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Clinical Document Architecture (CDA)

The Foundation for Clinical Data Exchange

June 15, 2006

Liora Alschuler

Blue Cross Blue Shield Association
Spring Technology and Architecture Workshop
St. Louis, MO

Clinical
Document
Architecture

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  - Consultant, Alschuler Associates, LLC
    - Tricare Management Activity, Department of Defense, Enterprise Wide Referrals & Authorizations; Documents, Files, Images (DFI)
    - Subcontractor, HITSP Standards Harmonization
    - Industry-leading EMR and RHIO solution vendors
  - Co-editor, CDA
  - Co-chair HL7 Structured Documents TC
  - Co-author, CDA & CRS Quick Start Guides
  - 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
  - www.alschulerassociates.com

Healthcare IT

- 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

- The HL7 CDA
- CDA for Health Information Exchange
- CDA + CCR = CCD
- CDA Document Types
- CDA for Personal Health Records
- 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

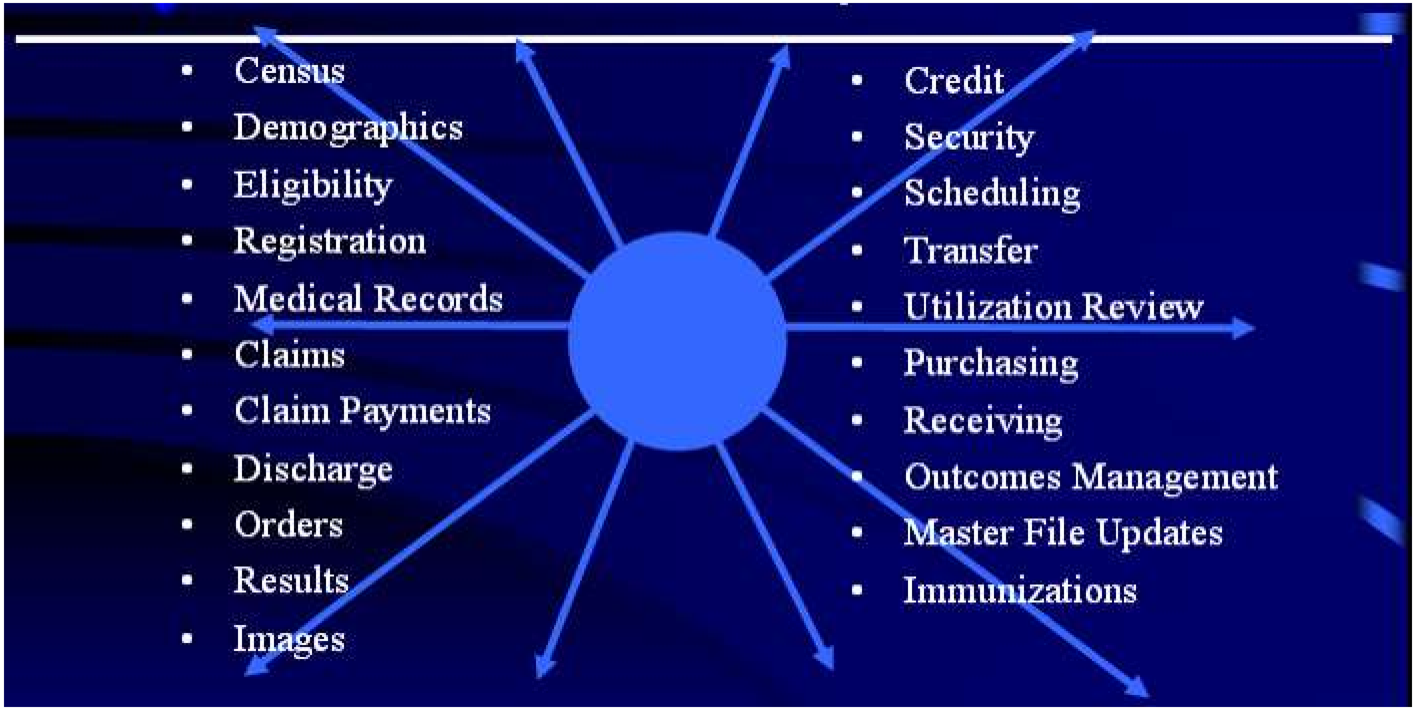
Committees & Special Interest Groups

- 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:

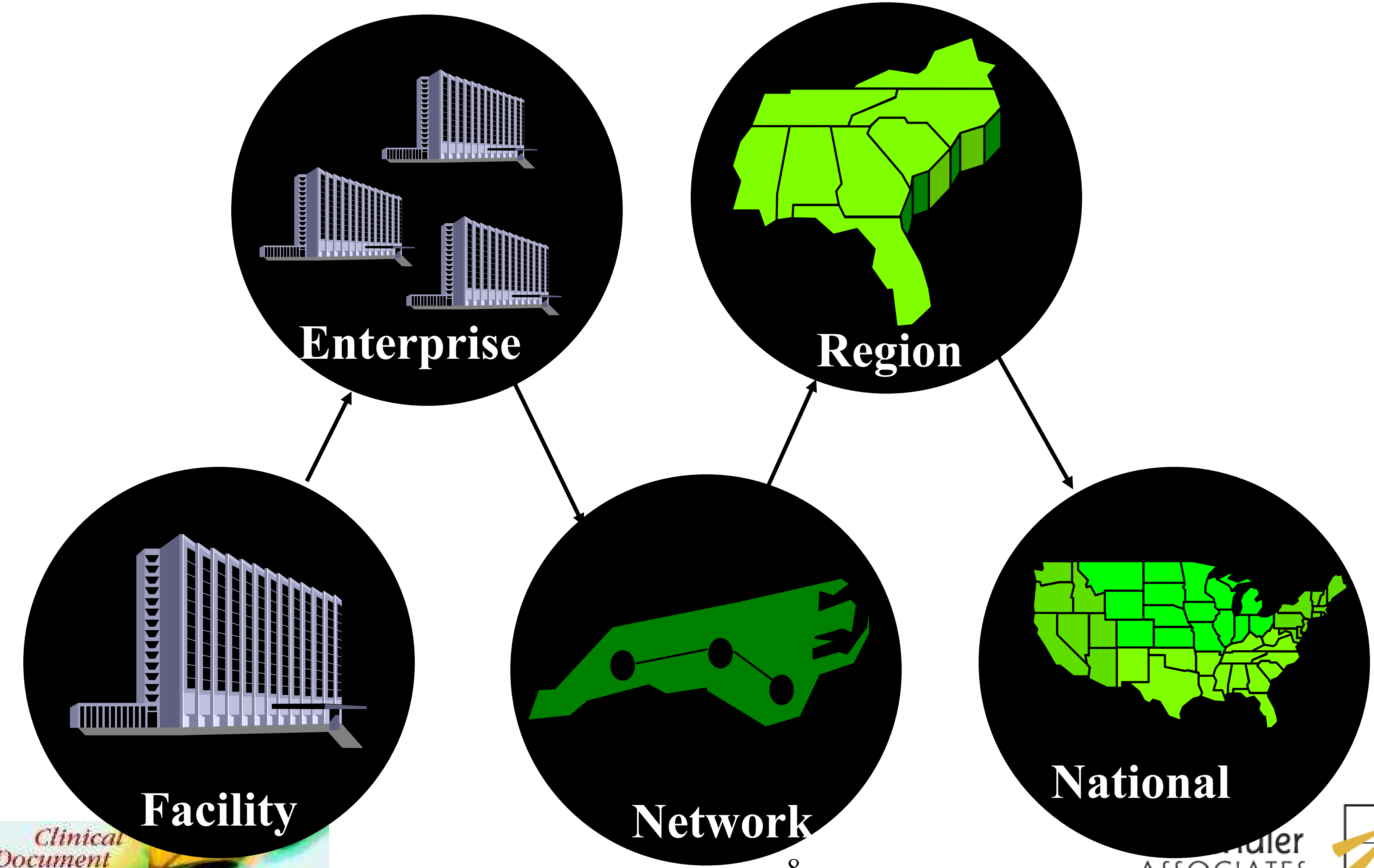


- Census
- Demographics
- Eligibility
- Registration
- Medical Records
- Claims
- Claim Payments
- Discharge
- Orders
- Results
- Images

- Credit
- Security
- Scheduling
- Transfer
- Utilization Review
- Purchasing
- Receiving
- Outcomes Management
- Master File Updates
- Immunizations

- Hospital-centric view of HIT

HL7 beyond the hospital interface



Facility

Enterprise

Network

Region

National

HL7 beyond the messaging interface

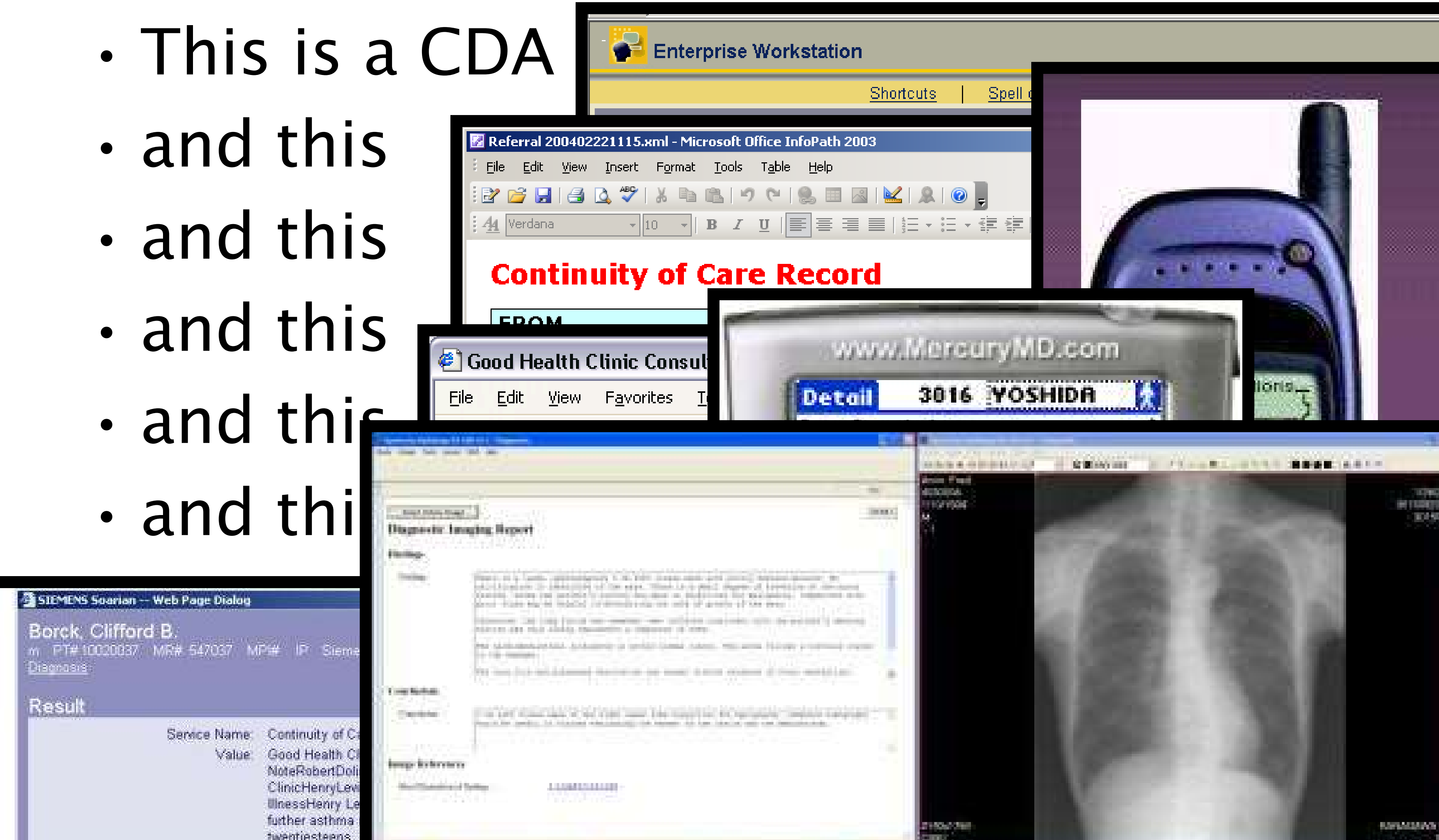
- CCOW: multi-application context management, single sign-on
- Arden Syntax: decision support, guidelines
- Electronic Health Record: functional, system and interoperability models
- Reference Information Model (RIM)
- Clinical Document Architecture

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 this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www.MercuryMD.com
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Diagnosis
Result
Diagnostic Imaging Report

Continuity of Care Record

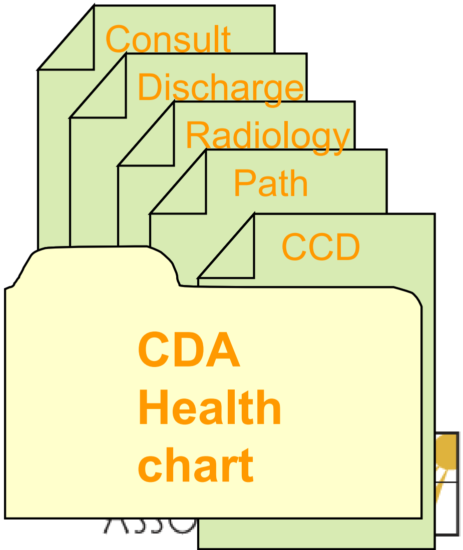
3016 YOSHIDA

Borck, Clifford B.
m PT# 10020037 MR# 547037 MPI# IP Sieme

Service Name: Continuity of C
Value: Good Health Cl
NoteRobertDoli
ClinicHenryLev
IllnessHenry Le
futher asthma
twentiesteens

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



Consult

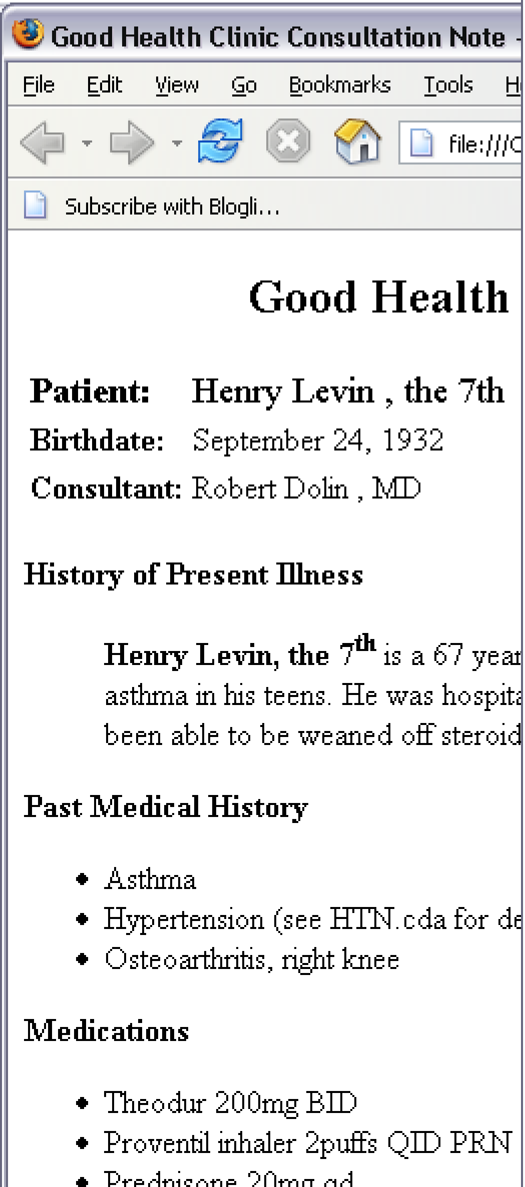
Discharge

Radiology

Path

CCD

CDA Health chart


Good Health Clinic Consultation Note -
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Subscribe with Blogli...

