CAQH CORE

CAQH CORE Webinar Series: Use & Adoption of Attachments in Healthcare Administration, Part IV

Clinical Document Architecture (CDA) Basics -- Clinical Content (CDA Body)

Thursday, January 18, 2018

2:00 – 3:30 pm ET

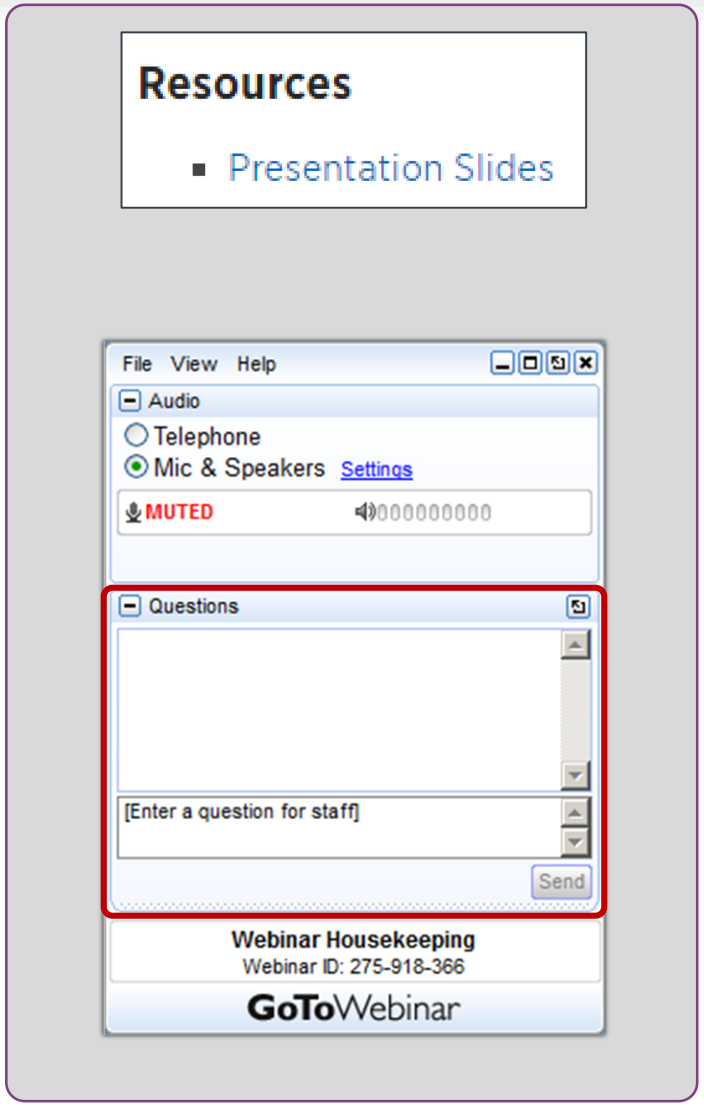
Logistics

Presentation Slides & How to Participate in Today's Session

Download the presentation slides at www.caqh.org/core/events.

- Click on the listing for today's event, then scroll to the bottom to find the Resources section for a PDF version of the presentation slides.
- Also, a copy of the slides and the webinar recording will be emailed to all attendees and registrants in the next 1-2 business days.

Questions can be submitted ***at any time*** with the **Questions panel on the GoToWebinar dashboard.**



CAQH CORE

Session Outline

- Welcome.
- Overview of CAQH CORE Attachments Work.
- CDA Basics: Clinical Content (CDA Body).
- Audience Q&A.

CAQH CORE Attachments Webinar – Clinical Document Architecture (CDA) Basics

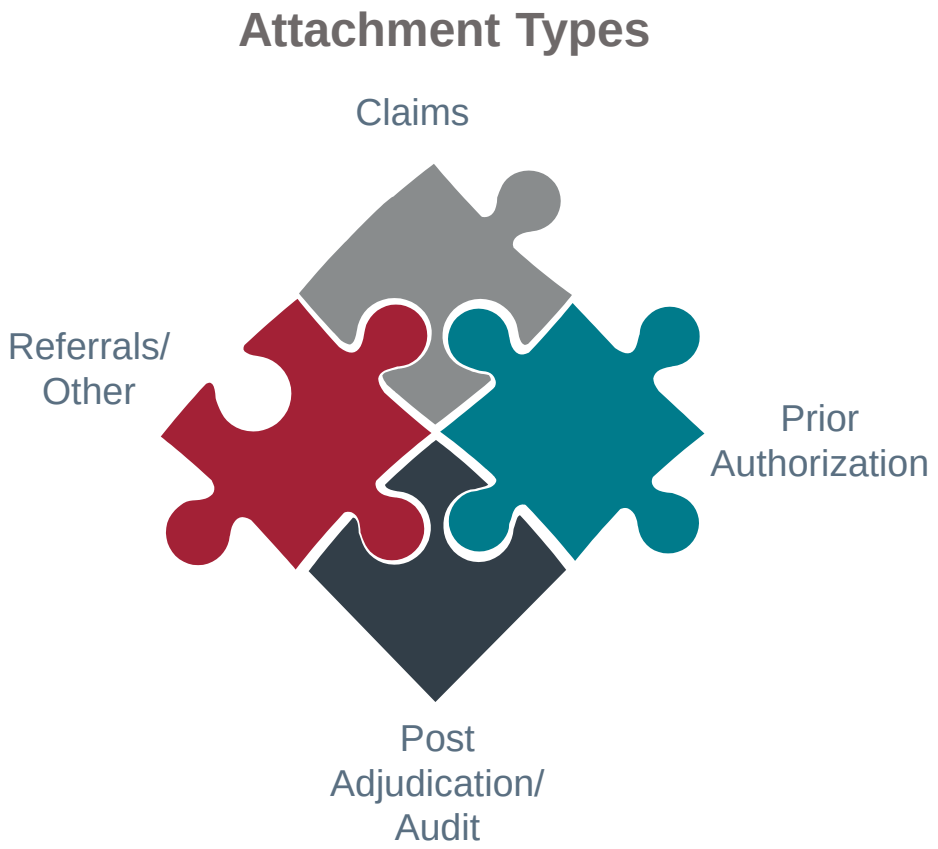
This webinar is the fourth in an ongoing educational series and is a technical training on the clinical content of the CDA for an intermediate/advanced audience of implementers of electronic attachments.

Purpose:

Support industry education on technical components of transmitting electronic attachments to save time and improve efficiencies.

Learning Objectives:

- Learn how efficient usage of an electronic attachment, such as the Clinical Document Architecture (CDA), can reduce administrative burden.
- Understand the Clinical Document Metadata for Attachments, including the key characteristics of the body and the body types (structured vs. unstructured).
- Get an overview of recent attachments developments, including the recently published HHS Unified Agenda.



CAQH CORE Overview

Robert Bowman
CAQH CORE Director

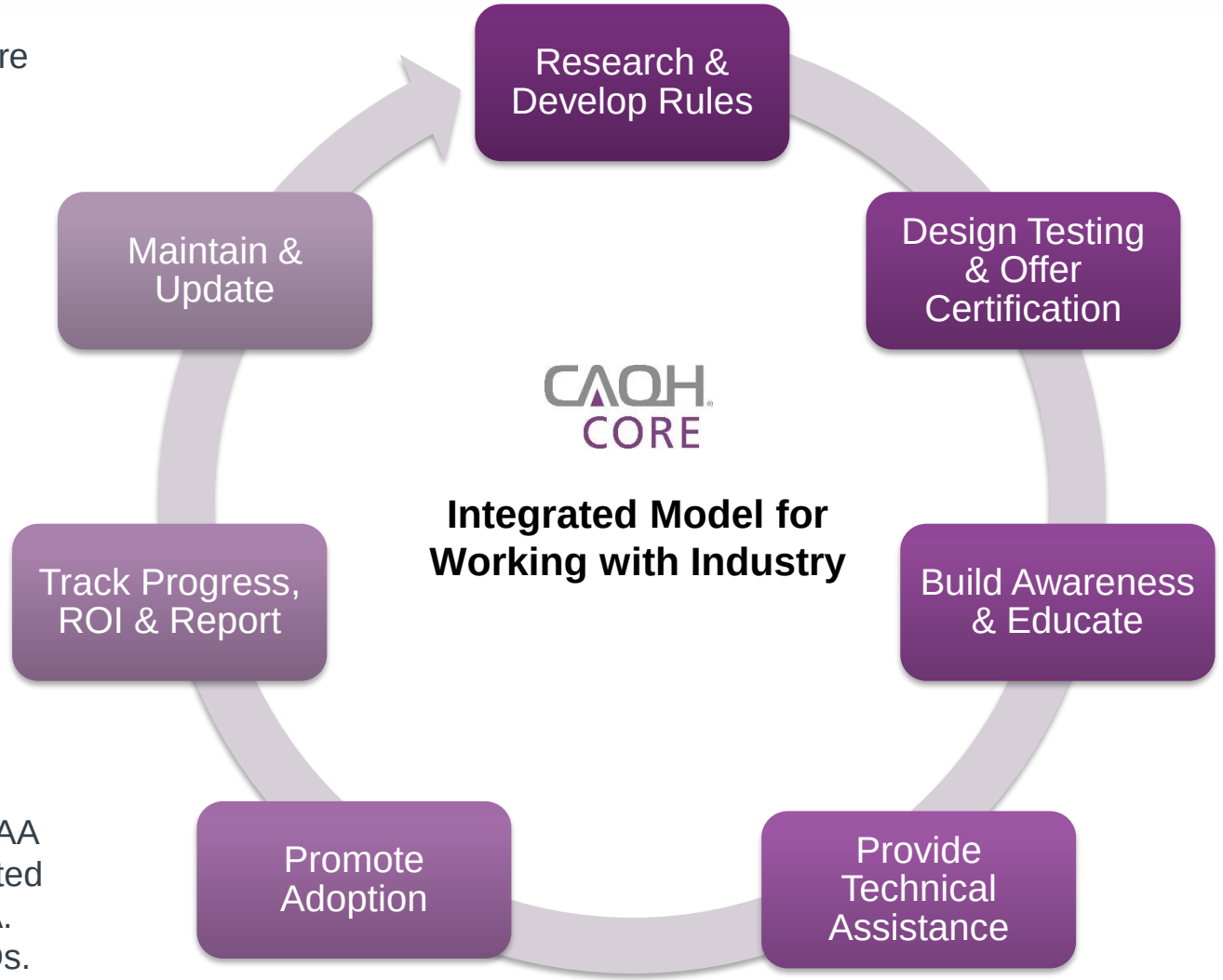
CAQH CORE Mission and Vision

MISSION Drive the creation and adoption of healthcare operating rules that support standards, accelerate interoperability and align administrative and clinical activities among providers, payers and consumers.

