



HL7 FHIR DevDays 2017



FHIR Documents

Rick Geimer, Chief Innovation Officer, Lantana Consulting Group



Amsterdam, 15-17 November | [@fhir_furore](#) | [#fhirdevdays17](#) | [www.fhirdevdays.com](#)

Instructor

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Lantana Consulting Group

- Our Mission
 - Improve healthcare through health information technology (IT)
 - Lead the industry through consulting and volunteer practice
- Our Services
 - Software and standard development and implementation
 - Terminology, data governance, and education
 - Strategic advice for health IT planning, design, and purchasing

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Outline

- Overview of Clinical Documents
- FHIR Documents
- The Composition Resource
- Document Bundles
- Document Operations and APIs
- C-CDA on FHIR and US Core
- Converting Data to/from C-CDA and FHIR
- Current/Future Work and Resources
- Live Walkthroughs (time permitting)

Clinical Documents

- This is a document
- and this
- and this
- and this
- and this
- and this
- and this



Clinical Documents

- **Persistence** – A clinical document continues to exist in an unaltered state, for a time period defined by local and regulatory requirements. **Note:** documents outlive the servers (and often the syntax) on which they are created.
- **Stewardship** – A clinical document is maintained by an organization entrusted with its care.
- **Potential for authentication** – A clinical document is an assemblage of information that is intended to be legally authenticated.
- **Context** – A clinical document establishes the default context for its contents.
- **Wholeness** – Authentication of a clinical document applies to the whole and does not apply to portions of the document without the full context of the document.
- **Human readability** – A clinical document is human-readable.

Why are documents important?

- The clinical record has a dual nature
 - Data
 - Narrative
- Documents support that duality
 - Essential for disparate teams—different disciplines, contexts, or clinical systems
 - Developers need coded data to drive applications
 - Clinicians often say that the most important part of the clinical record is the narrative written by their colleagues

FHIR Documents

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POSITION STATEMENT: CLINICAL DOCUMENTS AND FHIR

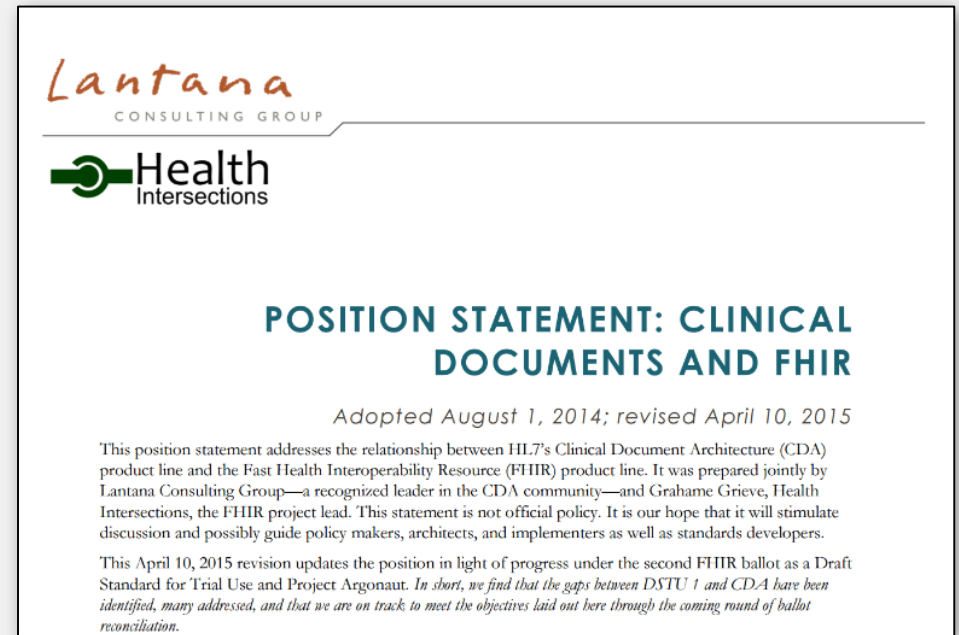
Adopted August 1, 2014; revised April 10, 2015

This position statement addresses the relationship between HL7's Clinical Document Architecture (CDA) product line and the Fast Health Interoperability Resource (FHIR) product line. It was prepared jointly by Lantana Consulting Group—a recognized leader in the CDA community—and Grahame Grieve, Health Intersections, the FHIR project lead. This statement is not official policy. It is our hope that it will stimulate discussion and possibly guide policy makers, architects, and implementers as well as standards developers.