Good Health

Patient: Henry Levin , the 7th

Birthdate: September 24, 1932

Consultant: Robert Dolin , MD

History of Present Illness

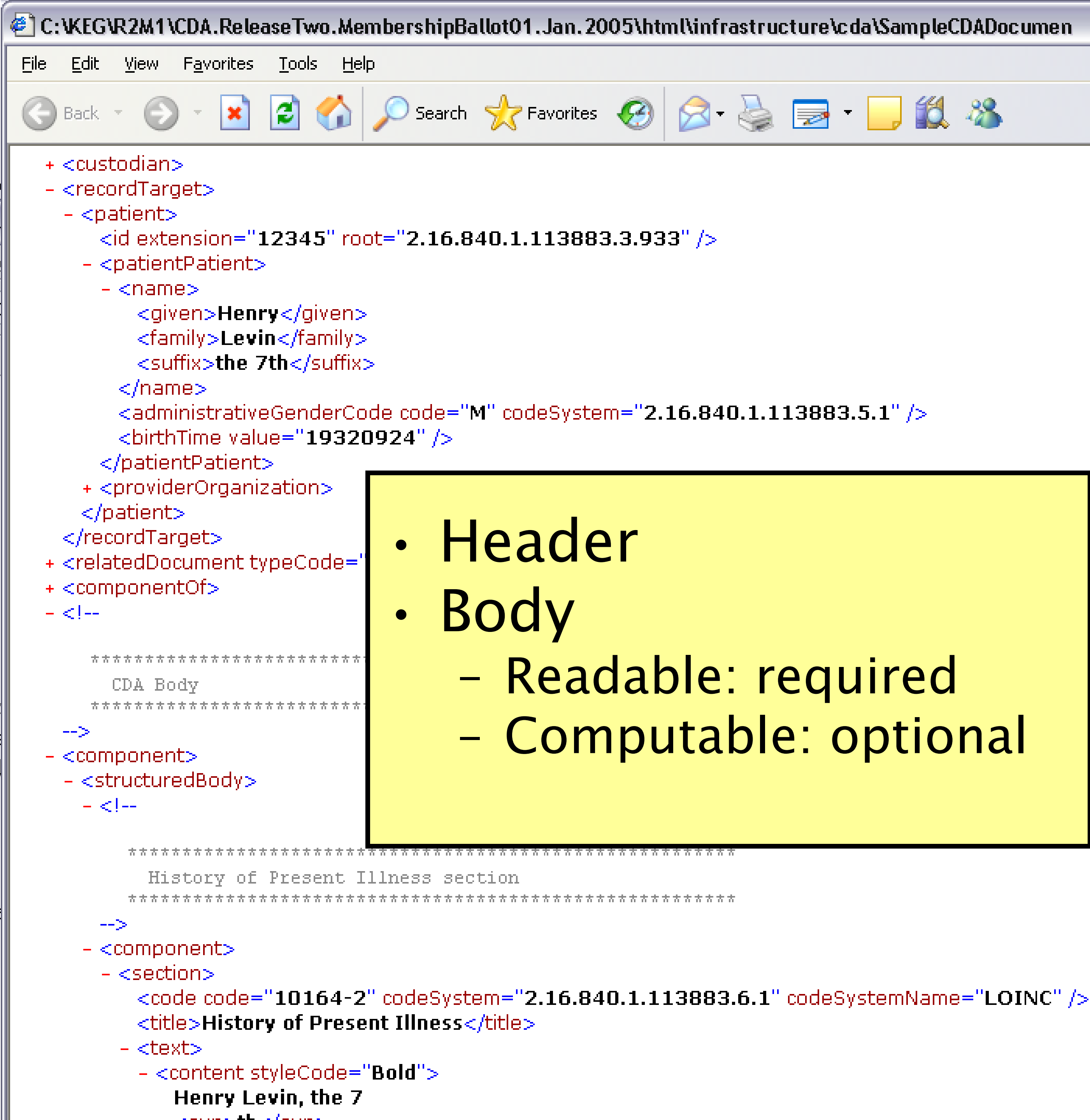
Henry Levin, the 7th is a 67 year
asthma in his teens. He was hospita
been able to be weaned off steroid

Past Medical History

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

Medications

- Theodur 200mg BID
- Proventil inhaler 2puffs QID PRN
- Prednisone 20mg qd


C:\KEG\R2M1\CDA.ReleaseTwo.MembershipBallot01.Jan.2005\html\infrastructure\cda\SampleCDADocumen
File Edit View Favorites Tools Help
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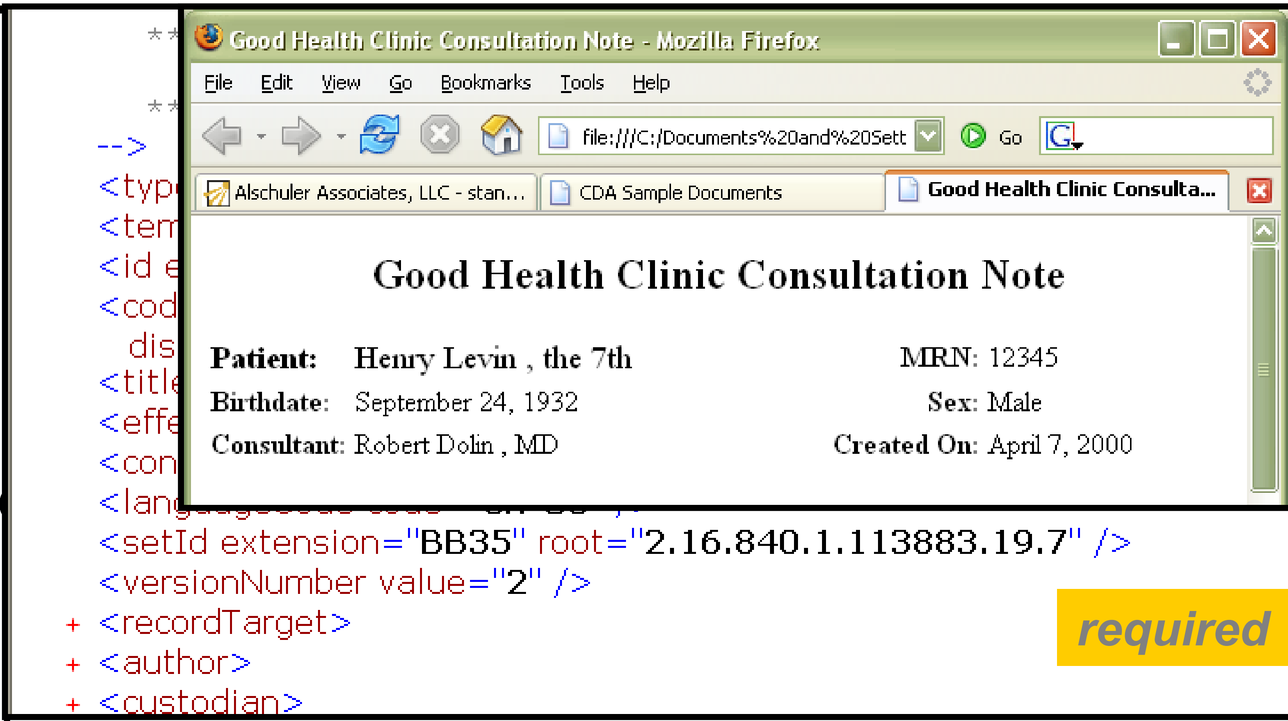
Search
Favorites

```
+ <custodian>
- <recordTarget>
  - <patient>
      <id extension="12345" root="2.16.840.1.113883.3.933" />
    - <patientPatient>
      - <name>
          <given>Henry</given>
          <family>Levin</family>
          <suffix>the 7th</suffix>
        </name>
        <administrativeGenderCode code="M" codeSystem="2.16.840.1.113883.5.1" />
        <birthTime value="19320924" />
      </patientPatient>
    + <providerOrganization>
    </patient>
  </recordTarget>
+ <relatedDocument typeCode="
+ <componentOf>
- <!--

    ***********************
     CDA Body
    ***********************
  -->
- <component>
  - <structuredBody>
    - <!--

        **************************************************
         History of Present Illness section
        **************************************************
      -->
    - <component>
      - <section>
          <code code="10164-2" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" />
          <title>History of Present Illness</title>
        - <text>
          - <content styleCode="Bold">
              Henry Levin, the 7
```

- 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


Good Health Clinic Consultation Note - Mozilla Firefox
File
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Alschuler Associates, LLC - stan...
CDA Sample Documents
Good Health Clinic Consulta...

```
**
**
-->
<typ
<tem
<id e
<cod
  dis
<title
<effe
<con
<lan
<setId extension="BB35" root="2.16.840.1.113883.19.7" />
<versionNumber value="2" />
+ <recordTarget>
+ <author>
+ <custodian>
```

Good Health Clinic Consultation Note

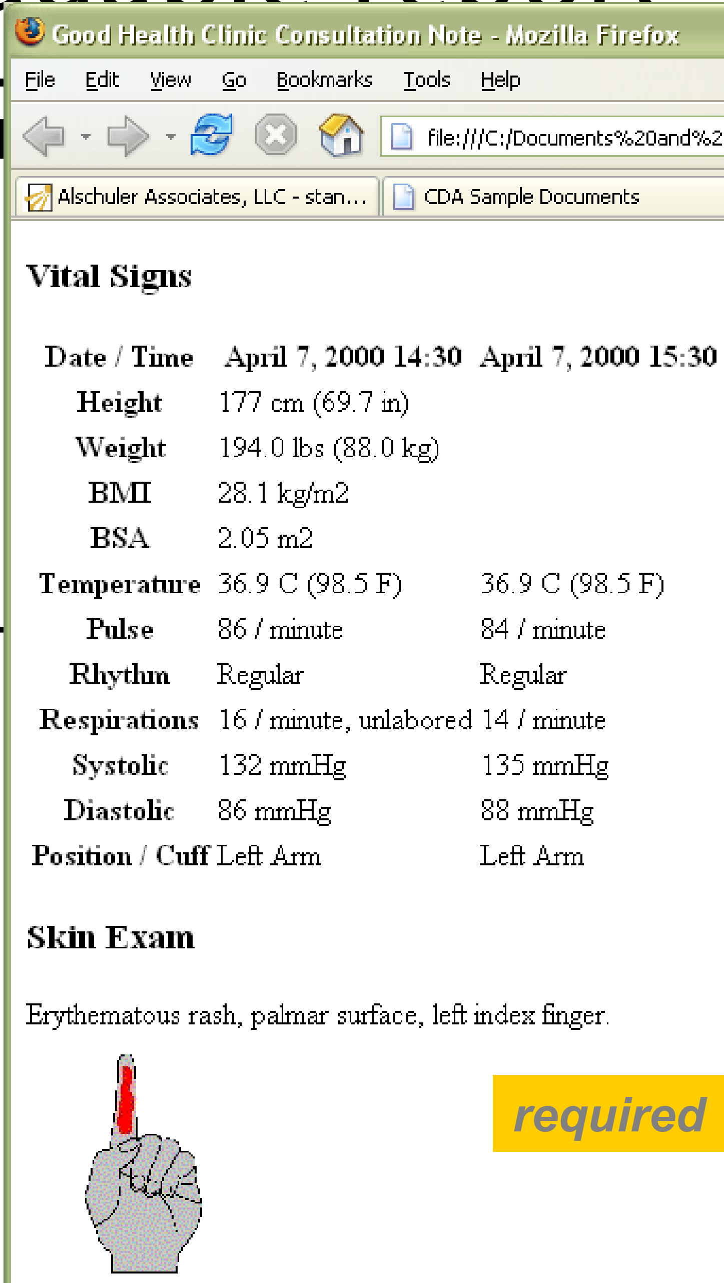
Patient: Henry Levin , the 7th
MRN: 12345
Birthdate: September 24, 1932
Sex: Male
Consultant: Robert Dolin , MD
Created On: April 7, 2000

required

CDA Body: Human-readable report

- Any type of clinical documen
  - H&P
  - Consult
  - Op note
  - Discharge Summary...

- Format: tif, PDF, HTML, XML
  - Paragraph
  - List
  - Table
  - Caption
  - Link
  - Content
  - Presentation


Good Health Clinic Consultation Note - Mozilla Firefox
File
Edit
View
Go
Bookmarks
Tools
Help
file:///C:/Documents%20and%2
Alschuler Associates, LLC - stan...
CDA Sample Documents

Vital Signs

Date / Time	April 7, 2000 14:30	April 7, 2000 15:30
Height	177 cm (69.7 in)	
Weight	194.0 lbs (88.0 kg)	
BMI	28.1 kg/m2	
BSA	2.05 m2	
Temperature	36.9 C (98.5 F)	36.9 C (98.5 F)
Pulse	86 / minute	84 / minute
Rhythm	Regular	Regular
Respirations	16 / minute, unlabored	14 / minute
Systolic	132 mmHg	135 mmHg
Diastolic	86 mmHg	88 mmHg
Position / Cuff	Left Arm	Left Arm

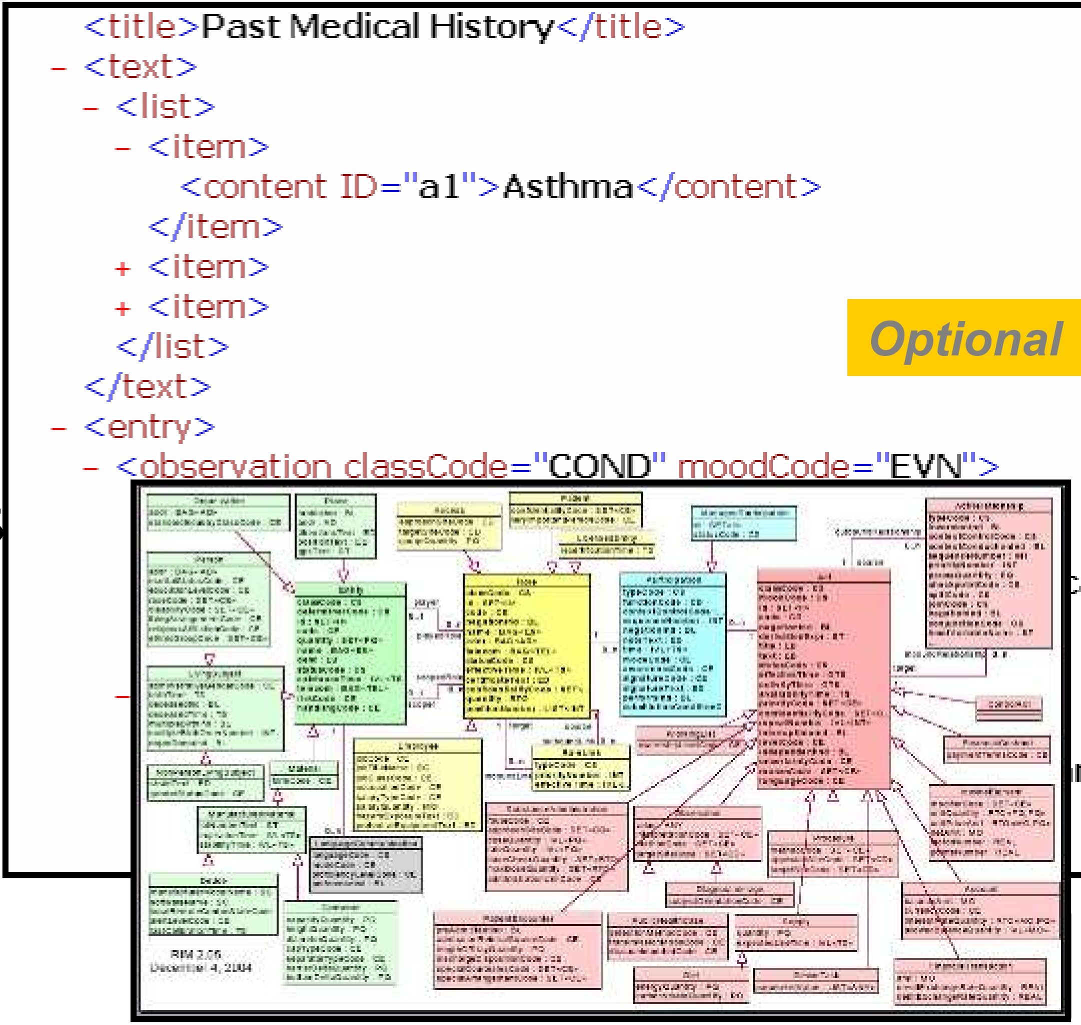
Skin Exam

Erythematous rash, palmar surface, left index finger.

