HL7
Clinical Document Architecture

Today and Tomorrow

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CDA - Today and Tomorrow

- **HL7, Home of the CDA**

- **CDA, What is it?**

- **Mayo's use of CDA**

- **Acceptance of CDA World Wide**

- **CDA Release 2 – What is planned?**

HL7

MEMBER 2004
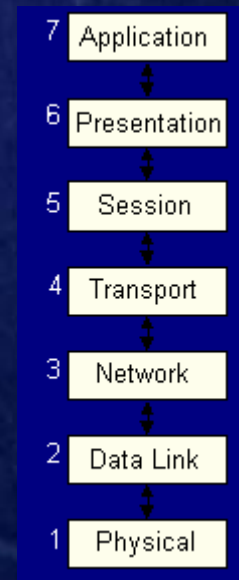ANSI Accredited
Standards Developer

What is Health Level 7 ?

- **Health Level 7 or HL7 is one of several ANSI-accredited Standards Developing Organizations responsible for national standards used by the health care industry today.**

  It's name is taken in part from the OSI model which represents the 7 layers of a communication stack.

  HL7 has focused on the application layer or layer 7 of healthcare applications.

7	Application
6	Presentation
5	Session
4	Transport
3	Network
2	Data Link
1	Physical

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HL7 is a Global Standard!

- Argentina
- Canada
- Czech Republic
- Ireland
- Korea (Sth.)
- Poland
- Switzerland
- The Netherlands

- Australia
- China
- Denmark
- Italy
- Lithuania
- Southern Africa
- Taiwan
- United Kingdom

- Brazil
- Croatia
- Finland
- Japan
- NZ
- Spain
- Turkey
- USA

HL7 Organizations in 27 Countries!

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What sort of standards ?

- ## HL7 Messaging Standards

	Chapter Title	Chapter Content
1	Introduction	Overview of HL7
2	Control	Message Definitions, Interchange Protocols
3	Patient Administration	Admit, Discharge, Transfer, and Demographics
4	Order Entry	Observations, Pharmacy, Dietary, and Supplies
5	Query	Rules applying to queries and to their responses
6	Financial Management	Patient Accounting and Charges
7	Observation Reporting	Observation Report Messages
8	Master Files	Health Care Application Master Files
9	Medical Records / Information Management	Document Management Services and Resources
10	Scheduling	Appointment Scheduling and Resources
11	Patient Referral	Primary Care Referral Messages
12	Patient Care	Problem-Oriented Records.
13	Laboratory Automation	Equipment status, specimen status, equipment inventory, equipment comment, equipment response, equipment notification, equipment test code settings, equipment logs/service
14	Application Management	Application control-level requests, transmission of application management information
15	Personnel Management	Professional affiliations, educational details, language detail, practitioner organization unit, practitioner detail, staff identification

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What sort of standards ?

- **HL7 Messaging Standards and …**
- **Clinical Context Management   (CCOW)**
- **Arden Syntax for Medical Logic Systems**
- **Reference Information Model   (RIM)**
- **Clinical Document Architecture (CDA)**
- **Electronic Healthcare Records (EHR)**

My area of focus…

- **HL7 Messaging Standards**

- **Clinical Context Management   (CCOW)**

- **Arden Syntax for Medical Logic Systems**

- **Reference Information Model   (RIM)**

∅ **Clinical Document Architecture (CDA)**

- **Electronic Healthcare Records (EHR)**

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Clinical Document Architecture

An XML markup standard that specifies the structure and semantics of "clinical documents" for the purpose of exchange.

Originally presented at the HL7 Plenary meeting in Sept of 1998, CDA Release 1.0 was approved as an ANSI standard on November of 2000.

Structured Documents TC

**Currently there are 4 Co-Chairs to the SDTC:**

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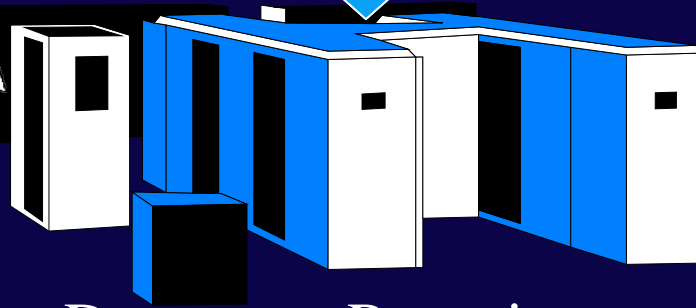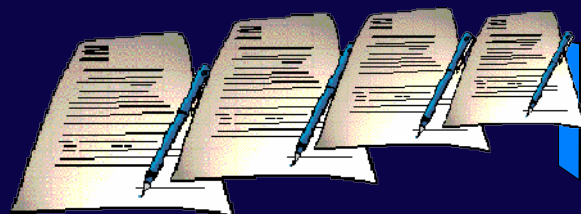**Email: robert.h.dolin@kp.org**