This April 10, 2015 revision updates the position in light of progress under the second FHIR ballot as a Draft Standard for Trial Use and Project Argonaut. *In short, we find that the gaps between DSTU 1 and CDA have been identified, many addressed, and that we are on track to meet the objectives laid out here through the coming round of ballot reconciliation.*

FHIR Documents

- **Position:** FHIR is the document future
- **Call to action:**
 - Define, document, and promote a future where clinical documents and Application Programming Interfaces (APIs) share a common syntax and set of resources
 - Establish, in technical and regulatory policy, a smooth roadmap to the future of clinical document exchange



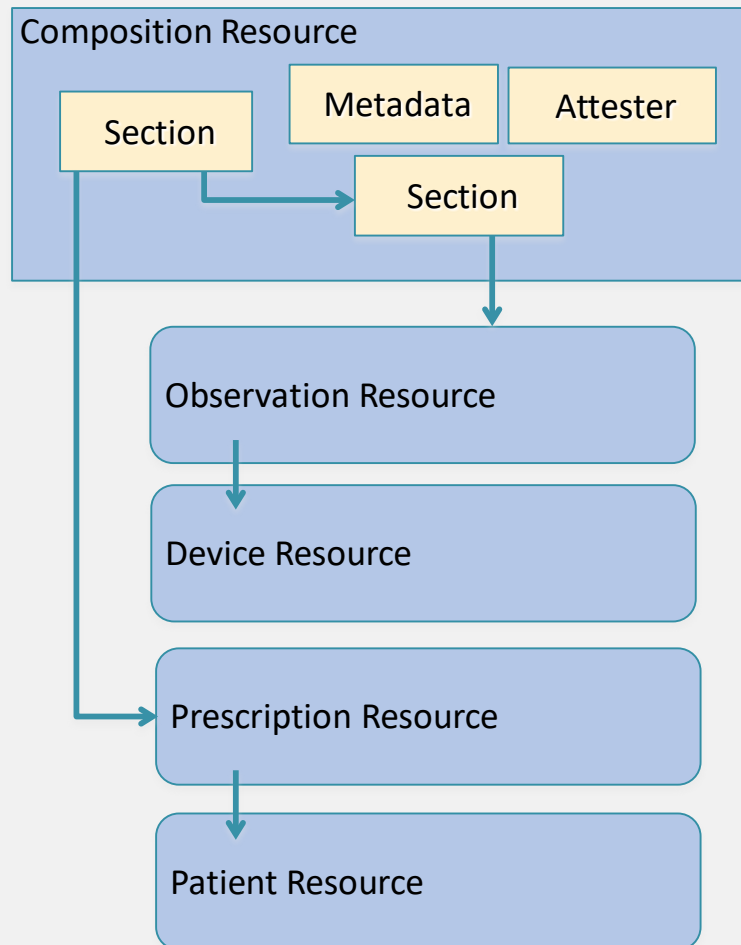
FHIR Documents

- Address 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.
- Has the same basic obligations as a CDA document
- Full rules: <http://build.fhir.org/documents.html>

Why FHIR Developers Might be Interested in Documents

- Load FHIR servers with massive amounts of existing data
 - Most electronic health record (EHR) systems export CDA
 - Their CDA export capabilities are more stable than many of their FHIR APIs (if any)
 - Converting CDA to FHIR is one of the quickest standardized path to Big Data in healthcare today
- Comply with existing requirements
 - FHIR is simpler than CDA
 - Teach developers to create FHIR documents, then convert to CDA for compliance with existing regulations
 - FHIR as an API for creating CDA documents
- Prepare for when FHIR documents are the norm

