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CDA on FHIR

The Road Ahead

Ground Rules

- All attendees are muted
- Please submit questions via chat
- Webinar is being recorded
- Slides and a link to the recorded webinar will be posted to the resources section of our website: https://www.lantanagroup.com/resources/presentations/

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About Lantana

Lantana Consulting Group provides services and software for healthcare providers, vendors, and regulators who develop and implement standards-based health information exchange. Lantana operates in a distributed environment with more than 25 consultants and staff.

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Lantana Vision & Expertise

Our Vision:

Health information available across the spectrum of care, supporting safe, effective, affordable healthcare that improves well-being, public health, quality of care, and research.

Our Expertise:

Lantana has developed and implemented over two dozen US and international healthcare data exchange standards, including the HL7:

- Clinical Document Architecture (CDA)
- Consolidated CDA (C-CDA)
- Fast Healthcare Interoperability Resources (FHIR)
- Healthcare Quality Measure Format (HQMF) or "eMeasure"
- Quality Reporting Document Architecture (QRDA) standards
- Healthcare Associated Infection Reports (HAI)

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Agenda

- **Welcome**
- Overview of CDA & FHIR
- The CDA on FHIR & C-CDA on FHIR Projects
- State of the art: CDA & FHIR
- The Road Ahead: A CDA FHIR Strategy
- Q&A & Links

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Speakers

Melissa Bundy
Director of Communications

Rick Geimer
Chief Technology Officer

Liora Alschuler
Chief Executive Officer

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Why look at CDA & FHIR?

Position: *See our white paper, written with Grahame Grieve*

"CDA addresses interoperability for clinical documents, mixing narrative and structured data. FHIR provides granular access to data, a contemporary, streamlined approach to interoperability, and is easy to implement. FHIR can be the future of CDA, but it is not there yet."

- Should I use FHIR instead of CDA?
- Can FHIR and CDA work together?
- How do I know which standard will help me accomplish my goals?
- What are the risks for early adopters of FHIR?
- How can I safely integrate FHIR into my interoperability strategy?

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What is CDA R2?

- A specification for exchange of clinical documents, defining their structure and semantics
- ANSI standard developed by HL7's Structured Documents Work Group (SDWG)
- ISO standard
- CDA R2 relies on:
  - XML
  - HL7 V3 RIM
  - HL7 V3 development methodology
  - Controlled vocabularies (SNOMED, LOINC, ICD-9, HL7, etc.)

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Characteristics of Clinical Documents

1. **Persistence** – A clinical document continues to exist in an unaltered state, for a time period defined by local and regulatory requirements (NOTE: There is a distinct scope of persistence for a clinical document, independent of the persistence of any XML-encoded CDA document instance).
2. **Stewardship** – A clinical document is maintained by an organization entrusted with its care.
3. **Potential for authentication** - A clinical document is an assemblage of information that is intended to be legally authenticated.
4. **Context** – A clinical document establishes the default context for its contents.
5. **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.
6. **Human readability** – A clinical document is human readable.

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CDA Header & Body

Header

Identifies

- Patient
- Author
- Custodian
- Type of document (e.g. Discharge summary)

Sufficient for

- Medical records management
- Document management
- Enable clinical document exchange across and within institutions

Body

Contains the clinical content

Supports StructuredBody and NonXMLBody

StructuredBody includes

- Sections – human-readable
- Entries – discrete clinical statements for machine processing

