Content and Interoperability Standards Panel:

HL7 Clinical Document Architecture (CDA::CCR::CCD)

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About me

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    - Tricare Management Activity, Department of Defense, Enterprise Wide Referrals & Authorizations; Documents, Files, Images (DFI)
    - Subcontractor, HITSP Standards Harmonization
    - Industry-leading PHR, EMR and RHIO solution vendors
  - Co-editor, CDA
  - Co-chair HL7 Structured Documents TC
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  - Member, HL7 Board of Directors
  - HL7 IHE Liaison
  - past Chair, KEG & XML SIG & HL7 Marketing Committee
  - Author *ABCD... SGML: A Managers Guide to Structured Information,* 1995
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Healthcare IT 101

- Largely a failed endeavor
- IOM perspective
  - Institute of Medicine, To Err Is Human
  - 98,000 preventable deaths each year
- MOM perspective
  - Post discharge
  - What meds?
  - Office visit: no value
- Problems known
- Why not fixed?

Clinical Document Architecture

Outline

- HL7
- CDA
- CDA for exchange networks
- CDA+CCR=CCD
- Summary, Resources & Questions

Health Level Seven (HL7.org)

- Standards Development Organization
- Developing standards for interoperability
  - Patient care
  - Public health
  - Clinical trials
  - Reimbursement
- HIPAA DSMO
- 20 years, 2000 members
- 30+ international affiliates
- “A model community”: building standards to a single information model

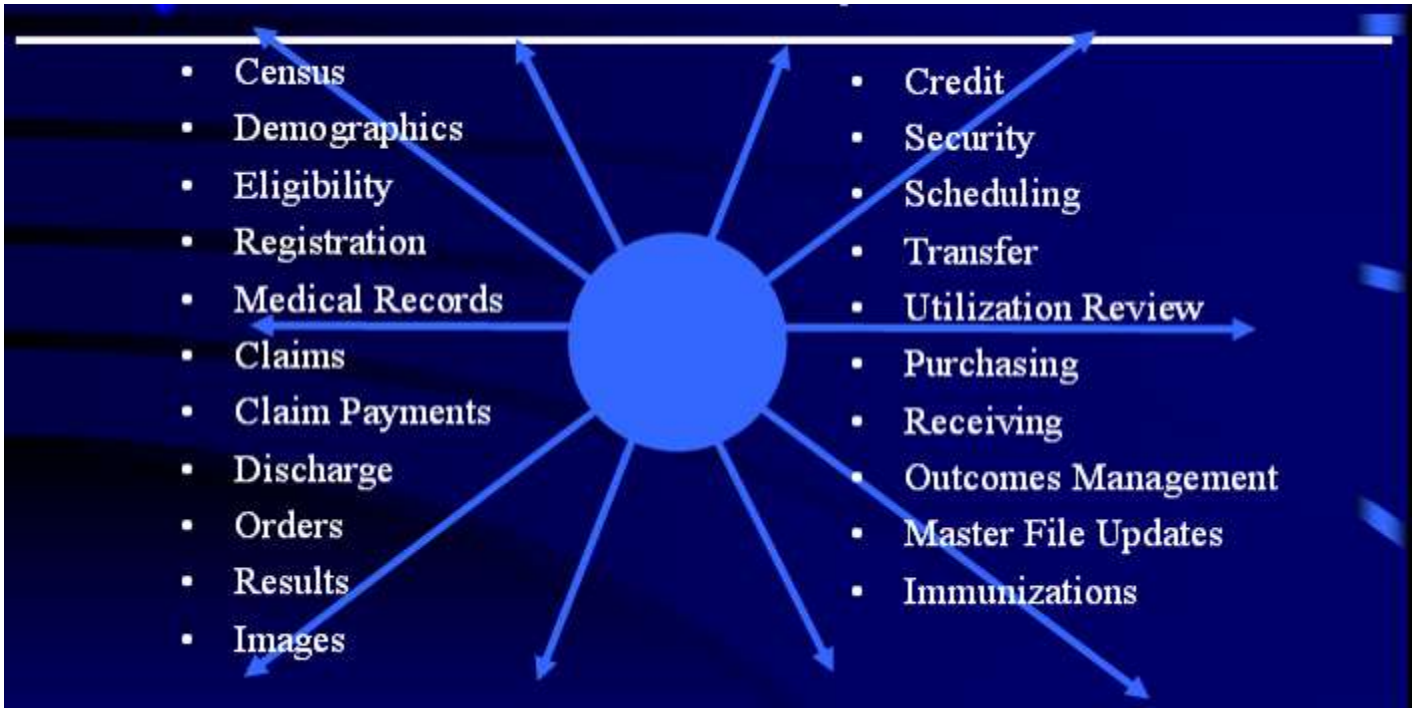
Committees & Special Interest Groups

- Anatomic Pathology
- Anesthesia
- Architecture Review Board**
- Arden Syntax
- Attachments
- Cardiology
- Common Message Element Types***
- CCOW*
- Clinical Decision Support*
- Clinical Genomics
- Clinical Guidelines
- Community Based Health Services
- Conformance
- Infrastructure & Messaging*
- Education**
- Electronic Health Records*
- Electronic Services**
- Emergency Dept.
- Financial Management*
- Government Projects (US)
- Imaging Integration
- Implementation**
- International Affiliates**
- Java
- Laboratory
- Health Care Devices
- Marketing**
- Medical Records/ Information Management*
- Modeling & Methodology*
- Orders & Observations*
- Organization Review**
- Outreach for Clinical Research*
- Patient Administration*
- Patient Care*
- Patient Safety
- Pediatric Data Standards
- Personnel Management*
- Pharmacy
- Process Improvement**
- Public Health & Emergency Response
- Publishing**
- Regulated Clinical Research Information Management (RCRIM)* (formerly Clinical Trials)
- Scheduling & Logistics*
- Security*
- Service Oriented Arch.
- Structured Documents*
- Technical Steering Committee**
- Templates
- Tooling**
- Vocabulary*
- XML