FHIR Documents are Bundles of Resources



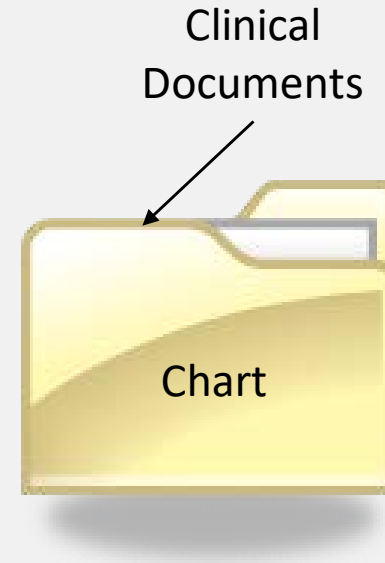
```

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

Yellow arrows in the original image point from the `<Composition />` element to the `<Observation />`, `<Device />`, and `<Patient />` elements, and from the `<Observation />` element to the `<Device />` element, illustrating the bundle structure.

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
 - Enabling clinical document exchange across and within institutions
 - Human readable documents



Composition in Detail

- Key fields
 - Identifier
 - Date
 - Type
 - Subject
 - Author
 - Attester
 - Custodian
 - Sections and narrative
 - References to other resources

Name	Flags	Card.	Type	Description & Constraints
Composition			DomainResource	A set of resources composed into a single coherent clinical statement with clinical attestation Elements defined in Ancestors: id, meta, implicitRules, language, text, contained, extension, modifierExtension Logical identifier of composition (version-independent)
identifier	Σ	0..1	Identifier	
status	?! Σ	1..1	code	preliminary final amended entered-in-error CompositionStatus (Required)
type	Σ	1..1	CodeableConcept	Kind of composition (LOINC if possible) FHIR Document Type Codes (Preferred)
class	Σ	0..1	CodeableConcept	Categorization of Composition FHIR Document Class Codes (Example)
subject	Σ	1..1	Reference(Any)	Who and/or what the composition is about
encounter	Σ	0..1	Reference(Encounter)	Context of the Composition
date	Σ	1..1	dateTime	Composition editing time
author	Σ	1..*	Reference(Practitioner Device Patient RelatedPerson)	Who and/or what authored the composition
title	Σ	1..1	string	Human Readable name/title
confidentiality	?! Σ	0..1	code	As defined by affinity domain ConfidentialityClassification (Required) Attests to accuracy of composition
attester	Σ	0..*	BackboneElement	
mode	Σ	1..*	code	personal professional legal official CompositionAttestationMode (Required)
time	Σ	0..1	dateTime	When the composition was attested
party	Σ	0..1	Reference(Patient Practitioner Organization)	Who attested the composition
custodian	Σ	0..1	Reference(Organization)	Organization which maintains the composition
relatesTo	Σ	0..*	BackboneElement	Relationships to other compositions/documents
code	Σ	1..1	code	replaces transforms signs appends DocumentRelationshipType (Required)
target[x]	Σ	1..1		Target of the relationship
targetIdentifier			Identifier	
targetReference			Reference(Composition)	
event	Σ	0..*	BackboneElement	The clinical service(s) being documented
code	Σ	0..*	CodeableConcept	Code(s) that apply to the event being documented v3 Code System ActCode (Example)
period	Σ	0..1	Period	The period covered by the documentation
detail	Σ	0..*	Reference(Any)	The event(s) being documented
section	I	0..*	BackboneElement	Composition is broken into sections + A section must at least one of text, entries, or sub-sections + A section can only have an emptyReason if it is empty
title		0..1	string	Label for section (e.g. for ToC)
code		0..1	CodeableConcept	Classification of section (recommended) Document Section Codes (Example)
text	I	0..1	Narrative	Text summary of the section, for human interpretation
mode	?! Σ	0..1	code	working snapshot changes ListMode (Required)
orderBy		0..1	CodeableConcept	Order of section entries List Order Codes (Preferred)
entry	I	0..*	Reference(Any)	A reference to data that supports this section
emptyReason	I	0..1	CodeableConcept	Why the section is empty List Empty Reasons (Preferred)
section	I	0..*	see section	Nested Section

Sections and Narrative

- Composition resources contain sections (which may be nested)
- Section narrative markup is XHTML
- Narrative contains the attested text of the document
- 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>
```

```
<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 of Bundle