NonXMLBody

- PDF
- JPEG

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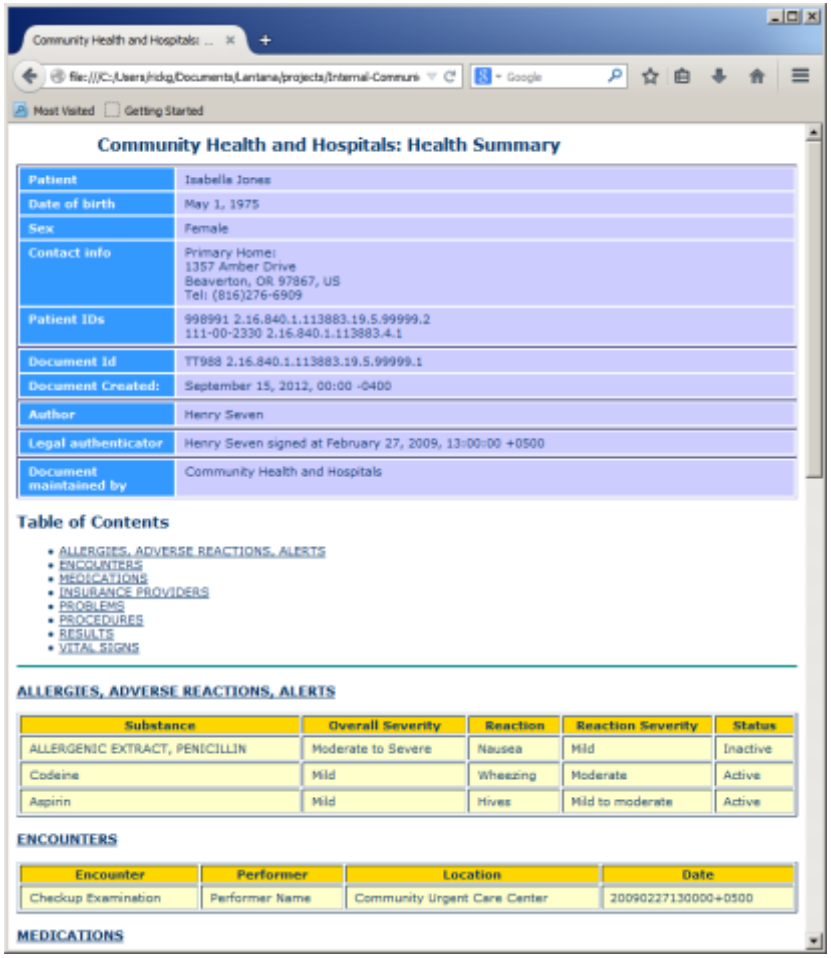
Sample CDA

CDA XML

```
<?xml version="1.0" encoding="UTF-8" standalone="true"?>
- <ClinicalDocument xmlns:sdtc="urn:hl7-org:sdtc" xmlns:cda="urn:hl7-org:v3"
xmlns="urn:hl7-org:v3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance">
    <realmCode code="US"/>
    <typeId extension="POCD_HD000040" root="2.16.840.1.113883.1.3"/>
    <templateId root="2.16.840.1.113883.10.20.22.1.1"/>
    <templateId root="2.16.840.1.113883.10.20.22.1.2"/>
    <id extension="TT988" root="2.16.840.1.113883.19.5.99999.1"/>
    <code code="34133-9" displayName="Summarization of Episode Note"
      codeSystemName="LOINC" codeSystem="2.16.840.1.113883.6.1"/>
    <title>Community Health and Hospitals: Health Summary</title>
    <effectiveTime value="201209150000-0400"/>
    <confidentialityCode code="N" codeSystem="2.16.840.1.113883.5.25"/>
    <languageCode code="en-US"/>
    <setId extension="sTT988" root="2.16.840.1.113883.19.5.99999.19"/>
    <versionNumber value="1"/>
  - <recordTarget>
    - <patientRole>
        <id extension="998991" root="2.16.840.1.113883.19.5.99999.2"/>
        <id extension="111-00-2330" root="2.16.840.1.113883.4.1"/>
      + <addr use="HP">
        <telecom value="tel:(816)276-6909" use="HP"/>
      - <patient>
        - <name use="L">
            <given>Isabella</given>
            <given>Isa</given>
            <family>Jones</family>
          </name>
          <administrativeGenderCode code="F" displayName="Female"
            codeSystem="2.16.840.1.113883.5.1"/>
          <birthTime value="19750501"/>
        + <birthplace>
        </patient>
      </patientRole>
  </recordTarget>
  - <author>
      <time value="20050329224411+0500"/>
    - <assignedAuthor>
        <id extension="99999999" root="2.16.840.1.113883.4.6"/>
        <code code="200000000X" displayName="Allopathic & Osteopathic
```

CDA Rendered in a Browser



Community Health and Hospitals: Health Summary

Patient	Isabella Jones
Date of birth	May 1, 1975
Sex	Female
Contact info	Primary Home: 1357 Amber Drive Beaverton, OR 97867, US Tel: (816)276-6909
Patient IDs	998991 2.16.840.1.113883.19.5.99999.2 111-00-2330 2.16.840.1.113883.4.1
Document Id	TT988 2.16.840.1.113883.19.5.99999.1
Document Created:	September 15, 2012, 00:00 -0400
Author	Henry Seven
Legal authenticator	Henry Seven signed at February 27, 2009, 13:00:00 +0500
Document maintained by	Community Health and Hospitals

