

# C-CDA Documents on FHIR®:

Essential information to  
understand how C-CDA and  
FHIR work together



**HEALTH  
STORY**

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**PROJECT** 

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# Health Story Project Leadership



**Lisa Nelson, MS, MBA**  
Principal Informaticist  
MaxMD

- Over twenty years of experience in IT strategy, support, and systems consulting.
- An independent consultant and an active member of HL7, participating in the Structured Documents, Patient Care and Templates Groups.
- Also active in Integrating the Healthcare Enterprise (IHE)



**Laura Bryan, MS, MT (ASCP), CHDS, AHDI-F**  
Vice President  
MedEDocs

- Informaticist
- Volunteer on the Health Story Project since its inception in 2007, serving as an editor to the original implementation guides and in Health Story leadership, representing healthcare documentation professionals (AHDI).
- Author, consultant, and VP of MedEDocs, a healthcare documentation technology provider.

# Today's Panelists



## Rick Geimer

Chief Innovation Officer, Lantana Consulting Group

- Co-Chair HL7 FHIR Infrastructure Working Group
- Member CDA Management Group
- Former Co-Chair HL7 Structured Documents Working Group
- Co author of Consolidated CDA (C-CDA)
- Lead on the C-CDA on FHIR Project
- Co-Lead on multiple Da Vinci Implementation Guides



## Matt Lord

Senior Consultant, MDIX, Inc.

- Project Lead for HL7 Service Oriented Architecture Model-Based Transformation Service project
- Employed by MDIX, Inc., which develops interoperability tools, including software, mappings, and operational environments
- Prior work includes policy advocacy and representation before Social Security Administration

## Health Story Project Objectives

- A health record is the patient's "health story" and is shared by the patient and the circle of caregivers involved in his/her care. Sharing encompasses both access and authorship.
- The primary purpose of the record is to support care delivery, which in turn, will support better health. Secondary reuse should be supported.
- Electronic records must produce a longitudinal record of lasting value. That record must express the thought process behind the delivery of care, preserving for future readers.
- Clinical records must be complete, well organized, easy to navigate, concise, logical and adaptable to the needs of the user, sharable, readily available and secure.
- The electronic record and new technologies support shared decision-making, document use of practice guidelines, and support evidence-based practice.

## Learning Objectives

- Understand the importance of the document paradigm supported in Fast Healthcare Interoperability Resources (FHIR)®
- Compare C-CDA documents and C-CDA on FHIR® documents
- Recognize why FHIR® APIs make exchanging information in C-CDA documents easier and better
- Discover standard mapping resources to make information transformation between C-CDA and FHIR® more consistent
- Appreciate how C-CDA on FHIR® and Document Reference resources support IHE document-sharing models

# What is CDA?

- HL7 Clinical Document Architecture R2.0
  - An information exchange standard
  - A defined and complete information object that can include text, images, sounds, and other multimedia content
  - Documentation of clinical observations and services, consistent with core principles
- Core Principles
  1. Persistence
  2. Stewardship
  3. Potential for Authentication
  4. Context
  5. Wholeness
  6. Human Readability

## What is C-CDA?

- HL7 Consolidated CDA (C-CDA) R2.1
- A collection of document, section and entry templates that define how to exchange structured information for 12 common clinical note types using the HL7 CDA standard.
- Document Templates for 12 common types of clinical note:
  - Care Plan
  - Consultation Note
  - Continuity of Care Document
  - Diagnostic Imaging Report
  - Discharge Summary
  - History and Physical
  - Operative Note
  - Procedure Note
  - Progress Note
  - Referral Note
  - Transfer Summary
  - Unstructured Document

# Why does C-CDA matter to Health Story Project?

- The “section” content in clinical notes matters
  - What sections are needed to tell the patient story?
  - What sections are relevant and pertinent for the type of clinical note being exchanged?
  - How will clinical notes being used to exchange information between system adhere to CDA Core Principles:
    - Persistence
    - Stewardship
    - Potential for Authentication
    - Context
    - Wholeness
    - Human Readability