* Technical Committees, ** Board Committees, ***Task Force

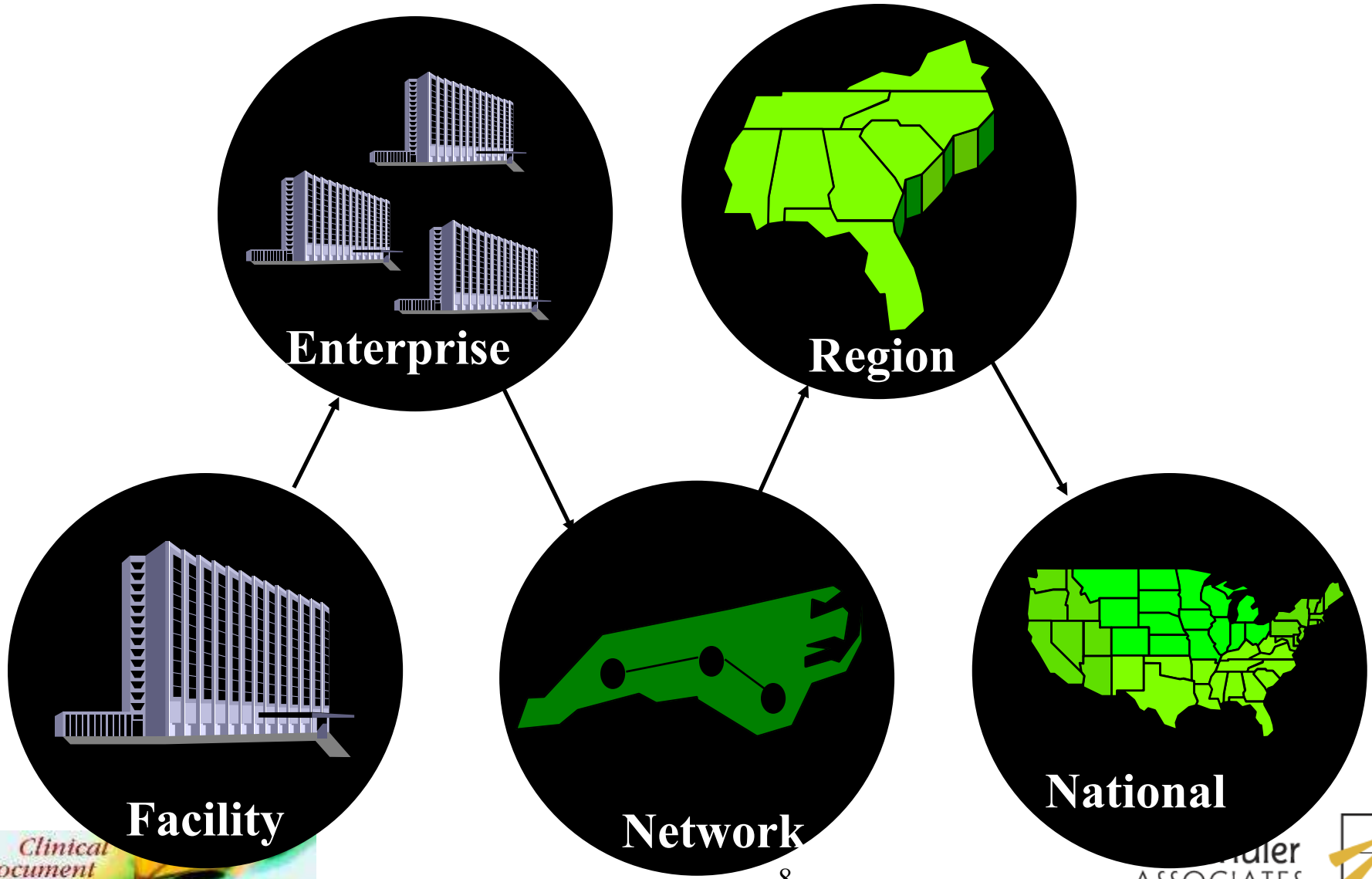
HL7 for messaging

- It's all about the interface:



- Hospital-centric view of HIT

HL7 beyond the hospital interface



HL7 beyond the messaging interface

- CCOW: multi-application context management, single sign-on
- Arden Syntax: decision support, guidelines
- Electronic Health Record: functional, system and interoperability models
- Reference Information Model (RIM)
- Clinical Document Architecture

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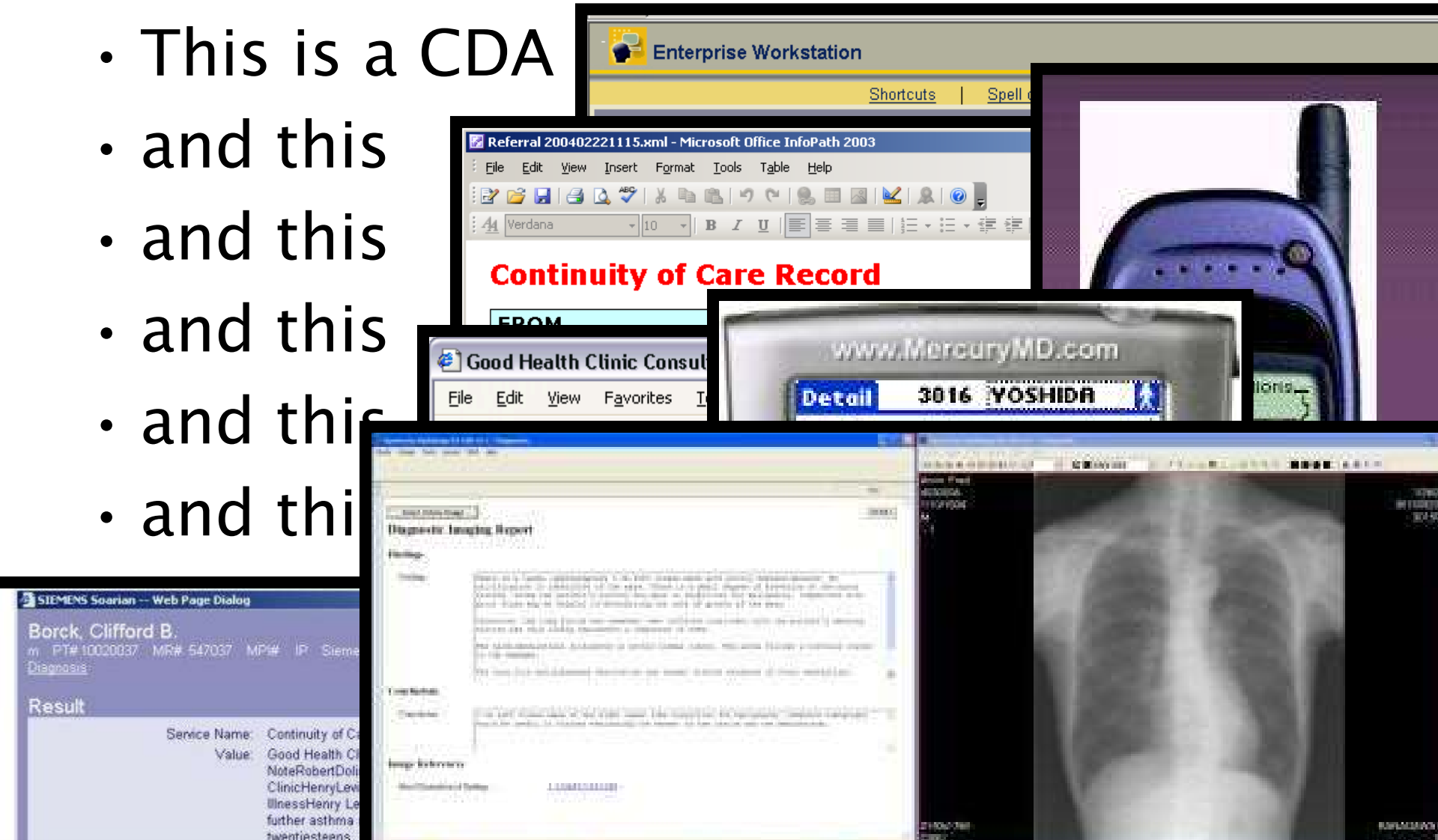
CDA

- Clinical Document Architecture
- ANSI/HL7 CDA R1.0-2000
- ANSI/HL7 CDA R2.0-2005
- A specification for document exchange using
  - XML,
  - the HL7 Reference Information Model (RIM)
  - Version 3 methodology
  - and vocabulary (SNOMED, ICD, local,…)