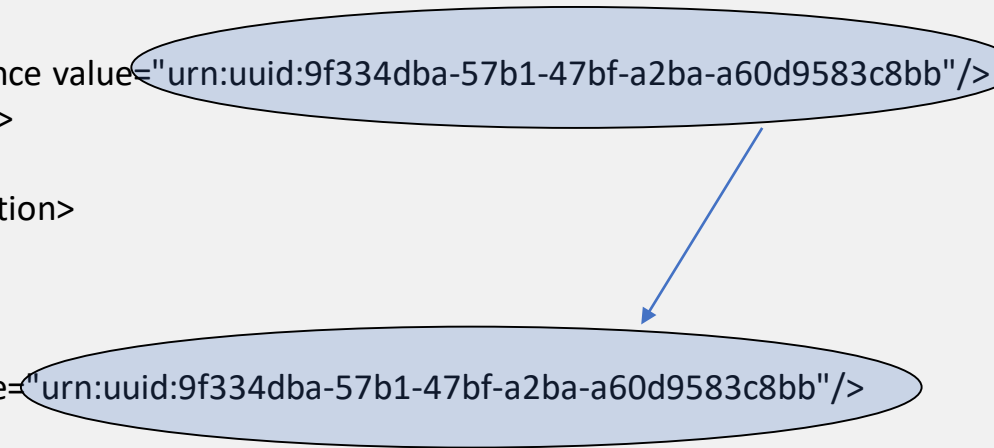
- Type = document
- Bundle.identifier
 - Version dependent
 - Must be globally unique to satisfy the persistence requirement
- First resource is Composition
- Documents must be standalone, so...
- Bundle must contain all resources referenced from the Composition

name	Flags	Card.	Type	Description & Constraints
Bundle	Σ I		Resource	Contains a collection of resources + <i>fullUrl</i> must be unique in a bundle, or else entries with the same <i>fullUrl</i> must have different <i>meta.versionId</i> + A document must have an identifier with a system and a value + <i>entry.request</i> only for some types of bundles + <i>entry.response</i> only for some types of bundles + <i>total</i> only when a search or history + <i>entry.search</i> only when a search Elements defined in Ancestors: <i>id</i> , <i>meta</i> , <i>implicitRules</i> , <i>language</i> Persistent identifier for the bundle
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)
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 http://www.iana.org/assignments/link-relations/link-relations.xhtml#link-relations-1
url	Σ	1..1	uri	Reference details for the link
entry	Σ I	0..*	BackboneElement	Entry in the bundle - will have a resource, or information + <i>fullUrl</i> cannot be a version specific reference + must be a resource unless there's a request or response Links related to this entry
link	Σ	0..*	see link	Links related to this entry
fullUrl	Σ	0..1	uri	Absolute URL for resource (server address, or UUID/OID)
resource	Σ	0..1	Resource	A resource in the bundle
search	Σ I	0..1	BackboneElement	Search related information
mode	Σ	0..1	code	match include outcome - why this is in the result set <i>SearchEntryMode</i> (Required)
score	Σ	0..1	decimal	Search ranking (between 0 and 1)
request	Σ I	0..1	BackboneElement	Transaction Related Information
method	Σ	1..1	code	GET POST PUT DELETE <i>HTTPVerb</i> (Required)
url	Σ	1..1	uri	URL for HTTP equivalent of this entry
ifNoneMatch	Σ	0..1	string	For managing cache currency
ifModifiedSince	Σ	0..1	instant	For managing update contention
ifMatch	Σ	0..1	string	For managing update contention
ifNoneExist	Σ	0..1	string	For conditional creates
response	Σ I	0..1	BackboneElement	Transaction Related Information
status	Σ	1..1	string	Status response code (text optional)
location	Σ	0..1	uri	The location, if the operation returns a location
etag	Σ	0..1	string	The etag for the resource (if relevant)
lastModified	Σ	0..1	instant	Server's date time modified
outcome	Σ	0..1	Resource	OperationOutcome with hints and warnings (for batch/transaction)
signature	Σ	0..1	Signature	Digital Signature

Documentation for this format

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>

Rendering FHIR Documents

- When the document is presented for human consumption, applications SHOULD present the collated narrative portions in order:
 - Subject resource Narrative
 - Composition resource Narrative
 - section.text Narratives
- Reference stylesheet (XSLT)
 - Document2HTML.xslt in the XML Tools download
 - <http://hl7.org/fhir/downloads.html>

Demonstration

- Review a FHIR Document Bundle

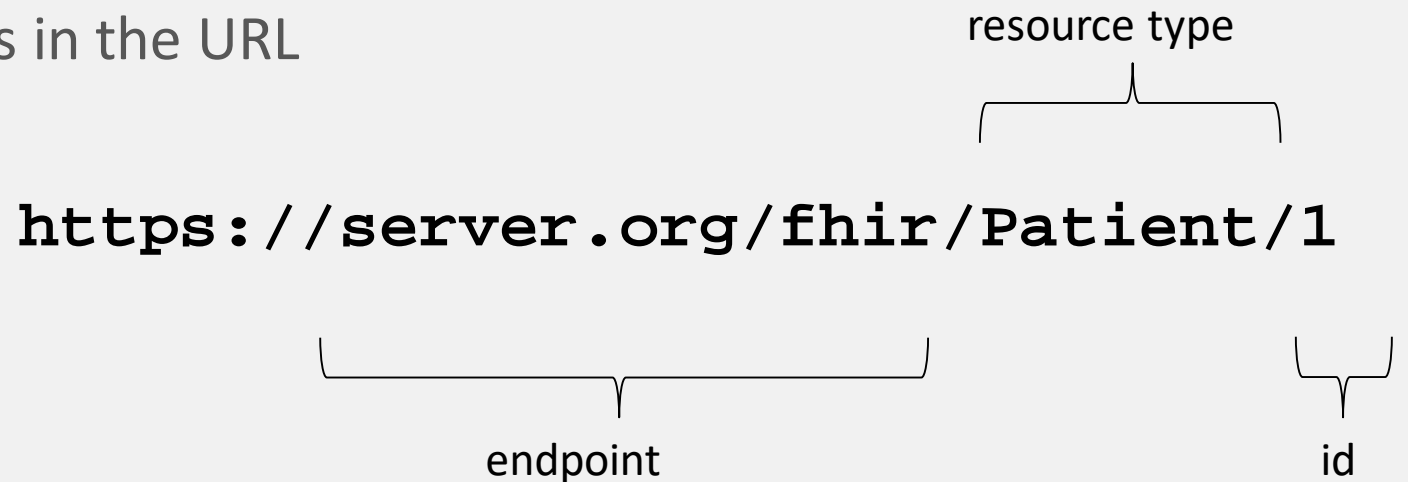
FHIR APIs

- REST = “Representational state transfer”
(an architecture for how to connect systems)
 - Based on HTTP, the protocol that powers the Web
 - Outcomes
 - Simple stable interfaces
 - High performance / scalability
 - Visible process (e.g., can debug)
 - Portability
 - Reliability (resistance to failure)
- REST in FHIR
 - The FHIR API is composed of RESTful web services

FHIR RESTful URLs

- CRUD(E) operations mapped to HTTP
 - Create new resource: POST to the resource type endpoint
 - Read existing resource: GET
 - Update existing resource: PUT
 - Delete existing resource: DELETE
 - Execute: Use \$operations in the URL

https://server.org/fhir/Patient/1