required

CDA Body: Machine Processible

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



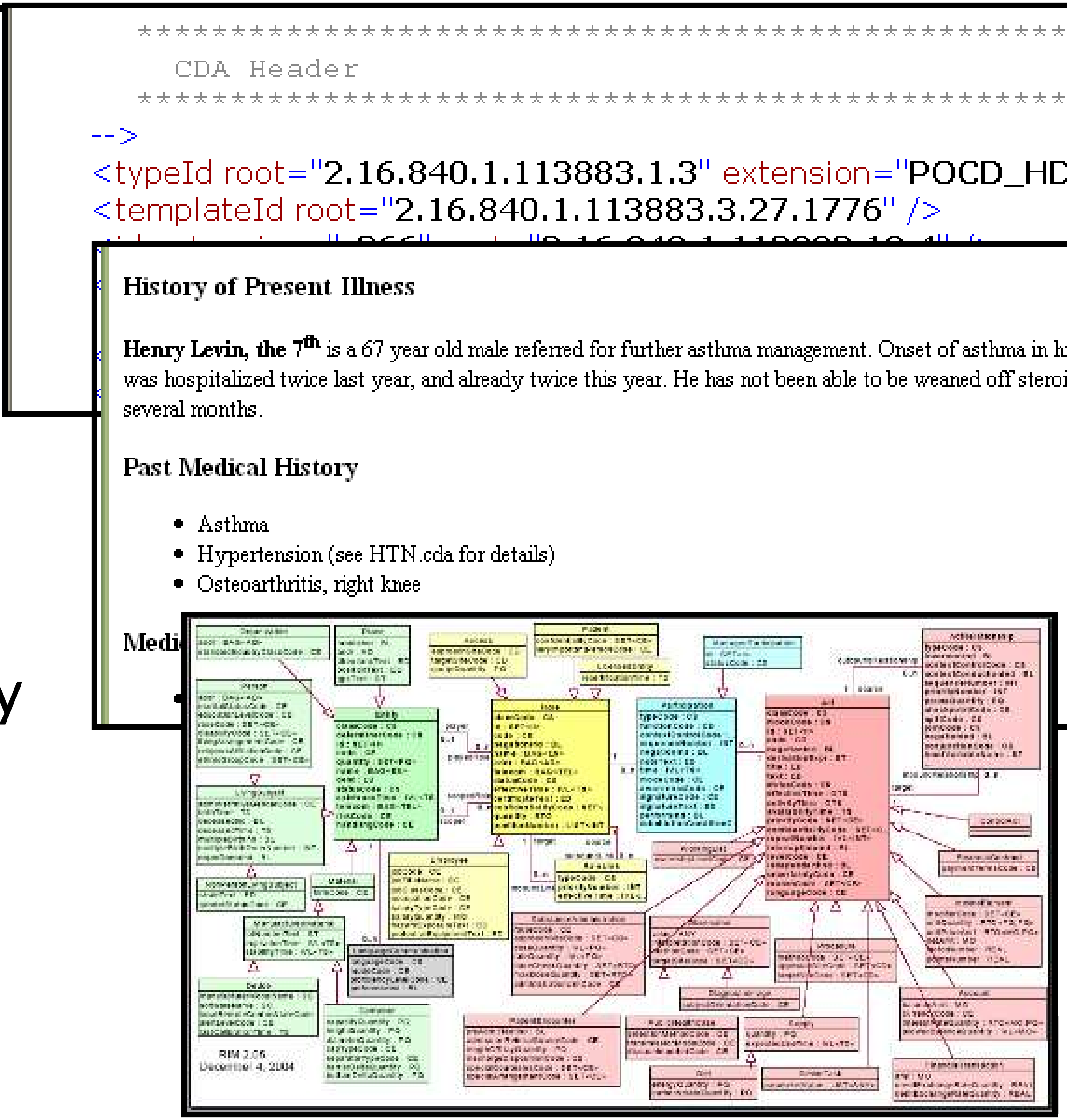
```
  <title>Past Medical History</title>
- <text>
  - <list>
    - <item>
        <content ID="a1">Asthma</content>
      </item>
    + <item>
    + <item>
    </list>
  </text>
- <entry>
  - <observation classCode="COND" moodCode="EVN">
```

Optional
RIM 2.05
December 4, 2004

Clinical Document Architecture

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

Outline

- The HL7 CDA
- CDA for Health Information Exchange
- CDA + CCR = CCD
- CDA Document Types
- CDA for Personal Health Records
- Summary, Resources & Questions

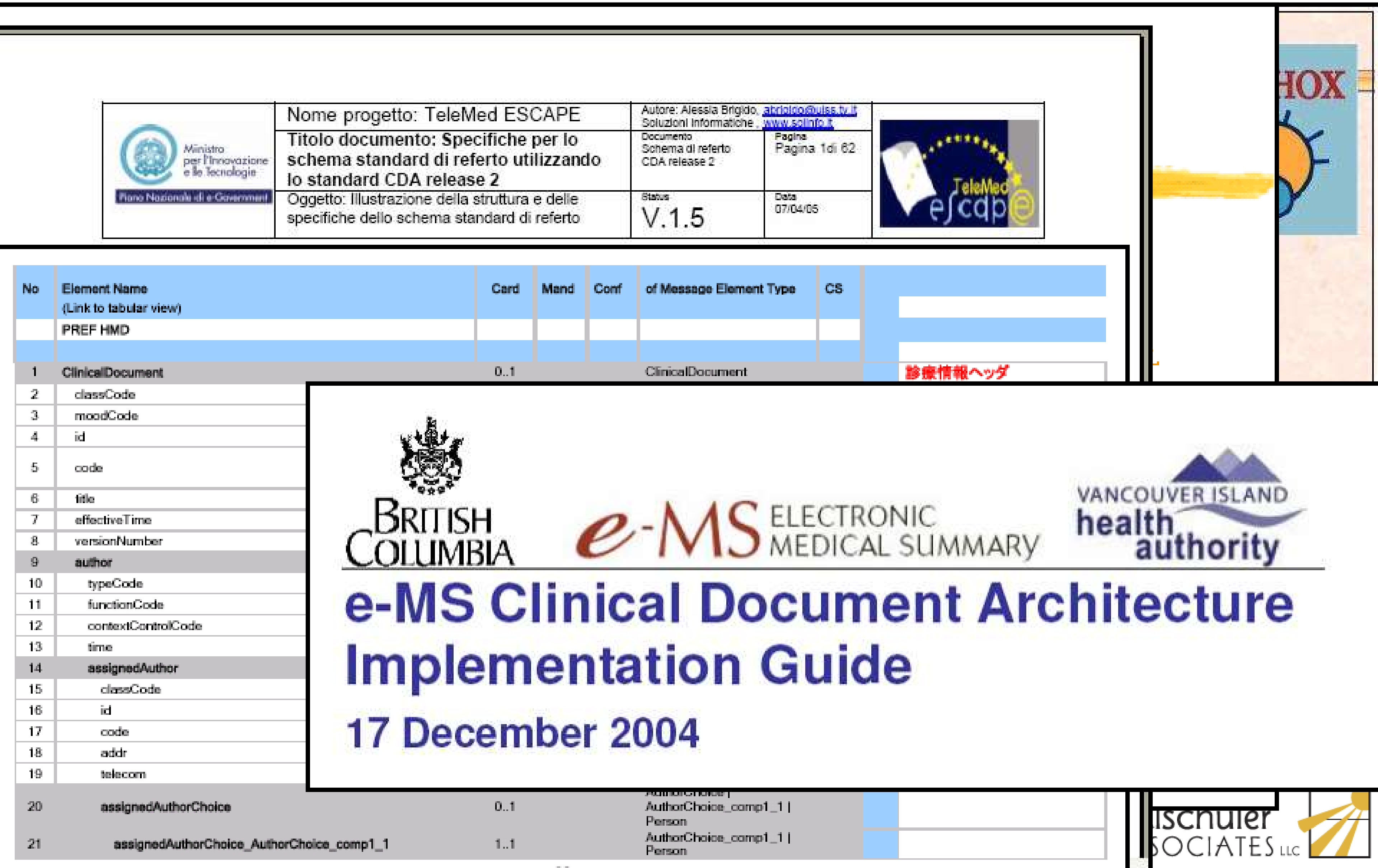
CDA for Information Exchange

- 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



Ministro per l'Innovazione e le Tecnologie
Piano Nazionale di e-Government

Nome progetto: TeleMed ESCAPE

Titolo documento: Specifiche per lo schema standard di referto utilizzando lo standard CDA release 2

Oggetto: Illustrazione della struttura e delle specifiche dello schema standard di referto

Autore: Alessia Brigido, abrigido@ulss.tv.it
Soluzioni Informatiche , www.solinfo.it

Documento
Schema di referto
CDA release 2

Pagina
Pagina 1di 62

Status
V.1.5

Data
07/04/05

TeleMed escape

No	Element Name (Link to tabular view)	Card	Mand	Conf	of Message Element Type	CS	
	PREF HMD						
1	ClinicalDocument	0..1			ClinicalDocument		診療情報ヘッダ
2	classCode						
3	moodCode						
4	id						
5	code						
6	title						
7	effectiveTime						
8	versionNumber						
9	author						
10	typeCode						
11	functionCode						
12	contextControlCode						
13	time						
14	assignedAuthor						
15	classCode						
16	id						
17	code						
18	addr						
19	telecom						
20	assignedAuthorChoice	0..1			AuthorChoice | AuthorChoice_comp1_1 | Person		
21	assignedAuthorChoice_AuthorChoice_comp1_1	1..1			AuthorChoice_comp1_1 | Person		

BRITISH COLUMBIA

e-MS ELECTRONIC MEDICAL SUMMARY

VANCOUVER ISLAND health authority

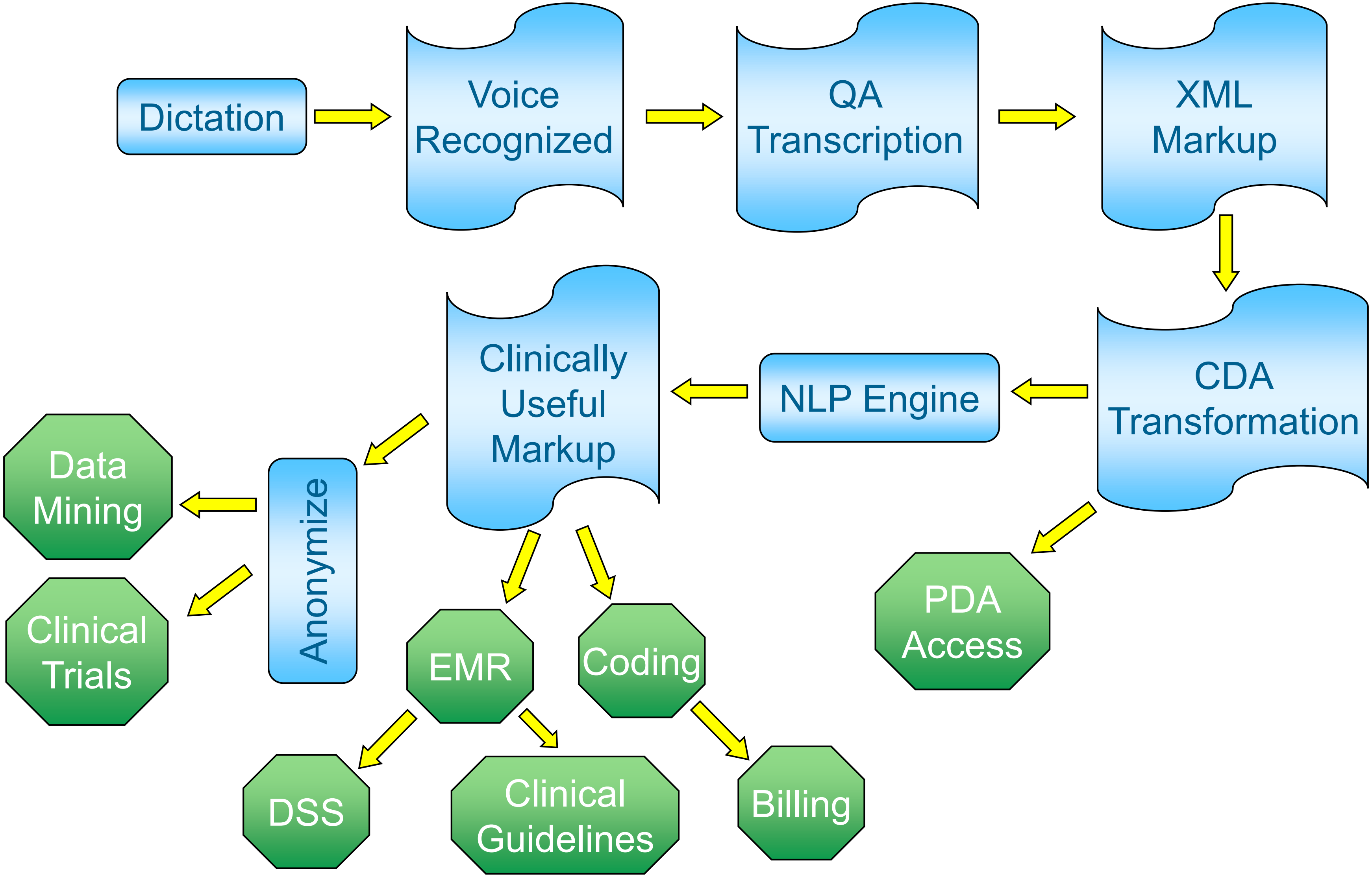
e-MS Clinical Document Architecture Implementation Guide