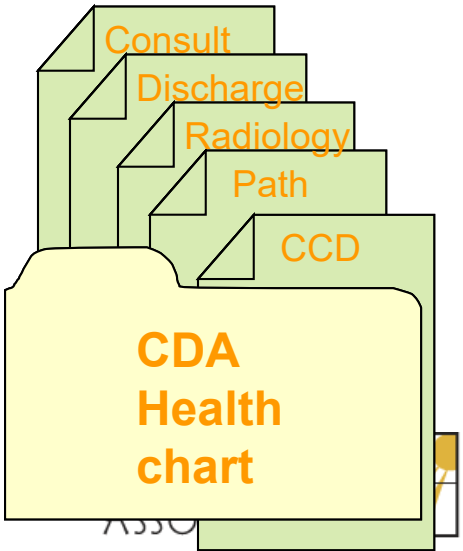
CDA: A Document Exchange Specification

- This is a CDA
- and this
- and this
- and this
- and this
- and thi

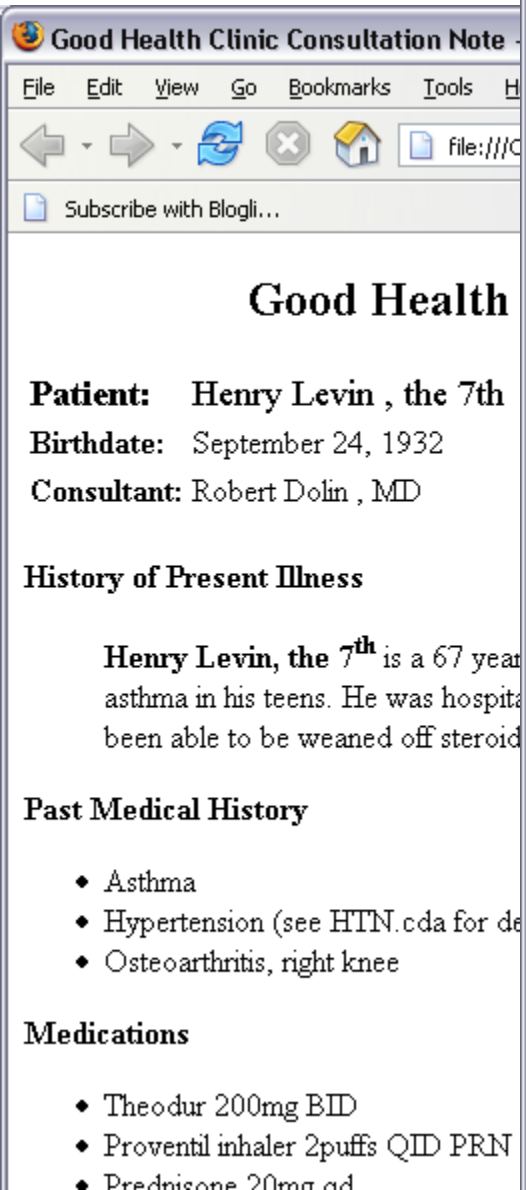


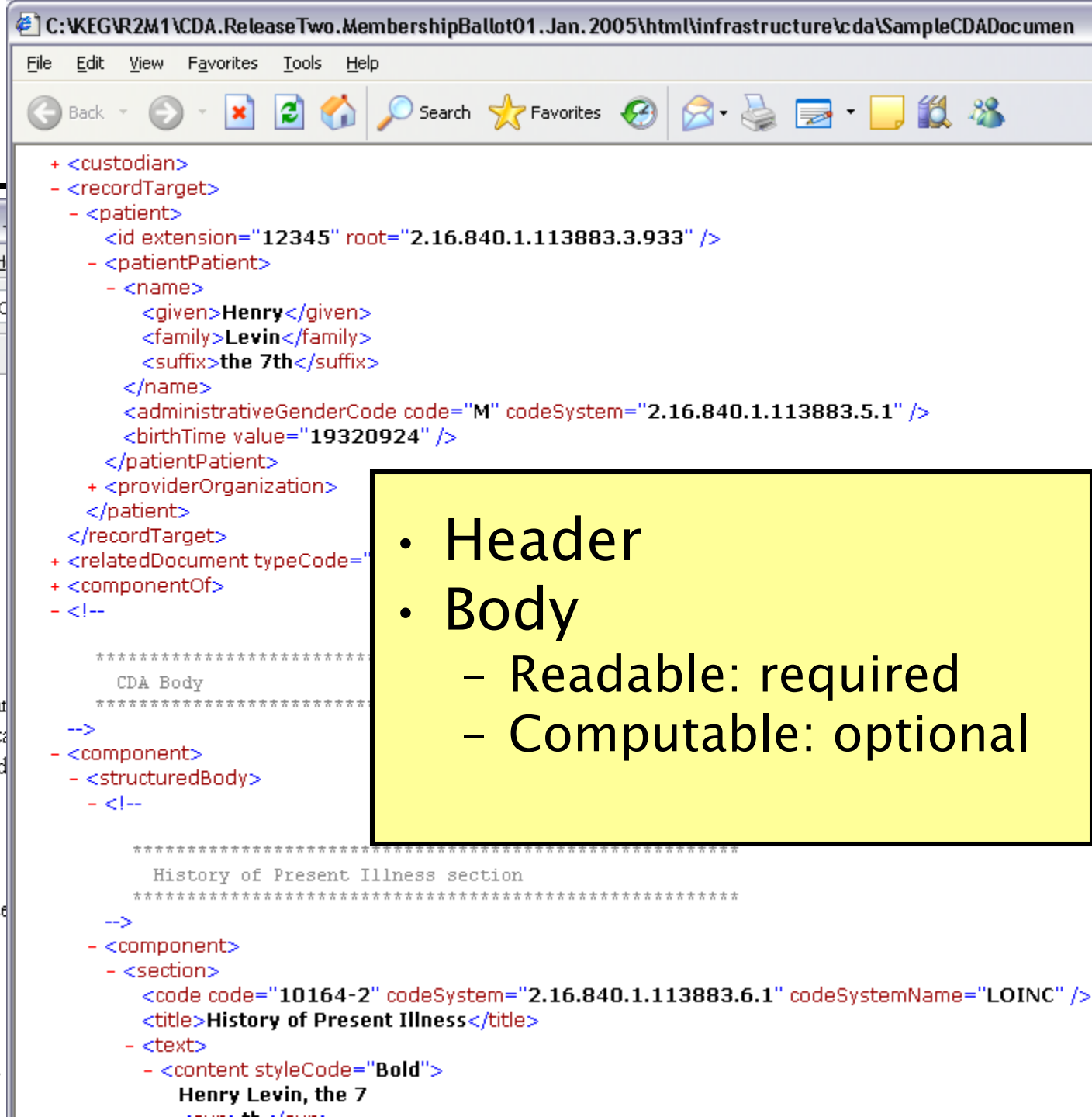
CDA: electronic documents

- eDocuments for Interoperability
  - Many CDA documents comprise an individual electronic medical record
  - Key component for local, regional, national electronic health records
  - Gentle on-ramp to information exchange
    - Everyone uses documents
    - EMR compatible, no EMR required
    - All types of clinical documents