The diagram shows the URL **https://server.org/fhir/Patient/1** with three annotations: a bracket above "Patient" labeled "resource type", a bracket below "server.org/fhir" labeled "endpoint", and a bracket below "1" labeled "id".

Documents and FHIR APIs

- Generating documents
 - \$document
 - Stores at the /Bundle endpoint if persist=true
- Moving documents or storing externally created documents
 - Send to /Bundle or /Binary depending on use case
 - Use PUT to preserve IDs when sending to /Bundle (First, make sure globally unique)
- Decomposing documents
 - POST to the transaction endpoint (May need to be converted to a transaction bundle first)

Managing FHIR Documents

- To satisfy the persistence and stewardship requirements, documents must be stored somewhere (or reproduced on demand)
- The easiest way is on a FHIR server directly, either at the Bundle or Binary endpoint
- Other options include document management systems, clinical data repositories, etc.
- **Important:** documents cannot be generated, transmitted, then disposed of like a message

Validating FHIR Documents

- FHIR validation pack
 - Includes XML Schema and Schematron files
 - <http://build.fhir.org/fhir-all-xsd.zip>
- The FHIR Validator
 - A Java JAR file that runs full FHIR validation
 - <http://build.fhir.org/validator.zip>
- FHIR server validation
 - Most servers to basic resource validation
 - Use the \$validate operation
 - Can validate profiles like C-CDA on FHIR
 - <http://build.fhir.org/operation-resource-validate.html>

Resources

- The FHIR specification
 - Updated continuously
 - Latest balloted version: <http://hl7.org/fhir>
 - Continuous build: <http://build.fhir.org/>
- “FHIR CDA Position Statement and Roadmap”
Lantana white paper co-authored with Grahame Grieve; Updated April, 2015
 - <http://www.lantanagroup.com/resources/publications/>
- Rick Geimer
 - Updated continuously, rebooted occasionally
 - rick.geimer@lantanagroup.com



HL7 FHIR DevDays 2017



C-CDA on FHIR

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Outline

- CDA and C-CDA
- C-CDA on FHIR
- US Core
- C-CDA on FHIR Walkthrough/Demo

Clinical Document Architecture (CDA)

- A specification for exchange of clinical documents, defining their structure and semantics
- ANSI/ISO standard developed by HL7's Structured Documents Work Group (SDWG)
- Base standard on which many implementation guides (IGs) are built:
 - Quality Reporting Document Architecture (QRDA)
 - Healthcare Associated Infection (HAI) Reports
 - Consolidated CDA (C-CDA)
 - . . . and many others

Consolidated CDA

- HL7 Consult Note
- HL7 Diagnostic Imaging Report
- HL7 Discharge Summary
- HL7 History and Physical
- HL7 Operative Note
- HL7 Procedure Note
- HL7 Unstructured Documents
- HL7 Progress Notes
- HL7 Continuity of Care Document
- HITSP/C84 Consult and History & Physical Note Document
- HITSP/C32 - Summary Documents Using HL7 CCD
- HITSP/C48 Referral and Discharge Summary Document constructs
- HITSP/C62 Scanned document



Consolidate and harmonize various standalone documents into one master implementation guide for the primary care use case.

Later versions added additional document types.

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 specification
- Tighter coupling to APIs (RESTful services)

Brief History of CDA to FHIR Mapping

- Initial CDA to FHIR mappings
 - Addressed question: “Can FHIR handle the CDA use case?”
 - Fixed FHIR when it couldn’t
 - 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

CDA Templates vs. FHIR Resources and Profiles

Level of abstraction



Reference Information Model

- Highly abstract
- act, participation, role...



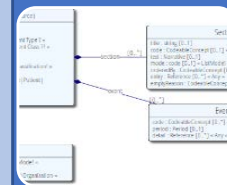
Reference Information Model

- Highly abstract
- act, participation, role...



Refined Information Model

- Generic CDA
- observation, procedure, etc.



Resource

- FHIR component for msg, doc
- AllergyIntolerance, Condition, etc.