17 December 2004

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



Dictation

Voice Recognized

QA Transcription

XML Markup

CDA Transformation

NLP Engine

Clinically Useful Markup

Anonymize

Data Mining

Clinical Trials

EMR

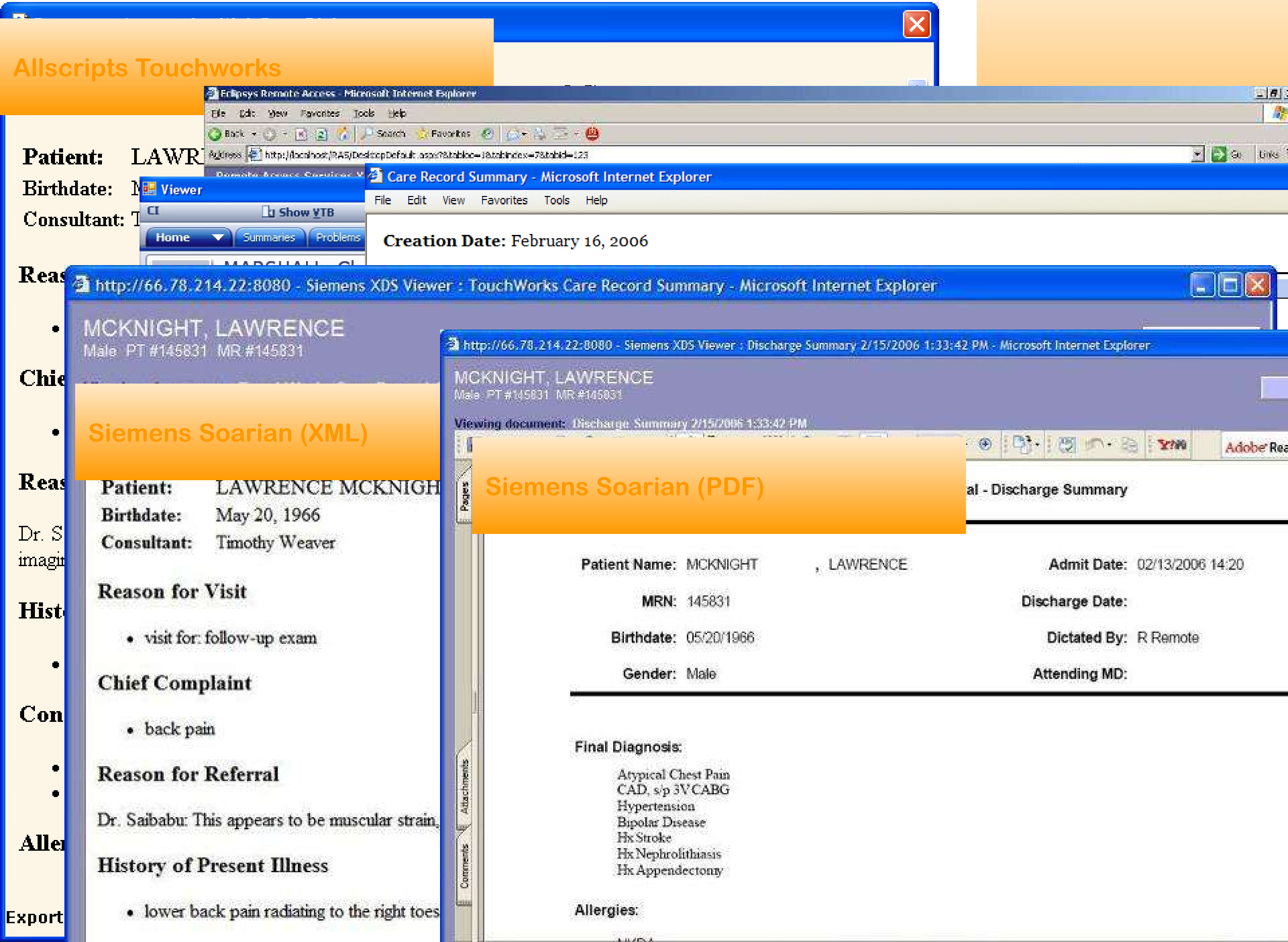
Coding

PDA Access

DSS

Clinical Guidelines

Billing



Allscripts Touchworks

Siemens Soarian (XML)

Siemens Soarian (PDF)

Eclipsys Remote Access - Microsoft Internet Explorer
File Edit View Favorites Tools Help
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Address http://localhost/RAS/DesktopDefault.aspx?&tabloc=1&tabindex=7&tabid=123
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Viewer
CI Show VTB
Home Summaries Problems
Care Record Summary - Microsoft Internet Explorer
File Edit View Favorites Tools Help
http://66.78.214.22:8080 - Siemens XDS Viewer : TouchWorks Care Record Summary - Microsoft Internet Explorer
http://66.78.214.22:8080 - Siemens XDS Viewer : Discharge Summary 2/15/2006 1:33:42 PM - Microsoft Internet Explorer
Pages
Attachments
Comments
Adobe Rea
Export

Patient: LAWR

Birthdate: M

Consultant: T

Creation Date: February 16, 2006

MCKNIGHT, LAWRENCE
Male PT #145831 MR #145831

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

MCKNIGHT, LAWRENCE
Male PT #145831 MR #145831

Viewing document: Discharge Summary 2/15/2006 1:33:42 PM

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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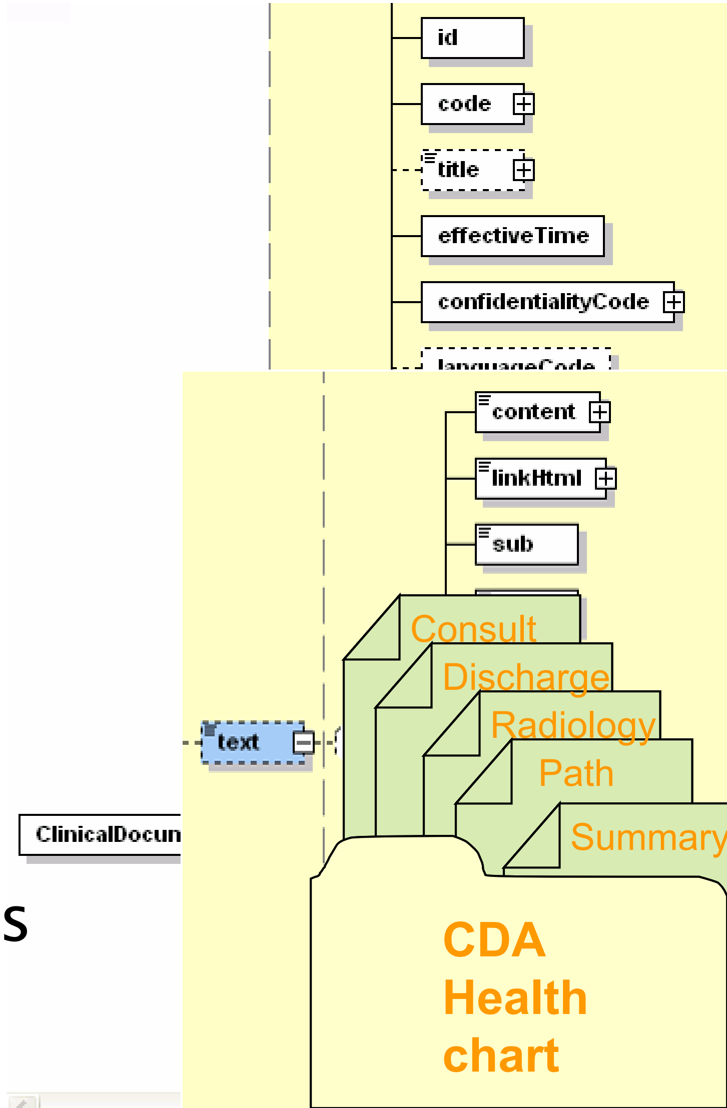
Agreements/MOUs

* 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


id
code
title
effectiveTime
confidentialityCode
languageCode
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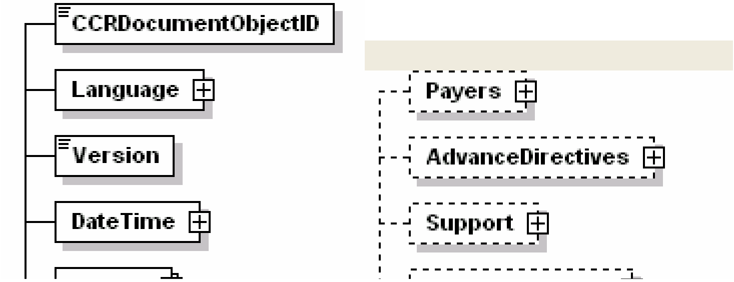
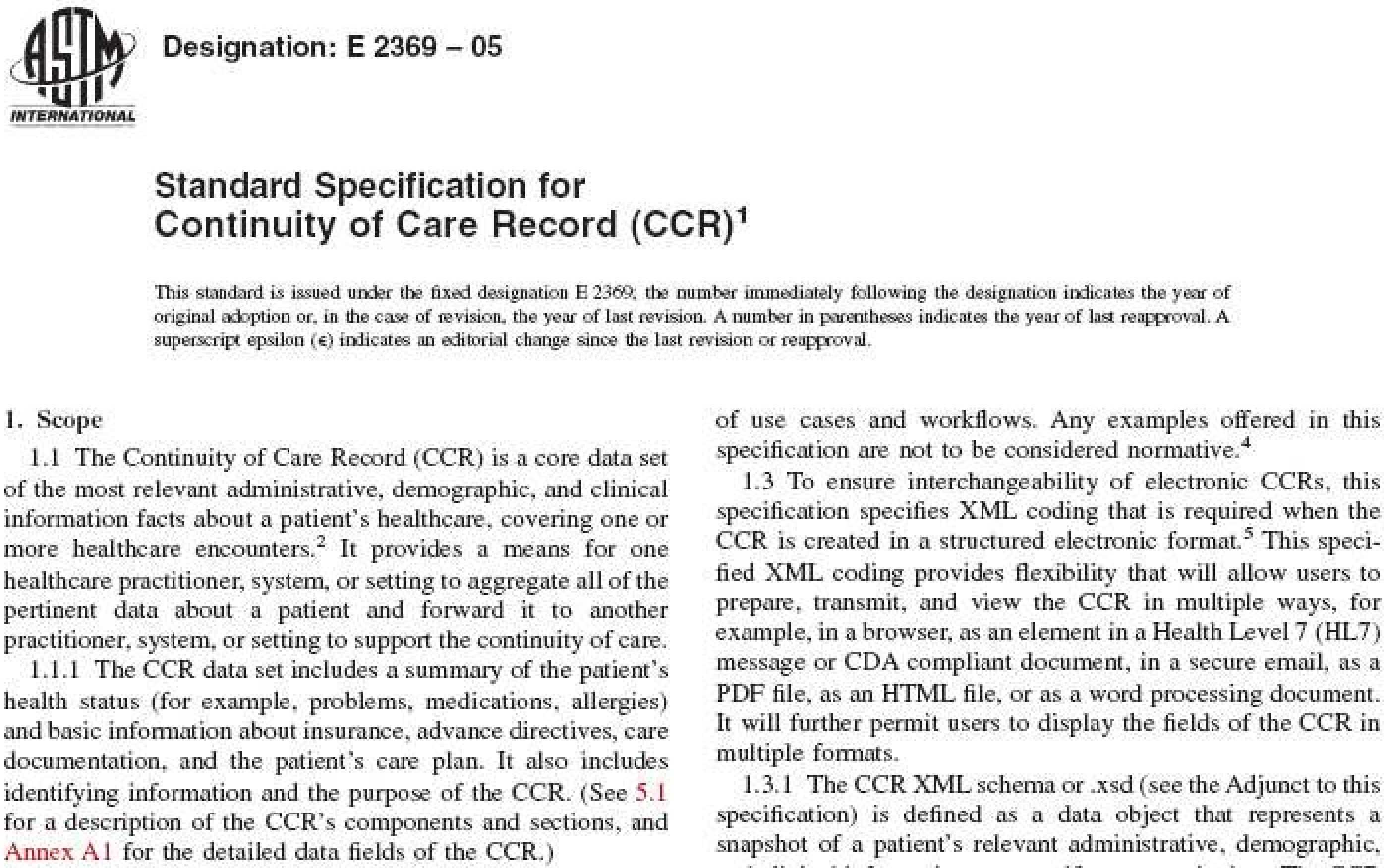
ClinicalDocun
Consult
Discharge
Radiology
Path
Summary
CDA
Health
chart

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,

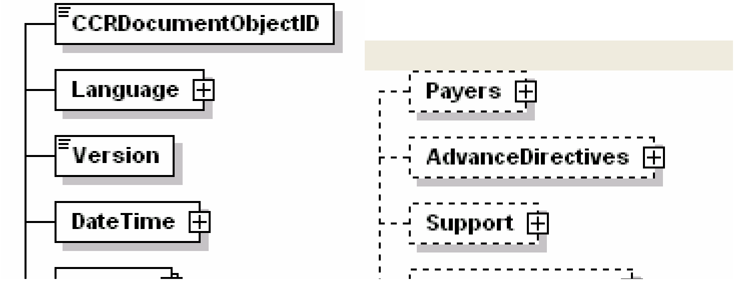
ASTM CCR vs. HL7 CDA

- 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?

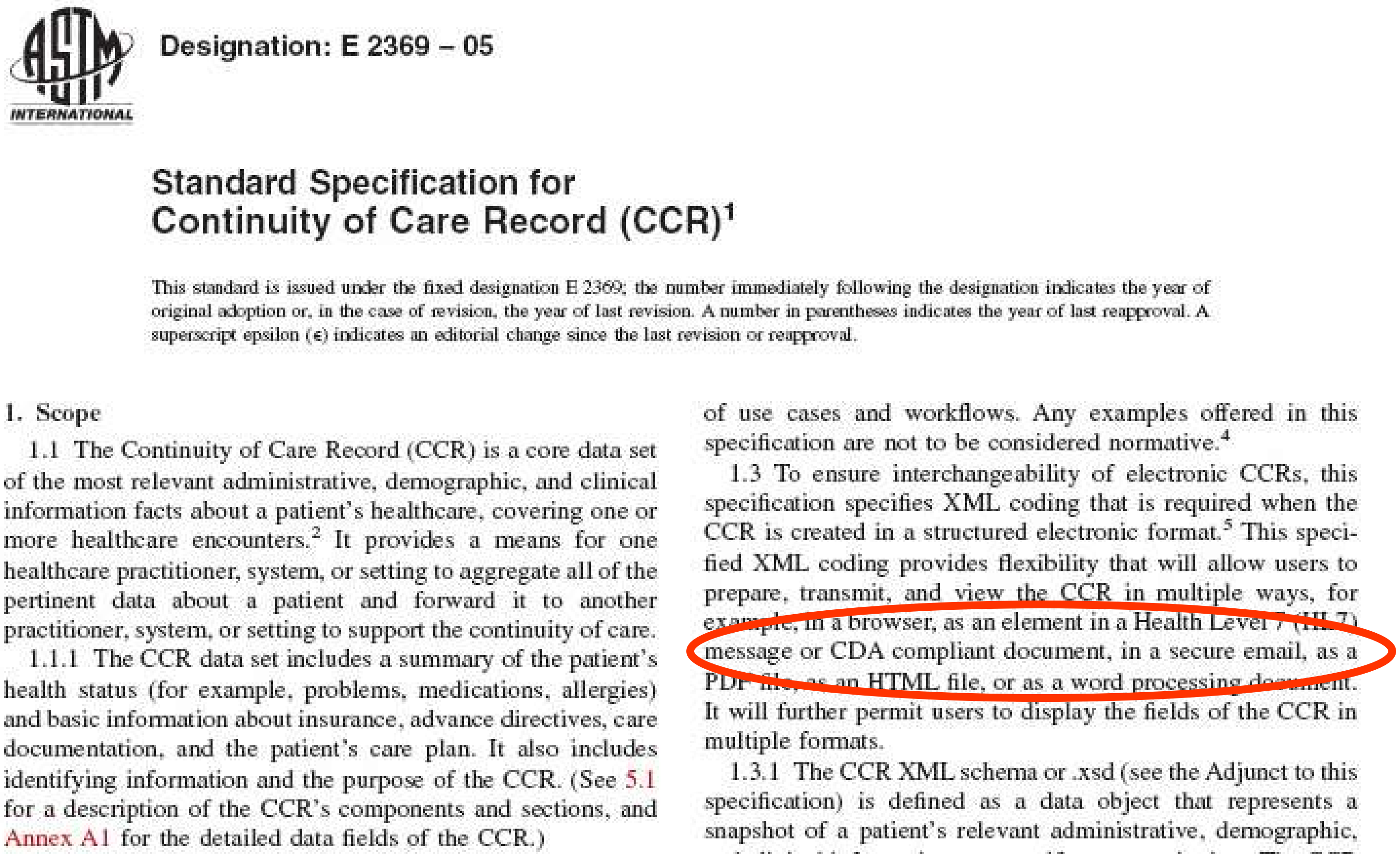
ASTM CCR + HL7 CDA = CCD

- CDA is designed t essional society recommendations, 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