VISION An industry-wide facilitator of a trusted, simple and sustainable healthcare data exchange that evolves and aligns with market needs.

DESIGNATION Named by Secretary of HHS to be national author for three sets of operating rules mandated by Section 1104 of the Affordable Care Act.

BOARD Multi-stakeholder. Voting members are HIPAA covered entities, some of which are appointed by associations such as AHA, AMA, MGMA. Advisors are non-HIPAA covered, e.g. SDOs.



Role of Operating Rules

- Developed to facilitate administrative interoperability and encourage clinical-administrative integration by building upon recognized standards and ensuring benefit for each critical stakeholder.
- Complements and supports healthcare and industry neutral standards – they do not repeat or reiterate standards.
- Used by other industries with high volume transactions and multiples parties, e.g. financial services.

INFRASTRUCTURE RULES	CONTENT RULES
Connectivity & Security	Supports use of recognized standards that can deliver valuable structured data or require access to unstructured data.
Response Time (Batch/Real-time)	
System Availability	
Exception Processing Error Resolution	
Roles & Responsibilities	
Companion Guides	
Acknowledgements	

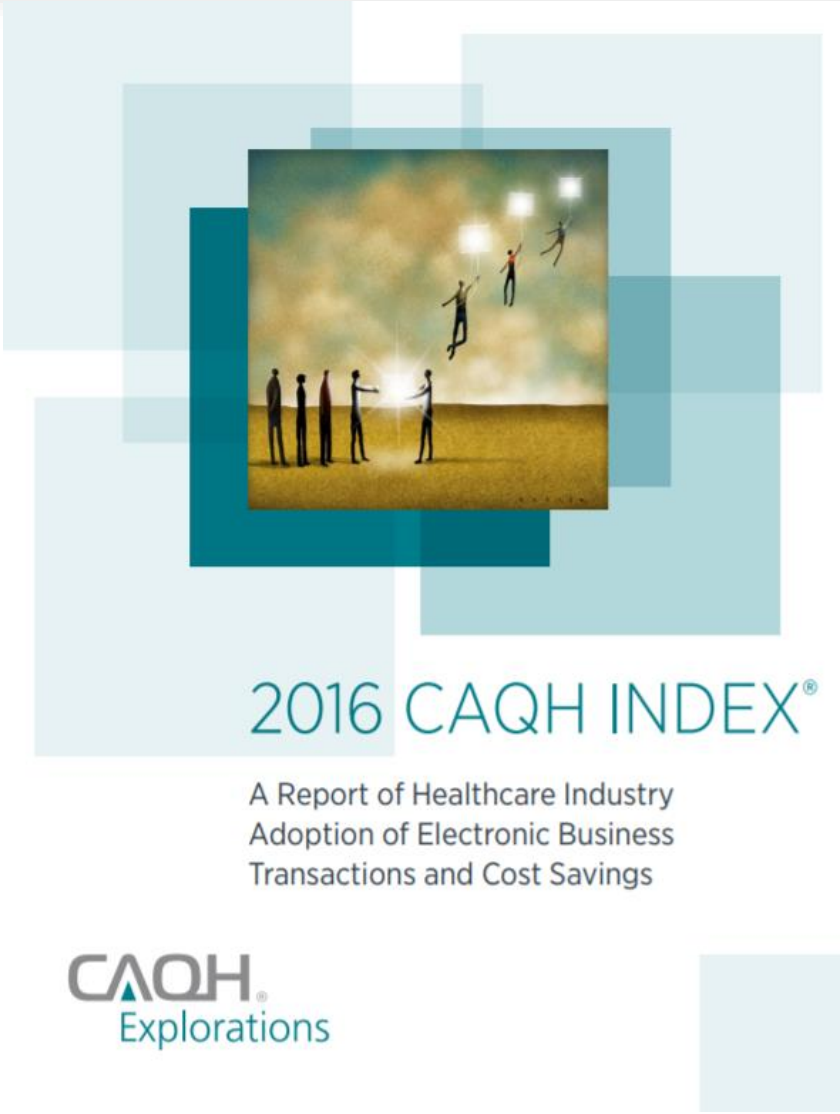
Infrastructure rules apply across transactions – establishing basic expectations on how the US data exchange "system" works, e.g. ability to track response times across all trading partners. *Infrastructure rules can be used with any version of a standard.*

Content rules support the exchange of valuable data that allow stakeholders to access information needed to manage an identified process; rules can address ongoing maintenance, setting expectation of evolution.

2016 CAQH Index Report

The 2016 CAQH Index report – which is based on data from over 5.4B transactions – reported on adoption and cost of electronic claim transactions for the first time. Key findings:

- Only **six percent** of healthcare claim attachments are submitted to medical health plans electronically, with the remaining sent either via fax or mail.
- The adoption of electronic claim attachments is isolated, as most medical health plans report **100% of claim attachments are submitted manually.**
- In labor alone, over a **half-billion dollars** could be saved by the industry by claim attachment adoption.
- Providers who switched to electronic prior authorizations **saved 14 minutes and $5.61** per transaction.
- Only use of the **X12 standard** for claim attachments was reported by participating health plans; no use of **the HL7 standard** for claim attachments was reported.



HHS Unified Agenda for 2018

The HHS Unified Agenda was published in December 2017.

"This proposed rule would adopt standards and operating rules for attachments based on statutory requirements introduced in the Health Insurance Portability and Accountability Act (HIPAA) and reinforced in the Affordable Care Act. In general, it would apply to circumstances in which a provider attaches clinical information to a transaction that it is being transmitted to a health plan. We are required to adopt standards to facilitate the electronic exchange of clinical information."

NPRM – August 2018

CAQH CORE Efforts on Attachments

Scope of Work

In Progress

Environmental Scan

- Monitor trends in transition to electronic attachments, estimate cost savings of automation and identify opportunity areas to support provider adoption.
- Currently interviewing CAQH CORE Participants, CAQH Index participating providers and interested stakeholders; includes provider site visits, stakeholder interviews and vendor product assessment.

Industry Education Series

CAQH CORE will continue to host education events about attachments. Previous topics in series focus on electronic attachments basics (Part I), best practices from claims attachments case studies (Part II) and clinical content for document metadata (Part III).

Activities in 2018 and Beyond

Advisory Group/Subgroup

Advisory Group: Review environmental scan findings to develop list of high priority opportunity areas to recommend to an Attachments Subgroup.

Subgroup: Review Advisory Group recommendations to identify areas to be addressed in attachment rule writing.

Electronic attachments should ease healthcare system workflow. The lack of an electronic attachment standard is a challenge for providers and health plans.

- Work is moving forward by HL7, a standards development organization, on a standard for claims attachments.
- There is a wide range of opinions on what standards would best serve the industry.

CAQH CORE was designated by HHS as the operating rule author for HIPAA transactions; operating rules support recognized standards. Opportunity areas for operating rules related to attachments are significant.

CAQH CORE Attachments

Environmental Scan Scope

Scan Goal

Inform development of draft attachments opportunity areas:

- Key components, drivers and frequency of various attachments (Claim, Prior Authorization, Audits, Post Adjudication, Referrals).
- Volume of attachments, challenges in processing various forms of attachments and barriers to fully automated submission process.
- Common requirements for attachments and any key variances among formats, data content or business needs.
- Utility of various IT products, such as Practice Management Systems (PMS), within the attachments workflow.

Interview & Site Visit Objectives

Conduct a combination of phone interview and site visits with representatives from implementer and provider organizations.

- Structured interviews with stakeholders. Specific interview guides/questions distributed prior to interview.
- Anticipate collecting quantitative and qualitative ROI data on attachment workflow types.
- Understand attachment workflow/best practices.

CAQH CORE Action

CAQH CORE has conducted preliminary interviews with different stakeholders, and is continuing to recruit additional organizations to participate. Participation will include:

- A one hour phone interview or half day site visit.
- Time to query colleagues and solicit input on the technical questions seen in the interview guide.
- Time to collect applicable data or business case for support.

If your organization is interested in participating in this important work, contact CORE@caqh.org.

Polling Question 1

Is your organization interested in participating the CAQH CORE Attachments environmental scan?

- Yes.
- No.
- Unsure/Need More Information.

CDA BASICS: CLINICAL CONTENT (CDA BODY)

Rick Geimer

Chief Innovation Officer, Lantana Consulting Group

Session Outline

Introduction

Brief Attachments Recap

CDA Body Details

Rendering CDA Documents

Validating CDA Documents

Live Demonstrations:

- XML Body using C-CDA
- Simple XML Body
- CDA Rendering
- CDA Validation

Questions/Answers

INTRODUCTION

Technical implementers in Provider, Payer, and Clearinghouse settings:

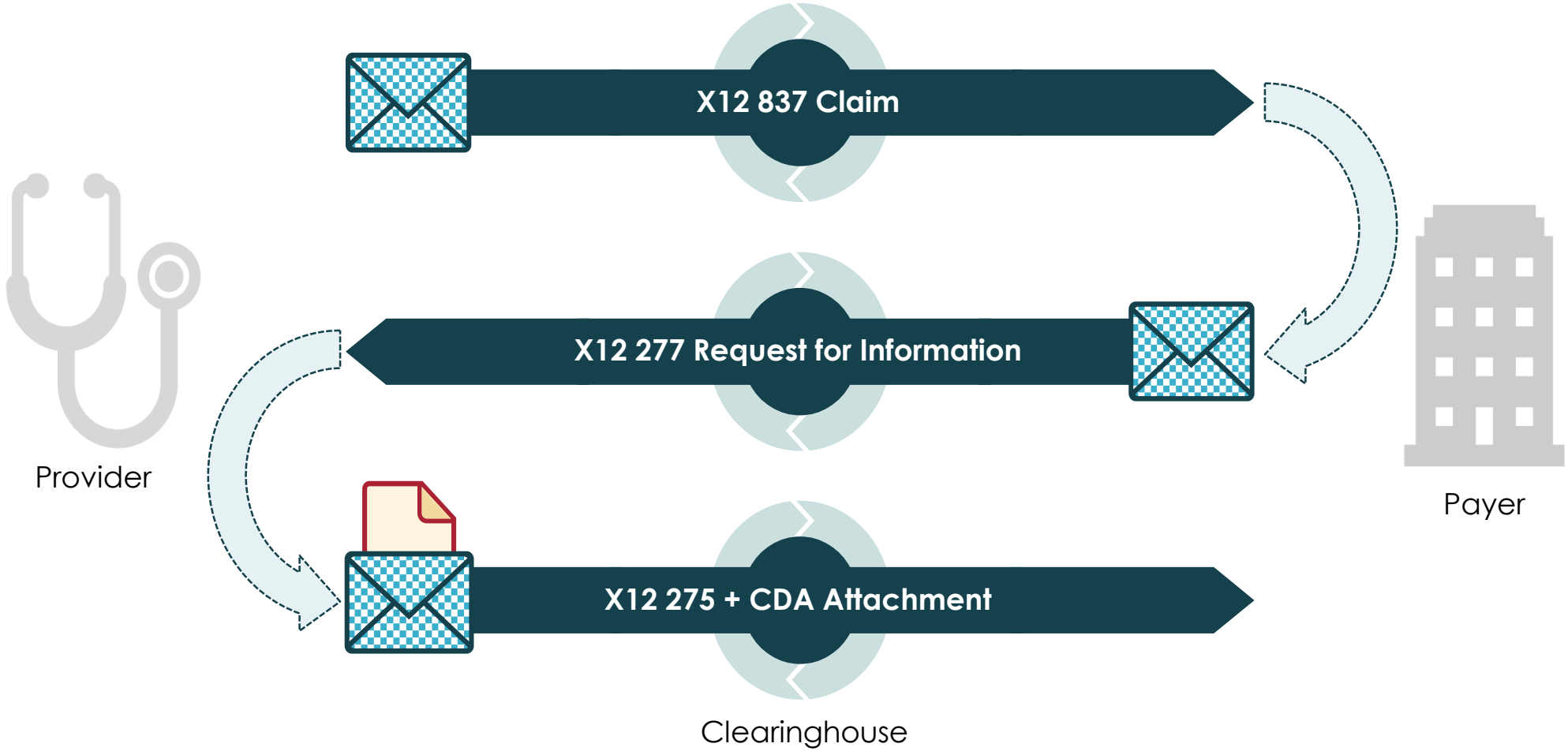
- Software architects
- Software developers
- Information analysts
- Information technology (IT) staff
- Information managers
- Vendors
- Others