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  - What sections are relevant and pertinent for the type of clinical note being exchanged?
  - How will clinical notes being used to exchange information between system adhere to CDA Core Principles?
    - Persistence
    - Stewardship
    - Potential for Authentication
    - Context
    - Wholeness
    - Human Readability

**Narrative Matters**

**What is C-CDA on FHIR?**

**How is HL7 facilitating the use of these two standards together?**

# FHIR and CDA

## Similarities

- Support profiling for specific use-cases
- Human readability is minimum for interoperability
- Validation tooling, profile tooling

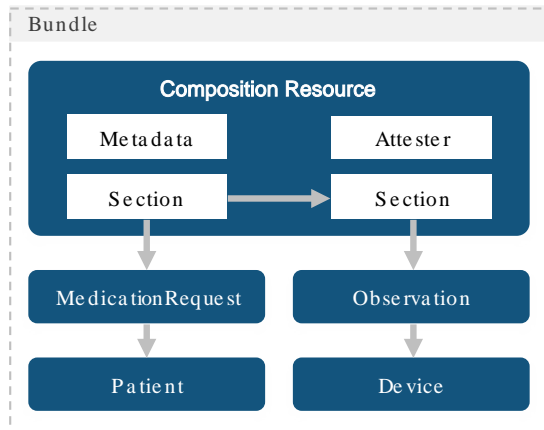
## FHIR Differences

- Can use out of the box – no templates required (but profiling still recommended)
- Not restricted to just documents
- Implementer tooling generated with spec
- Tighter coupling to APIs (RESTful services)

# FHIR Documents

- Addresses CDA use case for clinical documents
- Collection of resources bound together
  - Root is a Composition resource
  - Much like the CDA header + narrative
- Sent as a Bundle resource
- Can be signed, authenticated, etc.
- A FHIR document has the same core principles as a CDA document
- Full rules:
  - <http://build.fhir.org/documents.html>

# FHIR Documents Are Bundles of Resources

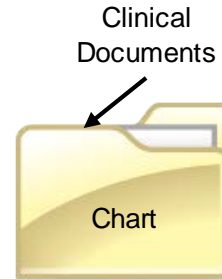


```
<Bundle>
  <entry>
    <Composition />
  </entry>
  <entry>
    <Observation />
  </entry>
  <entry>
    <Device />
  </entry>
  <entry>
    <MedicationRequest />
  </entry>
  <entry>
    <Patient />
  </entry>
</Bundle>
```

The diagram shows the sequence of resources in the bundle. A vertical line on the right side has five blue dots. Arrows point from these dots to the corresponding resource elements in the XML code: the top dot to the first <entry>, the second dot to the <Observation /> element, the third dot to the <Device /> element, the fourth dot to the <MedicationRequest /> element, and the bottom dot to the <Patient /> element.

# Composition Resource

- Contains
  - Patient
  - Author
  - Custodian
  - Type of document (e.g., Discharge summary)
  - Attested narrative of the document
- Sufficient for
  - Medical records management
  - Document management
  - Enable clinical document exchange across and within institutions
  - Human readable documents



## Sections and Narrative

- Composition resources contain sections (which may be nested)
- The section narrative markup is XHTML
- The narrative contains the attested text of the document
- It is ok for sections to consist of only human readable text (i.e., no machine processable resources)

# First: Human Readable

```
<section>
  <title value="Allergies and Intolerances"/>
  <code>
    <coding>
      <system value="http://loinc.org"/>
      <code value="48765-2"/>
      <display value="Allergies and adverse reactions"/>
    </coding>
  </code>
  <text>
    <status value="generated"/>
    <div xmlns="http://www.w3.org/1999/xhtml">
      <ul>
        <li>Penicillin - Hives</li>
        ...
      </ul>
    </div>
  </text>
  ...
</section>
```