ContinuityOfCareRecord



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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

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)

Outline

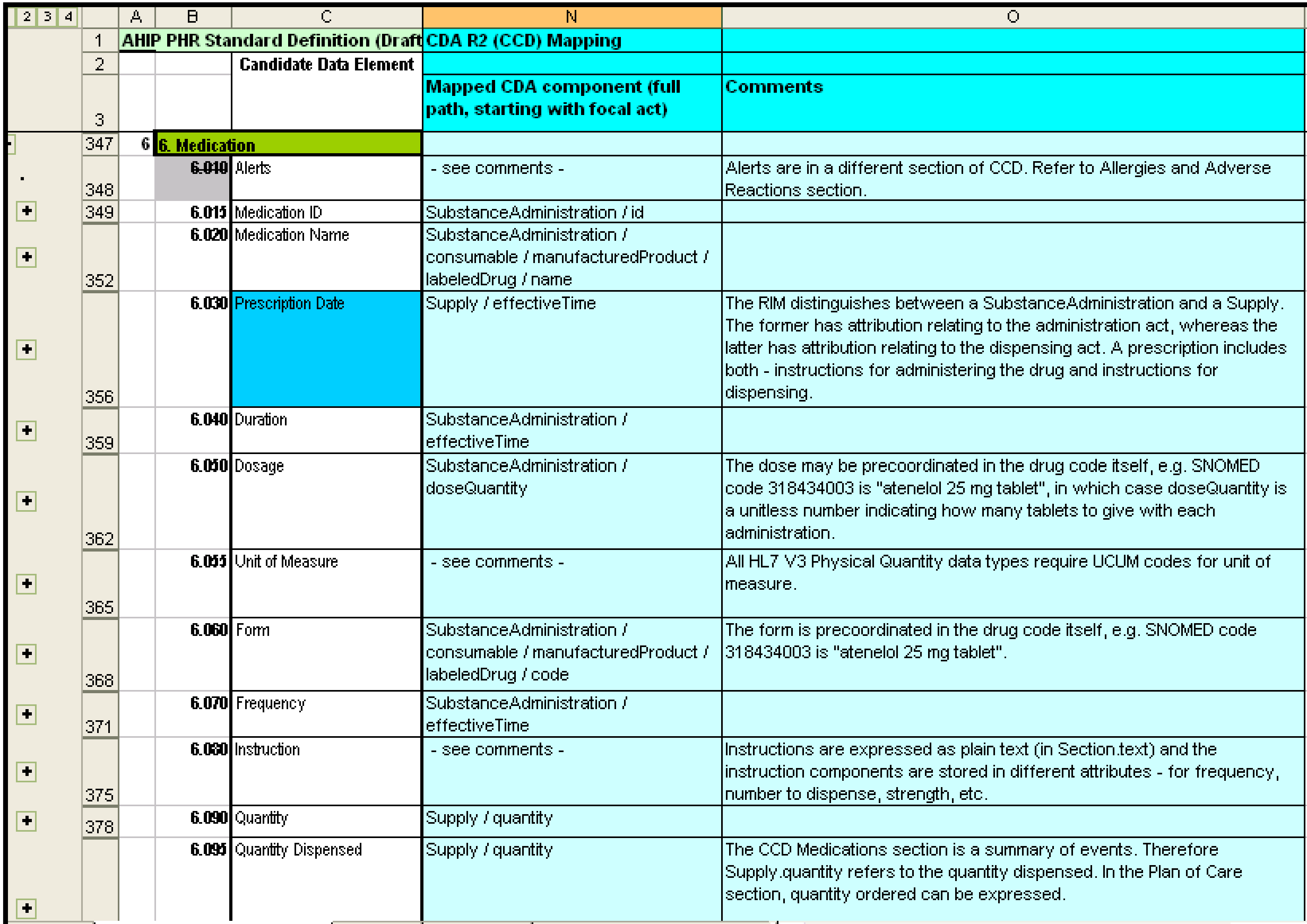
- The HL7 CDA
- CDA for Health Information Exchange
- CDA + CCR = CCD
- CDA Document Types
- CDA for Personal Health Records
- Summary, Resources & Questions

Medication information in CDA

- Works for CCR
- Works for IHE
- Works for AHIC
- What about *our* requirements?
- Can CDA accommodate the AHIP Medication data elements?
- How expressive is CDA?

AHIP Medication data elements mapped to CDA/CCD

Courtesy Bob Dolin, MD, Kaiser Permanente



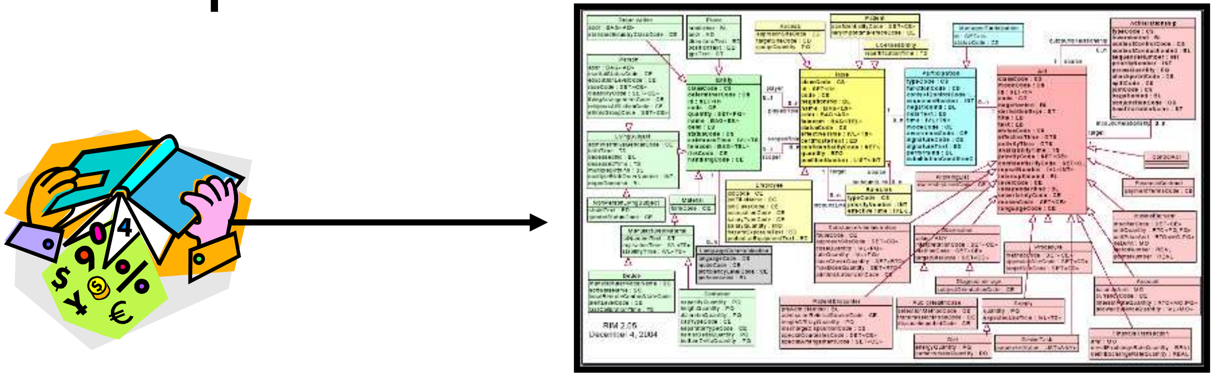
	A	B	C	N	O
1	**AHIP PHR Standard Definition (Draft**			**CDA R2 (CCD) Mapping**	
2			**Candidate Data Element**		
3				**Mapped CDA component (full path, starting with focal act)**	**Comments**
347	6	**6. Medication**			
348		**6.010**	Alerts	- see comments -	Alerts are in a different section of CCD. Refer to Allergies and Adverse Reactions section.
349		**6.015**	Medication ID	SubstanceAdministration / id	
352		**6.020**	Medication Name	SubstanceAdministration / consumable / manufacturedProduct / labeledDrug / name	
356		**6.030**	Prescription Date	Supply / effectiveTime	The RIM distinguishes between a SubstanceAdministration and a Supply. The former has attribution relating to the administration act, whereas the latter has attribution relating to the dispensing act. A prescription includes both - instructions for administering the drug and instructions for dispensing.
359		**6.040**	Duration	SubstanceAdministration / effectiveTime	
362		**6.050**	Dosage	SubstanceAdministration / doseQuantity	The dose may be precoordinated in the drug code itself, e.g. SNOMED code 318434003 is "atenelol 25 mg tablet", in which case doseQuantity is a unitless number indicating how many tablets to give with each administration.
365		**6.055**	Unit of Measure	- see comments -	All HL7 V3 Physical Quantity data types require UCUM codes for unit of measure.
368		**6.060**	Form	SubstanceAdministration / consumable / manufacturedProduct / labeledDrug / code	The form is precoordinated in the drug code itself, e.g. SNOMED code 318434003 is "atenelol 25 mg tablet".
371		**6.070**	Frequency	SubstanceAdministration / effectiveTime	
375		**6.080**	Instruction	- see comments -	Instructions are expressed as plain text (in Section.text) and the instruction components are stored in different attributes - for frequency, number to dispense, strength, etc.
378		**6.090**	Quantity	Supply / quantity	
		6.095	Quantity Dispensed	Supply / quantity	The CCD Medications section is a summary of events. Therefore Supply.quantity refers to the quantity dispensed. In the Plan of Care section, quantity ordered can be expressed.

Medication information in CDA

- Works for CCD
- Works for IHE
- Works for AHIC
- What about our requirements?
- Can CDA accommodate the AHIP Medication data elements?
- How expressive is CDA?
  - *As expressive as the HL7 RIM*

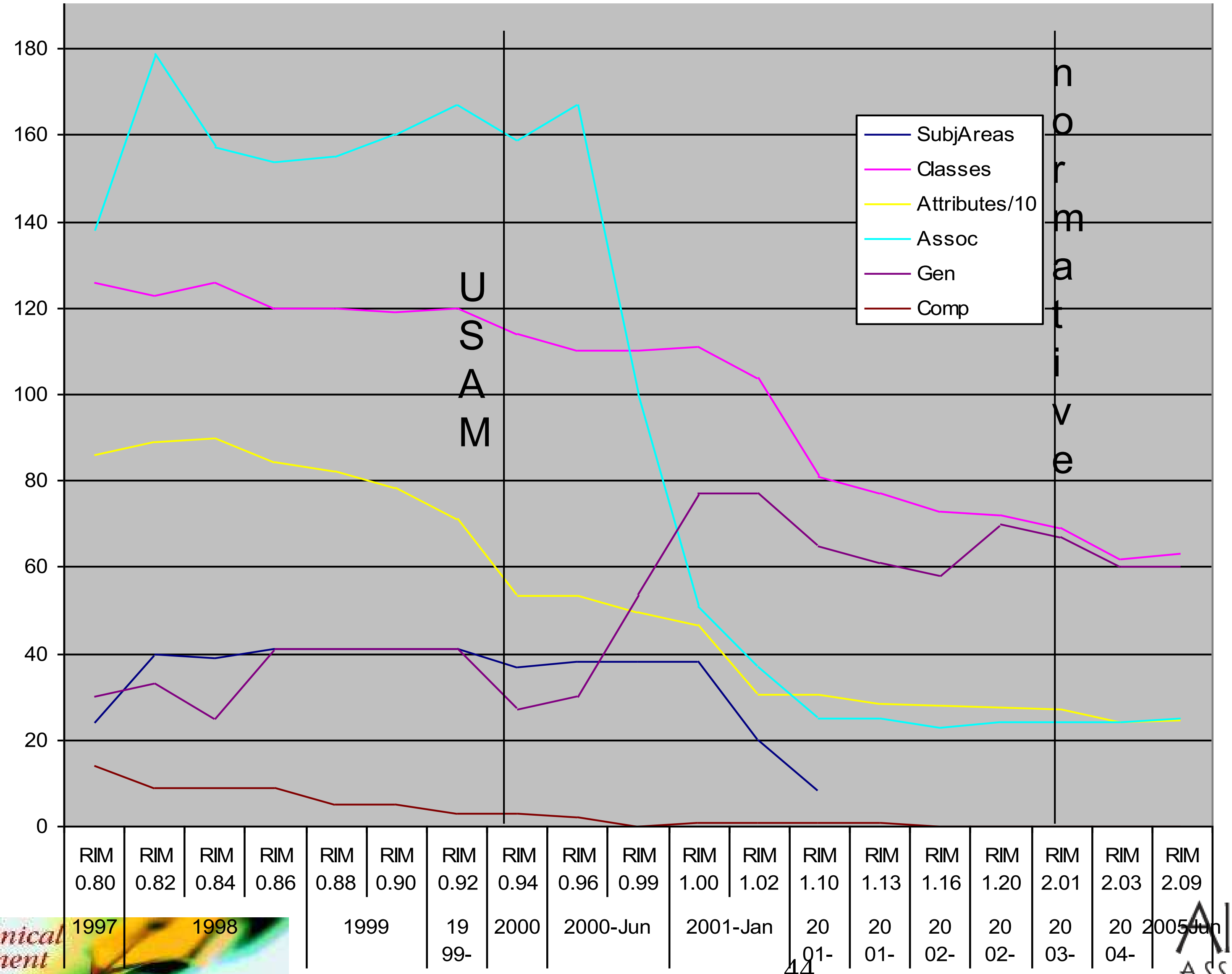
The HL7 RIM

- Where did it come from and how is it developed?

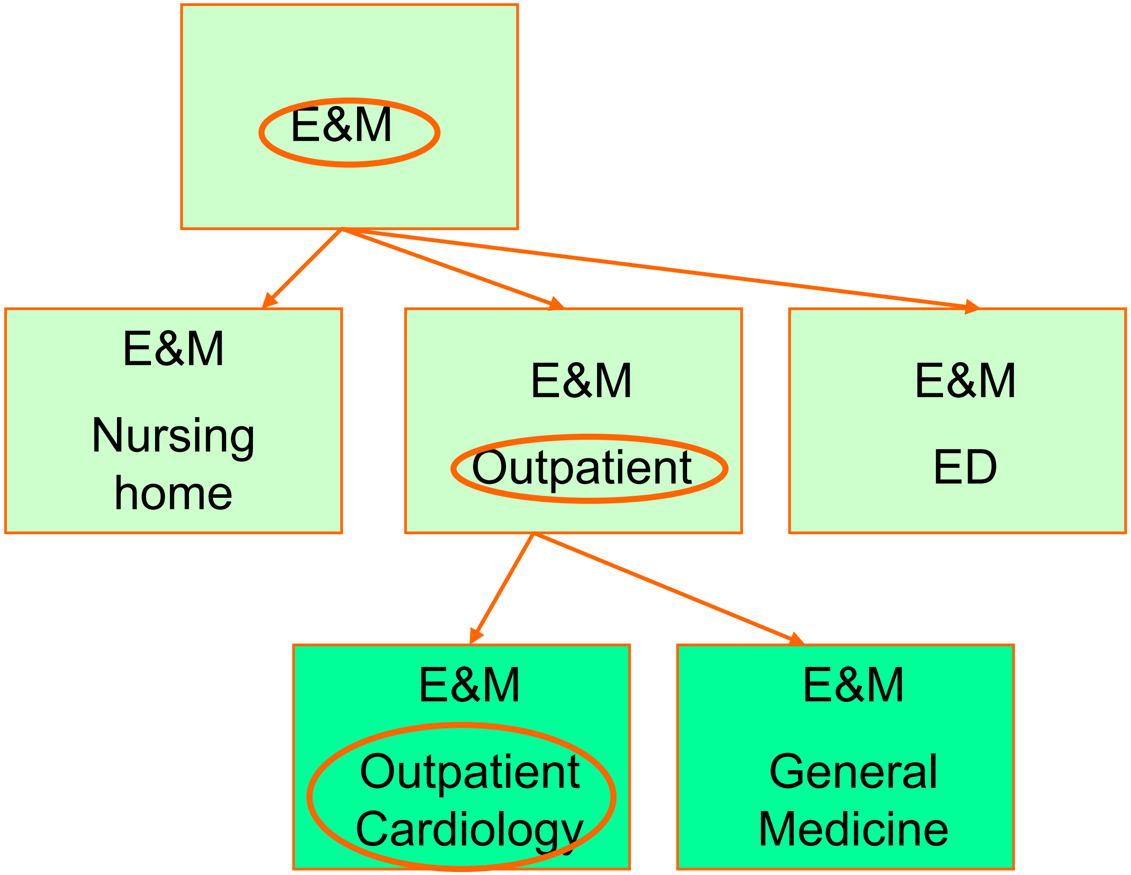


- Requirements applied to RIM
  - From V2 and new applications
  - From other standards organizations
  - From users
- RIM harmonization is a continual process
  - But it doesn’t just grow…