Provide overview of the clinical content of Clinical Document Architecture (CDA) documents:

- Different ways of representing clinical content in CDA
- Overview of CDA implementation guides (IGs)
- Guidance for displaying and validating CDA documents

BRIEF ATTACHMENTS RECAP

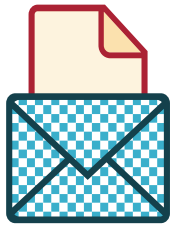
Basic Attachments Orchestration



X12 and CDA

X12 275: "envelope" which ties the attachment to the:

- Patient
- Claim
- Attachment request (solicited scenario)



CDA document: "payload" containing:

- Demographic details
- Author/Attester information
- Clinical information
  - Structured (coded data)
  - Unstructured (embedded PDF, etc.)

Payload in X12 275 envelope:

- Base64 encoded
- Binary Data Segment (BDS)

Clinical Document Architecture (CDA):

- Specification for exchange of clinical documents; defines document structure and semantics
- ANSI standard developed by HL7's Structured Documents Work Group ISO standard

Clinical documents:

- Authenticated part of clinical record, less like EDI and more like a contract
- Human-readable requirement
- Machine-readable (coded data) option, defined by templates, per use case

Architecture:

- Constraints based on specific use cases
- Implementation guides, such as C-CDA, specify content requirements
- Use cases include primary care, transfer of care, quality and public health reporting

CDA Header

- Identifies:
  - Patient
  - Author
  - Custodian
  - Document Type (e.g., Discharge Summary)
- Sufficient for:
  - Medical records management
  - Document management
  - Clinical document exchange across departments and institutions

CDA Body

- Contains attested clinical content or administrative content
- Contains human readable narrative
- May contain coded data

This webinar focuses on the CDA body.

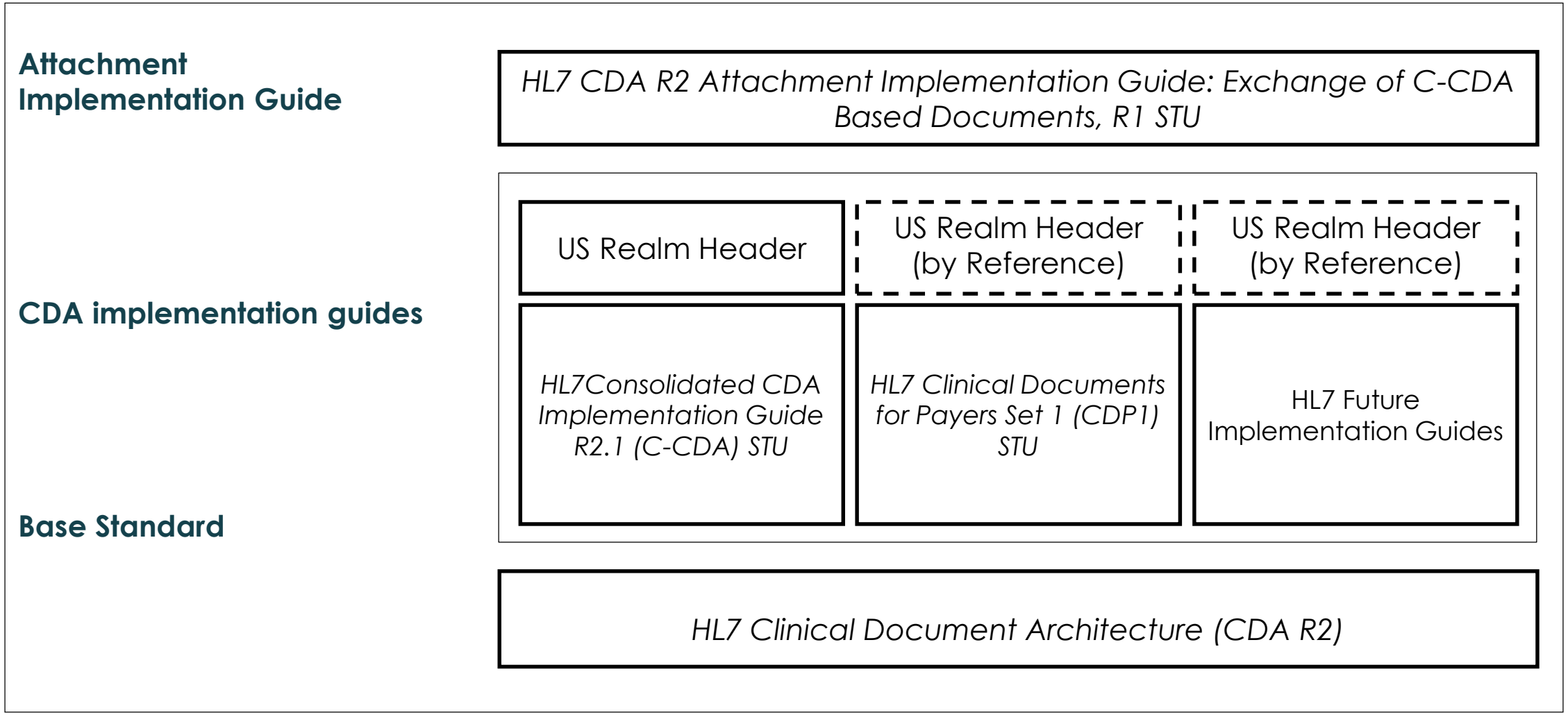
The CDA specification is:

- Generic
- Flexible
- Adaptable
- When a document is **conformant to the CDA standard**, its flexibility and level of abstraction do not imply that it **satisfies a given requirement**.

Implementation Guides (IGs) let us define additional constraints:

- What kind of documents can be exchanged and when?
- Which sections are mandatory? Which are optional?
- What coded information and vocabularies should the sections contain (ICD-9/10 diagnostics, LOINC lab test codes, SNOMED CT clinical findings, etc.)?

Attachments can be any document with a CDA US Realm Header.



IGs Valid for Attachments

Any IG that uses the US Realm Header from C-CDA:

- Consolidated CDA (C-CDA)
- Periodontal Attachment (new)
- Clinical Oncology Treatment Plan and Summary
- Emergency Medical Services; Patient Care Report
- Ambulatory Healthcare Provider Reporting to Birth Defect Registries
- Clinical Documents for Payers Set 1 (CDP1)
- … and so on

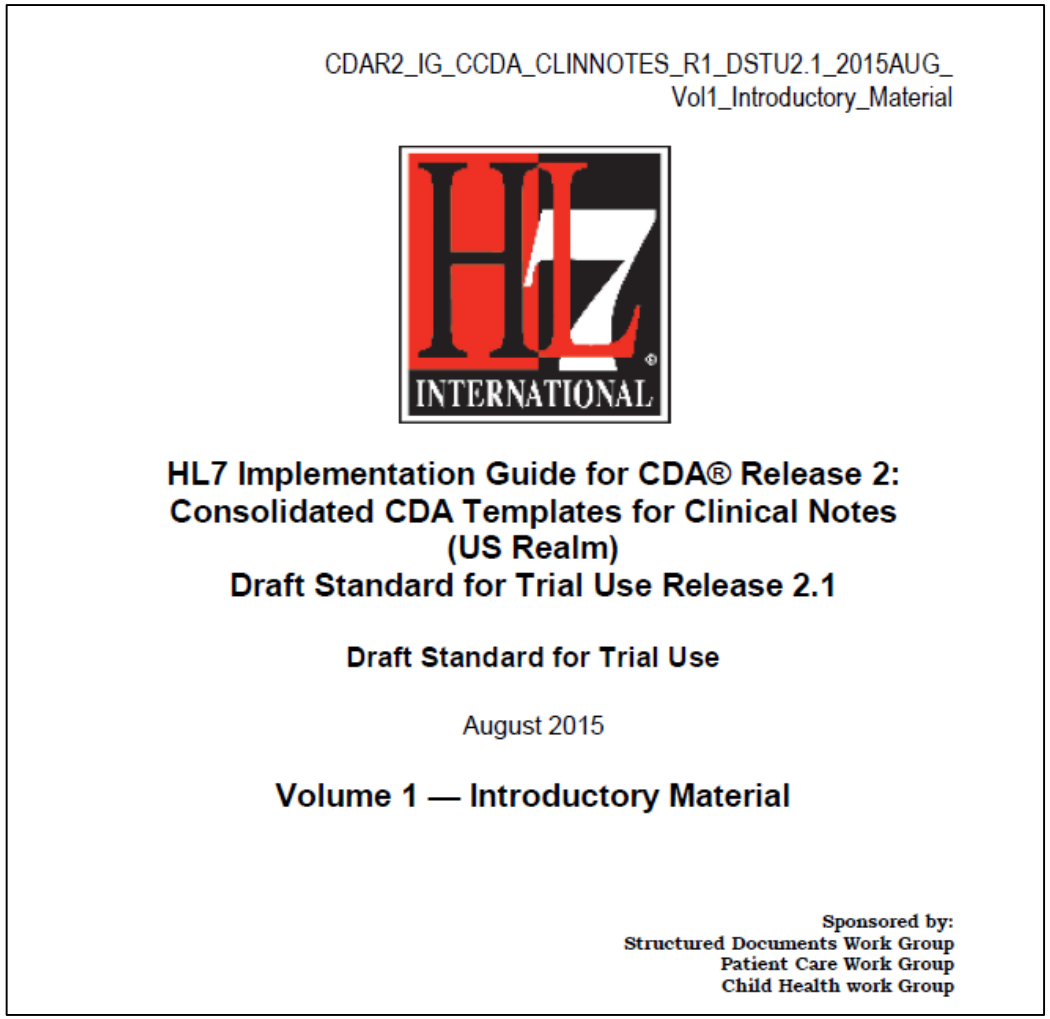
List is extensible:

- New project proposed for orthodontics
- Others sure to follow

C-CDA: A widely implemented US realm implementation guide for CDA.