## Allergies and Intolerances

- Penicillin - Hives



## Next: Coded Data

```
<AllergyIntolerance xmlns="http://hl7.org/fhir">  
  <clinicalStatus value="active"/>  
  <verificationStatus value="confirmed"/>  
  <category value="medication"/>  
  <criticality value="high"/>  
  <code>  
    <coding>  
      <system value="http://snomed.info/sct"/>  
      <code value="418038007"/>  
      <display value="allergy to penicillin"/>  
    </coding>  
  </code>  
</patient>  
  <reference value="Patient/1"/>  
  <display value="Henry Levin"/>  
</patient>
```

```
<assertedDate value="2000"/>  
<reaction>  
  <manifestation>  
    <coding>  
      <system value="http://snomed.info/sct"/>  
      <code value="247472004"/>  
      <display value="hives"/>  
    </coding>  
  </manifestation>  
  <severity value="mild"/>  
</reaction>  
</AllergyIntolerance>
```

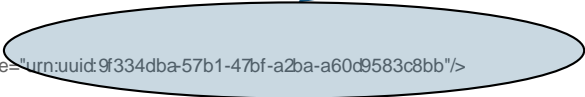
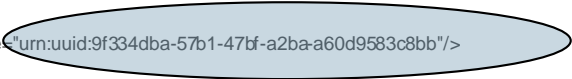
# A Bit More on Bundle

- Bundle.type = document
- Bundle.identifier
  - Version dependent
  - Must be globally unique to satisfy the persistence requirement
- First entry is a Composition
- Documents must be standalone, SO...
- The bundle contains all resources referenced from the Composition

Name	Flags	Card.	Type	Description & Constraints
 Bundle	Σ I N		Resource	Contains a collection of resources + FullUri must be unique in a bundle, or else entries with the same fullUri must have different meta.versionId + A document must have an identifier with a system and a value + entry.request only for some types of bundles + entry.response only for some types of bundles + total only when a search or history + entry.search only when a search Elements defined in Ancestors: id, meta, implicitRules, language
 identifier	Σ	0..1	Identifier	Persistent identifier for the bundle
 type	Σ	1..1	code	document   message   transaction   transaction-response   batch   batch-response   history   searchset   collection BundleType (Required)
 timestamp	Σ	0..1	instant	When the bundle was assembled
 total	Σ I	0..1	unsignedInt	If search, the total number of matches
 link	Σ	0..*	BackboneElement	Links related to this Bundle
 relation	Σ	1..1	string	See <a href="http://www.iana.org/assignments/link-relations/link-relations.xhtml#link-relations-1">http://www.iana.org/assignments/link-relations/link-relations.xhtml#link-relations-1</a>
 url	Σ	1..1	uri	Reference details for the link
 entry	Σ I	0..*	BackboneElement	Entry in the bundle - will have a resource,

# References in Bundles

```
<?xml version="1.0" encoding="UTF-8"?>
<Bundle xmlns="http://hl7.org/fhir">
  <id value="ee5590ab-72c0-4c07-9dc0-cc574729cd0a"/>
  <type value="document"/>
  <entry>
    <fullUrl value="urn:uuid:511b05b3-8c3d-4cbe-b9d8-fe5f8666f994"/>
    <resource>
      <Composition>
        <subject>
          <reference value="urn:uuid:9f334dba-57b1-47bf-a2ba-a60d9583c8bb"/>
        </subject>
        ...
      </Composition>
    </resource>
  </entry>
  <entry>
    <fullUrl value="urn:uuid:9f334dba-57b1-47bf-a2ba-a60d9583c8bb"/>
    <resource>
      <Patient>...</Patient>
    </resource>
  </entry>
</Bundle>
```



This example shows UUID URIs, but can be a FHIR server URL such as <http://example.org/fhir/Patient/1>

# Brief History of CDA on FHIR

- Initial CDA to FHIR mappings
  - Purpose: Answer the question, “Can FHIR handle the CDA use case?”, and fix FHIR if the answer is no.
  - Based on FHIR DSTU1, so mostly for historical reference
  - <http://tinyurl.com/jqyc4l8>
- Argonaut Project C-CDA to FHIR mappings
  - Conceptual mappings of C-CDA to FHIR, for use by analysts
  - Based on pre-DSTU2 FHIR (resulted in key changes to DSTU2)
  - <http://tinyurl.com/zhj2u9s>
- C-CDA on FHIR project
  - Implementable profiles targeting FHIR STU3
  - [http://wiki.hl7.org/index.php?title=C-CDA\\_on\\_FHIR](http://wiki.hl7.org/index.php?title=C-CDA_on_FHIR)