Clinical Document Architecture

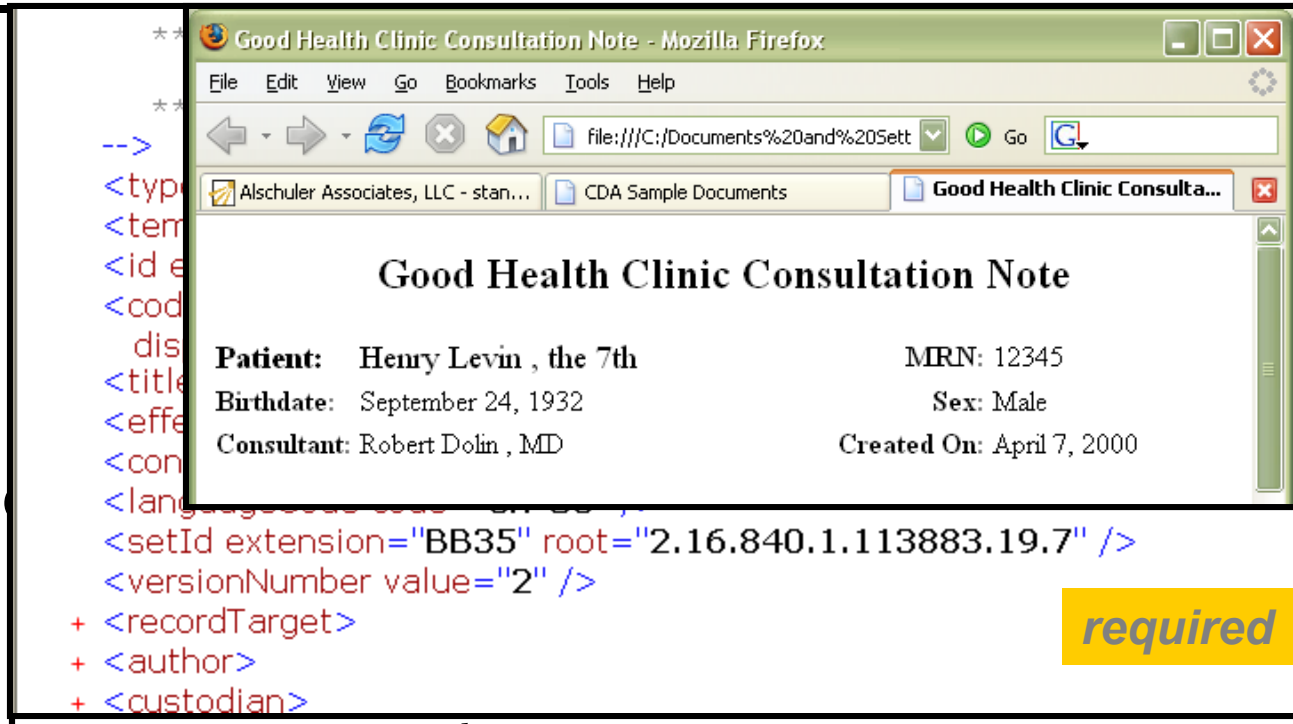




- Header
- Body
  - Readable: required
  - Computable: optional

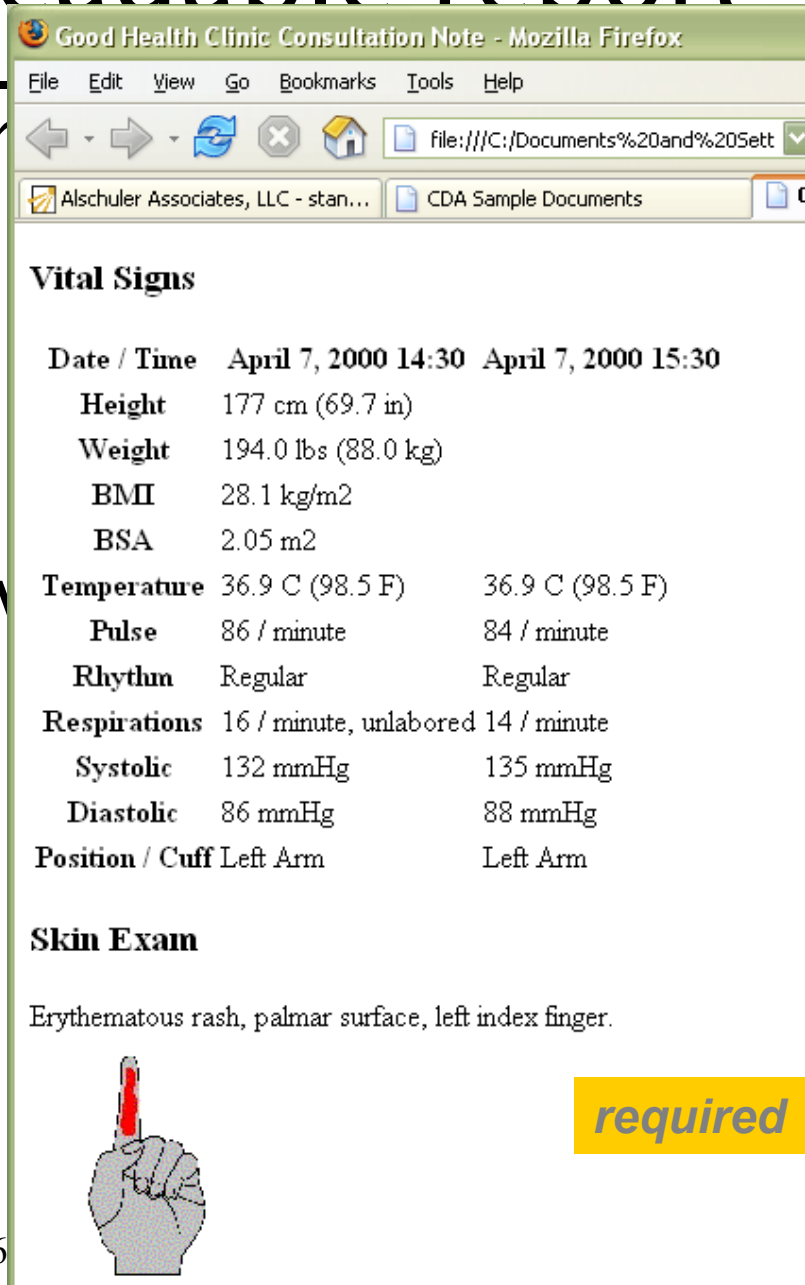
CDA Header: Metadata

- Identify
  - Patient
  - Provider
  - Document typ
- Sufficient for
  - Medical records management
  - Document management
  - Registry/repositoryg
  - Record locator service
  - Store, query, retrieve



CDA Body: Human-readable report

- Any type of clinical docum
  - H&P
  - Consult
  - Op note
  - Discharge Summary…
- Format: tif, PDF, HTML, XM
  - Paragraph
  - List
  - Table
  - Caption
  - Link
  - Content
  - Presentation

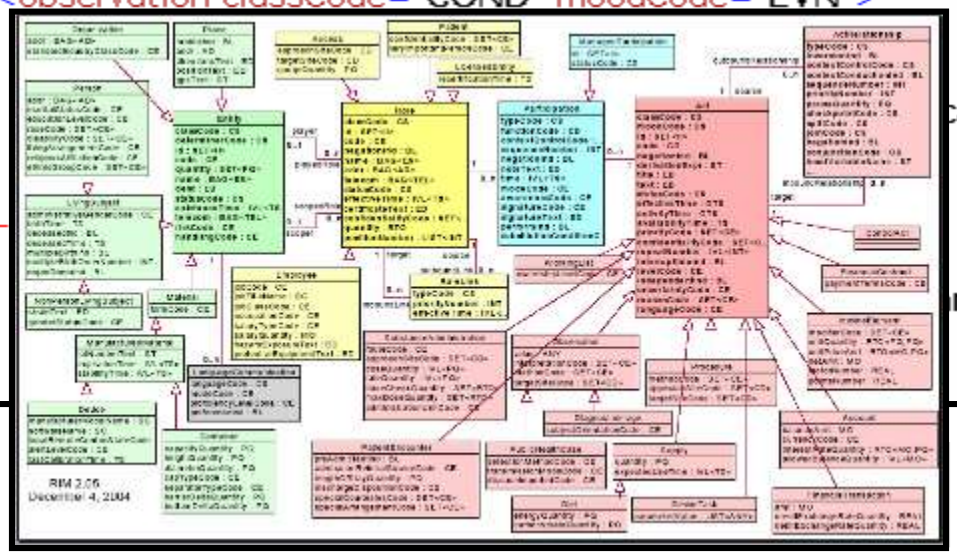


CDA Body: Machine Processible

- Model-based computable semantics:
  - Observation
  - Procedure
  - Organizer
  - Supply
  - Encounter
  - Substance Adminis
  - Observation Media
  - Region Of Interest
  - Act

```
<title>Past Medical History</title>
- <text>
  - <list>
    - <item>
        <content ID="a1">Asthma</content>
      </item>
    + <item>
    + <item>
    </list>
  </text>
- <entry>
  - <observation classCode="COND" moodCode="EVN">
```

Optional



CDA: Incremental Computability

- Standard HL7 metadata
- Simple XML for point of care human readability
- RIM semantics for reusable computability ("semantic interoperability")

```
**********************************************************
  CDA Header
**********************************************************
-->
<typeId root="2.16.840.1.113883.1.3" extension="POCD_HD
<templateId root="2.16.840.1.113883.3.27.1776" />
```