Body of C-CDA documents can contain required Meaningful Use data:

- Problems
- Allergies
- Medications
- Immunizations
- Lab Results
- Procedures
- Smoking Status
- … and so on


CDAR2_IG_CCDA_CLINNOTES_R1_DSTU2.1_2015AUG_
Vol1_Introductory_Material

HL7 INTERNATIONAL

HL7 Implementation Guide for CDA® Release 2:
Consolidated CDA Templates for Clinical Notes
(US Realm)
Draft Standard for Trial Use Release 2.1

Draft Standard for Trial Use

August 2015

Volume 1 — Introductory Material

Sponsored by:
Structured Documents Work Group
Patient Care Work Group
Child Health work Group

C-CDA Release 2.1 Document Types

- Care Plan
- Consultation Note
- Continuity of Care (CCD)
- Diagnostic Imaging Report
- Discharge Summary
- History and Physical (H&P)
- Operative Note
- Procedure Note
- Progress Note
- Referral Note
- Transfer Summary
- Unstructured Document
- US Realm Header for Patient Generated Document

Template

- A layer of constraints applied to the generic CDA model to narrow its scope for a specific use case or implementation.
- Think of a template as a set of instructions or a recipe for creating CDA documents (or parts of a document) for a particular purpose.

The C-CDA Implementation Guide contains a library of templates.

Templates: Cookbook Analogy

CDA without Templates:

- Like a kitchen full of raw ingredients, with no menu, recipes, cookbooks, or other guidance
- Flexible, but hard to use without experience
- Only the cook understands the meal before it arrives at the table

CDA with Templates:

- Same kitchen, but…
  - Full menu with recipes
  - Prepped food
  - Less flexible, but easier for a novice
- Both the cook and the diner know what to expect

Cookbook Analogy, Extended

Template (recipe) defines the basic structure.
Implementer (cook) fills in the blanks with live data (ingredients).

```
<observation classCode="OBS" moodCode="EVN">
  <templateId root=
    "2.16.840.1.113883.10.20.6.2.10"/>
     <code code="[code]"
        codeSystem="[code_system]"
        codeSystemName="[code_system_name]"
        displayName="[display_name]"/>
     <statusCode code="completed"/>
     <effectiveTime value=
        "[measurement_date]"/>
     <value xsi:type="PQ"
        value="[measure]"
        unit="[ucum_unit]"/>
</observation>
```

Recipe: Populate fields [blue] with appropriate data.

```
<observation classCode="OBS" moodCode="EVN">
  <templateId root=
    "2.16.840.1.113883.10.20.6.2.10" />
     <code code="50373000"
        codeSystem="2.16.840.1.113883.6.96"
        codeSystemName="SNOMED-CT"
        displayName="Body height"/>
     <statusCode code="completed"/>
     <effectiveTime value=
        "20121114"/>
     <value xsi:type="PQ"
        value="177"
        unit="cm"/>
</observation>
```

Fully *cooked* data.

Conformance statement: A constraint defined in a template that an implementer follows to conform to that template.

- Conformance statements can constrain the base CDA standard or another template (inheritance)
- Can tighten constraints, cannot loosen them

  Example:
  - Can tighten 0..* to 1..1
  - Cannot loosen 1..1 to 0..1
  - Can tighten MAY to SHALL
  - Cannot loosen SHALL to SHOULD
- Can constrain vocabulary by setting a code system, value set, or single value

  Example:
  - Can set the code system to LOINC
  - Can require that a code comes from the Problem value set

Conformance Statement Examples

- SHALL contain exactly one [1..1] code
- This code SHOULD contain zero or one [0..1] @code="373930000" Cognitive function finding (Code System: SNOMED CT)

Template identifiers (templateId elements) indicate conformance to a template.

```
<ClinicalDocument>
   ...
  <!-- Conformant to a document template -->
  <templateId root="2.16.840.1.113883.10.20.22.1.1"/>
    ...
  <section>
    <!-- Conformant to a section template -->
    <templateId root="2.16.840.1.113883.10.20.5.5.6"/>
     ...
  </section>
  ...
</ClinicalDocument>
```

CDA BODY

Body Types

Non-XML Body:

- PDF, Microsoft Word, etc.

XML Body:

- CDA documents conforming to Implementation Guides (IGs) such as C-CDA
- May include large amounts of coded data

Simple XML Body (Proposed):

- CDA XML
- Limited or no coded data

All body types are human readable and can be attested to. Will show examples later in this presentation.

Body Types: Pros vs. Cons

Body Type	Advantages	Disadvantages
Non-XML Body	• Consistent, coded metadata • Repurpose existing content • Inexpensive to produce • Quickest path from paper to electronic attachments	• Insufficient for Meaningful Use • Multiple formats for body (PDF, Word)
Structured Body	• All content in a single format (XML) • Coded data to industry-standard IG • Can drive decision support, auto adjudication, etc.	• Expensive and time-consuming to produce • Return on investment (ROI) requires complimentary rules, decision support
Simple XML Body	• All content in a single format (XML) • Add coded data based on ROI analysis • Inexpensive to produce • Key support for text and natural language processing	• Insufficient for Meaningful Use certification • No required codes in body • Loosely constrained document type codes

Use cases:

- Existing electronic documents such as Microsoft Word, HTML, etc.
- Scanned paper data
- Systems that only export in PDF
- Documents without a CDA implementation guide

Non-XML body CDA documents are expected to be common for attachments.

Two options for including files (e.g., PDFs):

- Embed via Base64 encoding
  - Consolidates all content in a single file
  - Requires decoding before content can be displayed with standard CDA stylesheets
- Reference via URI
  - Render with standard CDA stylesheets
  - Splits content in multiple files
  - Can include a hash for security

The *HL7 Attachments Implementation Guide* requires Base64 encoding, barring prior arrangements between trading partners.

Base64 Encoded

```
<nonXMLBody>
 <text
  mediaType="application/pdf"
  representation="B64">
  JVBERi0xLjQNJeLjz9MNCjE2IDAgb2Jq...
 </text>
</nonXMLBody>
```

Referenced File

```
<nonXMLBody>
 <text mediaType="application/pdf" >
  <reference
   value="UD_sample.pdf"/>
 </text>
</nonXMLBody>
```

XML Body

- Also known as a **Structured Body**
- Summary documents with XML Body are exported by Meaningful Use certified EHRs
- Includes both human-readable content and coded data
- Some document types allow narrative only
- Conforms to CDA implementation guides
- Examples of clinical content:
  - Problems
  - Allergies
  - Medications
  - Procedures

Structured Body Example (Narrative)

```
<section>
  <templateId root="2.16.840.1.113883.10.20.22.2.6"/>
  <templateId root="2.16.840.1.113883.10.20.22.2.6.1"/>
  <code code="48765-2" codeSystem="2.16.840.1.113883.6.1"/>
  <title>ALLERGIES, ADVERSE REACTIONS, ALERTS</title>
  <text>
    <table border="1" width="100%">
      <thead>  <tr>
         <th>Substance</th>  <th>Overall Severity</th> <th>Reaction</th>
         <th>Reaction Severity</th> <th>Status</th>
       </tr>  </thead>
      <tbody>  <tr>
         <td>ALLERGENIC EXTRACT, PENICILLIN</td> <td>Moderate to Severe</td> <td>Nausea</td>
         <td>Mild</td> <td>Inactive</td>
       </tr>  </tbody>
    </table>
  </text>
</section>
```

Rendered View

ALLERGIES, ADVERSE REACTIONS, ALERTS

Substance	Overall Severity	Reaction	Reaction Severity	Status
ALLERGENIC EXTRACT, PENICILLIN	Moderate to Severe	Nausea	Mild	Inactive

Structured Body Example (Coded Data)

```
<observation classCode="OBS" moodCode="EVN">
  <id root="80a6c740-67a5-11db-bd13-0800200c9a66"/>
  <code
    code="26515-7"
    codeSystem="2.16.840.1.113883.6.1"
    displayName="PLT"/>
  <statusCode code="completed"/>
  <effectiveTime value="200003231430-0400"/>
  <value xsi:type="PQ"
    value="123"
    unit="10+3/ul"/>
  <interpretationCode
    code="L"
    codeSystem="2.16.840.1.113883.5.83"/>
  <referenceRange>
    <observationRange>
      <value xsi:type="IVL_PQ">
        <low value="150" unit="10+3/ul"/>
        <high value="350" unit="10+3/ul"/>
      </value>
    </observationRange>
  </referenceRange>
</observation>
```

Lab Result

- LOINC code for Platelets
- Observation made on March 23, 2000 at 14:30
- The measured value: 123
- Interpretation is “low”
- The measured value is less than the low value of the reference range (why the interpretation is low)

Simple XML Body

- CDA documents with narrative, in which coded data are allowed but not required
- Incremental improvement over non-XML Body
  - CDA Narrative (single format vs. CDA + PDF or other format)
  - Incremental coded data where there is ROI
- Sections have titles and LOINC codes are optional
- January 2018 HL7 ballot
  - http://www.hl7.org/documentcenter/public/ballots/2018JAN/downloads/CDAR2_IG_XDOC_R1_D1_2018JAN.zip
  - Must be an HL7 voting member to access while under ballot
  - Will be freely available to anyone a few months after final publication
  - Full name : C-CDA R2.1 Supplemental Templates for Minimally Structured Document (XDoc), Release 1 (US Realm)

Simple XML Body Example

```
<structuredBody>
    <component>
        <section>
            <code code="48765-2"
              codeSystem="2.16.840.1.113883.6.1"
              codeSystemName="LOINC"/>
            <title>Allergies</title>
            <text>
                <list listType="unordered">
                    <item>Penicillin: Hives</item> </list>
            </text>
        </section>
    </component>
    <component>
        <section>
            <title>Problems</title>
            <text>
                <list listType="unordered">
                    <item>Hypertension</item> </list>
            </text>
        </section>
    </component>
</structuredBody>
```

RENDERING CDA DOCUMENTS

CDA Stylesheets:

- XSLT stylesheets convert CDA to HTML
- Run directly in a browser for real-time rendering, or run separately to generate a static HTML version of the document
- HL7 CDA Stylesheet in gForge: https://gforge.hl7.org/svn/strucdoc
- Lantana stylesheet: https://github.com/lantanagroup/stylesheets

CDA Rendering Challenge:

- http://www.hl7.org/events/toolingchallenge.cfm

Stylesheet Options:

- Run from browser
  - Requires adding a processing instruction, if not present
  - Security concerns: referencing external software
  - Browser support: browser support for XSLT has varied over time
- Run offline
  - Use Xalan, Saxon, etc. to convert to XHTML
  - View transformed HTML result in browser

VALIDATING CDA DOCUMENTS

CDA Validation

- Ensure documents are valid according to the base CDA standard and to implementation guides.
- Validation must include the document structure as well as parts of the data.
- Validation checks:
  - Overall XML well-formedness (XML Schema – CDA.xsd)
  - IG correctness (Schematron)
- Validation does not check:
  - Clinical correctness
  - Human readability (beyond the presence of narrative)

Schema Validation

- Based on CDA schema
- Ensures XML well-formedness
- Should validate the document without errors
- Ensures the XML conforms to overall CDA structure
- Does not validate data against IG constraints
- Only checks existence of nodes and hard document structure
- Examples:
  - Misnamed elements
  - Elements that are out of order
  - Missing elements required by the base CDA specification

Schematron Validation

- Based on IG requirements
- Typically a 1:1 correspondence between conformance statements in an IG and Schematron rules
- Uses declarative expression, so developers can be expressive in document requirements and structure
- Should validate the document without errors
- Validates data (i.e., existence of nodes with specific values, node counts)
- Uses standard XPath (1.1) to "select" nodes based on index, name, name + value, and others
- Schematron will not check anything that is not a conformance statement
- Some conformance statements cannot be represented using Schematron (e.g., "Any assistants SHALL be identified")

Schematron tests conformance statements that are defined in an implementation guide (IG).

Example conformance statement:
SHALL contain exactly one [1..1] @classCode="OBS"

- What does this say?
- This constraint contains an expression of cardinality and the value of an attribute

Corresponding Schematron assertion example:
count(/observation/[@classCode="OBS"]) = 1

HL7 Tools:

- CDA XML Schema
- C-CDA Schematron Schema
- HL7's gForge Subversion repository: https://gforge.hl7.org/svn/strucdoc

Online Validation Tools:

- C-CDA Scorecard: https://sitenv.org/scorecard/
- Edge Testing Tool (ETT): https://ttpedge.sitenv.org/ttp/#/validators
- Lantana CDA Validator: http://lantanagroup.com/validator/

LIVE DEMONSTRATIONS

XML Body using C-CDA
Simple XML Body
CDA Rendering
CDA Validation

Polling Question 2

Which type of CDA body do you feel is most useful for your use case?

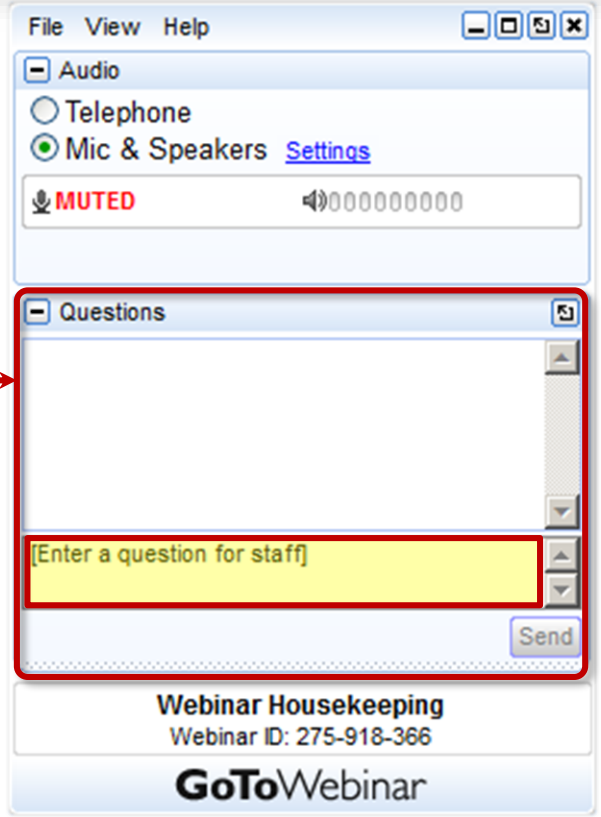
- Non-XML Body (no coding, PDF, MS Word, etc.).
- XML Body (Extensive coding required for many document types).
- Simple XML Body (no required coding, but can add where there is ROI).

Audience Q&A

Please submit your questions

Enter your question into the “Questions” pane in the lower right hand corner of your screen.

You can also submit questions at any time to CORE@caqh.org



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- Navigate to the Resources section for today’s event to find a PDF version of today’s presentation slides.
- Also, a copy of the slides and the webinar recording will be emailed to all attendees and registrants in the next 1-2 business days.

Resources

- Presentation Slides

CAQH CORE

Upcoming CAQH CORE Education Sessions

CAQH CORE Town Hall National Webinar
TUESDAY, FEBRUARY 6TH, 2018 – 2 PM ET

Overview and Trends in Value-based Payment Federal and Industry Initiatives
TUESDAY, MARCH 13TH, 2018 – 2 PM ET

To register for this, and all CAQH CORE events, please go to **www.caqh.org/core/events**

Thank you for joining us!

@CAQH

Website: www.CAQH.org/CORE

Email: CORE@CAQH.org

The CAQH CORE Mission

Drive the creation and adoption of healthcare operating rules that support standards, accelerate interoperability and align administrative and clinical activities among providers, payers and consumers.

BACKUP SLIDES

ORIGINAL-XML Body Demo Using C-CDA

```
<section>
    <!-- ** Vital Signs Section (entries required) (V3) ** -->
    <templateId root="2.16.840.1.113883.10.20.22.2.4.1" extension="2015-08-01"/>
    <templateId root="2.16.840.1.113883.10.20.22.2.4.1"/>
    <code code="8716-3" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" displayName="VITAL SIGNS"/>
<observation classCode="OBS" moodCode="EVN">
    <!-- ** Vital sign observation (V2) ** -->
    <templateId root="2.16.840.1.113883.10.20.22.4.27" extension="2014-06-09"/>
    <templateId root="2.16.840.1.113883.10.20.22.4.27"/>
    <id root="ed9589fd-fda0-41f7-a3d0-dc537554f5c2"/>
    <code code="8302-2" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" displayName="Height"/>
    <statusCode code="completed"/>
    <effectiveTime value="20120910"/>
    <value xsi:type="PQ" value="177" unit="cm"/>
    <interpretationCode code="N" codeSystem="2.16.840.1.113883.5.83"/>
    <author typeCode="AUT">
        <templateId root="2.16.840.1.113883.10.20.22.4.119"/>
        <time value="201209101145-0800"/>
        <assignedAuthor>
            <id extension="555555555" root="2.16.840.1.113883.4.6"/>
            <code code="207QA0505X" displayName="Adult Medicine" codeSystem="2.16.840.1.113883.6.101" cod
        </assignedAuthor>
    </author>
</observation>
                                <td ID="vit6">128/80</td>
                            </tr>
                        </tbody>
                    </table>
                </text>
```

XML Body Demo Using C-CDA

Table of Contents

XML Body Demo Using C-CDA

component	0..1	MAY		1198-30683	
section	1..1	SHALL		1198-30684	Payers Section (V3) (identifier: urn:hl7ii:2.16.840.1.113883.10.20.22.2.18:2015-08-01
component	0..1	SHOULD		1198-30685	
section	1..1	SHALL		1198-30686	Plan of Treatment Section (V2) (identifier: urn:hl7ii:2.16.840.1.113883.10.20.22.2.10:2014-06-09
component	1..1	SHALL		1198-30687	
section	1..1	SHALL		1198-30688	Social History Section (V3) (identifier: urn:hl7ii:2.16.840.1.113883.10.20.22.2.17:2015-08-01
component	1..1	SHALL		1198-30689	
section	1..1	SHALL		1198-30690	Vital Signs Section (entries required) (V3) (identifier: urn:hl7ii:2.16.840.1.113883.10.20.22.2.4.1:2015-08-01
component	0..1	MAY		1198-32143	
section	1..1	SHALL		1198-32144	Mental Status Section (V2) (identifier: urn:hl7ii:2.16.840.1.113883.10.20.22.2.56:2015-08-01

XML Body Demo Using C-CDA

Table 218: Vital Signs Section (entries required) (V3) Constraints Overview

XPath	Card.	Verb	Data Type	CONF#	Value
section (identifier: urn:hl7ii:2.16.840.1.113883.10.20.22.2.4.1:2015-08-01)					
@nullFlavor	0..1	MAY		1198-32874	urn:oid:2.16.840.1.113883.5.1008 (HL7NullFlavor) = NI
templateId	1..1	SHALL		1198-7273	
@root	1..1	SHALL		1198-10452	2.16.840.1.113883.10.20.22.2.4.1
@extension	1..1	SHALL		1198-32585	2015-08-01
code	1..1	SHALL		1198-15962	
@code	1..1	SHALL		1198-15963	8716-3
@codeSystem	1..1	SHALL		1198-30903	urn:oid:2.16.840.1.113883.6.1 (LOINC) = 2.16.840.1.113883.6.1
title	1..1	SHALL		1198-9967	
text	1..1	SHALL		1198-7275	
entry	1..*	SHALL		1198-7276	
organizer	1..1	SHALL		1198-15964	Vital Signs Organizer (V3) (identifier: urn:hl7ii:2.16.840.1.113883.10.20.22.4.26:2015-08-01

XML Body Demo Using C-CDA

```
<section>
    <!-- ** Vital Signs Section (entries required) (V3) ** -->
    <templateId root="2.16.840.1.113883.10.20.22.2.4.1" extension="2015-08-01"/>
    <templateId root="2.16.840.1.113883.10.20.22.2.4.1"/>
    <code code="8716-3" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" displayName="VITAL SIGNS"/>
    <title>VITAL SIGNS</title>
    <text>
        <table border="1" width="100%">
            <thead>
                <tr>
                    <th align="right">Date / Time: </th>
                    <th>Sept 10, 2012</th>
                    <th>Sept 1, 2011</th>
                </tr>
            </thead>
            <tbody>
                <tr>
                    <th align="left">Height</th>
                    <td ID="vit1">177 cm</td>
                    <td ID="vit2">177 cm</td>
                </tr>
                <tr>
                    <th align="left">Weight</th>
                    <td ID="vit3">86 kg</td>
                    <td ID="vit4">88 kg</td>
                </tr>
                <tr>
                    <th align="left">Blood Pressure</th>
                    <td ID="vit5">132/88</td>
                    <td ID="vit6">128/80</td>
                </tr>
            </tbody>
        </table>
    </text>
```

