequence ID
Cancer Patient
Patient (US Core)
Cancer-Related Medication Request
MedicationRequest (US Core)
Medication
Reason
Procedure Intent
Termination Reason
Cancer-Related Medication Administration
MedicationAdministration
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
Name
Contact Info
Birth Date
Gender
Zip Code
US Core Race
US Core Ethnicity
Karnofsky Performance Status
Score
Interpretation
Observation
Comorbidities (Elixhauser)
Risk Score
Component
Comorbidity Type
38 types
Present/Absent
Condition Code
Condition Reference
ECOG Performance Status
External Profiles
Blood Pressure
Height
Weight
CMP
CBC
mCODE IG version 2.0.0
11/12/2021

Multi-Professional Society Engagement



Health **E**quity **A**chievement in **R**adiation **T**herapy

- HEART was developed to measure health equity issues within radiation oncology and proposed by ASTRO for inclusion in the RO Model.
- AAPM added Social Determinants of Health (SDOH) into OORO
- Collaboration on promoting addition of additional SDOH measures (e.g., disability) and identifying common standard value sets
- Exploring overlaps with mCODE and the HL7 Gravity accelerator.



United States Core Data for Interoperability

Outgrowth of 21st Century Cures Act

National effort to identify data classes for interoperable data exchange

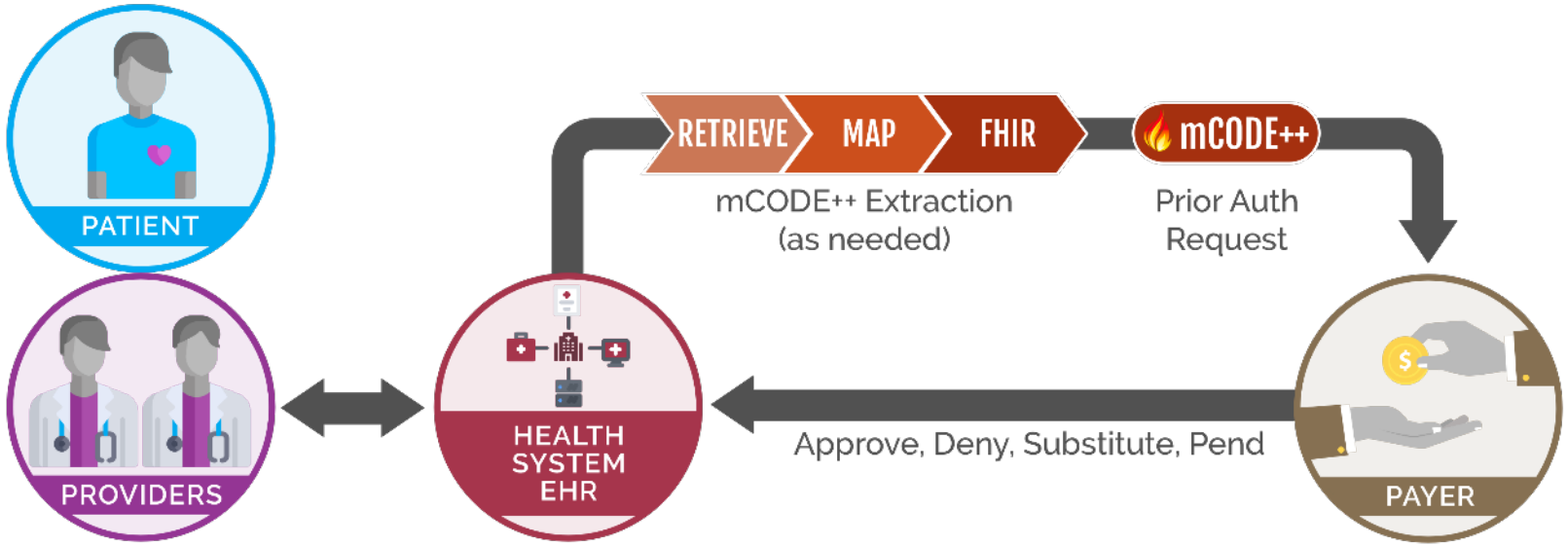
CodeX Prior Authorization in Oncology

Problem

- Prior authorization imposes a burden on patients, providers, and payers
- Prior authorization documentation requirements vary by payer plan
- Current manual processes are costly and may delay treatment

Solution

- Reduce clinical burden when requesting oncology treatment regimens by building on Da Vinci CRD/DTR/PAS specifications to supplement prior authorization request with mCODE data elements.