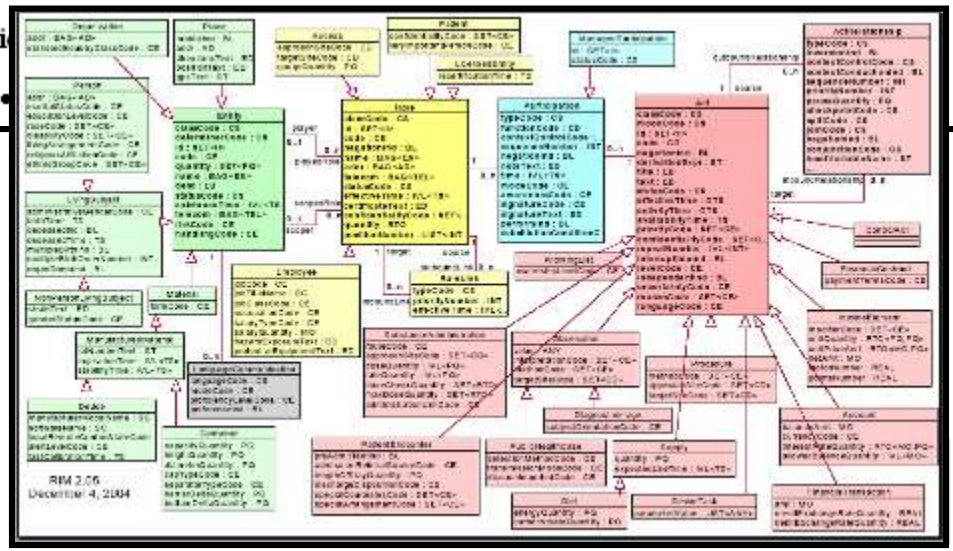
History of Present Illness

Henry Levin, the 7th is a 67 year old male referred for further asthma management. Onset of asthma in h
was hospitalized twice last year, and already twice this year. He has not been able to be weaned off steroi
several months.

Past Medical History

- Asthma
- Hypertension (see HTN.cda for details)
- Osteoarthritis, right knee

Medi



Clinical Document Architecture

Investing in Information

- CDA can be simple
- CDA can be complex
- Simple encoding relatively inexpensive
- Complex encoding costs more
- You get what you pay for:
  - like charging a battery,
  - the more detailed the encoding
  - the greater the potential for reuse

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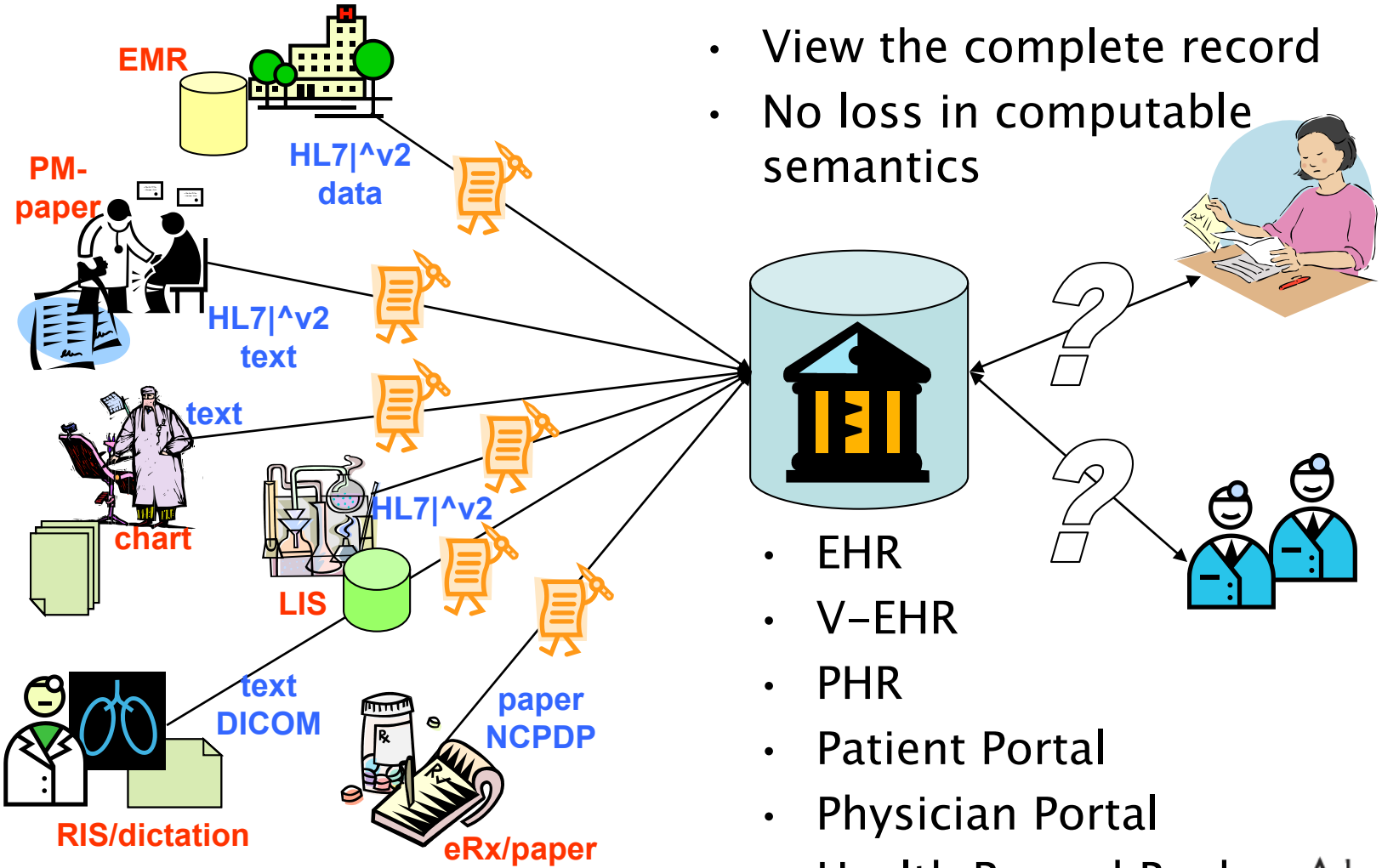
CDA document-based network

- All transform to CDA
- View the complete record
- No loss in computable semantics