Table of Contents

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- ENCOUNTERS
- MEDICATIONS
- INSURANCE PROVIDERS
- PROBLEMS
- PROCEDURES
- RESULTS
- VITAL SIGNS

ALLERGIES, ADVERSE REACTIONS, ALERTS

Substance	Overall Severity	Reaction	Reaction Severity	Status
ALLERGENIC EXTRACT, PENICILLIN	Moderate to Severe	Nausea	Mild	Inactive
Codeine	Mild	Wheezing	Moderate	Active
Aspirin	Mild	Hives	Mild to moderate	Active

ENCOUNTERS

Encounter	Performer	Location	Date
Checkup Examination	Performer Name	Community Urgent Care Center	20090227130000+0500

MEDICATIONS

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Where is CDA used?

Primary Care

- Consolidated CDA (C-CDA)

Quality Reporting

- Quality Reporting Document Architecture (QRDA)

Public Health

- Healthcare Associated Infection (HAI) Reporting

… and many other areas

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HL7 CDA: Incrementalism

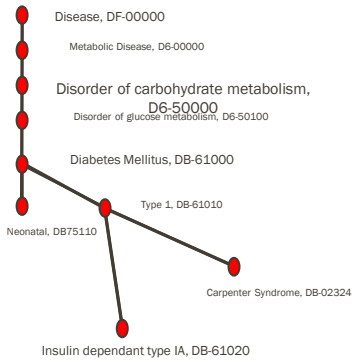
1. Get the data flowing, get the data flowing, get the data flowing.
2. Incrementally add structure where it is valuable to do so.

Narrative Text

HL7 CDA Structured Documents

Coded Discrete Data Elements (via CDA Templates)

SNOMED CT



Quality Reporting

Decision Support

Clinical Applications

Meaningful Use!

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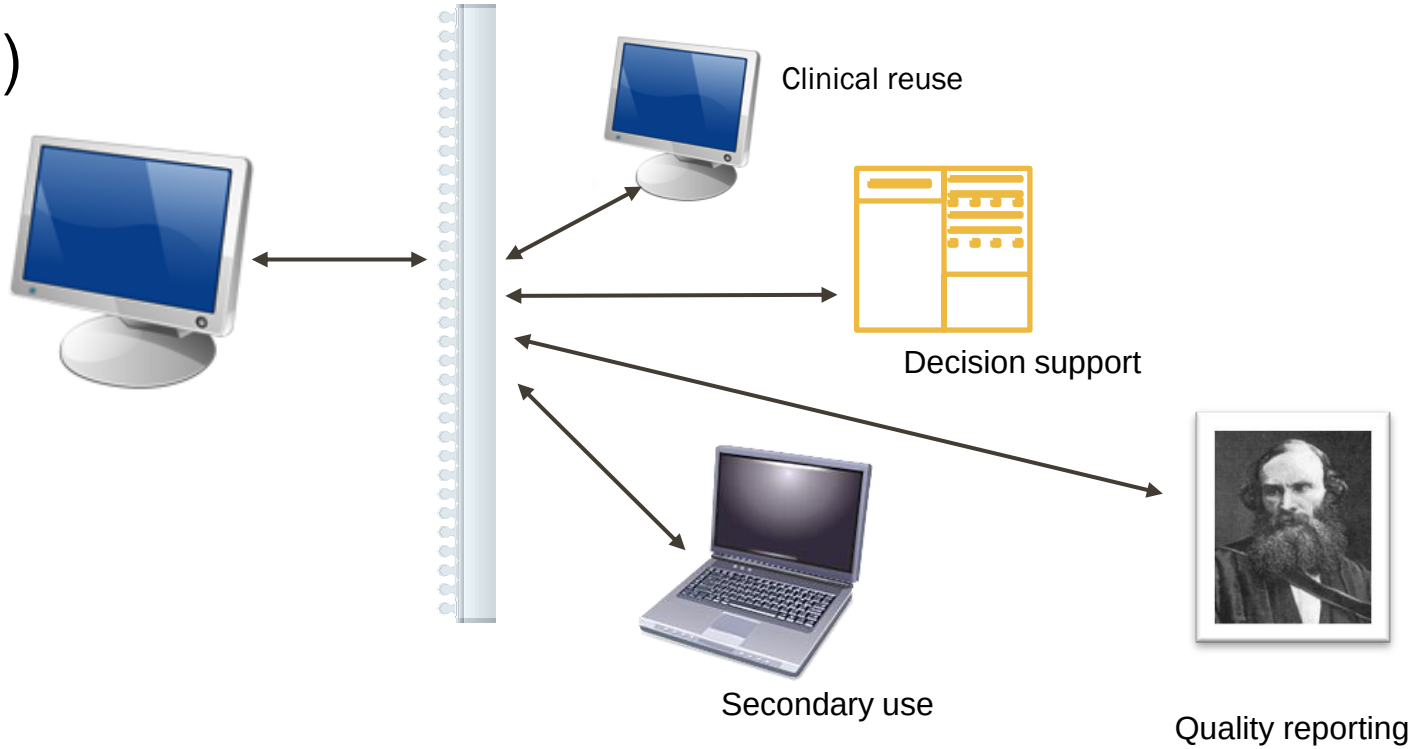
CDA, MU, and Re-use