## FHIR Implementation Guides and Profiles

- FHIR IGs are collections of profiles, value sets, examples, resource instances (conformance, etc.) and human readable documentation.
- There is an ImplementationGuide resource that ties it all together
- Publishing FHIR IGs is a rather new and tricky process

## C-CDA on FHIR

- US Realm FHIR implementation guide
- Picked up where the Argonaut mappings left off
- Goal:
  - Implementable FHIR profiles for the C-CDA use case
- Scope:
  - To represent Consolidated CDA Templates for Clinical Notes (C-CDA) 2.1 templates using FHIR profiles
  - This first stage of the project defines all the C-CDA document-level profiles on the Composition resource and contained sections.
  - Any coded data used by sections will be accomplished by referencing relevant US-Core FHIR profiles.

# Finding C-CDA on FHIR

- Published specification (FHIR STU3)
  - <http://hl7.org/fhir/us/ccda/index.html>
- Current build (FHIR R4)
  - <https://build.fhir.org/ig/HL7/ccda-on-fhir-r4/>

This is the Continuous Integration Build of FHIR (will be incorrect/inconsistent at times). See the Directory of published versions.

## Welcome to FHIR®

First time here? See the executive summary, the developer's introduction, clinical introduction, or architect's introduction, and then the FHIR overview / roadmap. See also the open license (and don't miss the full Table of Contents or you can search this specification).

<b>Clinical Reasoning</b>		Decision Support, Clinical Quality Measures		
<b>Clinical</b> Allergy, Problem, etc.	<b>Diagnostics</b> Observation, Report, Request, etc.	<b>Medications</b> Order, Dispense, Administration, Statement, etc.	<b>Workflow</b> Task, Subscription, etc.	<b>Financial</b> Claims, EligibilityRequest, etc.
<b>Administration</b>		Patient, Practitioner, Device, Organization, Location, Healthcare Service		
<b>Implementer Support</b> Downloads, Common Use Cases, Testing	<b>Security &amp; Privacy</b> Security, Consent	<b>Conformance</b> StructureDefn, CapabilityStatement, Profiling	<b>Terminology</b> CodeSystem, ValueSet, ConceptMap, Terminology Sys	<b>Ontology</b> RDF
<b>Foundation</b>		Base Documentation, XML, JSON, REST API + Search, Data Types, Extensions		

### External Links:

#### Implementation Guides

- Specifications based on the FHIR Standard
- Published by HL7, Affiliates & FHIR Foundation
- Other IGs (FHIR Wiki)

#### FHIR Foundation

- Enabling health interoperability through FHIR
- Community Forum + FHIR Chat
- Public Test Servers & Software
- Blogs that cover FHIR
- FHIR Wiki

#### Translations

- Note that translations are not always up to date
- Russian
- Chinese
- Japanese

## Document Types

- Covers same structured documents as C-CDA
- Each defines the legal sections and coded data for that document type
- Unstructured Document is covered by the US Core Document Reference profile
- Care Plan
- Continuity of Care Document (CCD)
- Consultation Note
- Diagnostic Imaging Report
- Discharge Summary
- History and Physical
- Operative Note
- Procedure Note
- Progress Note
- Referral Note
- Transfer Summary



# US Core Framework

- Location
  - Published (FHIR STU3):
    - <http://hl7.org/fhir/us/core/index.html>
  - Current build (FHIR R4):
    - <https://build.fhir.org/ig/HL7/US-Core-R4/>
- FHIR Profiles for the Common Clinical Data Set (CCDS)
  - CCDS location:
    - [https://www.healthit.gov/sites/default/files/2015Ed\\_CCG\\_CCDS.pdf](https://www.healthit.gov/sites/default/files/2015Ed_CCG_CCDS.pdf)