- EHR
- V-EHR
- PHR
- Patient Portal
- Physician Portal
- Health Record Bank

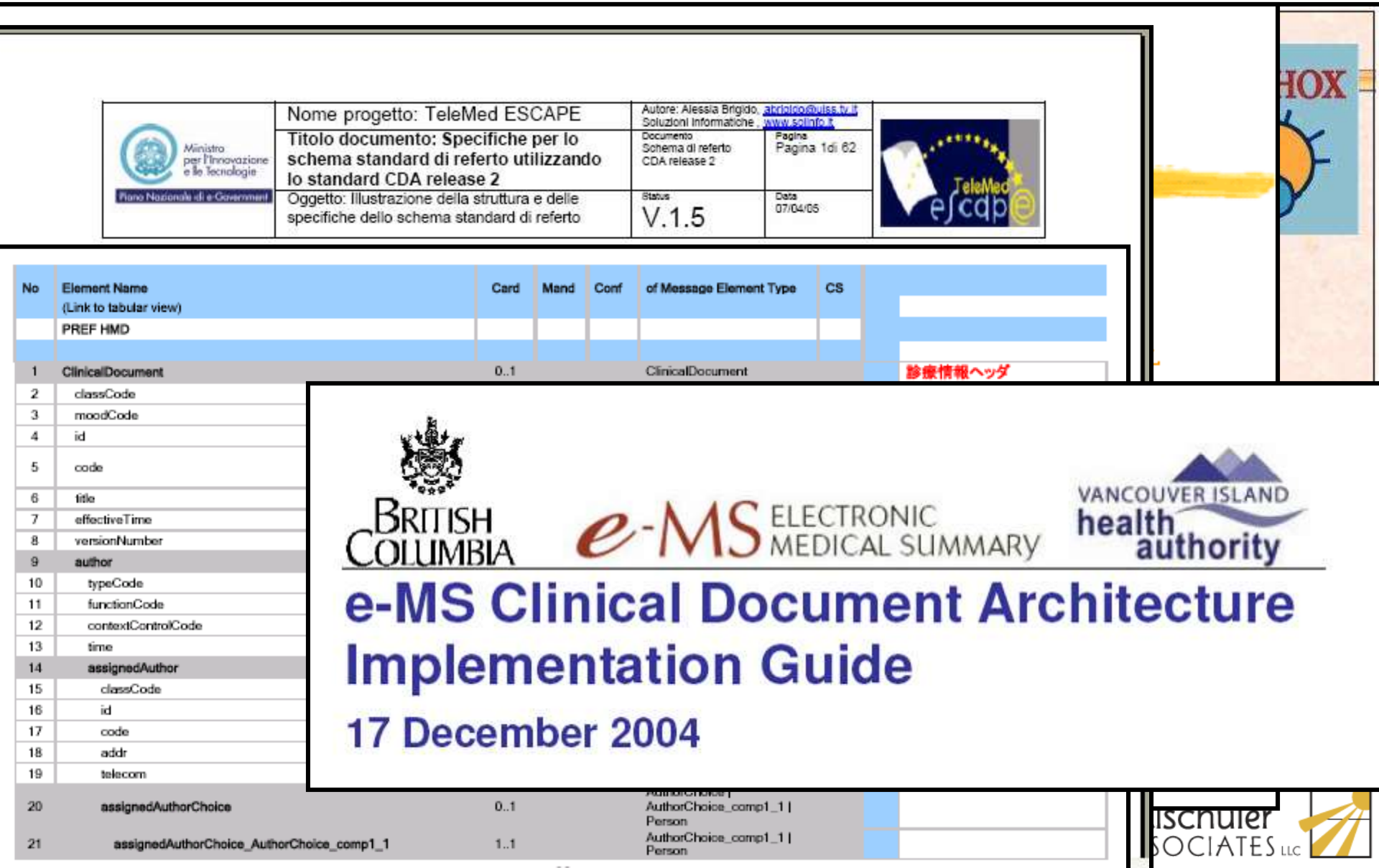
CDA for Information Exchange

- International: basis of interoperability in most advanced national networks
  - Finland, Greece, Canada, Germany, Japan, Korea, France, Italy, New Zealand, Australia, and more
- US: Federal Health Architecture/CHI
  - CMS Notice of Proposed Rule Making
    - Claims attachments using CDA + X12
    - First pilot concluded, others underway
  - VA/DoD bi-directional exchange
- US: Document format for NHIN pilots, RHIO design
  - NHIN Pilots: preliminary architecture
  - HITSP: preliminary choice
  - IHE Medical Summary – CDA for NHIN/RHIO exchange

Major Implementations (outside US)

- PICNIC (European Union)
- SCIPHOX (Germany)
- HYGEIAnet/WebOnColl (Greece)
- Aluetietojärjestelmä (Finland)
- Health Information Summaries (New Zealand)
- Referrals (Australia)
- MERIT-9 (Japan)
- NHS (Wales)
- Buenos Aires HMO project (Argentina)
- Plus projects in France, Italy, Russia, Estonia, Taiwan, Korea…