Templated CDA

- CCD or C-CDA or QRDA
- Allergy – Intolerance Observation, Problem Observation, etc.



Profile

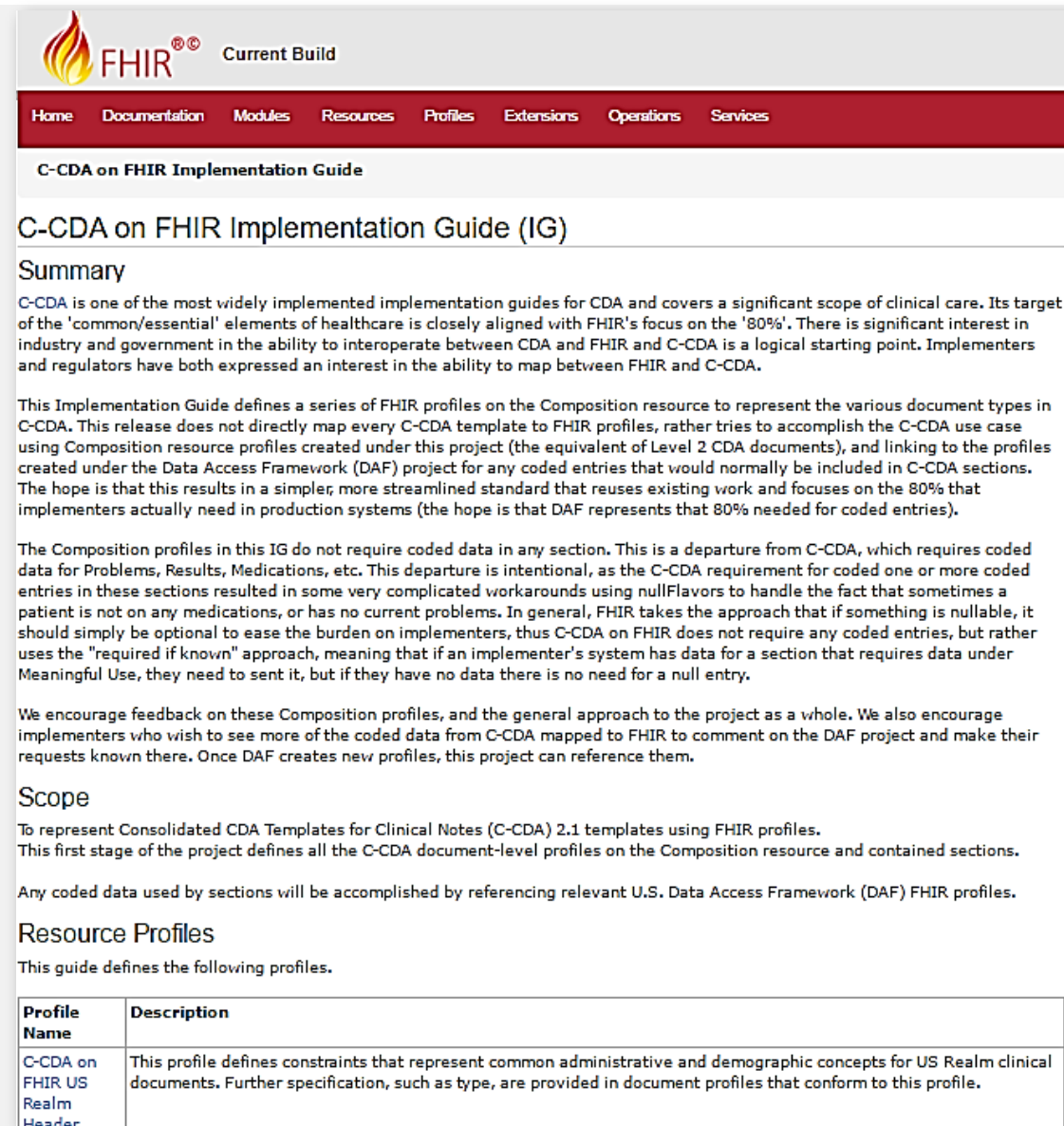
- Localized resource
- US-Core-AllergyIntolerance, US-Core-Condition, etc.

FHIR Implementation Guides and Profiles

- FHIR IGs are collections of profiles, value sets, examples, resource instances (conformance, etc.) and human readable documentation.
- An ImplementationGuide resource 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 Argonaut mappings left off
- Goal: Implementable FHIR profiles for the C-CDA use case



FHIR[®] Current Build

Home Documentation Modules Resources Profiles Extensions Operations Services

C-CDA on FHIR Implementation Guide

C-CDA on FHIR Implementation Guide (IG)

Summary

C-CDA is one of the most widely implemented implementation guides for CDA and covers a significant scope of clinical care. Its target of the 'common/essential' elements of healthcare is closely aligned with FHIR's focus on the '80%'. There is significant interest in industry and government in the ability to interoperate between CDA and FHIR and C-CDA is a logical starting point. Implementers and regulators have both expressed an interest in the ability to map between FHIR and C-CDA.

This Implementation Guide defines a series of FHIR profiles on the Composition resource to represent the various document types in C-CDA. This release does not directly map every C-CDA template to FHIR profiles, rather tries to accomplish the C-CDA use case using Composition resource profiles created under this project (the equivalent of Level 2 CDA documents), and linking to the profiles created under the Data Access Framework (DAF) project for any coded entries that would normally be included in C-CDA sections. The hope is that this results in a simpler, more streamlined standard that reuses existing work and focuses on the 80% that implementers actually need in production systems (the hope is that DAF represents that 80% needed for coded entries).

The Composition profiles in this IG do not require coded data in any section. This is a departure from C-CDA, which requires coded data for Problems, Results, Medications, etc. This departure is intentional, as the C-CDA requirement for coded one or more coded entries in these sections resulted in some very complicated workarounds using nullFlavors to handle the fact that sometimes a patient is not on any medications, or has no current problems. In general, FHIR takes the approach that if something is nullable, it should simply be optional to ease the burden on implementers, thus C-CDA on FHIR does not require any coded entries, but rather uses the "required if known" approach, meaning that if an implementer's system has data for a section that requires data under Meaningful Use, they need to send it, but if they have no data there is no need for a null entry.

We encourage feedback on these Composition profiles, and the general approach to the project as a whole. We also encourage implementers who wish to see more of the coded data from C-CDA mapped to FHIR to comment on the DAF project and make their requests known there. Once DAF creates new profiles, this project can reference them.

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 U.S. Data Access Framework (DAF) FHIR profiles.

Resource Profiles

This guide defines the following profiles.

Profile Name	Description
C-CDA on FHIR US Realm Header	This profile defines constraints that represent common administrative and demographic concepts for US Realm clinical documents. Further specification, such as type, are provided in document profiles that conform to this profile.

C-CDA on FHIR Scope

- Represent C-CDA Templates for Clinical Notes (C-CDA 2.1) templates using FHIR profiles
- 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

- January 2017 ballot