## C-CDA on FHIR Extensions

- Adds features missing from Composition and needed for the C-CDA use case
- Some may eventually be added to Composition if the use case proves to be general (and international) enough
- Data Enterer
  - US Core Practitioner
- Informant
  - US Core Practitioner
- Information Recipient
  - US Core Practitioner
- Participant
  - RelatedPerson
- Performer
  - US Core Practitioner
- Authorization
  - Contract

## C-CDA on FHIR Demo

- Live walkthrough of the specification
- Composition profiles and US Core

# Mapping between C-CDA and C-CDA on FHIR

- Provide standards-based reference for interoperability
- Moving from Document, to Section, Entry, Element, and Attribute  
Level of Detail
- Cannot be 100% accurate
  - FHIR extensions cannot be standard-based mapping
  - Not formal logic; much of detailed mapping is building community consensus

# The Need for Interoperability

Each standard is a significant investment for an organization.

How can we optimize support for both?

Path	Code	Cardinality	Notes
ProblemSection2			2.16.840.1.113883.10.20.22...
< Comment >			
NullFlavor	NullFlavor	0..1	
code	CE	1..1	C:Error:No Base Enumerati...
title	ST	1..1	
text	StrucDocText	1..1	
problemConcernAct2	ProblemConcern...	1..*	
statusCode	CS	1..1	V:ProblemAct statusCode
effectiveTime	IVL_TS	1..1	
code	CD	1..1	C:Error:No Base Enumerati...
author	AuthorParticipati...	0..*	
time	TS	1..1	
assignedAuthor	AssignedAuthor	1..1	
id	II	1..1	
code	CE	1..1	
assignedPerson	AssignedPerson	0..*	
name	PN	0..*	
cd:Person	Person	1..1	
representing	Representing	1..1	redefines assignedAuthor...
cd:AssignedAuthor	AssignedAuthor	1..1	
cd:Author	Author	1..1	
problemObservation2	ProblemObservat...	1..*	SUBJ (has subject)
negationInd	BooleanObject	0..1	
effectiveTime	IVL_TS	1..1	
value	CD	1..1	V:Problem
code	CDCode	1..1	V:Problem Type (SNOMED ...
text	ED	0..1	
statusCode	CS	1..1	C:Error:No Base Enumerati...
author	AuthorParticipati...	0..*	
prognosisObservation	PrognosisObserv...	0..1	REFR (refers to)
priorityPreference	PriorityPreference	0..*	REFR (refers to)
problemStatus	ProblemStatus	0..1	REFR (refers to)
healthStatusObservation	HealthStatusObs...	0..1	

Path	Code	Cardinality	Notes
Condition			
<< Definition >>	< Com		
<< Description >>	< Con		
<< ShortDescription >>			
identifier	Identifier	0..*	Σ
clinicalStatus	CodeableConcept	0..1	?! Σ [http://hl7.org/fhir/Value...
verificationStatus	CodeableConcept	0..1	?! Σ [http://hl7.org/fhir/Value...
category	CodeableConcept	0..*	[ConditionCategoryCodes]+
severity	CodeableConcept	0..1	[Condition/DiagnosisSeverity]#
code	CodeableConcept	0..1	Σ [Condition/Problem/Diagn...
bodySite	CodeableConcept	0..1	Σ [SNOMEDCTBodyStructure...
subject	Reference	1..*	Σ (Patient)
encounter	Reference	0..*	Σ (Encounter)
onset[x]	DataElement	0..1	Σ (dateTime   Age   Period   ...
abatement[x]	DataElement	0..1	(dateTime   Age   Period   ...
recordedDate	Annotation	0..*	Σ
recorder	Reference	0..1	Σ (Practitioner)
asserter	Reference	0..1	Σ (Practitioner)
note	Annotation	0..*	
stage	Stage	0..*	
evidence	Evidence	0..*	
Stage			
Evidence			
con-5			XPath
con-4			XPath
con-3			XPath
con-1			XPath
con-2			XPath