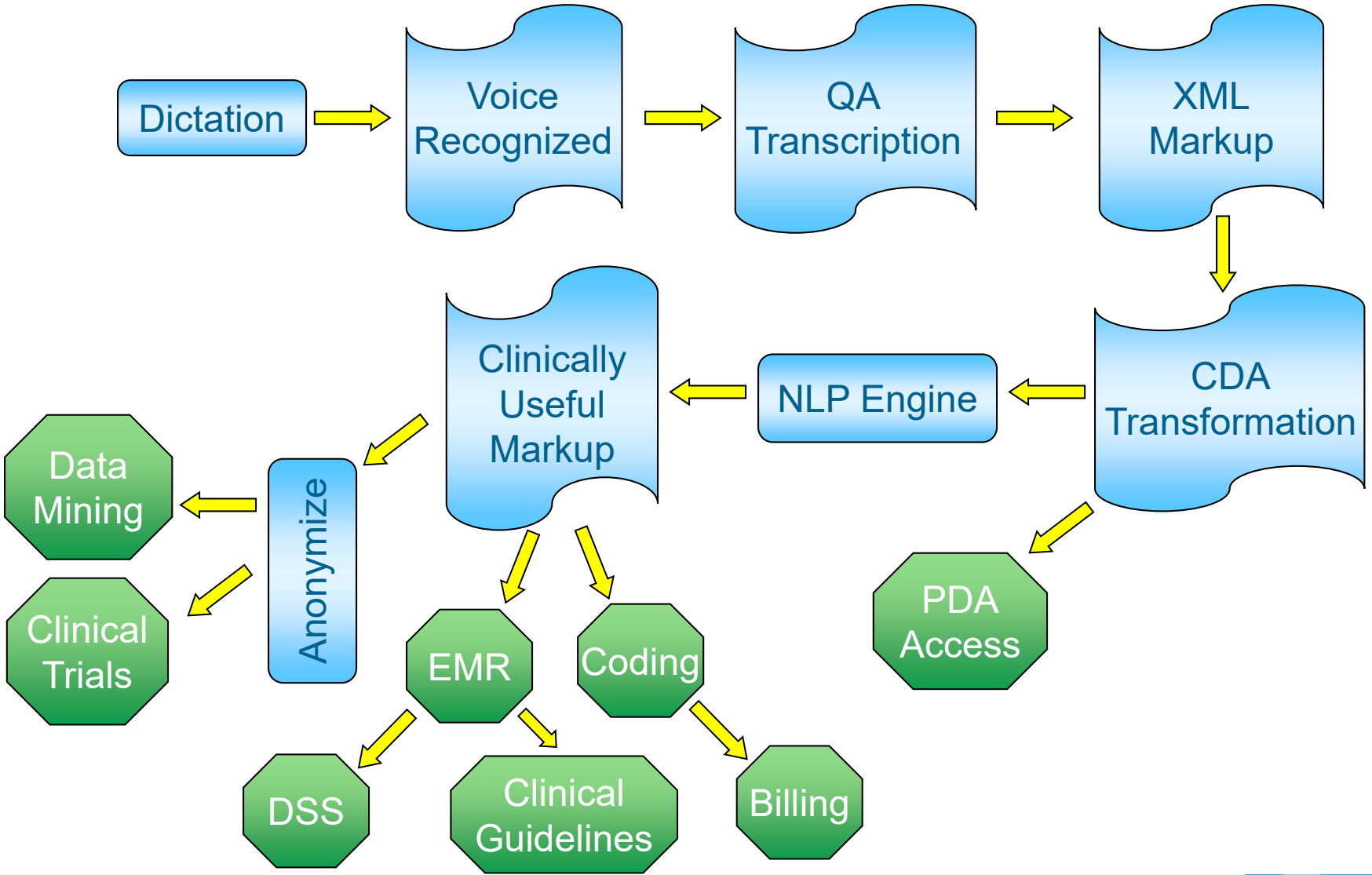
CDA: an international standard

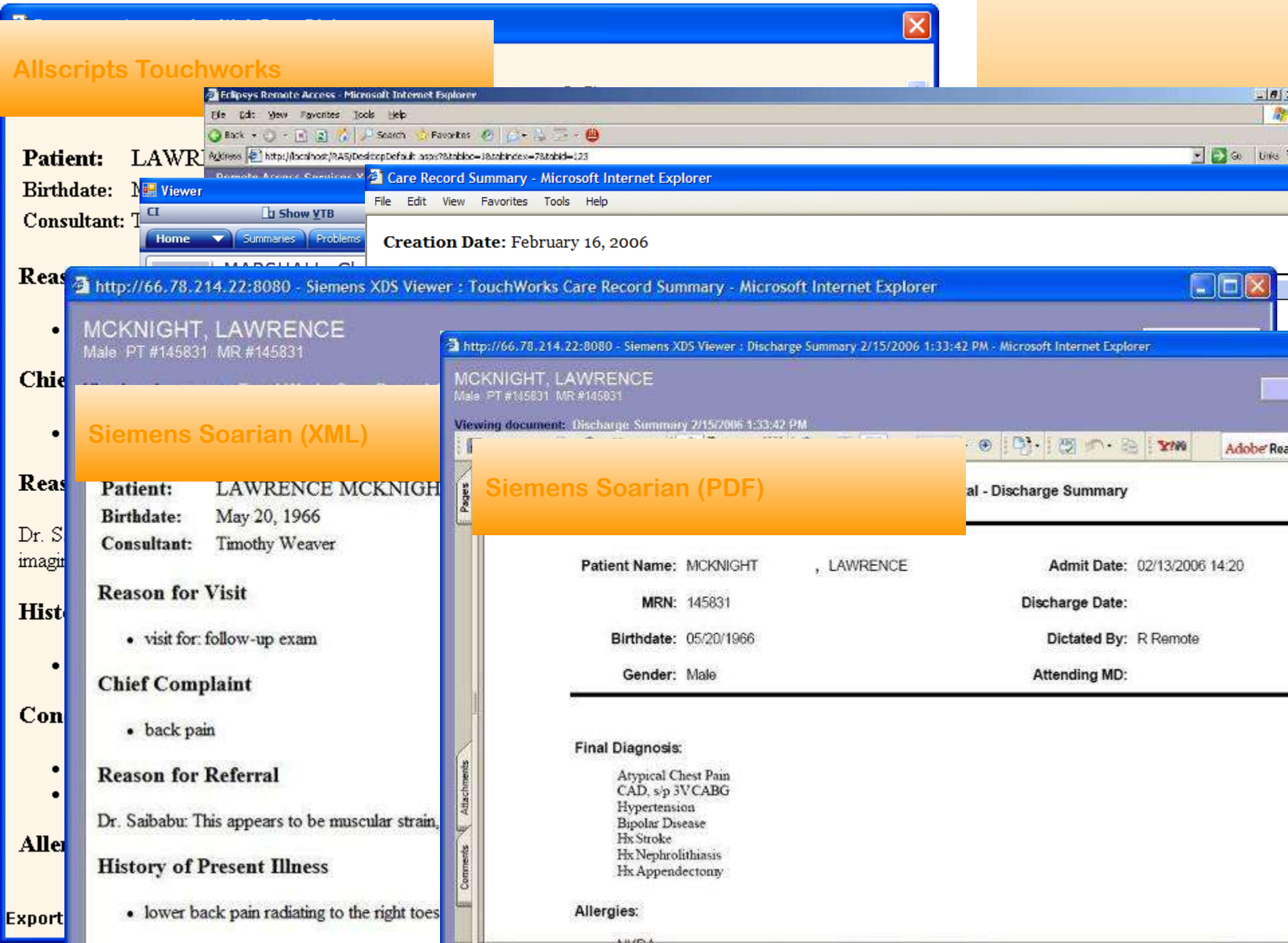


CDA: Investing in Information

- CDA at the Mayo Clinic
  - Initiated in 1999
  - About 50,000 documents each week
  - Clinical documents: Most important capital asset
- CDA at New York Presbyterian (was Col-Pres)
  - "CDA Philosophy"
  - Clinical notes contain critical information in narrative
  - Best format for information mining and aggregation across applications
  - 1/3 of all discharges summaries

XML Value Chain




Allscripts Touchworks
Patient: LAWR
Birthdate: M
Consultant: T
Reas
Chie
Reas
Dr. S
imagi
Hist
Con
Aller
Export
Eclipsys Remote Access - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Viewer
CI
Show YTB
Home
Summaries
Problems
Care Record Summary - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Creation Date: February 16, 2006
http://66.78.214.22:8080 - Siemens XDS Viewer : TouchWorks Care Record Summary - Microsoft Internet Explorer
MCKNIGHT, LAWRENCE
Male PT #145831 MR #145831
Siemens Soarian (XML)
Patient: LAWRENCE MCKNIGH
Birthdate: May 20, 1966
Consultant: Timothy Weaver
Reason for Visit
visit for: follow-up exam
Chief Complaint
back pain
Reason for Referral
Dr. Saibabu: This appears to be muscular strain,
History of Present Illness
lower back pain radiating to the right toes
http://66.78.214.22:8080 - Siemens XDS Viewer : Discharge Summary 2/15/2006 1:33:42 PM - Microsoft Internet Explorer
MCKNIGHT, LAWRENCE
Male PT #145831 MR #145831
Viewing document: Discharge Summary 2/15/2006 1:33:42 PM
Siemens Soarian (PDF)
Pages
Attachments
Comments
al - Discharge Summary
Patient Name: MCKNIGHT , LAWRENCE
Admit Date: 02/13/2006 14:20
MRN: 145831
Discharge Date:
Birthdate: 05/20/1966
Dictated By: R Remote
Gender: Male
Attending MD:
Final Diagnosis:
Atypical Chest Pain
CAD, s/p 3V CABG
Hypertension
Bipolar Disease
Hx Stroke
Hx Nephrolithiasis
Hx Appendectomy
Allergies:

CDA for Information Exchange

- IHE choice for Medical Summaries

MediNotes	MediNotes e
NextGen Healthcare Information Systems	NextGen EMR
AllScripts	Touchworks EHR
GE Healthcare	Centricity® Enterprise Solution (formerly Carecast)
Philips Medical Systems	Xtenity
McKesson	Horizon Ambulatory Care
CapMed/IBM	Personal HealthKey
Eclipsys	Sunrise
Medical Informatics Engineering	Webchart
Dictaphone	Enterprise Workstation
Epic Systems	EpicCare
GE Healthcare	Centricity® Physician Office
Misys Healthcare Systems	Misys Connect
Siemens	Soarian

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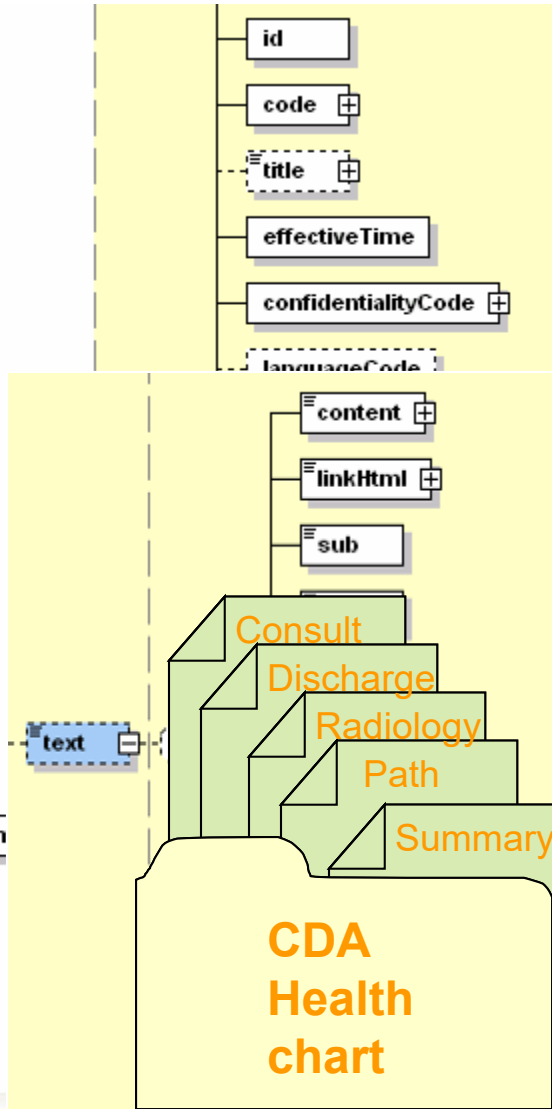
Agreements/MOUs

* Accredited Standards Committee X12 — ASC-X12
* American Dental Association — ADA
    o ADA Joint Project Statement
* American Society for Testing Materials — ASTM
* CEN/TC 251
* Clinical Data Interchange Standards Consortium — CDISC
* Digital Imaging and Communication In Medicine — DICOM
* eHealth Initiative – eHI
* Institute for Electrical and Electronic Engineers — IEEE
* Integrating the Healthcare Enterprise — IHE
* Medbiquitous
* National Council for Prescription Drug Program — NCPDP
* OASIS
* Object Management Group — OMG
* University of Nevada Las Vegas — UNLV
* College of American Pathologists – SNOMED International Division — SNOMED