 - <http://hl7.org/fhir/us/ccda/index.html>
- Current build
 - <http://build.fhir.org/ig/HL7/ccda-on-fhir/>

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

0 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).

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

External Links:

Implementation Guides Specifications based on the FHIR standard <ul style="list-style-type: none"> • Published by HL7, Affiliates & FHIR Foundation ↗ • Other IGs (FHIR Wiki) ↗ 	FHIR Foundation ↗ Enabling health interoperability through FHIR <ul style="list-style-type: none"> • Community Forum ↗ + FHIR Chat ↗ • Public Test Servers & Software ↗ • Blogs that cover FHIR ↗ • FHIR Wiki ↗ 	Translations Note that translations are not always up to date <ul style="list-style-type: none"> • Russian ↗ • Chinese ↗ • Japanese ↗
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C-CDA on FHIR Details

- Included in the specification
 - Composition profiles
 - Composition resource examples
 - Extensions
- Not included (yet)
 - Mappings
 - Profiles on resources other than Composition
 - Unstructured Documents
(may be a profile on DocumentReference)

US Realm Header

- Generic constraints that apply to all US Realm documents
- References common US Realm extensions
- Abstract
 - Not meant to be implemented standalone
 - Base profile for all C-CDA on FHIR Composition profile

Element	Cardinality	Type	Profile	Notes
backboneelement	0..*			attester
mode	1..*	code		mode Fixed Value
party	1..1	Reference(US Core Patient Profile)		party
custodian	1..1	Reference(US Core Organization Core Profile)		custodian
CCDA-on-FHIR-Data-Enterer	0..1	Reference(US Core Practitioner Profile)		Optional Extension URL: http://hl7.org/fhir/USCore/extension/CCDA-on-FHIR-Data-Enterer
url	1..1	uri		
CCDA-on-FHIR-Informant	0..*	Reference(US Core Practitioner Profile), Reference(US Core Patient Profile), Reference(RelatedPerson)		informant URL: http://hl7.org/fhir/USCore/extension/CCDA-on-FHIR-Informant
url	1..1	uri		
CCDA-on-FHIR-Information-Recipient	0..*	Reference(US Core Practitioner Profile)		information URL: http://hl7.org/fhir/USCore/extension/CCDA-on-FHIR-Information-Recipient
url	1..1	uri		
CCDA-on-FHIR-Participant	0..*	Reference(US Core Practitioner Profile), Reference(US Core Patient Profile), Reference(RelatedPerson)		participant URL: http://hl7.org/fhir/USCore/extension/CCDA-on-FHIR-Participant
url	1..1	uri		
CCDA-on-FHIR-Performer	0..*	Reference(US Core Practitioner Profile)		performer URL: http://hl7.org/fhir/USCore/extension/CCDA-on-FHIR-Performer
url	1..1	uri		
CCDA-on-FHIR-Authorization	0..*	Reference(C-CDA on FHIR Consent)		authorization URL: http://hl7.org/fhir/USCore/extension/CCDA-on-FHIR-Authorization

US Core Framework

- US Core Implementation Guide:
<http://hl7.org/fhir/us/core/index.html>
- FHIR Profiles for the Common Clinical Data Set (CCDS):
https://www.healthit.gov/sites/default/files/2015Ed_CCG_CCDS.pdf

- [US Core AllergyIntolerance Profile](#)
- [US Core CareTeam Profile](#)
- [US Core Condition \(a.k.a Problem\) Profile](#)
- [US Core Device Profile](#)
- [US Core DiagnosticReport Profile](#)
- [US Core Goal Profile](#)
- [US Core Immunization Profile](#)
- [US Core Location Profile](#)
- [US Core Medication Profile](#)
- [US Core MedicationRequest Profile](#)
- [US Core MedicationStatement Profile](#)
- [US Core Practitioner Profile](#)
- [US Core Procedure Profile](#)
- [US Core Results Profile](#)
- [US Core Smoking Status Profile](#)
- [US Core CarePlan Profile](#)
- [US Core Organization Core Profile](#)
- [US Core Patient Profile](#)



























US Core adopts the
[Vitals Signs Profile](#) from FHIR Core.

Key US Core Profiles Used in the US Realm Header

- Patient
- Practitioner
- Organization











Key US Core Profiles / Patient

- Patient
- Practitioner
- Organization
- Profile on the Patient resource
- Key Constraints