XML Body Demo Using C-CDA

```
<observation classCode="OBS" moodCode="EVN">
    <!-- ** Vital sign observation (V2) ** -->
    <templateId root="2.16.840.1.113883.10.20.22.4.27" extension="2014-06-09"/>
    <templateId root="2.16.840.1.113883.10.20.22.4.27"/>
    <id root="ed9589fd-fda0-41f7-a3d0-dc537554f5c2"/>
    <code code="8302-2" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" displayName="Height"/>
    <statusCode code="completed"/>
    <effectiveTime value="20120910"/>
    <value xsi:type="PQ" value="177" unit="cm"/>
    <interpretationCode code="N" codeSystem="2.16.840.1.113883.5.83"/>
    <author typeCode="AUT">
        <templateId root="2.16.840.1.113883.10.20.22.4.119"/>
        <time value="201209101145-0800"/>
        <assignedAuthor>
            <id extension="555555555" root="2.16.840.1.113883.4.6"/>
            <code code="207QA0505X" displayName="Adult Medicine" codeSystem="2.16.840.1.113883.6.101" cod
        </assignedAuthor>
    </author>
</observation>
```

ORIGINAL-Simple XML Body Demo

Table 1: Minimally Structured Document (XDoc) Constraints Overview

XPath	Card.	Verb	Data Type	CONF #	Value
ClinicalDocument (identifier: urn:hl7ii:2.16.840.1.113883.3.117.1.9.1.1:2017-12-01)					
templateId	1..1	SHALL		3360-1	
@r					
@e					
code					
com					
str					
c					

```
<component>
  <section>
    <!-- Problem section template -->
    <code code="11450-4" displayName="Problem list" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" />
    <title>PROBLEMS</title>
    <text>
      <list>
        <item>Patellofemoral arthritis since 1983</item>
        <item>Asthma since 1950</item>
        <item>Pneumonia in January 1997</item>
        <item>Myocardial infarction in January 1997</item>
      </list>
    </text>
  </section>
</component>
```

Simple XML Body Demo

Table 1: Minimally Structured Document (XDoc) Constraints Overview

XPath	Card.	Verb	Data Type	CONF #	Value
ClinicalDocument (identifier: urn:hl7ii:2.16.840.1.113883.3.117.1.9.1.1:2017-12-01)					
templateId	1..1	SHALL		3360-1	
@root	1..1	SHALL		3360-2	2.16.840.1.113883.3.117.1.9.1.1
@extension	1..1	SHALL		3360-3	2017-12-01
code	1..1	SHALL		3360-8	
component	1..1	SHALL		3360-4	
structuredBody	1..1	SHALL		3360-5	
component	1..*	SHALL		3360-6	
section	1..1	SHALL		3360-7	

Simple XML Body Demo

```
<component>
  <section>
    <!-- Problem section template -->
    <code code="11450-4" displayName="Problem list" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" />
    <title>PROBLEMS</title>
    <text>
      <list>
        <item>Patellofemoral arthritis since 1983</item>
        <item>Asthma since 1950</item>
        <item>Pneumonia in January 1997</item>
        <item>Myocardial infarction in January 1997</item>
      </list>
    </text>
  </section>
</component>
```

SOCIAL HISTORY

Social History Observation	Description	Dates Observed
Current Smoking Status	Former smoker	September 10, 2012
Tobacco Use	Moderate cigarette smoker, 10-19/day	February, 2009 - February, 2011
Alcoholic drinks per day	12	Since February, 2012

VITAL SIGNS

Date / Time:	Sept 10, 2012	Sept 1, 2011
Height	177 cm	177 cm
Weight	86 kg	88 kg
Blood Pressure	132/88	128/80

CDA Rendering Demo

Good Health Clinic: Discharge Summary (UD)

Patient	Jacob Martin
Date of birth	April 11, 2006
Sex	Male
Race	White
Ethnicity	Not Hispanic or Latino
Contact info	Primary Home: 34 South Wells St. Blinkford, ID 78598, US Tel: (912)912-9123
Patient IDs	998993 2.16.840.1.113883.19.5.99999.2 111-00-2331 2.16.840.1.113883.4.1
Document Id	TT989 2.16.840.1.113883.19.5.99999.1
Document Created:	September 16, 2012, 19:19 -0400
Author	Amanda Assigned
Contact info	1020 Healthcare Drive Sheridan, WY 99099, US Tel: 555-555-1021
Entered by	Amanda Assigned
Contact info	1010 Village Avenue Sheridan, WY 99099, US Tel: 555-555-1021
Signed	Amanda Assigned at April 27, 2009, 14:00:00 +0600

CDA Rendering Demo

Community Health Hospital

Discharge Summary

Patient ID: 12345
Patient Name: Levin, Henry L.
Date of Discharge: 03/26/2009

Description: Acute cerebrovascular accident/left basal ganglia and deep white matter of the left parietal lobe, hypertension, urinary tract infection, and hypercholesterolemia.

DISCHARGE DIAGNOSES:
1. Acute cerebrovascular accident/left basal ganglia and deep white matter of the left parietal lobe.
2. Hypertension.
3. Urinary tract infection.
4. Hypercholesterolemia.

PROCEDURES:
1. On 3/26/2009, portable chest, single view. Impression: atherosclerotic change in the aortic knob.
2. On 3/26/2009, chest, portable, single view. Impression: Mild tortuosity of the thoracic aorta, maybe secondary to hypertension; right lateral costophrenic angle is not evaluated due to positioning of the patient.

CDA Rendering Demo

ADVANCE DIRECTIVES

Directive	Description	Verification	Supporting Document(s)
Resuscitation status	Do not resuscitate	Dr. Patricia Primary, Feb 19, 2011	Advance directive

ALLERGIES AND ADVERSE REACTIONS

Substance	Reaction
Penicillin	Nausea
Codeine	Wheezing

ENCOUNTERS

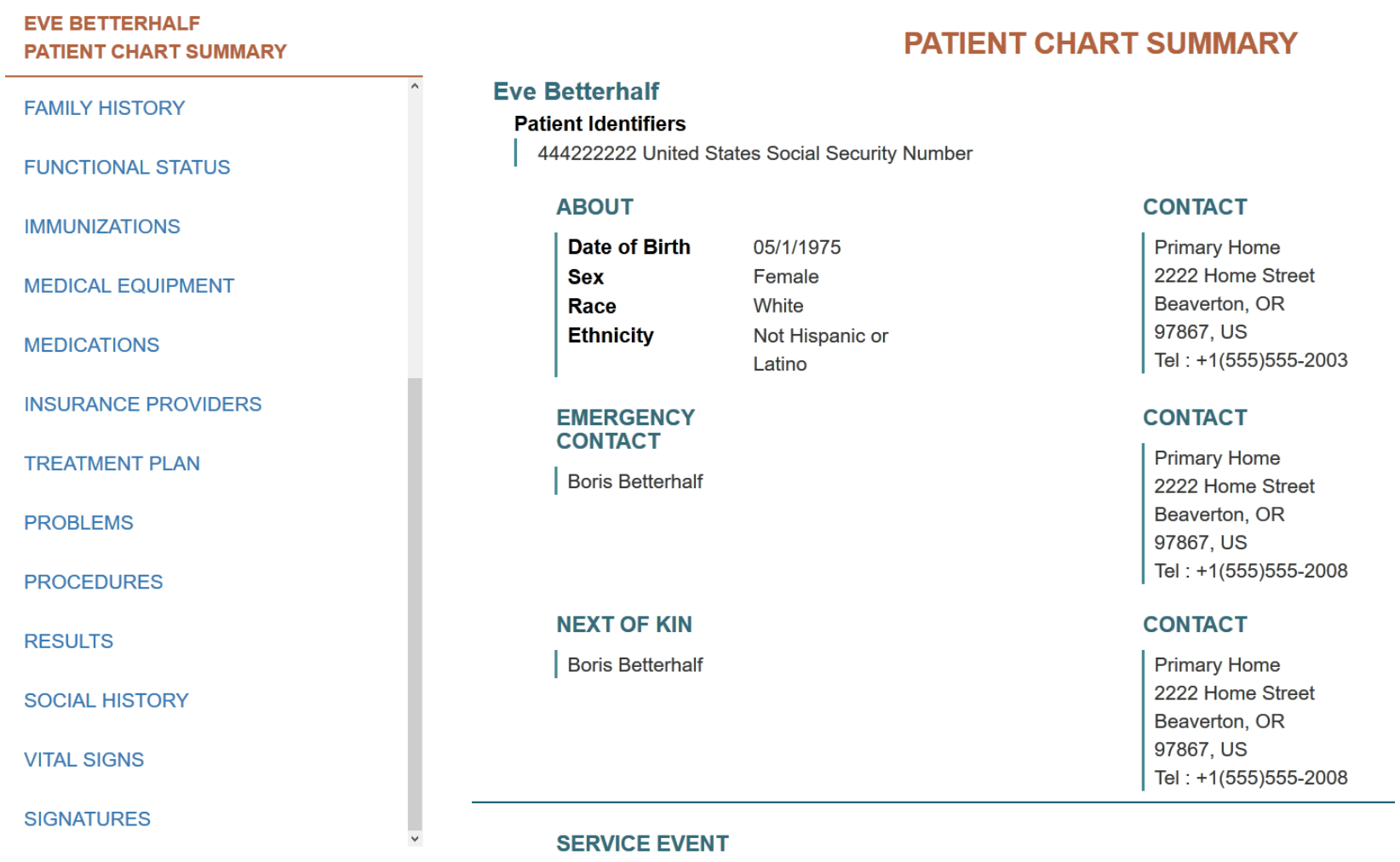
Encounter	Performer	Location	Date
Checkup Examination	Performer Name	Community Urgent Care Center	September 27, 2012 at 1:00pm

FAMILY HISTORY

Father (deceased)

Diagnosis	Age At Onset
Myocardial Infarction (cause of death)	57
Diabetes	40

CDA Rendering Demo



EVE BETTERHALF
PATIENT CHART SUMMARY

- FAMILY HISTORY
- FUNCTIONAL STATUS
- IMMUNIZATIONS
- MEDICAL EQUIPMENT
- MEDICATIONS
- INSURANCE PROVIDERS
- TREATMENT PLAN
- PROBLEMS
- PROCEDURES
- RESULTS
- SOCIAL HISTORY
- VITAL SIGNS
- SIGNATURES