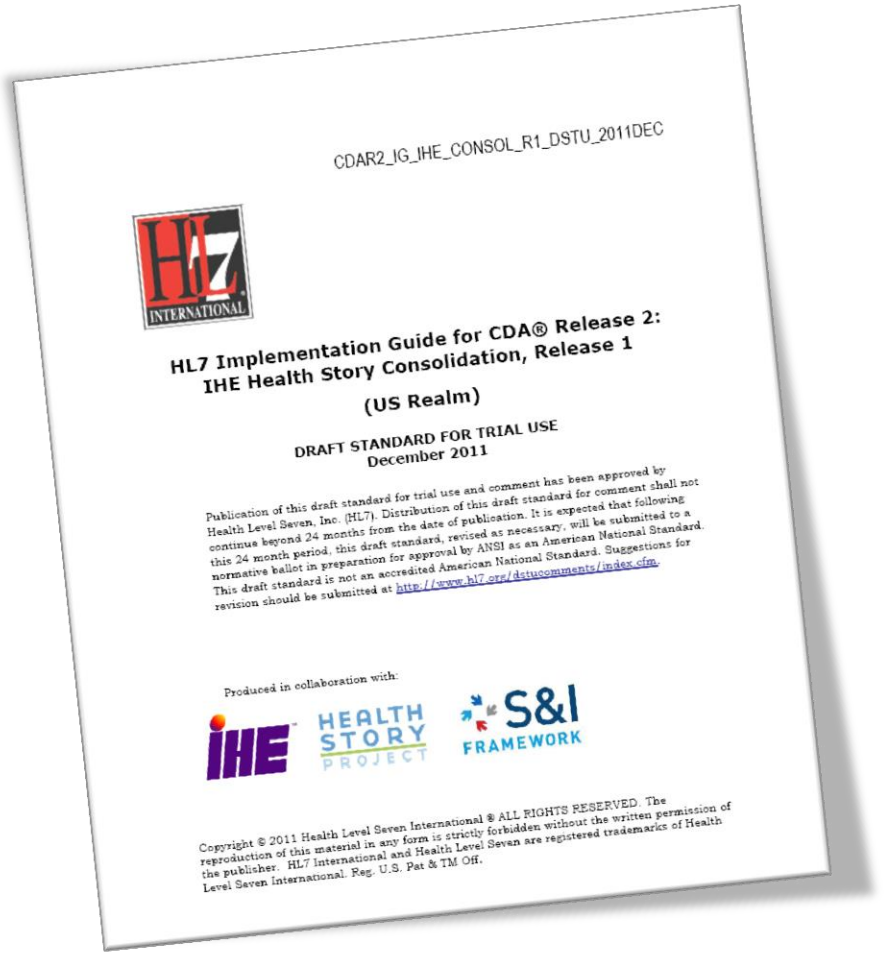
Local Electronic Health Record (EHR)

National Meaningful Use (MU)



Consolidated CDA

- Release 1.1
  - Continuity of Care Document
  - Consultation Note
  - Diagnostic Imaging Report
  - Discharge Summary
  - History and Physical
  - Operative Note
  - Procedure Note
  - Progress Note
  - Unstructured Document
- Release 2 (Pending Final Publication)
  - Care Plan
  - Referral Note
  - Transfer Summary
  - Patient Generated Document



CDAR2_IG_IHE_CONSOL_R1_DSTU_2011DEC

HL7 INTERNATIONAL

HL7 Implementation Guide for CDA® Release 2: IHE Health Story Consolidation, Release 1

(US Realm)

DRAFT STANDARD FOR TRIAL USE
December 2011

Publication of this draft standard for trial use and comment has been approved by Health Level Seven, Inc. (HL7). Distribution of this draft standard for comment shall not continue beyond 24 months from the date of publication. It is expected that following this 24 month period, this draft standard, revised as necessary, will be submitted to a normative ballot in preparation for approval by ANSI as an American National Standard. This draft standard is not an accredited American National Standard. Suggestions for revision should be submitted at http://www.hl7.org/dstucomments/index.cfm.