 - Birth date
 - Communication
 - Race/ethnicity
 - Birth sex

 identifier	 S	1..1	identifier
 system	 S	1..1	uri
 value	 S	1..1	string
 name	 S	1..*	HumanName
 family	 S	1..1	string
 given	 S	1..*	string
 gender	 S	1..1	code
 birthDate	 S	0..1	date
 animal		0..0	
 communication	 S	0..*	BackboneElement
 language	 S	1..1	CodeableConcept
 us-core-race	 S	0..1	(Complex)
 us-core-ethnicity	 S	0..1	(Complex)

Key US Core Profiles / Practitioner

- Patient
 - Practitioner
 - Organization
- Profile on the Practitioner resource
 - Key Constraints
 - Identifier
 - Name
 - For identifier, National Provider Identifier (NPI) preferred, but tax ID and local IDs also allowed

me	Flags	Card.	Type
Practitioner		0..*	
 identifier		1..*	Identifier
 system		1..1	uri
 value		1..1	string
 name		1..1	HumanNa
 family		1..1	string

Key US Core Profiles / Organization

- Patient
- Practitioner
- **Organization**
 - Profile on the Organization resource
 - Key Constraints
 - Identifier
 - Organization status
 - Name
 - Contact info
 - Address
 - Endpoint info (for web services)

Name	Flags	Card.	Type
Organization		0..*	
identifier	S	1..*	Identifier
active	S	1..1	boolean
name	S	1..1	string
telecom	S	1..*	ContactPoint
address	S	1..*	Address
line	S	0..*	string
city	S	0..1	string
state	S	0..1	string
postalCode	S	0..1	string
endpoint	S	0..*	Reference(Endpoint)

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

Document Types

- Based on the US Realm Header
 - Each adds additional constraints specific to that document type
 - Each defines legal sections and coded data for that document type
- 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

CCD Overview

- Most common document type in C-CDA (the CDA-based standard)
- Expected to be highly prevalent in C-CDA on FHIR
- Is a summary document type, intended for transfer of care scenarios
- Is often overused as a kind of “EHR data dump” (Who wants to read a 60 page “summary”?)

CCD Header

- Inherits from US Core
- Binds type to 34133-9 (summarization of Episode Note) from LOINC
- Requires event to be present (the period of care being summarized)

Name	Flags	Card.	Type	Description & Constraints
Composition		0..*		
type		1..1	CodeableConcept	Summary of episode note Required Pattern: {"coding": [{"system": "http://loinc.org", "code": "34133-9"}]}
event		1..1	BackboneElement	serviceEvent
code		0..*	CodeableConcept	code Required Pattern: {"coding": [{"system": "urn:oid:2.16.840.1.113883.5.6", "code": "PCPR"}]}
period		1..1	Period	period
start		1..1	dateTime	start
end		1..1	dateTime	end

CCD Sections

Required

- Allergies and Intolerances
- Medications
- Problems
- Results
- Vital Signs
- Social History

Optional

- Procedures
- Advance Directives
- Encounters
- Family History
- Functional Status
- Immunizations
- Nutrition
- Mental Status
- Plan of Treatment
- Payers
- Medical Equipment

Profiles Used in CCD Sections

- US Core Allergies
- US Core Medication Statement
- US Core Condition
- US Core Procedure
- US Core Result
- US Core Immunization
- US Core Vital Signs
- US Core Smoking Status Observation

Plus other unprofiled resources such as Observation, Encounter, etc.

C-CDA on FHIR Demo

- Live walkthrough of the specification
- Composition profiles and US Core
- Converting CDA documents to FHIR

C-CDA on FHIR Timeline

- Sept 2016 “For Comment” ballot completed (Ballot reconciliation finished Dec 2016)
- First STU ballot in January 2017
- Final publication...now!

Resources

- The FHIR specification
 - Updated continuously
 - Latest balloted version: <http://hl7.org/fhir>
 - Continuous build: <http://build.fhir.org/>
- “FHIR CDA Position Statement and Roadmap” Lantana white paper co-authored with Grahame Grieve; Updated April, 2015
 - <http://www.lantanagroup.com/resources/publications/>
- Rick Geimer
 - Updated continuously, rebooted occasionally
 - rick.geimer@lantanagroup.com