PATIENT CHART SUMMARY

Eve Betterhalf

Patient Identifiers

444222222 United States Social Security Number

ABOUT

Date of Birth	05/1/1975
Sex	Female
Race	White
Ethnicity	Not Hispanic or Latino

CONTACT

Primary Home
2222 Home Street
Beaverton, OR
97867, US
Tel : +1(555)555-2003

EMERGENCY CONTACT

Boris Betterhalf

CONTACT

Primary Home
2222 Home Street
Beaverton, OR
97867, US
Tel : +1(555)555-2008

NEXT OF KIN

Boris Betterhalf

CONTACT

Primary Home
2222 Home Street
Beaverton, OR
97867, US
Tel : +1(555)555-2008

SERVICE EVENT

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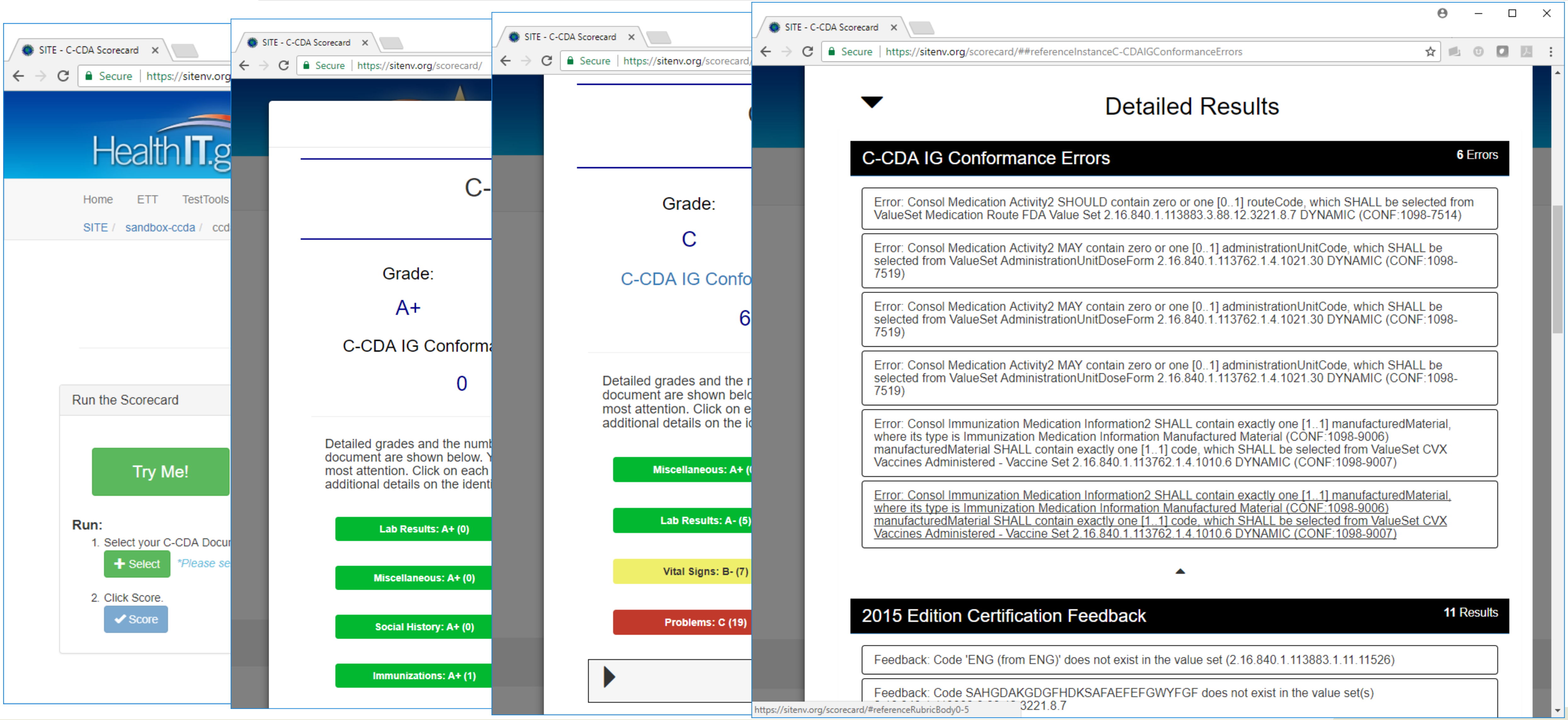
SOCIAL HISTORY

Social History Observation	Description	Dates Observed
Current Smoking Status	Former smoker	September 10, 2012
Tobacco Use	Moderate cigarette smoker, 10-19/day	February, 2009 - February, 2011
Alcoholic drinks per day	12	Since February, 2012

VITAL SIGNS

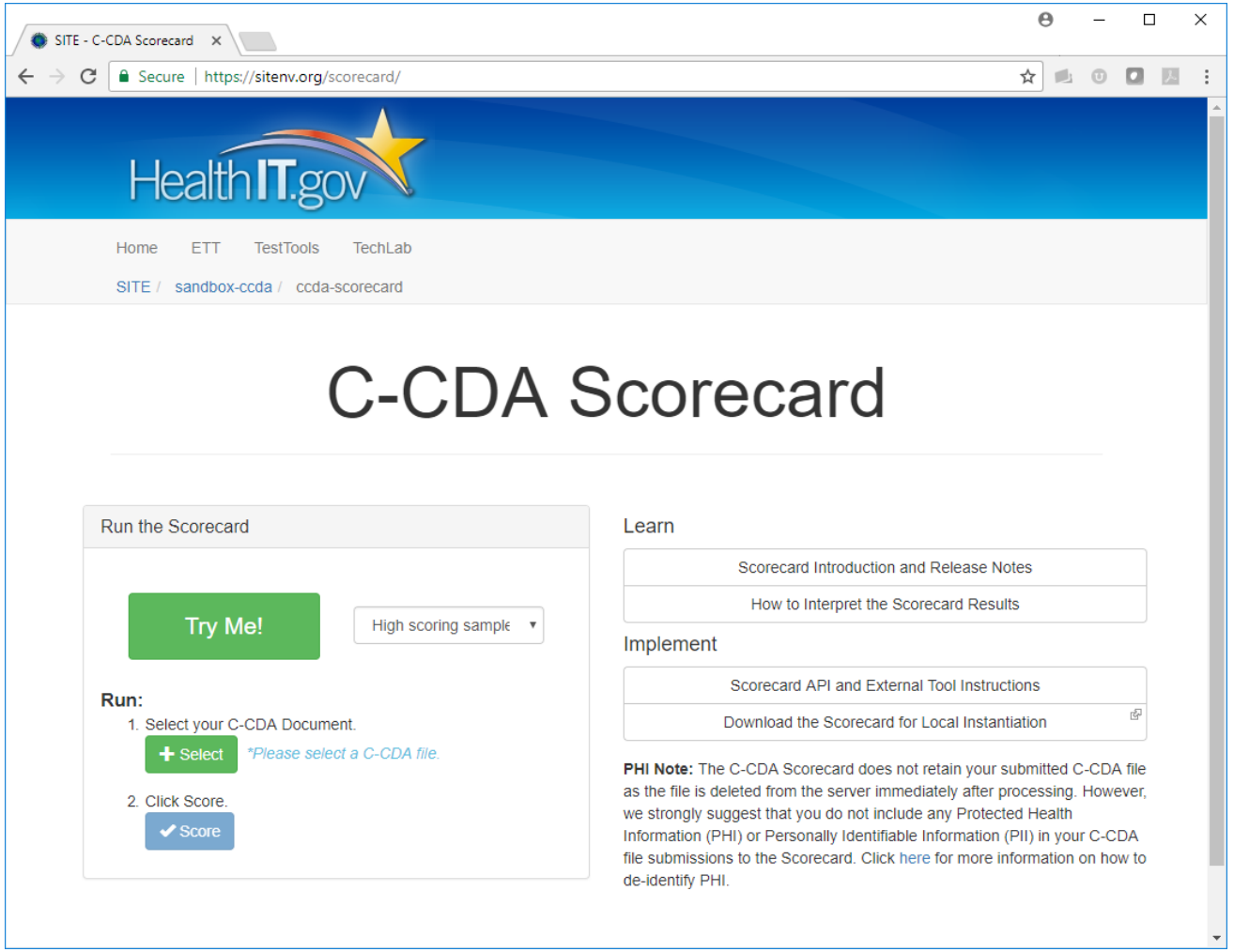
Date / Time:	Sept 10, 2012	Sept 1, 2011
Height	177 cm	177 cm
Weight	86 kg	88 kg
Blood Pressure	132/88	128/80