Produced in collaboration with:

IHE HEALTH STORY PROJECT S&I FRAMEWORK

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FHIR

F – Fast (to design & to implement)

- Relatively – There are no magic bullets

H – Health

- That's why we are here

I – Interoperable

- Key to leveraging HIT

R – Resources

- Building blocks – more on these to follow

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Genesis of FHIR

Increasing recognition of value of interoperability

- Across organizations, disciplines, even borders
- Regional and National programs
- Mobile & cloud-based applications
- Faster – integration in days, weeks; not months or years

Health information needs to be interoperable

- CDA okay for documents; not everything is a document
- HL7 v2 is ~25 years old, proprietary syntax
- HL7 v3 messaging has not taken off

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FHIR Manifesto

- Focus on **Implementers**
- Leverage cross-industry web technologies
- Target support for common scenarios
- Require human readability as base level of interoperability
- Support multiple paradigms & architectures
- Make content freely available
- Demonstrate best practice governance

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FHIR is Developer-Friendly

REST APIs

Vibrant User Community

XML

Easily Extensible

Atom

JSON

Free & Open

Multiple Reference Implementations

Unified framework for messaging and documents

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FHIR is like Lego™ for Healthcare

- Resources = Blocks
- Resources are discrete chunks of clinical information
- Resources can be assembled into larger constructs
- You operate on resources via FHIR's REST APIs.

  Think programming Lego Mindstorms ™

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Example Patient Resource

```
<Patient xmlns="http://hl7.org/fhir">
  <extension url="http://www.goodhealth.org/consent#trials">
    <valueCode value="renal"/>
  </extension>
  <text>
    <status value="generated"/>
    <div xmlns="http://www.w3.org/1999/xhtml">
      <p>Henry Levin the 7th</p>
      <p>MRN: 123456</p>
    </div>
  </text>
  <identifier>
    <use value="usual"/>
    <label value="MRN"/>
    <system value="http://www.goodhealth.org/identifiers/mrn"/>
    <value value="123456"/>
  </identifier>
  <name>
    <family value="Levin"/>
    <given value="Henry"/>
    <suffix value="The 7th"/>
  </name>
  <gender>
    <text value="Male"/>
  </gender>
  <birthDate value="1932-09-24"/>
  <managingOrganization>
    <reference value="Organization/2"/>
    <display value="Good Health Clinic"/>
  </managingOrganization>
  <active value="true"/>
</Patient>
```

Extension with reference to its definition

Human-readable Summary

Structured Data Content:

- MRN
- Name
- Gender
- Date of Birth
- Provider

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But Can FHIR Do Documents?

- A “document” is a collection of resources.
- Break up the header and body into discrete resources.
- Bundle the resources up into a single XML document using Atom.
- Rendering is simple because the narrative is XHTML.
- … but that’s not quite enough for clinical documents.

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CDA on FHIR: New HL7 Project

Addresses the core principles of CDA using FHIR:

- Persistence
- Stewardship
- Potential for authentication
- Context
- Wholeness
- Human-readability

Timeline:

- Sept. 2014: Initial mapping and profiles for review
- Jan. 2015: CDA an FHIR first draft
- Spring 2015: Ballot with FHIR DSTU 2

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CDA on FHIR

The need:

- FHIR documents are “generic” documents and can represent anything.
- FHIR is not constrained for the clinical document use case.
- Aspects of clinical documents are not in FHIR’s 80 percent.

The scope:

- Implement the clinical document use case using FHIR syntax.
- Focus on the universal realm header and rules for body content (i.e., similar scope to CDA R2).
- Standardize a few realm-specific extensions where required (e.g., race/ethnicity codes in the US).