Rise & fall & rise of the RIM



Document typology



E&M

E&M

Nursing home

E&M

Outpatient

E&M

ED

E&M

Outpatient Cardiology

E&M

General Medicine

Type of service

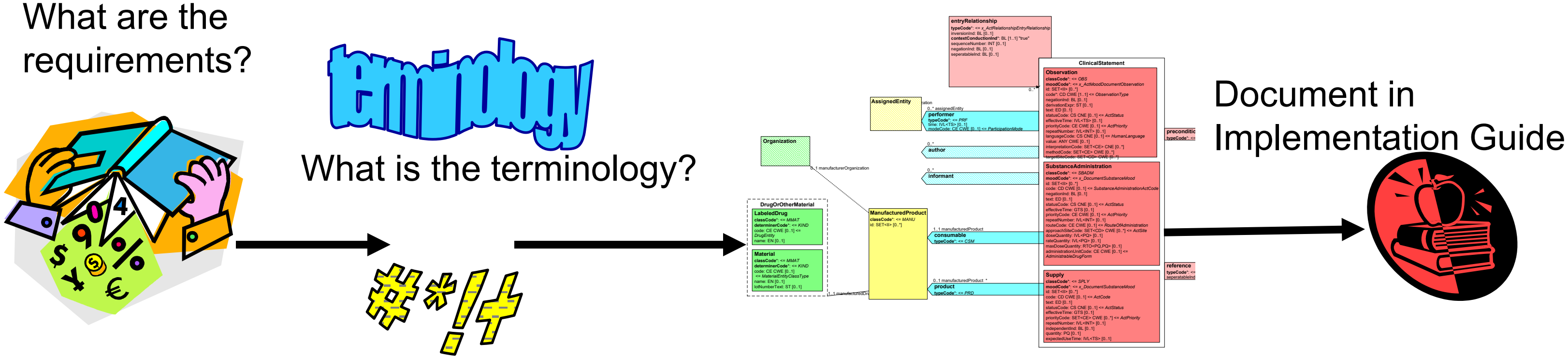
Setting

Clinical categorization

CDA Implementation Guides

Role of Domain Experts and Users:

- Define requirements
- Provide resources



What are the requirements?

terminology

What is the terminology?

What is the cardinality?

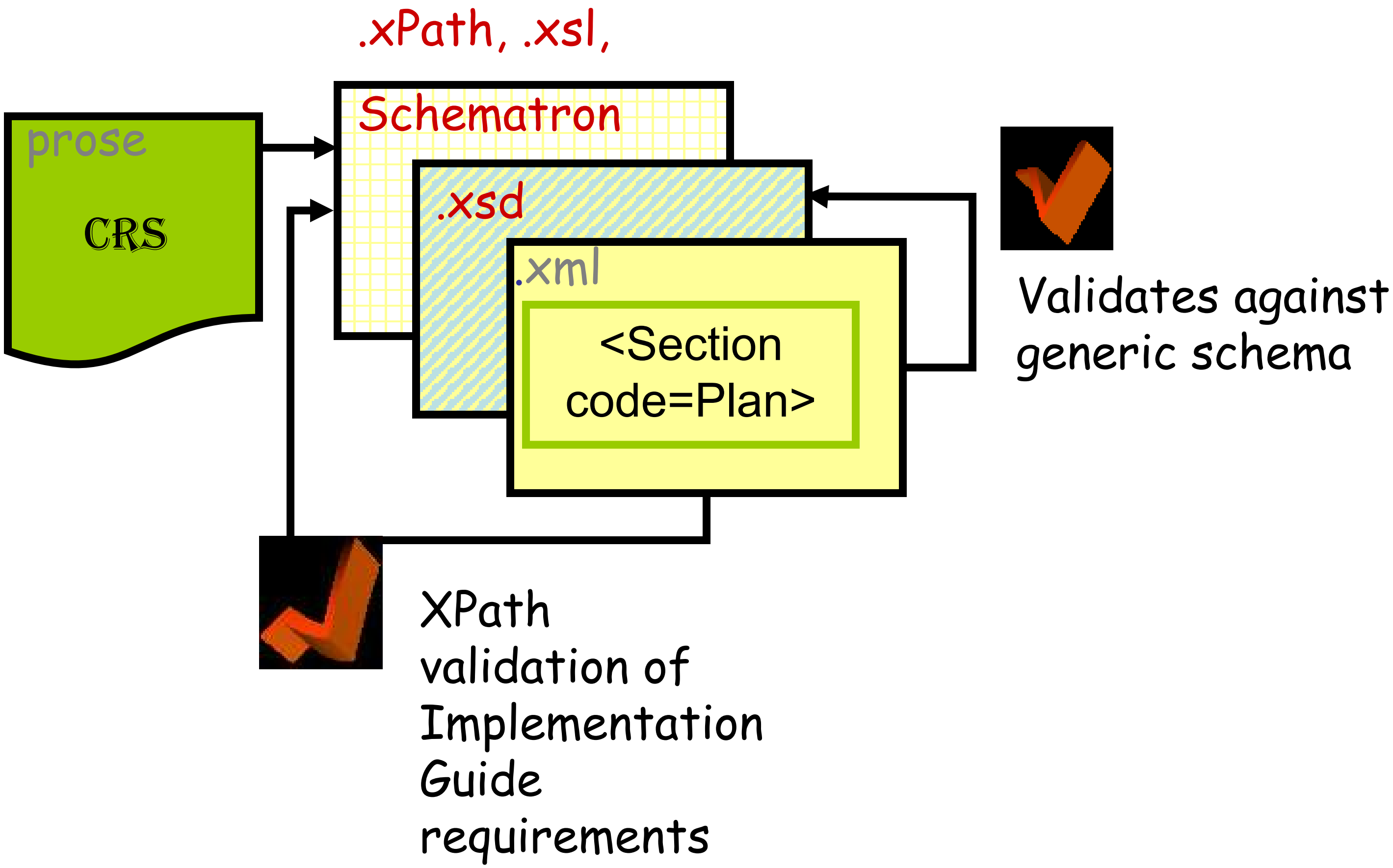
Express as a Clinical Statement

Document in Implementation Guide

Role of Structured Documents TC:

- Assess scope
- Compare against existing Guides
- Quality control
- Sponsor ballot

Validating CDA document types


.xPath, .xsl,
Schematron
prose
CRS
.xsd
.xml
<Section code=Plan>

Validates against generic schema

XPath validation of Implementation Guide requirements

Outline

- The HL7 CDA
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Requirements for a PHR: Summary

- Patient-centric, patient-directed
- Open interface/data specs
- Comprehensive record
- Supports re-use

Requirements for a PHR: #1

- Patient-centric, patient-directed
  - "mine", irrespective of Plan, provider, location
    - Plan can change
    - Providers compete, overlap, are replaced
    - US healthcare does not layout neatly along geographical boundaries
  - Patient controls access privileges
    - Confidentiality at document, section level
    - Within limits of HIPAA, within PTO

Requirements for a PHR: #2

- Universal, open interface, data format
  - All can contribute
  - Application independent
  - Vendor independent
- Data supplied from all sources
- Not proprietary, works with any vendor’s tools

Requirements for a PHR: #3

- Receives, catalogs, all aspects of health record
    - Provider notes
    - Lab and imaging
    - Pharmacy
    - Dental
    - CAM
    - Patient-provided information

Requirements for a PHR: #4

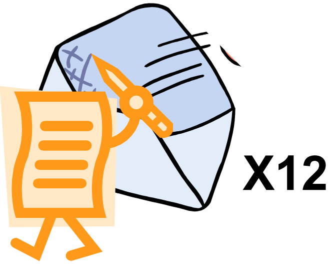
- Data available for re-use
  - Reimbursement, pay for performance
  - Practice management, decision support
  - Public health
  - Clinical trials
- *(some restrictions will apply)*

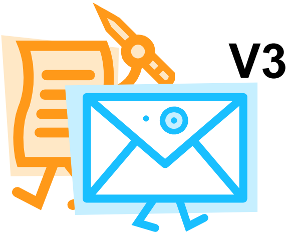
CDA PHR: Patient-centric, Patient-directed

- Each source record is a complete document with patient metadata sufficient to support eMPI
- Each encounter with the healthcare system results in one or more such documents
- Confidentiality can be specified for the document as a whole or pieces of it

CDA PHR: Open Interface

- An open standard: all applications can import/export
- CDA can be the payload in any type of communication message



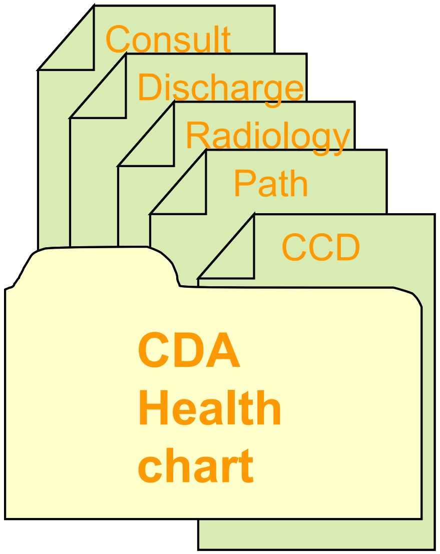


CDA PHR: Comprehensive

- CDA can be any type of clinical document
- With incremental approach,

  all can play
- *The CDA PHR can be*

  the full chart


Consult
Discharge
Radiology
Path
CCD
CDA
Health
chart

CDA PHR: Re-use

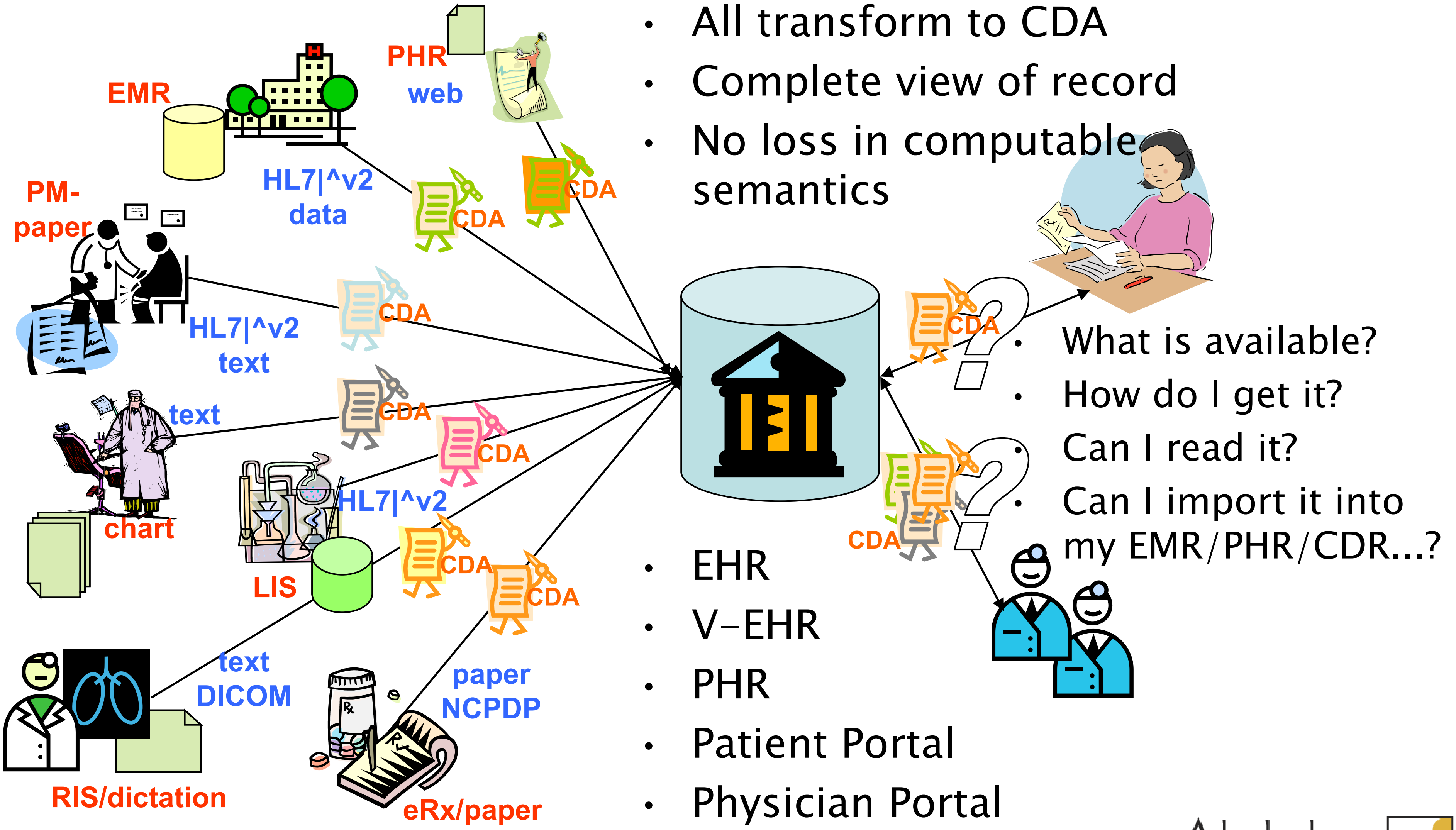
- Manual re-use supported by all levels of CDA
  - Human review from the local desktop, eliminates sneaker/ “auto” net
- Automated re-use supported *to the extent that coded data available*
  - Pilots show effective for clinical trials, decision support
- We can get to automated re-use incrementally, *as business drivers warrant*

- Roles defined in CDA Header
  - Patient (subject, record target)
  - Author
  - Authenticator, legal authenticator
  - Custodian
- Document-based approach with unambiguous legal responsibility allows information sharing with clear lines of responsibility

CDA for PHR: Summary

- Patient-centric, patient-directed
  - Supports eMPI, patient identification across providers
  - Confidentiality can be specified for the document as a whole or pieces of it
- Open interface/data specs
  - Designed for broad-based interoperability
  - Header: the metadata required for content management
- Comprehensive record
  - All records, not just a summary
  - Everybody plays: benefits increase with better coding
- Supports re-use
  - Both manual and automated

CDA document-based network


EMR
PHR
web
HL7|^v2
data
CDA
CDA
PM-
paper
CDA
HL7|^v2
text
text
CDA
CDA
chart
HL7|^v2
LIS
CDA
CDA
text
DICOM
paper
NCPDP
RIS/dictation
eRx/paper
CDA
CDA

- All transform to CDA
- Complete view of record
- No loss in computable semantics

- What is available?
- How do I get it?
- Can I read it?
- Can I import it into my EMR/PHR/CDR...?

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

Clinical Document Architecture

Alschuler ASSOCIATES LLC

AHIC Consumer Empowerment Use Case

Courtesy Bob Dolin, MD, Kaiser Permanente

- The following scenario is based on the American Health Information Community Consumer Empowerment Harmonized Use Case, with a focus on medication summary data.