C-CDA

FHIR

# Model-Based Transformation Service Exemplar Mapping

CCDA		FHIR		Mapping rules		Notes
CCD Element	Value set binding	FHIR Element	Value set binding	CCDA to FHIR	FHIR to CCDA	
				Source FHIR Target Rules	CCDA Target Rules	
RESULTORGANIZER (requires id, code, statusCode, result observation)		US-Core-DiagnosticReport (requires status, category="LAB", code, subject, effective[X], issued, Observation)		US-Core-DiagnosticReport.category = LAB		
id		US-Core-DiagnosticReport.identifier				
code	NA	US-Core-DiagnosticReport.code				
statusCode	2.16.840.1.113883.11.20	Gap				
effectiveTime		DiagnosticReport.effectivePeriod				
author		Gap				
RESULT OBSERVATION (requires id, code, statusCode, effectiveTime)		DiagnosticReport.result => US-Core-Observationresults (requires status, category="laboratory", code, subject, value)				
id		US-Core-Observationresults.identifier				
code	2.16.840.1.113883.6.1	US-Core-Observationresults.code	2.16.840.1.113883.6.1			
statusCode	2.16.840.1.113883.11.20.9.1	Gap	2.16.840.1.113883.4.642.3.317			
effectiveTime		US-Core-Observationresults.effectivePeriod				
value		US-Core-Observationresults.value				
interpretationCode	2.16.840.1.113883.11.78	US-Core-Observationresults.interpretation	2.16.840.1.113883.4.642.3.386			FHIR valueset far more values
methodCode		US-Core-Observationresults.method				
targetSiteCode		US-Core-Observationresults.bodySite				
author		US-Core-Observationresults.performer => US-Core-Practitioner & US-Core-PractitionerRole				Performer and Author have different se
time		US-Core-Observationresults.issued				
assignedAuthor (assignedAuthor)		US-Core-Observationresults.performer & US-Core-Practitioner.identifier & US-Core-PractitionerRole.practitioner.reference				US-Core-Practitioner.identifier & US-Core-PractitionerRol
code	2.16.840.1.114222.4.111061	US-Core-PractitionerRole.specialty	2.16.840.1.114222.4.111066			US-Core-PractitionerRole.identifier = Observation.performer
addr		US-Core-PractitionerRole.location => Location.address				Not sure how to find this reference to get back to CCD
telecom		US-Core-PractitionerRole.telecom				US-Core-PractitionerRole.practitioner.reference = US-Co
assignedPerson (Person)						
name		US-Core-Practitioner.name				US-Core-Practitioner.identifier = US-Core-Observationres
representedOrganization (Organization)						
id		US-Core-Organization.identifier				Organization.identifier = PractitionerRole.organization.refe
name		US-Core-Organization.name				Organization.identifier = PractitionerRole.organization.refe
address		US-Core-Organization.address				Organization.identifier = PractitionerRole.organization.refe
telecom		US-Core-Organization.telecom				Organization.identifier = PractitionerRole.organization.refe
referenceRange						
text		Observation.referenceRange.text				
value						
low		US-Core-Observationresults.referenceRange.low				
high		US-Core-Observationresults.referenceRange.high				