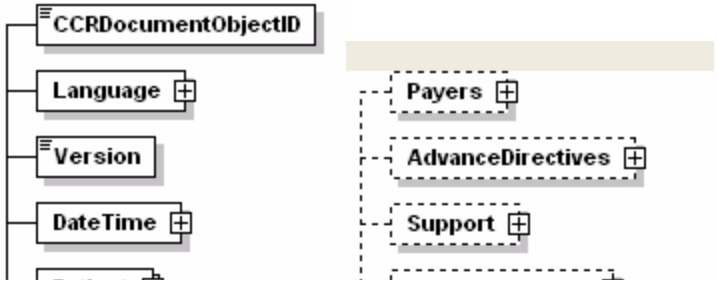
HL7's CDA

- Clinical Document Architecture
  - ANSI/HL7 R1-2000, R2-2005
- eDocuments for Interoperability
  - Key component for local, regional, national electronic health records
  - Gentle on-ramp to information exchange
    - Everyone uses documents
    - EMR compatible, no EMR required
    - All types of clinical documents



Clinical Document Architecture

ASTM's CCR



ContinuityOfCareRecord

Designation: E 2369 – 05

Standard Specification for Continuity of Care Record (CCR)[1]

This standard is issued under the fixed designation E 2369; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 The Continuity of Care Record (CCR) is a core data set of the most relevant administrative, demographic, and clinical information facts about a patient's healthcare, covering one or more healthcare encounters.[2] It provides a means for one healthcare practitioner, system, or setting to aggregate all of the pertinent data about a patient and forward it to another practitioner, system, or setting to support the continuity of care.

1.1.1 The CCR data set includes a summary of the patient's health status (for example, problems, medications, allergies) and basic information about insurance, advance directives, care documentation, and the patient's care plan. It also includes identifying information and the purpose of the CCR. (See 5.1 for a description of the CCR's components and sections, and Annex A1 for the detailed data fields of the CCR.)

of use cases and workflows. Any examples offered in this specification are not to be considered normative.[4]

1.3 To ensure interchangeability of electronic CCRs, this specification specifies XML coding that is required when the CCR is created in a structured electronic format.[5] This specified XML coding provides flexibility that will allow users to prepare, transmit, and view the CCR in multiple ways, for example, in a browser, as an element in a Health Level 7 (HL7) message or CDA compliant document, in a secure email, as a PDF file, as an HTML file, or as a word processing document. It will further permit users to display the fields of the CCR in multiple formats.

1.3.1 The CCR XML schema or .xsd (see the Adjunct to this specification) is defined as a data object that represents a snapshot of a patient's relevant administrative, demographic,

Clinical Document Architecture

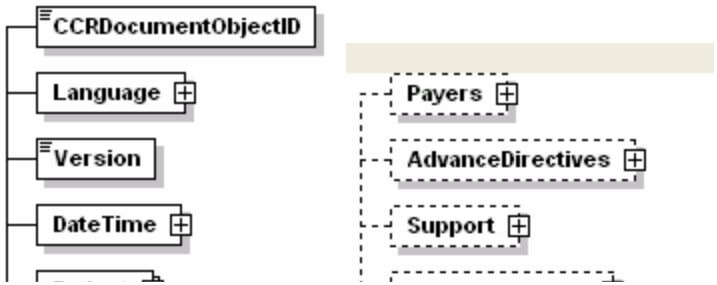
ASTM CCR vs. HL7 CDA

- Conflicting?
- Overlapping?
- What if you could have both!#*?I*!!*
  - What if you could have your data elements
  - And send them in a common exchange framework?

ASTM CCR + HL7 CDA = CCD

- CDA is designed t[illegible]essional society recommendations, [illegible]cal practice guidelines, standardized data sets, etc.
- From the perspective of CDA, the ASTM CCR is a standardized data set that can be used to constrain CDA specifically for summary documents.
- The resulting specification, known as the Continuity of Care Document (CCD), is being developed as a collaborative effort between ASTM and HL7.

ASTM's CCR



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Clinical Document Architecture

Continuity of Care Document

- CCD maps the CCR elements into a CDA representation.

CCR data element	CDA R2 correspondence
Results	Section
Result	Observation
DateTime	Observation.effectiveTime
IDs	Observation.id
Type: Values include: Hematology, Chemistry, Serology, Virology, Toxicology, Microbiology, Imaging – X-ray, Ultrasound, CT, MRI, Angiography, Cardiac Echo, Nuclear Medicine, Pathology, Procedure	Draw values from observation.code (e.g. by looking at the LOINC class for a LOINC code).
Description	Observation.code
Status	Observation.statusCode
Procedure	Observation.methodCode; Procedure
Test	Observation

Continuity of Care Document

- Did this come out of the blue?
- There is a history of collaboration
  - Many people have participated in both efforts
  - Presentation on CDA for continuity of care at ASTM CCR meeting, August, 2003
  - Memorandum of Understanding, 2004
  - Acapulco demo: CDA for CCR, October, 2004
    - HL7 partnered with Massachusetts Medical Society, Microsoft, Ramsey Systems (UK)
  - Initial HL7 Care Record Summary ballot, April, 2005:
    - Limited to CDA header, no detailed section coding
    - Anticipated: "Development of detailed (CDA Level 3) Implementation Guides for "continuity of care" (CCR) in collaboration with the ASTM E31 under the 2004 Memorandum of Understanding"
  - HL7 ballot on CCR, Spring 2005: incorporated changes required for bi-directional exchange and semantic interoperability

Continuity of Care Document

- "ASTM is dedicated and privileged to work in collaboration with HL7 on the expression of ASTM's Continuity of Care Record content within HL7's CDA XML syntax and the seamless transformation of clinical and administrative data between the two standards."
- Rick Peters, MD, E31.28

Continuity of Care Document

- Benefits
  - Industry concensus on summary document contents and requirements through ASTM ballots (2004, 2005)
  - Industry concensus on document exchange framework through HL7 ballots (1999-2005)
  - Summaries for continuity of care
    - Interoperable with full range of document types
    - Interoperable with HL7 V3 messages, all RIM-based specifications (public health reporting, clinical trials, structured product labels and more)

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CDA for Interoperability

- HL7/ANSI specification based on
  - Reference Information Model (RIM)
  - Extensible Markup Language (XML)
  - Standard Terminology
- The spec:
  - Header+Human-readable report+(optional) computable semantics
- Industry acceptance:
  - Internationally implemented for 6 years
  - US: FHA, CHI, CMS, VA, DoD, NHIN, HITSP...
  - Vendor support: strong & growing
- Interoperability
  - Full patient record, not just the data that can be coded today
  - Full patient record – summaries and more, implementation guides in the works from multiple professional societies and agencies

Current Work

- HL7
  - Continuity of Care Document (with ASTM)
  - Pathology reports (with CAP)
  - Imaging reports (with DICOM)
  - Claims attachments, migrate from R1 (with CMS)
  - Medical Summary (with IHE, EHR Vendors Association)
  - Dental reports (with ADA)
  - Anesthesiology Reports (with Anes SIG)
  - Public health reports (with CDC)
  - … *What should we be doing to develop standard documents for LTC?*

References & More Info

www.HL7.org Structured Documents Technical Committee web page

All meetings, listservs, open to all

JAMIA

Dolin RH, Alschuler L, Boyer S, Beebe C, Behlen FM, Biron PV, Shabo A. HL7 Clinical Document Architecture, Release 2. J Am Med Inform Assoc. 2006;13:30–39.

http://www.jamia.org/cgi/reprint/13/1/30

Care Record Summary

http://www.hl7.org/Library/Committees/structure/CareRecordSummary%5FI2%5F2005SEP%2Ezip

CDA Release 2.0 Normative Edition: see HL7.org

AlschulerAssociates.com liora@alschulerassociates.com

Quick Start Guides

CDA/CRS Validator

CDA Gallery

Thank you!

Questions?