- The Use Case calls for sufficient data exchange to enable the following activities:
  - Create medication history;
  - Update medication history;
  - View medication history;
  - Physician review of medication history with consumer;
  - Differentiate current from relevant past medications

- Everything shown in the scenario can be built today with existing or draft standards:
  - **Messaging:** IHE XDS or HL7 Medical Records;
  - **Summary data:** CCR or CCD;
  - **Vocabulary:** LOINC, SNOMED, HL7, RxNorm

Empowering medication summary data

- 1) Provider of PHR Services receives medication information, from a variety of sources.
- 2) Health Care Provider requests medication information from PHR Provider. PHR Provider authenticates the request.
  - IHE XDS or HL7 Medical Records query message.
  - Query parameters include patient, document type (e.g. CCD, procedure report, consultation), author, etc.
- 3) PHR Provider transmits requested medication information. Health Care Provider receives medication information.
  - IHE XDS or HL7 Medical Records message, carrying a CCD.

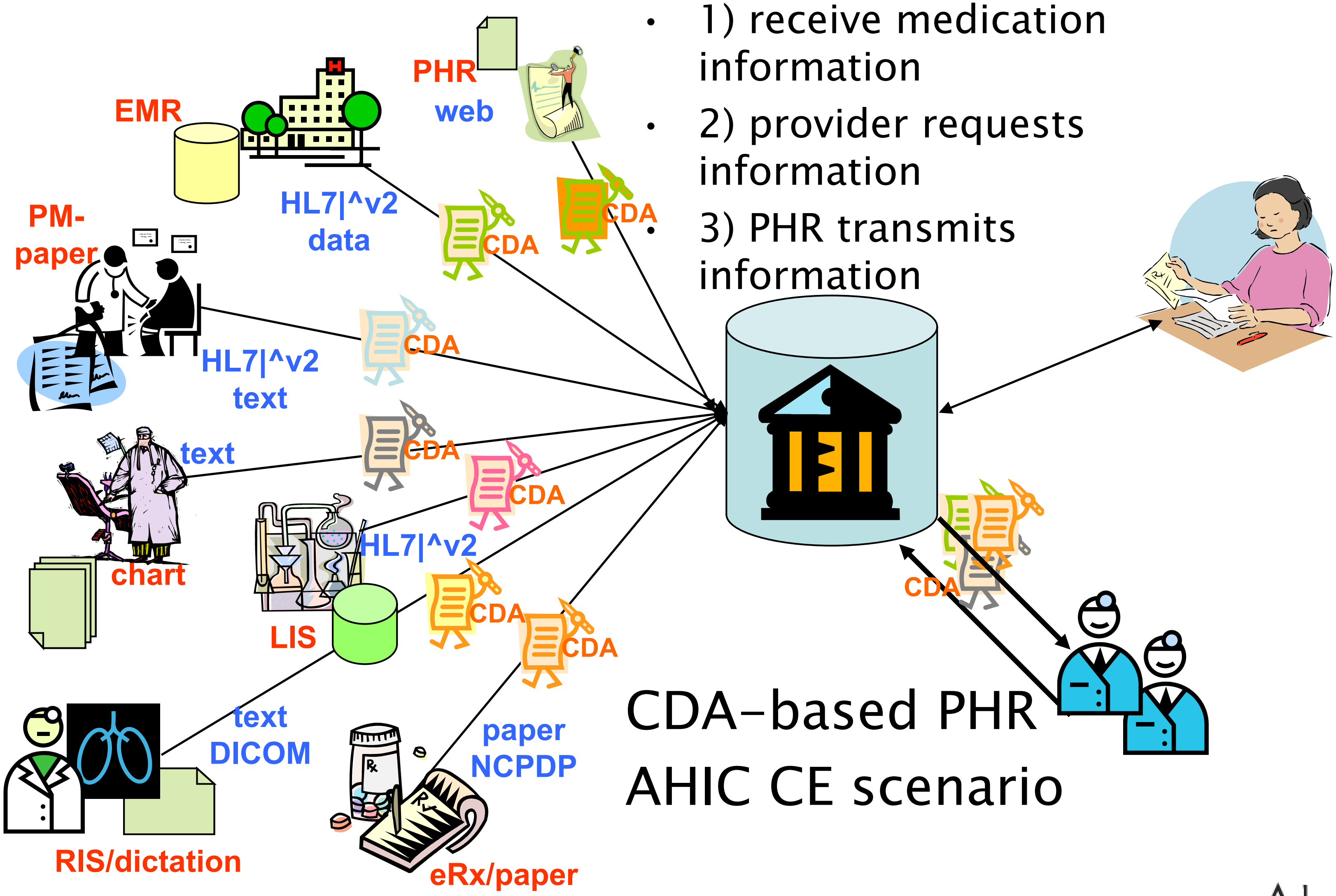
Courtesy Bob Dolin, MD, Kaiser Permanente

Clinical Document Architecture

Alschuler ASSOCIATES LLC

CDA document-based network

- 1) receive medication information
- 2) provider requests information
- 3) PHR transmits information


EMR
PHR
web
HL7|^v2
data
CDA
CDA
PM-
paper
HL7|^v2
text
CDA
text
CDA
CDA
chart
HL7|^v2
LIS
CDA
CDA
text
DICOM
paper
NCPDP
RIS/dictation
eRx/paper
CDA

CDA-based PHR
AHIC CE scenario

HL7 message carrying a CCD

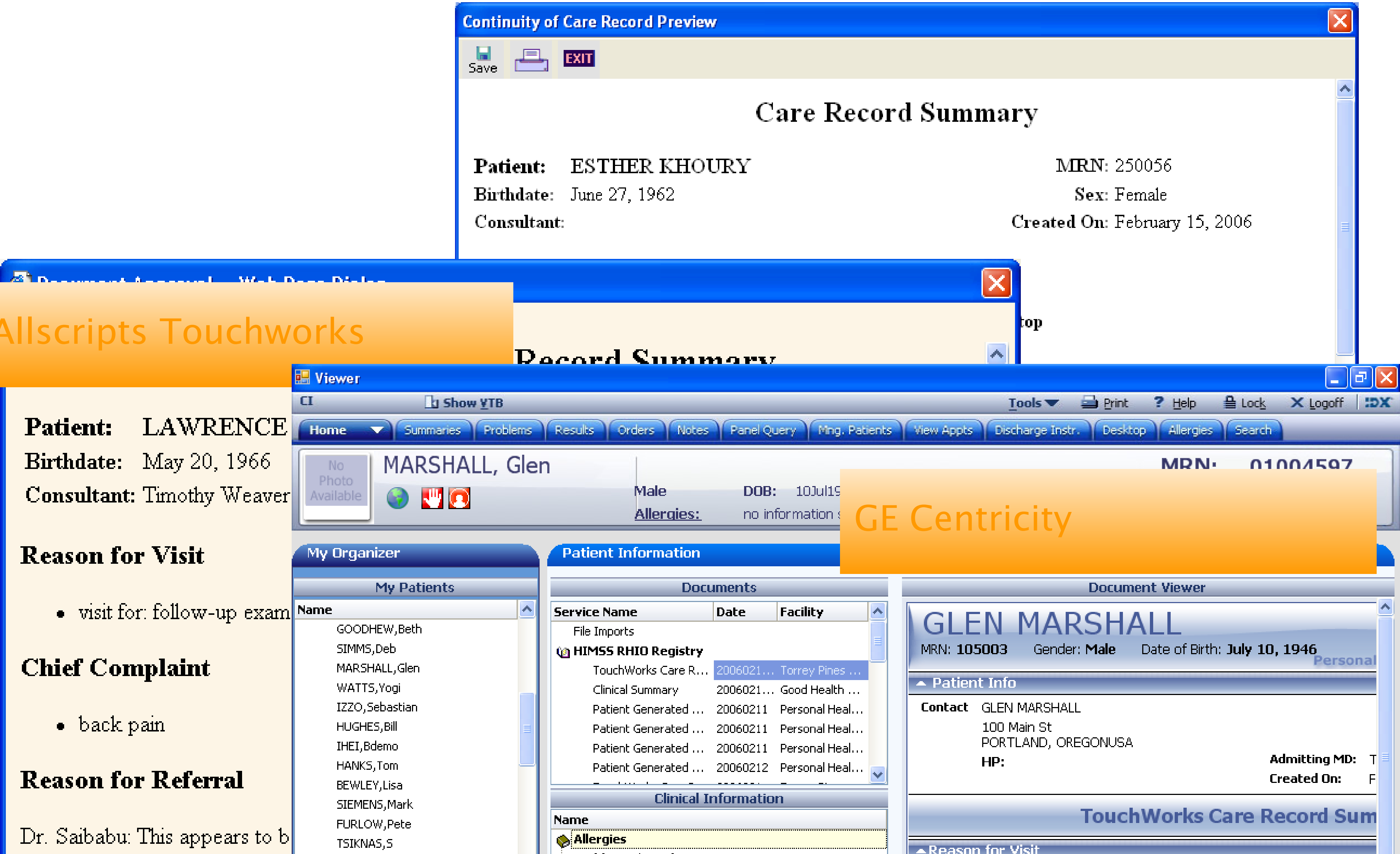
```
<someAct>
  <code code="34133-9“
    codeSystem=“&LOINC;" displayName=“Summary note"/>
  <text type="multipart/related">
MIME-Version: 1.0
Content-Type: multipart/related; boundary="HL7-CDA-part";
type="text/xml"; start="10.12.45567.43"
Content-Transfer-Encoding: BASE64

--HL7-CDA-part
Content-Type: text/xml; charset="US-ASCII"
Content-ID: &lt;10.12.45567.43>

... Base 64 of base CDA document, which contains
  ...
  <observationMedia classCode=“OBS” moodCode=“EVN”>
    <id root="10.23.4567.345"/>
    <value mediaType="image/jpeg”>
      <reference value="canned_left_hand_image.jpeg"/>
    </value>
  </observationMedia>
  ...

--HL7-CDA-part
Content-ID: &lt;10.23.4567.345>
Content-Location: canned_left_hand_image.jpeg
Content-Type: image/JPEG

... Base64 image ...

--HL7-CDA-part--
  </text>
</someAct>
```

Courtesy Bob Dolin, MD, Kaiser Permanente

CDA in PHR: CapMed

- Screen captures from IHE (Integrating the Healthcare Enterprise) demonstration HIMSS 2006
- Patient can: enter data, send to insurer, provider
- Provider can export to PHR, view records on PHR
- Shown as example, *not endorsement*

CDA in PHR : CapMed/IHE Demo



Continuity of Care Record Preview

Care Record Summary

Patient: ESTHER KHOURY
Birthdate: June 27, 1962
Consultant:

MRN: 250056
Sex: Female
Created On: February 15, 2006

Allscripts Touchworks

Record Summary

Patient: LAWRENCE
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 b

Viewer

Show VTB
Tools
Print
Help
Lock
Logoff
Home
Summaries
Problems
Results
Orders
Notes
Panel Query
Mng. Patients
View Appts
Discharge Instr.
Desktop
Allergies
Search
No Photo Available

MARSHALL, Glen

Male DOB: 10Jul19

Allergies: no information

MRN: 01004597

GE Centricity

My Organizer

My Patients

Name
GOODHEW,Beth
SIMMS,Deb
MARSHALL,Glen
WATTS,Yogi
IZZO,Sebastian
HUGHES,Bill
IHEI,Bdemo
HANKS,Tom
BEWLEY,Lisa
SIEMENS,Mark
FURLOW,Pete
TSIKNAS,S

Patient Information

Documents

Service Name	Date	Facility
File Imports		
HIMSS RHIO Registry		
TouchWorks Care R…	2006021…	Torrey Pines …
Clinical Summary	2006021…	Good Health …
Patient Generated …	20060211	Personal Heal…
Patient Generated …	20060211	Personal Heal…
Patient Generated …	20060211	Personal Heal…
Patient Generated …	20060212	Personal Heal…

Clinical Information

Name
Allergies

Document Viewer

GLEN MARSHALL

MRN: 105003 Gender: Male Date of Birth: July 10, 1946

Personal

Patient Info

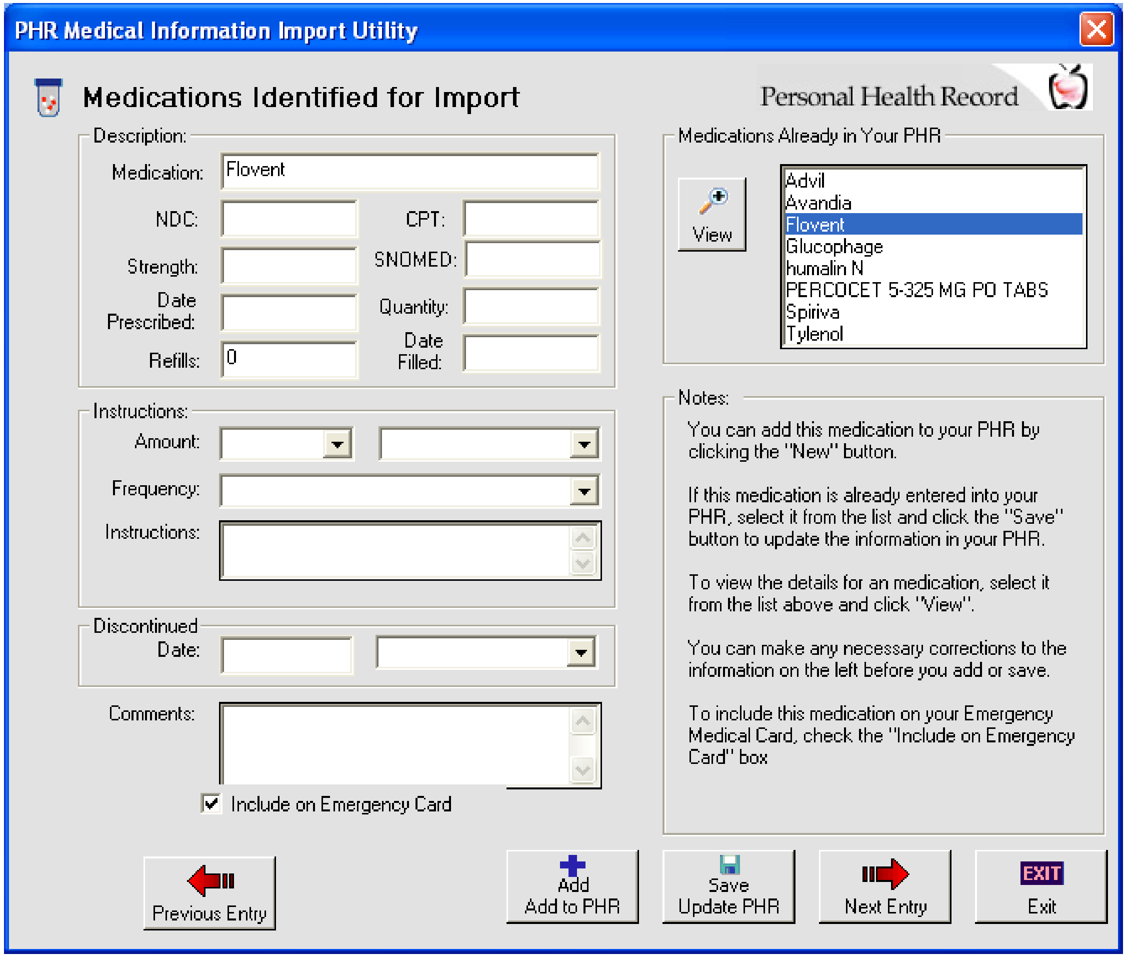
Contact GLEN MARSHALL
100 Main St
PORTLAND, OREGONUSA
HP:

Admitting MD: T
Created On: F

TouchWorks Care Record Sum

Reason for Visit

CDA in PHR : CapMed/IHE Demo


PHR Medical Information Import Utility
Personal Health Record
Description:
NDC:
CPT:
Strength:
SNOMED:
Date Prescribed:
Quantity:
Date Filled:
Instructions:
Amount:
Frequency:
Instructions:
Discontinued
Date:
Comments:
View
Notes:
Previous Entry
Add
Add to PHR
Save
Update PHR
Next Entry
EXIT
Exit

Medications Identified for Import

Medication: Flovent

Refills: 0

☑ Include on Emergency Card

Medications Already in Your PHR

- Advil
- Avandia
- Flovent
- Glucophage
- humalin N
- PERCOCET 5-325 MG PO TABS
- Spiriva
- Tylenol

Notes:

You can add this medication to your PHR by clicking the "New" button.