# Model-Based Transformation Service Exemplar Mapping

CCDA		FHIR		Mapping rules		Notes
CCD Element	Value set binding	FHIR Element	Value set binding	CCDA Source R FHIR Target Rules	FHIR to CCDA Target Rules	
RESULTORGANIZER (requires id, code, statusCode, result observati		US-Core-DiagnosticReport (requires status, category="LAB", code, subject, effective[X], issued, Observation			US-Core-DiagnosticReport.category = LAB	
id		US-Core-DiagnosticReport.identifier				
code	NA	US-Core-DiagnosticReport.code				
statusCode	2.16.840.1.113883.11.20	Gap				
effectiveTime		DiagnosticReport.effectivePeriod				
author		Gap				
RESULT OBSERVATION (requires id, code, statusCode, effectiveTim		US-Core-Observationresults (requires status, category="laboratory", code, subject, value)				
RESULTORGANIZER (requires id, code, statusCode, result observati		US-Core-DiagnosticReport (requires status, category="LAB", code, subject, effective[X], issued, Observation				
id		US-Core-DiagnosticReport.identifier				
code	NA	US-Core-DiagnosticReport.code				
statusCode	2.16.840.1.113883.11.20.9.39	Gap				
effectiveTime		DiagnosticReport.effectivePeriod				
author		Gap				
RESULT OBSERVATION (requires id, code, statusCode, effectiveTim		DiagnosticReport.result => US-Core-Observationresults (requires status, category="laboratory", code, subject, value)				
id		US-Core-Observationresults.identifier				
code	2.16.840.1.113883.6.1	US-Core-Observationresults.code			2.16.840.1.113883.6.1	
statusCode	2.16.840.1.113883.11.20.9.39	Gap			2.16.840.113883.4.642.3.387	
effectiveTime		US-Core-Observationresults.effectivePeriod				
value		US-Core-Observationresults.value				
interpretationCode	2.16.840.1.113883.1.11.78	US-Core-Observationresults.interpretation			2.16.840.1.113883.4.642.3.386	
methodCode		US-Core-Observationresults.method				
targetSiteCode		US-Core-Observationresults.bodySite				
author		US-Core-Observationresults.performer => US-Core-Practitioner & US-Core-PractitionerRole				
time		US-Core-Observationresults.issued				
assignedAuthor (assignedAuthor)						
id		US-Core-Observationresults.performer & US-Core-Practitioner.identifier & US-Core-PractitionerRole.practitioner.reference				
code	2.16.840.1.114222.4.11.1066	US-Core-PractitionerRole.speciality			2.16.840.1.114222.4.11.1066	
addr		US-Core-PractitionerRole.location => Location.address				
telecom		US-Core-PractitionerRole.telecom				
assignedPerson (Person)						
name		US-Core-Practitioner.name				

# Model-Based Transformation Service

## Exemplar Mapping

<b>RESULTORGANIZER (requires id, code, statusCode, result observation)</b>		US-Core-DiagnosticReport (requires status, category="LAB", code, subject, effective[X], issued, Observation	
id		US-Core-DiagnosticReport.identifier	
code	NA	US-Core-DiagnosticReport.code	
statusCode	2.16.840.1.113883.11.20.9.39	Gap	
effectiveTime		DiagnosticReport.effectivePeriod	
<b>author</b>		Gap	
<b>RESULT OBSERVATION (requires id, code, statusCode, effectiveTime, v</b>		DiagnosticReport.result => US-Core-Observationresults (requires status, category="laboratory", code, subj	
id		US-Core-Observationresults.identifier	
code	2.16.840.1.113883.6.1	US-Core-Observationresults.code	
statuscode	2.16.840.1.113883.11.20.9.39	Gap	
effectiveTime		US-Core-Observationresults.effectivePeriod	
value		US-Core-Observationresults.value	
interpretationCode	2.16.840.1.113883.1.11.78	US-Core-Observationresults.interpretation	
methodCode		US-Core-Observationresults.method	
targetSiteCode		US-Core-Observationresults.bodySite	
<b>author</b>		US-Core-Observationresults.performer => US-Core-Practitioner & US-Core-PractitionerRole	
time		US-Core-Observationresults.issued	
assignedAuthor (assignedAuthor)			
id		US-Core-Observationresults.performer & US-Core-Practitioner.identifier & US-Core-PractitionerRole.practi	
code	2.16.840.1.114222.4.11.1066	US-Core-PractitionerRole.speciality	
addr		US-Core-PractitionerRole.location => Location.address	
telecom		US-Core-PractitionerRole.telecom	
addr		US-Core-PractitionerRole.location => Location.address	
telecom		US-Core-PractitionerRole.telecom	
assignedPerson (Person)			
name		US-Core-Practitioner.name	



# Interoperability Challenges between C-CDA and C-CDA on FHIR

- Definitional ambiguity or vagueness
- Semantic-Structural Interactions

# Definitional Ambiguity

Author: a party that *originates* the Act and therefore has *responsibility* for the information given in the Act and *ownership* of this Act.

Performer: A person, non-person living subject, organization or device that actually and principally *carries* out the action.