ORIGINAL-CDA Validation

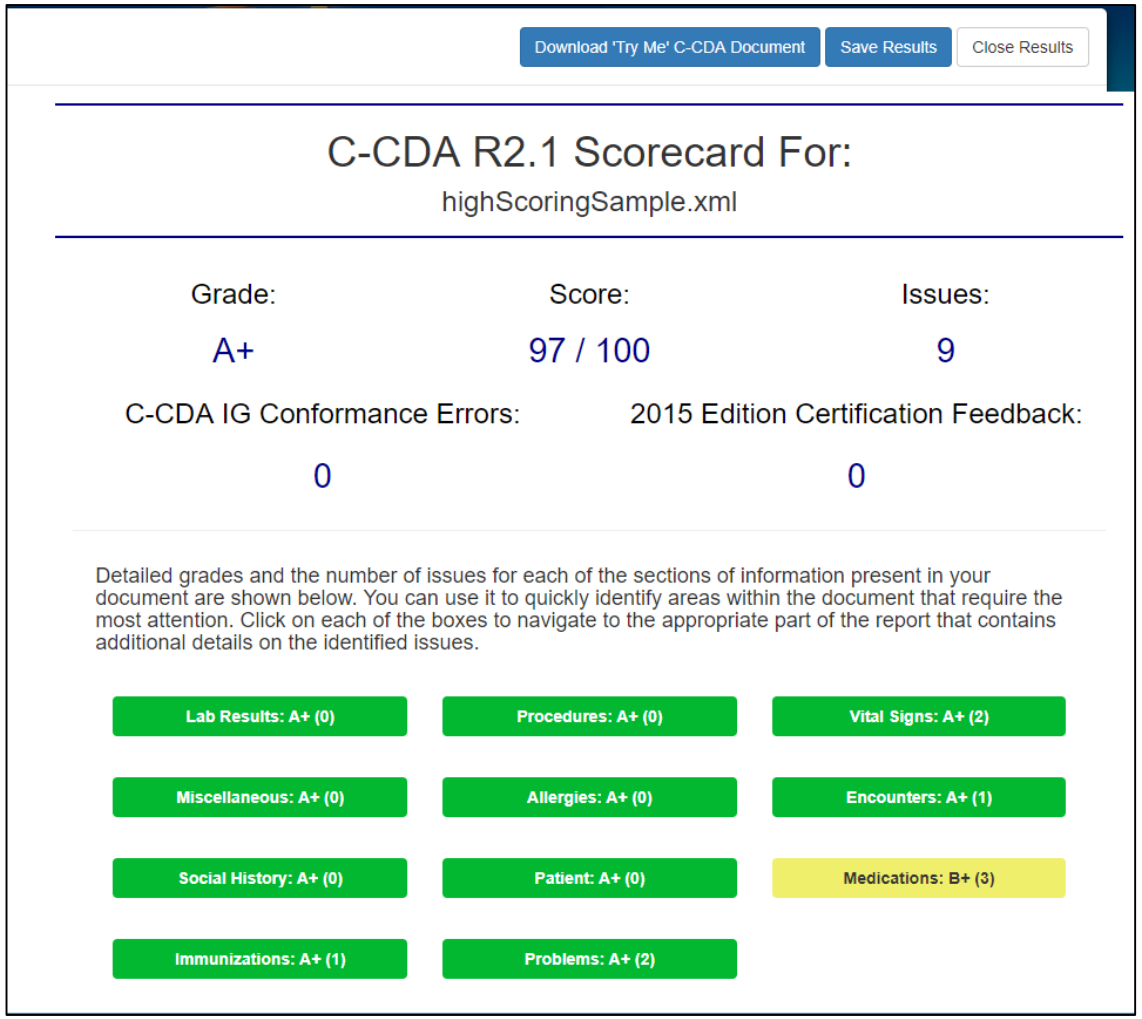


Lantana CONSULTING GROUP

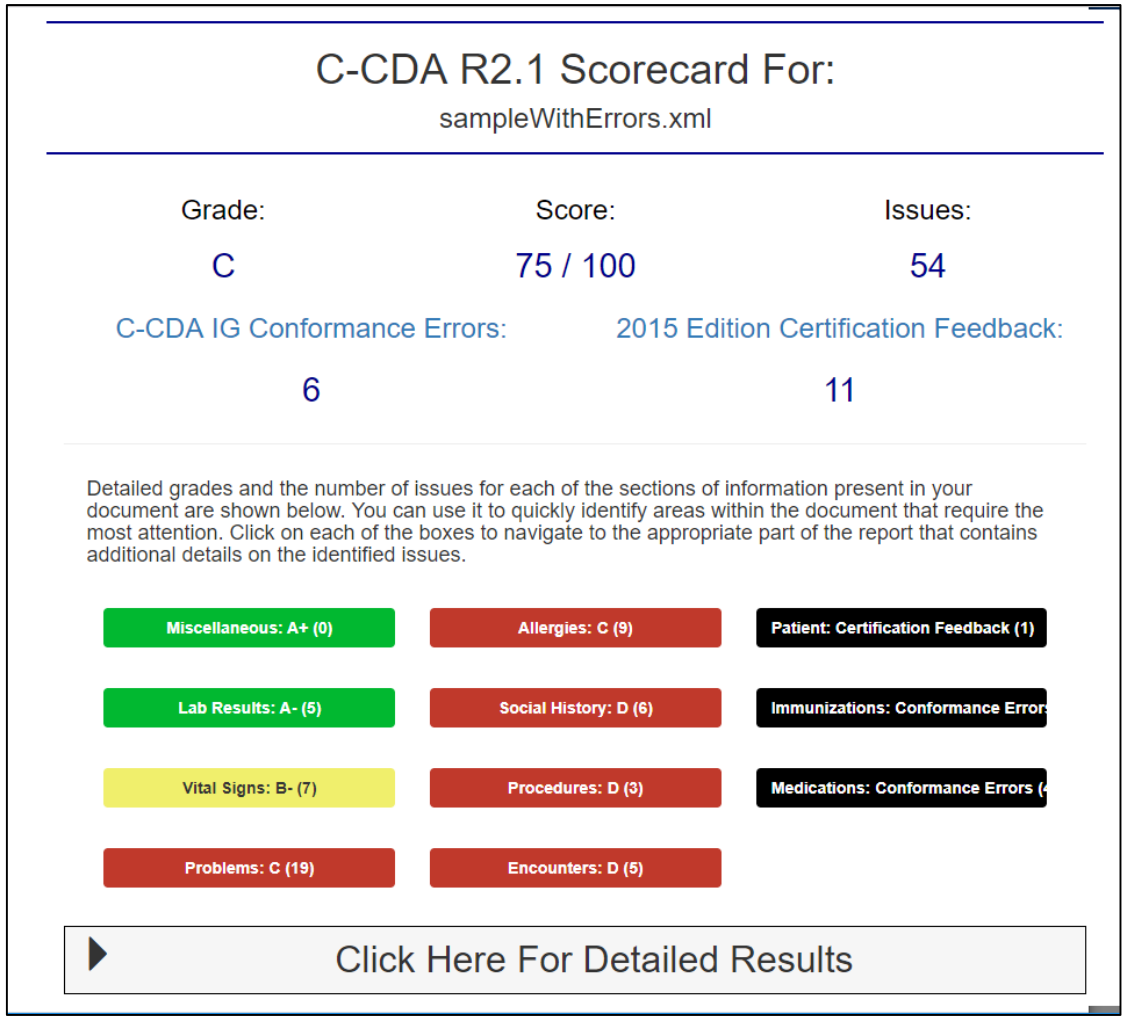
CDA Validation



CDA Validation



CDA Validation



C-CDA R2.1 Scorecard For:

sampleWithErrors.xml

Grade:	Score:	Issues:
C	75 / 100	54

C-CDA IG Conformance Errors:	2015 Edition Certification Feedback:
6	11

Detailed grades and the number of issues for each of the sections of information present in your document are shown below. You can use it to quickly identify areas within the document that require the most attention. Click on each of the boxes to navigate to the appropriate part of the report that contains additional details on the identified issues.

Miscellaneous: A+ (0)	Allergies: C (9)	Patient: Certification Feedback (1)
Lab Results: A- (5)	Social History: D (6)	Immunizations: Conformance Error
Vital Signs: B- (7)	Procedures: D (3)	Medications: Conformance Errors (
Problems: C (19)	Encounters: D (5)	

Click Here For Detailed Results

Detailed Results

C-CDA IG Conformance Errors

6 Errors

Error: Consol Medication Activity2 SHOULD contain zero or one [0..1] routeCode, which SHALL be selected from ValueSet Medication Route FDA Value Set 2.16.840.1.113883.3.88.12.3221.8.7 DYNAMIC (CONF:1098-7514)

Error: Consol Medication Activity2 MAY contain zero or one [0..1] administrationUnitCode, which SHALL be selected from ValueSet AdministrationUnitDoseForm 2.16.840.1.113762.1.4.1021.30 DYNAMIC (CONF:1098-7519)

Error: Consol Medication Activity2 MAY contain zero or one [0..1] administrationUnitCode, which SHALL be selected from ValueSet AdministrationUnitDoseForm 2.16.840.1.113762.1.4.1021.30 DYNAMIC (CONF:1098-7519)

Error: Consol Medication Activity2 MAY contain zero or one [0..1] administrationUnitCode, which SHALL be selected from ValueSet AdministrationUnitDoseForm 2.16.840.1.113762.1.4.1021.30 DYNAMIC (CONF:1098-7519)

Error: Consol Immunization Medication Information2 SHALL contain exactly one [1..1] manufacturedMaterial, where its type is Immunization Medication Information Manufactured Material (CONF:1098-9006) manufacturedMaterial SHALL contain exactly one [1..1] code, which SHALL be selected from ValueSet CVX Vaccines Administered - Vaccine Set 2.16.840.1.113762.1.4.1010.6 DYNAMIC (CONF:1098-9007)

Error: Consol Immunization Medication Information2 SHALL contain exactly one [1..1] manufacturedMaterial, where its type is Immunization Medication Information Manufactured Material (CONF:1098-9006) manufacturedMaterial SHALL contain exactly one [1..1] code, which SHALL be selected from ValueSet CVX Vaccines Administered - Vaccine Set 2.16.840.1.113762.1.4.1010.6 DYNAMIC (CONF:1098-9007)

2015 Edition Certification Feedback

11 Results

Feedback: Code 'ENG (from ENG)' does not exist in the value set (2.16.840.1.113883.1.11.11526)

Feedback: Code SAHGDAKGDGFHDKSAFAFFFFGWYFGF does not exist in the value set(s)

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Clinical Document Architecture (CDA) R2

- http://www.hl7.org/implement/standards/product_brief.cfm?product_id=7

Consolidated CDA (C-CDA)

- http://www.hl7.org/implement/standards/product_brief.cfm?product_id=408

HL7 Attachments IG

- http://www.hl7.org/implement/standards/product_brief.cfm?product_id=464

HL7 balloted Supplemental Templates for Minimally Structured Document (XDoc)

- http://www.hl7.org/documentcenter/public/ballots/2018JAN/downloads/CDAR2_IG_XDOC_R1_D1_2018JAN.zip

Resources—Working with CDA

CDA Stylesheets

- HL7 CDA Stylesheet in gForge: https://gforge.hl7.org/svn/strucdoc
- Lantana stylesheet: https://github.com/lantanagroup/stylesheets

CDA Rendering Challenge

- http://www.hl7.org/events/toolingchallenge.cfm

Validation Tools

- HL7 tools:
  - CDA XML Schema
  - C-CDA Schematron Schema
  - HL7's gForge Subversion repository: https://gforge.hl7.org/svn/strucdoc
- Online validation tools
  - C-CDA Scorecard: https://sitenv.org/scorecard/
  - Edge Testing Tool (ETT): https://ttpedge.sitenv.org/ttp/#/validators
  - Lantana CDA Validator: http://lantanagroup.com/validator/

Use and Adoption of Attachments in Healthcare Administration

- Part I
  - https://www.caqh.org/about/event/use-and-adoption-attachments-healthcare-administration-part-i
- Part II
  - https://www.caqh.org/about/event/use-and-adoption-attachments-healthcare-administration-part-ii
- Part III
  - https://www.caqh.org/about/event/use-and-adoption-attachments-healthcare-administration-part-iii-clinical-document

Acronyms

ANSI	American National Standards Institute
BDS	Binary Data Segment
CAQH	Council for Affordable Quality Healthcare, Inc.
CCD	Continuity of Care Document
C-CDA	Consolidated CDA
CDA	Clinical Data Architecture
CDP-1	Clinical Documents for Payers, Set 1
CORE	Committee on Operating Rules for Information Exchange
EDI	Electronic Data Interchange
EHR	Electronic Health Record
H&P	History and Physical
HL7	Health Level Seven International
HTML	Hypertext Markup Language
IG	Implementation Guide
ISO	International Organization for Standardization
IT	Information Technology
LOINC	Logical Observation Identifiers Names and Codes
PDF	Portable Document Format
ROI	Return on Investment
URI	Uniform Resources Identifier
XLST	Extensible Stylesheet Language Transformations
XML	Extensible Markup Language
XPath	XML Path Language