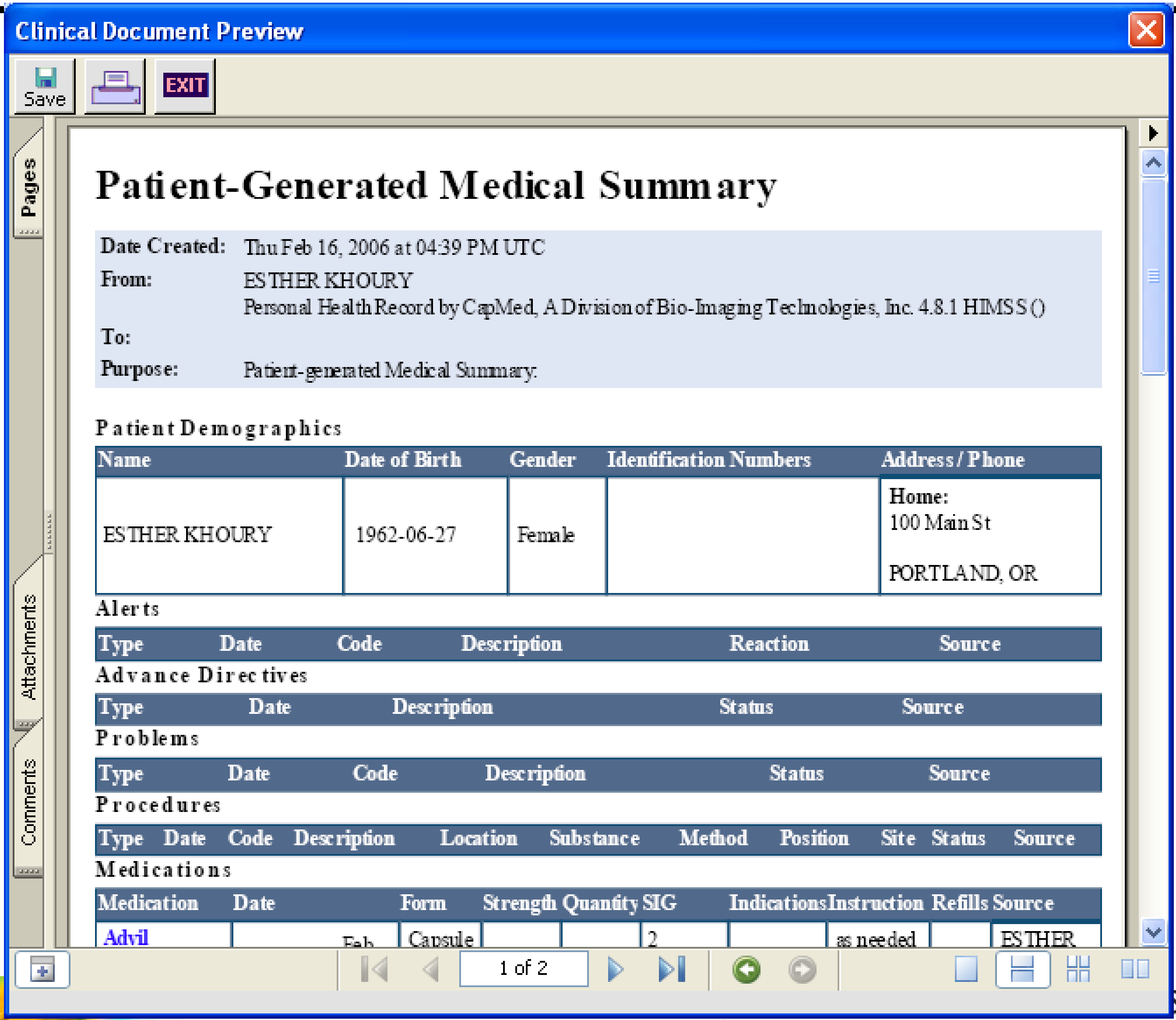
If this medication is already entered into your PHR, select it from the list and click the "Save" button to update the information in your PHR.

To view the details for an medication, select it from the list above and click "View".

You can make any necessary corrections to the information on the left before you add or save.

To include this medication on your Emergency Medical Card, check the "Include on Emergency Card" box

CDA in PHR : CapMed/IHE Demo



Patient-Generated Medical Summary

Date Created:	Thu Feb 16, 2006 at 04:39 PM UTC
From:	ESTHER KHOURY Personal Health Record by CapMed, A Division of Bio-Imaging Technologies, Inc. 4.8.1 HIMSS ()
To:	
Purpose:	Patient-generated Medical Summary.

Patient Demographics

Name	Date of Birth	Gender	Identification Numbers	Address / Phone
ESTHER KHOURY	1962-06-27	Female		Home: 100 Main St PORTLAND, OR

Alerts

Type	Date	Code	Description	Reaction	Source

Advance Directives

Type	Date	Description	Status	Source

Problems

Type	Date	Code	Description	Status	Source

Procedures

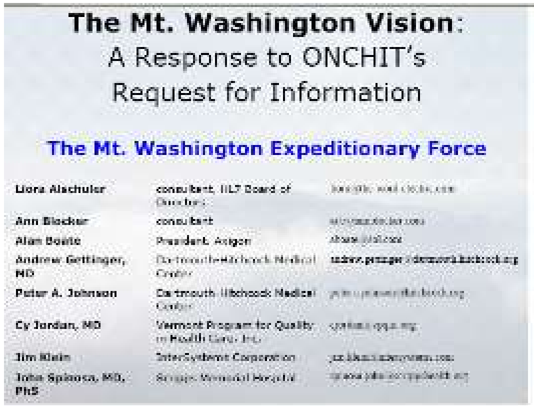
Type	Date	Code	Description	Location	Substance	Method	Position	Site	Status	Source

Medications

Medication	Date	Form	Strength	Quantity	SIG	Indications	Instruction	Refills	Source
Advil	Feb	Capsule			2		as needed		ESTHER

The PHR as a bank account

- An account with access privileges
  - What goes in/out
  - Who sends it in/out
- Personal account holder
  - Makes cash deposits/withdrawals
  - Audits the account
- Third parties
  - Direct deposits
  - Wire transfers (at direction of account holder)



The Mt. Washington Vision:
A Response to ONCHIT's
Request for Information

The Mt. Washington Expeditionary Force

Liora Alschuler	consultant, HL7 Board of Directors	[illegible]
Ann Blocker	consultant	[illegible]
Alan Boate	President, Axigon	[illegible]
Andrew Gettinger, MD	Dartmouth-Hitchcock Medical Center	[illegible]
Peter A. Johnson	Dartmouth-Hitchcock Medical Center	[illegible]
Cy Jordan, MD	Vermont Program for Quality in Health Care, Inc.	[illegible]
Jim Klein	InterSystems Corporation	[illegible]
John Spinosa, MD, PhD	Scripps Memorial Hospital	[illegible]

Sponsored by:
INTERSYSTEMS
and hosted by:
DARTMOUTH-HITCHCOCK
MEDICAL CENTER

Project Springfield

- Technical
  - Use simple electronic clinical documents
  - Use existing infrastructure: SSL and the Web
  - Leverage existing tools and products: PHR
- Business
  - Springfield Health Information Exchange
    - SpringHIE, a new, for-profit entity
    - Hosting a Health Record Bank for the Springfield area
  - Business model
    - Aligns costs/benefits: Provider, patient participation subsidized by payers
- Cultural: patient-centric, patient-controlled

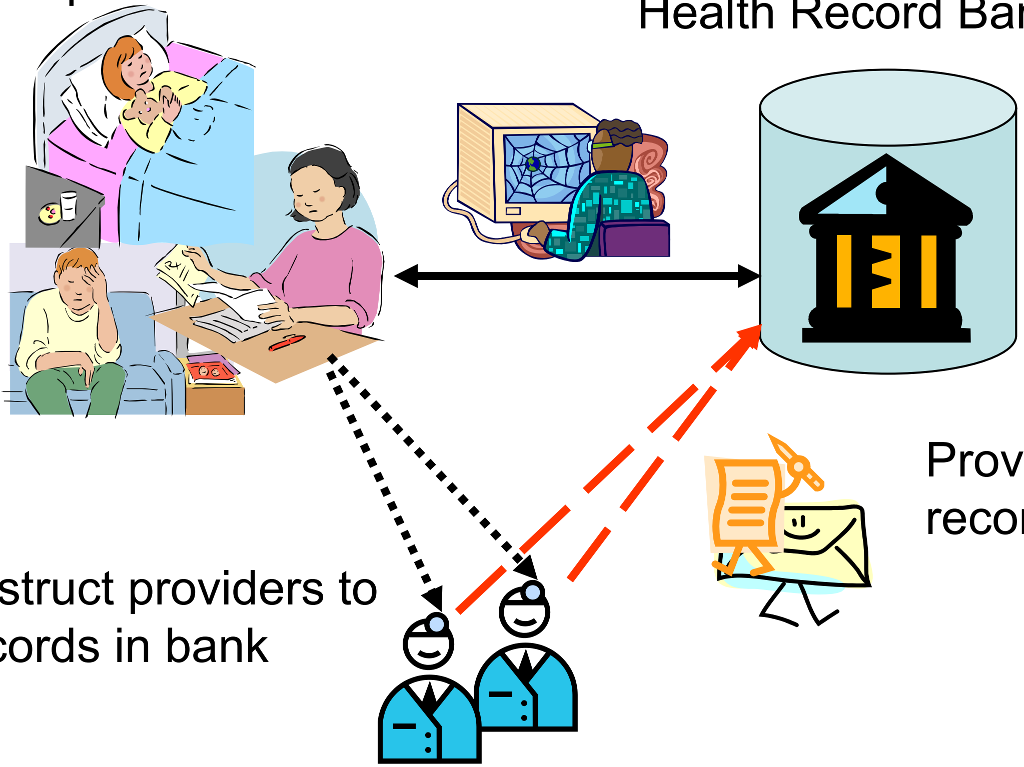
SpringHIE

- Initiates
  - Recruits technical partners
  - Raises funds
  - Develops technical architecture and business framework
  - Creates community presence
- Implements
  - Partnership with co-developers
  - Contracts for development, as required
- Oversees
  - Patient/bank interactions
  - Maintenance of technical standards
  - HIPAA business partner agreements

The Health Record Bank

- A commercial entity
- A technology partner holding a business agreement with SpringHIE
  - Standards of operation
- Operates and maintains a repository for patient records populated by providers under patient control

SpringHIE: Initiation



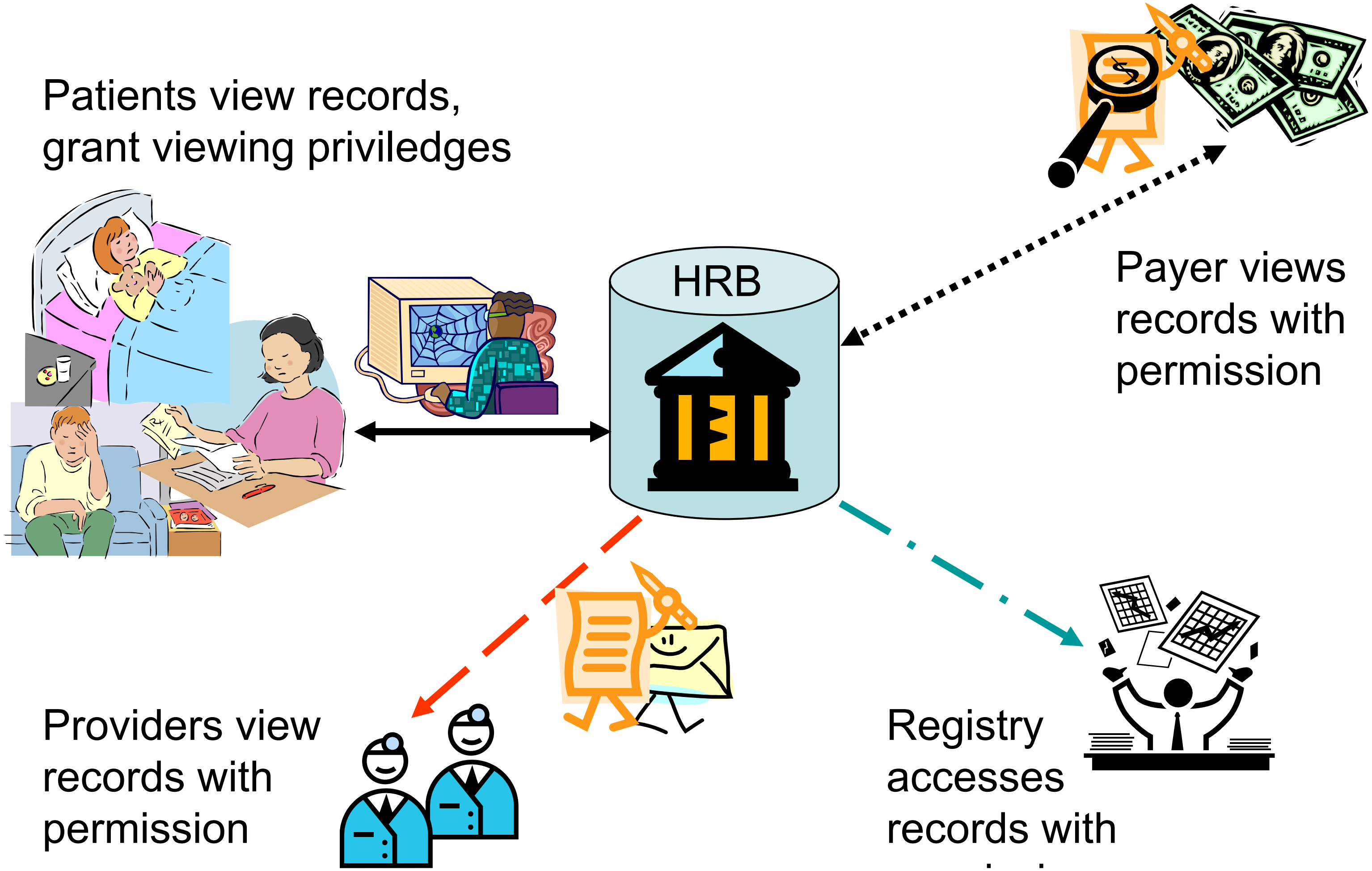
Patients open HRB accounts

Health Record Bank (HRB)

Providers deposit records in bank

Patients instruct providers to deposit records in bank

SpringHIE: Usage



Patients view records,
grant viewing priviledges

Payer views
records with
permission

Providers view
records with
permission

Registry
accesses
records with
permission

SpringHIE: Privacy

- Patient sets access control
- Disadvantage: must justify access according to HIPAA
  - Treatment
  - Payment
  - Operations
- Advantage: trust

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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)
  - Medical Summary (with IHE, EHR Vendors Association)
  - Pathology reports (with CAP)
  - Imaging reports (with DICOM)
  - Claims attachments, migrate from R1 (with CMS)
  - Dental reports (with ADA)
  - Anesthesiology Reports (with Anes SIG)
  - Public health reports (with CDC)
  - ... *What are your priorities?*

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

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Quick Start Guides

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Thank you!

Questions?