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FHIR Mapping to CDA

- Map CDA to FHIR “Composition” and supporting resources
- SDWG and FMG members leading the project

Element	ardinal	Man	Con	Type	Extensible	FHIR Specification Mapping	Base Card.
ClinicalDocument	0..1			ClinicalDocument		Bundle with Document Tag	
typeId	1..1	M	R	II		n/a	
classCode	1..1	M	R	CS	CNE	n/a	
moodCode	1..1	M	R	CS	CNE	n/a	
id	1..1		R	II		feed.id	1..1
code	1..1		R	CE	CWE	Composition.type	1..1
title	0..1			ST		Composition.title	0..1
effectiveTime	1..1		R	TS		Composition.date	1..1

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CDA on FHIR Challenges

- Lots of data mapping: Easy (mostly), but time-consuming
- Compatibility issues
  - Restrict FHIR to items allowed by CDA (backwards compatible)?
  - Allow items in FHIR that have no CDA equivalents?
  - Multiple profiles are likely.
- Paradigm mismatches
  - FHIR took a data-centric approach, but documents are often narrative-centric.
  - FHIR's versioning may need to be revisited (Composition resource may need an internal, version-specific ID).
  - New resources may be needed.

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Consolidated CDA (C-CDA) on FHIR

- Pending project to map C-CDA to FHIR; same timeline as CDA on FHIR
  - US Realm
  - Map C-CDA templates to FHIR
- Different management than C-CDA itself
  - FHIR management group (FMG) is driving; domain work groups are responsible for resources.
  - In C-CDA, SDWG retained ownership and requested input from domain working groups.

Work Group	CCDA Entry Template	Proposed base resource
Orders & Observations	(Current) Smoking Status Observation	Observation
Orders & Observations	Age Observation	Observation
Orders & Observations	Assessment Scale Observation	Observation
Orders & Observations	Caregiver Characteristics	Observation
Orders & Observations	Code Observations	Observation
Orders & Observations	Cognitive Status (Result) Observation	Observation

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CDA on FHIR & C-CDA on FHIR

Simultaneous: How to remain coherent?

- CDA on FHIR focuses on the general framework.
- C-CDA on FHIR Phase 1 asks domain WG volunteers to map body resources (medications, allergies, etc.).
- C-CDA on FHIR Phase 2 asks SDWG volunteers to align all prior tasks.
- …but there are a lot of risks and assumptions, and not much funding to resolve them.

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The White Paper: Key Points

CDA addresses interoperability for clinical documents, mixing narrative and structured data. FHIR provides granular access to data, a contemporary, streamlined approach to interoperability, and is easy to implement. FHIR can be the future of CDA, but it is not there yet.

We noted:

- CDA is HL7's leading specification for exchange of clinical data, at the center of Meaningful Use for continuity of care and quality reporting.
- FHIR can be a better option because of its API-centric nature, streamlined syntax, use of contemporary Internet protocols, and overall ease of use and simplicity.

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So, where do we go from here?

- How do CDA and FHIR relate today and in the future?
- Is FHIR a complement to CDA, like V2/3 messaging, or a replacement?
- How does it affect the next iteration of HL7 clinical document exchange?
- To answer, we need to know:
  - What's the relationship between documents and APIs?
  - What are the success criteria for FHIR as a clinical document specification?
  - Can "CDA on FHIR" replace "CDA on HL7 V3" for all clinical documents?

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Documents & APIs :: Narrative & Data

A medical record combines data and narrative.

- CDA provides strong support for combining data and narrative.
  - Use cases have formal obligations (persistence, stewardship, authentication, etc.).
  - Data is packaged in a persistent format during exchange between disparate parts of the healthcare system.
- APIs are service contracts.
  - Provide access to the data-centric parts of the clinical record
  - Orchestrate exchange of documents and data

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Relationship Between Documents and APIs?

- Both the document and API should seamlessly use the same syntax and semantics, and
- Both should reflect and support the duality between narrative and data.

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APIs Documents

HL7 V3 Vision

Messages  Documents

- Didn’t happen
  - V3 Messaging didn’t take
  - Documents aren’t APIs, aren’t collections of data elements
  - Leads to some attempts to use CDA in ways never intended
- CDA did happen

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Success Criteria for FHIR as a Document

Q: Can “CDA on FHIR” replace “CDA on HL7 V3”?

A: The FHIR framework must prove practical for the full use case for clinical documents.

- **Authoring**
- **Reading**
- **Framework**

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Can “CDA on FHIR” replace “CDA on HL7 V3”?

Provisional conclusions:

- No fundamental issues with the overall approach have been identified.
- Many minor issues existing in the current FHIR resources are being addressed.
- More work is needed to find the most effective way to bind narrative content with the associated machine-readable data contained in the document.
- FHIR resources need to be developed in several remaining subjects.