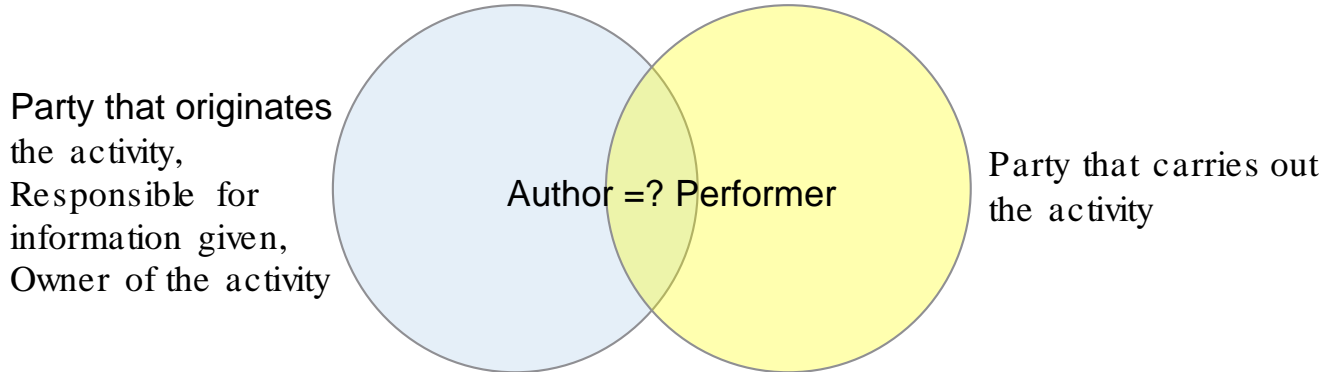
# Additional Mapping Challenge

Some FHIR Resources do not include an “Author” structural element.

For example, the FHIR Procedure Resource, and the US Core Procedure Profile, do not include an “Author Element.”

US Core Procedure does contain “Performer.”

# Mapping Ambiguity



# Solutions and Layers of Solutions

- FHIR contains the Provenance Resource that can always represent Author Participation information
- But Provenance is not part of US Core Profiles (yet ...)
- And, multiple groups have interest in use of Provenance Resource
- Which demonstrates that this is as much coordinating and building community consensus as it is data mapping

Provenance		TU	DomainResource
target	Σ	1..*	Reference(Any)
occurred[x]		0..1	
occurredPeriod			Period
occurredDateTime			dateTime
recorded	Σ	1..1	instant
policy		0..*	uri
location		0..1	Reference(Location)
reason		0..*	CodeableConcept
activity		0..1	CodeableConcept
agent		1..*	BackboneElement
type	Σ	0..1	CodeableConcept
role		0..*	CodeableConcept
who	Σ	1..1	Reference(Practitioner   PractitionerRole   RelatedPerson   Patient   Device   Organization)
onBehalfOf		0..1	Reference(Practitioner   PractitionerRole   RelatedPerson   Patient   Device   Organization)
entity		0..*	BackboneElement
role	Σ	1..1	code
what	Σ	1..1	Reference(Any)
agent		0..*	see agent
signature		0..*	Signature

## Current status of the mapping work

- Provided Ballot for Comment and received important feed back on formatting and novel mappings, such as Provenance
- Currently developing two substantive portions for Balloting a new standard
  - Functional Specification for transformation service: a tool-neutral, standard neutral specification identifying the functions necessary for effective transformation
  - Real-world Use Cases demonstrating value of detailed transformations
- Where do people go to get access to the map?
- Where do they go to stay abreast of or participate in the project?

## For More Information on Model-Based Transformation Service

- Website maintained regularly at <https://confluence.hl7.org/display/SOA/Model-Based+Transformation+Service>
- Includes Project Documents page with mappings at <https://confluence.hl7.org/display/SOA/Project+Documents>
- Currently finalizing mappings and welcoming participation for developing choosing Use Cases that demonstrate value of transformations
- Goal: Functional Specification for Transformation Services
  - Use Cases in September 2019
  - HL7 STU Ballot in January 2020

# Questions?



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