FHIR Documents

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Your Instructor

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Lantana Consulting Group

Mission:
- Improve healthcare through health information technology (IT)
- Lead the industry through our consulting and volunteer practice

Services:
- Software & standard development & implementation
- Terminology, data governance, and education
- Strategic advice for health IT planning, design, and purchasing

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 dual nature of the clinical record:
  - 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

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

- Out of the box – no templates required (profiling recommended)
- Not restricted to documents
- Spec-generated implementer tooling
- Tighter coupling to APIs (RESTful services)
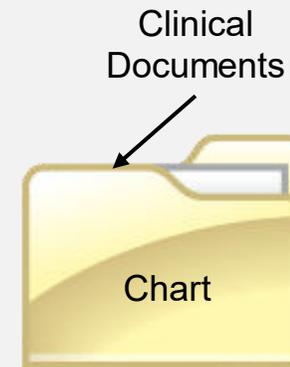
FHIR Documents

- Address CDA use case for clinical documents

- Collection of resources bound together
  - Root is a Composition resource
  - Similar to CDA header + narrative

- Sent as a Bundle resource

- Functionality for signature and authentication

- Same core principles as CDA documents

- Full rules: http://build.fhir.org/documents.html
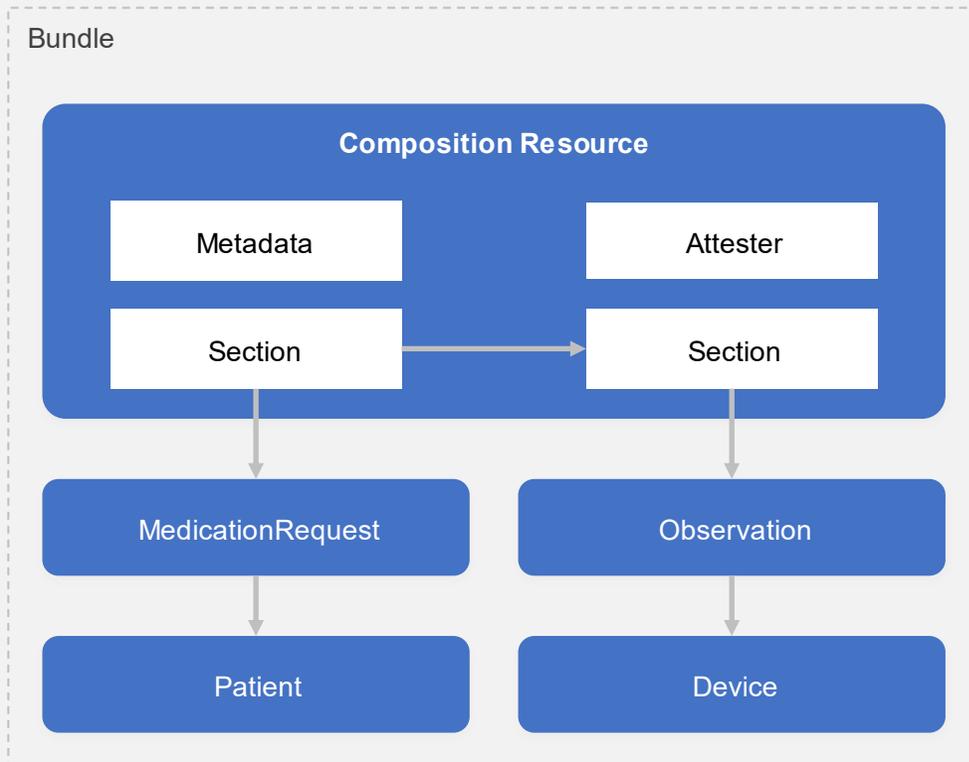
Composition Resource

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

Clinical Documents

Chart

Sections and Narrative

- Composition resources contain sections, which may be nested
- XHTML section narrative markup
- Narrative contains the attested text of the document
- Sections can 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

```xml
<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>
```

```xml
<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>
```
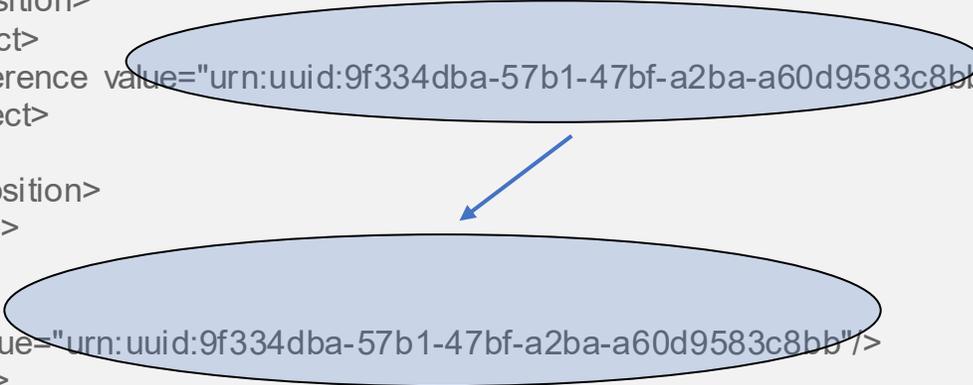
A Bit More on Bundle

- Bundle.type = document

- Bundle.identifier:
  - Version dependent
  - Globally unique to satisfy the persistence requirement

- First entry is a Composition

- Documents must be standalone

- The bundle contains all resources referenced in the Composition

e	Flags	Card.	Type	Description & Constraints
Bundle	Σ I N		Resource	Contains a collection of resources + FullUrl must be unique in a bundle, or else entries with the same fullUrl 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 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

References in Bundles

```xml
<?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 RESTful URLs, such as:
http://example.org/fhir/Patient/1

Brief History of CDA on FHIR

- Initial CDA to FHIR mappings:
  - Answer the question, "Can FHIR handle the CDA use case?", and fix FHIR if the answer is no
  - Based on FHIR DSTU1 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, which resulted in key changes to DSTU2
  - http://tinyurl.com/zhj2u9s

- C-CDA on FHIR project:
  - Implementable profiles that target FHIR STU3
  - 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 (e.g., conformance) and human readable documentation.

- An ImplementationGuide resource ties it all together.

- Publishing FHIR IGs is a new and tricky process.

C-CDA on FHIR

- US Realm FHIR implementation guide

- Followed the Argonaut mappings

- Goal: Implementable FHIR profiles for the C-CDA use case

- Scope:
  - Use FHIR profiles to represent Consolidated CDA Templates for Clinical Notes (C-CDA) 2.1 templates.
  - The first stage of the project defines all C-CDA document-level profiles on the Composition resource and nested sections.
  - References to relevant US-Core FHIR profiles will accomplish all coded data within the sections.

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/

Document Types

- 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

Each document type

- Covers same structured documents as C-CDA

- Defines the legal sections and coded data for that document type

The US Core Document Reference profile covers the Unstructured Document

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

C-CDA on FHIR Extensions

- Data Enterer: US Core Practitioner

- Informant: US Core Practitioner

- Information Recipient: US Core Practitioner

- Participant: RelatedPerson

- Performer: US Core Practitioner

- Authorization: Contract

- Add features missing from Composition and necessary for the C-CDA use case

- Some could be future additions to Composition if the use case proves general (and international)

C-CDA on FHIR Demo

- Live walkthrough

- Composition profiles and US Core

Questions?