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The Roadmaps

Lay the groundwork (specifications)

- Complete CDA on FHIR project
- Publish formal mapping expressions
- Establish governance

Implement the vision

- Clinical documents and APIs share a common syntax and set of resources.
- Acquire data through an API, insert into a document.
- Acquire data from within a document, offer through API.

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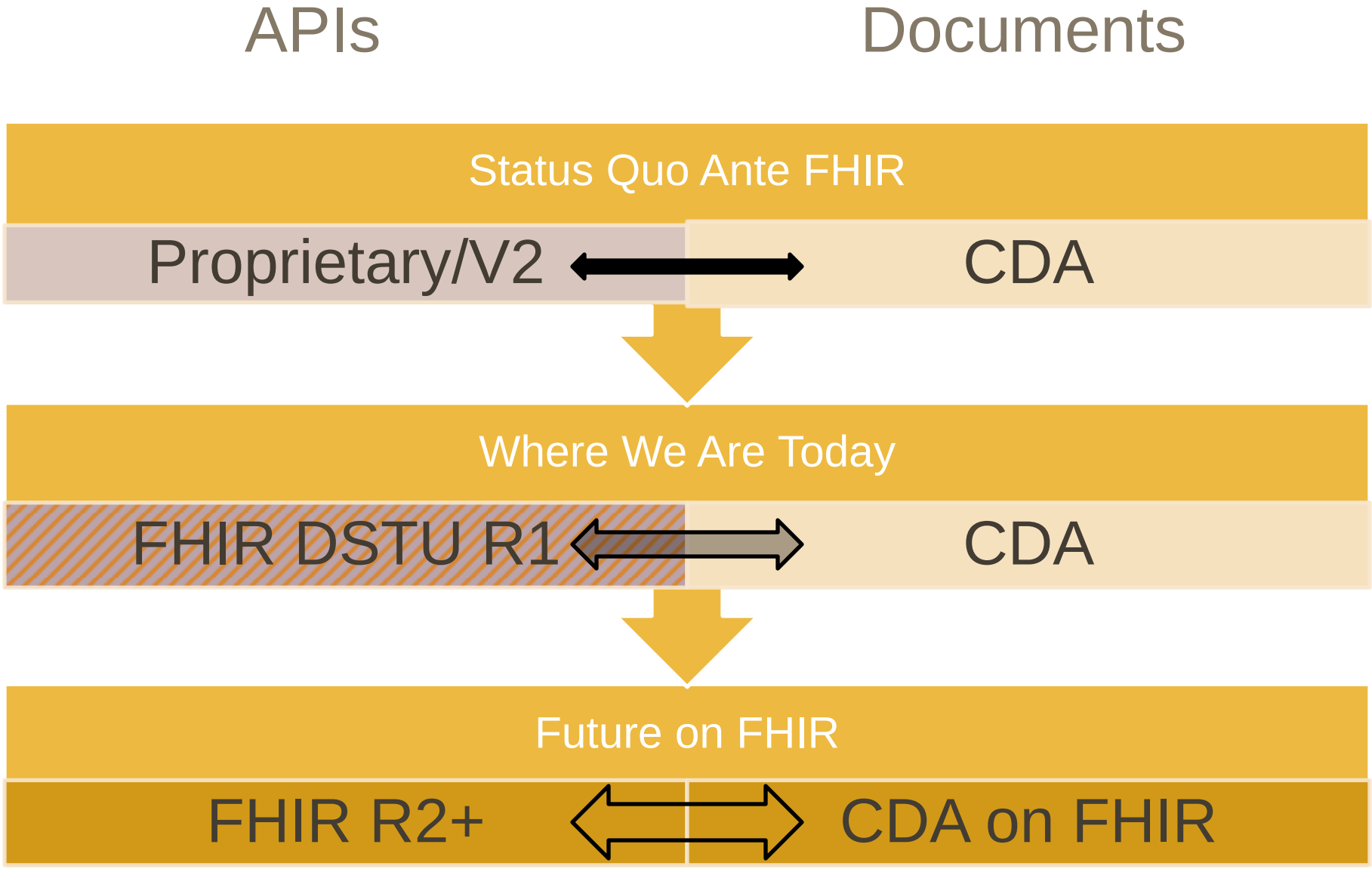

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Where We Are Today

Use CDA where:

- Stability is critical for investment in clinical information
- Use cases are broad

Use FHIR where:

- Change in the specification is tolerable
- Use cases are limited
- An implementation strategy is in place to extract and transform data to populate CDA R2 documents, like "greenCDA"

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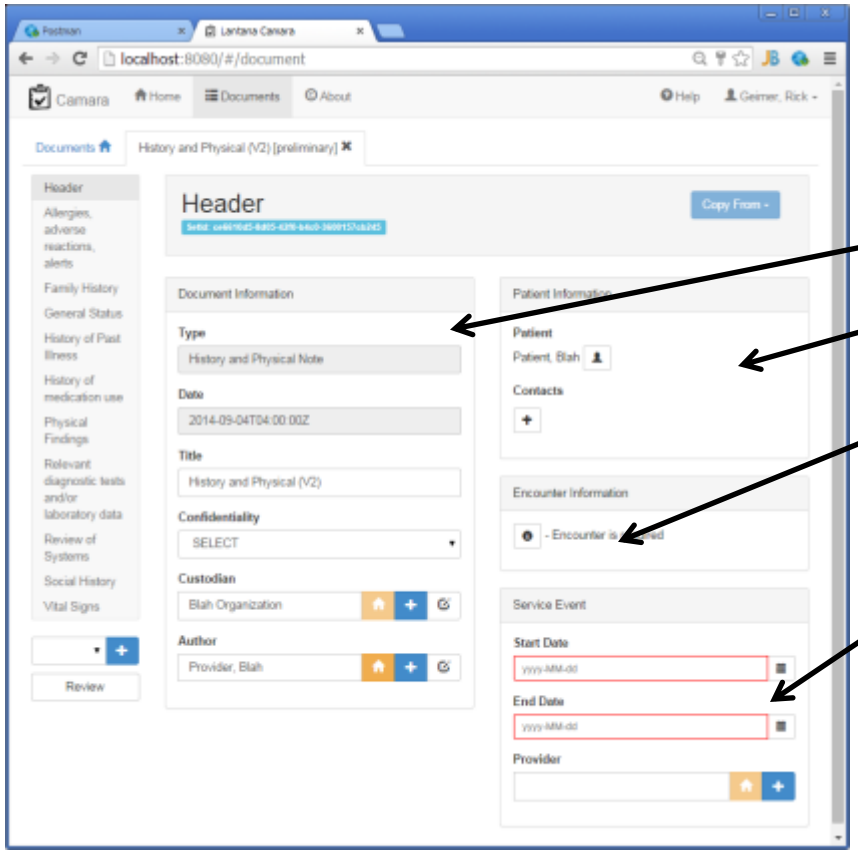
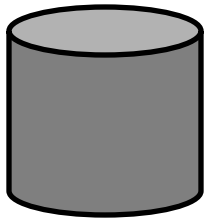
Using FHIR with CDA Today: Lantana Camara



Draft documents are stored as discrete FHIR resources.



Camara Server

Final documents are assembled from the resources and converted to CDA for exchange.

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Considerations

- How long will FHIR be a DSTU?
  - Not a stable specification for the immediate future
  - As DSTU – you **may** have to redo anything/everything
- FHIR's developer focus
  - Ease of implementation takes precedence over completeness (80-20 rule)
  - Works for HIT – does it support clinical cohesiveness?
- Basics of CDA stable since 2000/2005
- CDA on FHIR may co-exist with CDA on V3 for a long time
- Distinguish between API and document use cases, and retain flexibility while the FHIR specification develops

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Q & A

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https://www.linkedin.com/company/lantana-consulting-group

http://feeds.feedburner.com/lantanagroup

Where We Are Today

Using FHIR R1 with CDA – very close in approach to greenCDA

greenCDA

What is it?

- An implementation methodology for generating templated CDA instances.
- A simplified XML Schema paired with a transform to normative CDA
- An 80% solution

What is it not?

- A replacement for normative CDA

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Where We Are Today

Using FHIR R1 with CDA – very close in approach to greenCDA

FHIR R1

What is it?

- An implementation methodology for generating templated CDA instances.
- A simplified XML/JSON Schema paired with a transform to normative CDA
- An 80% solution

What is it not?

- A replacement for normative CDA

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CDA: Best Overall Option, Not Perfect

- HL7 V3 is overly complicated and has largely been a failure.
- CDA is based on V3.
  - CDA is arguably the only widely successful implementation of V3.
  - CDA has been successful not because of HL7 V3, but in spite of it.
- Is it possible to meet the CDA use case on a better framework?

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