Desired Impact

- Develop automated prior authorization capability in which 80% of approvals do not require manual inspection

Da Vinci Exchange

- Implementing this use case in oncology produces the standardized exchange for use in any specialty or other PA services or procedure.

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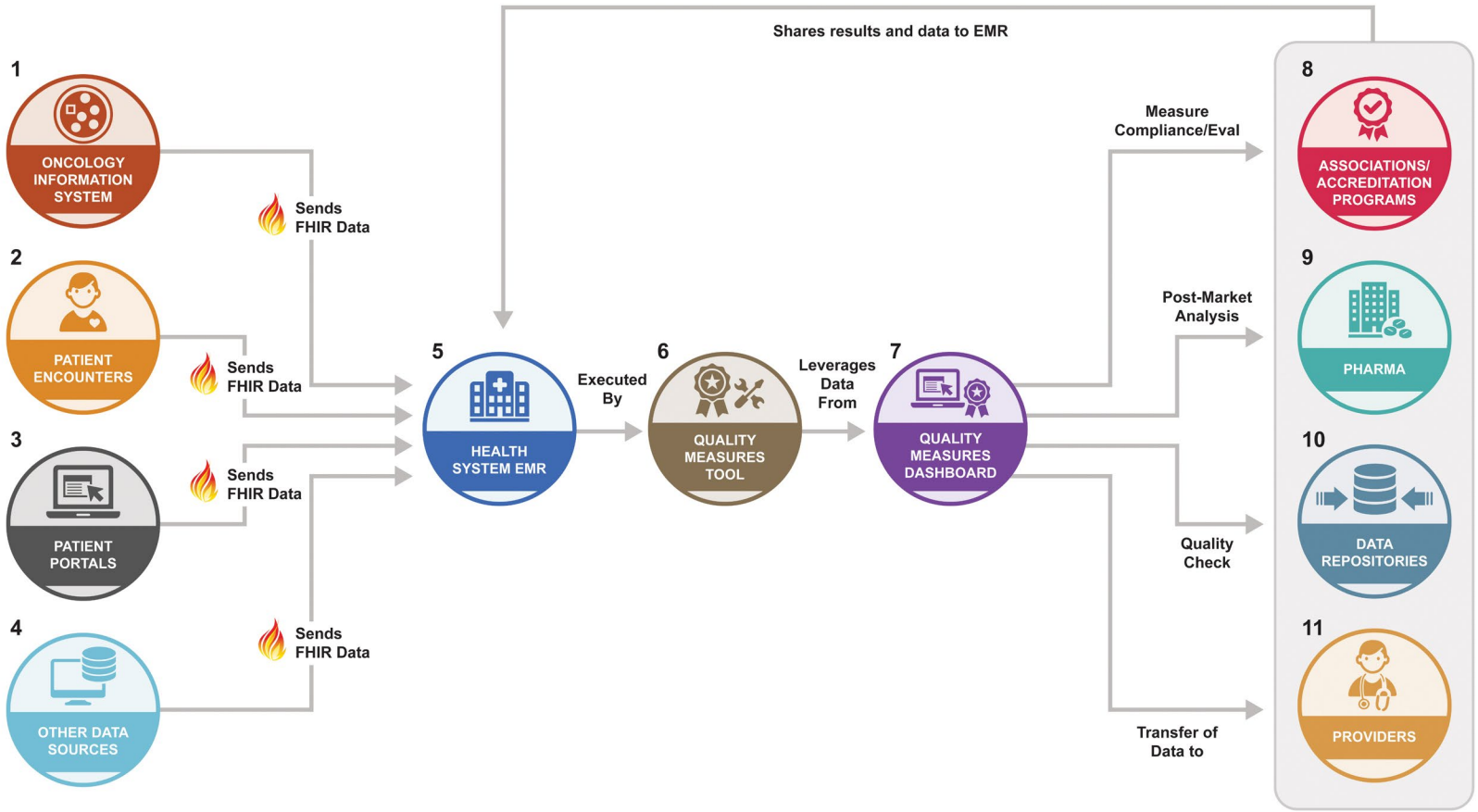
Quality Measure for Cancer

Problem

- Complexity of siloed data sources, slow development process, unstandardized data

Solution

- Create a solution that demonstrates the ability to develop FHIR digital measures using mCODE for value-based programs and clinical quality improvement in oncology.



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