Document Exchange Standard
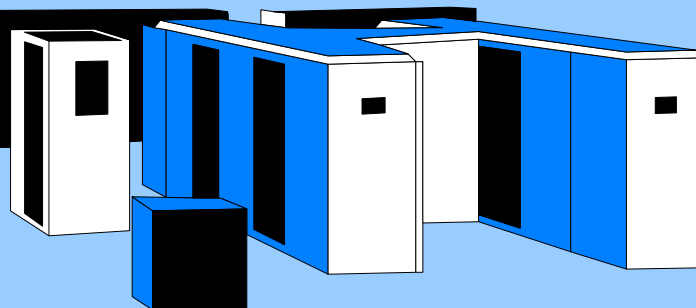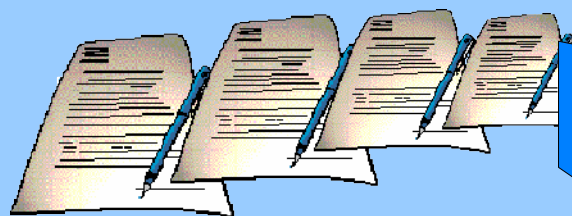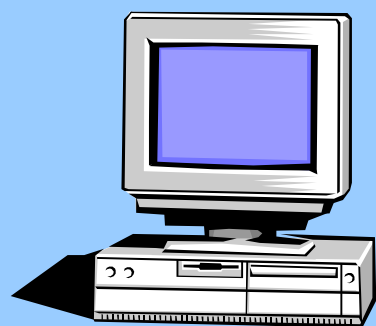
Local Document Management System

CDA
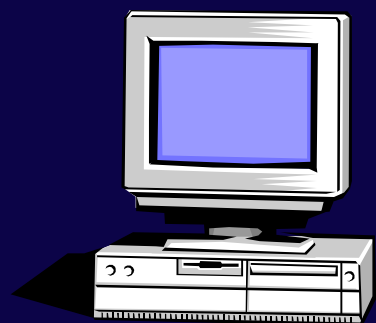
Document Repository

Key Aspects of CDA

- **CDA documents are encoded in Extensible Markup Language (XML).**

- **CDA documents derive their meaning from the HL7 Reference Information Model (RIM) and use the HL7 Version 3 Data Types.**

- **The CDA specification is richly expressive and flexible. Document-level, section-level and entry-level templates can be used to constrain the generic CDA specification.**

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What is XML ?

- **XML - eXtensible Markup Language is a simplified subset of SGML that has been optimized for use on the World Wide Web.**

  - **HTML is an example of an SGML compliant specification, where the tags are predefined.**

  - **XML is extensible, in that it allows you to define your own vocabulary or <tags> which can be used to describe the abstract structure of a document.**

Why use XML?
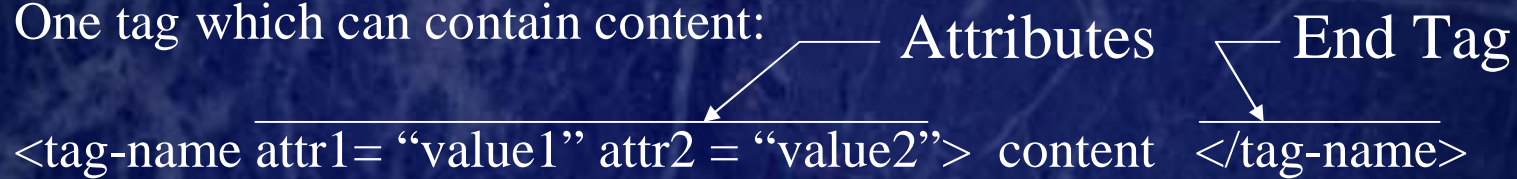
- **If you carefully define your tags, in the future you can go back and read those documents.**

  - **Word changes file format with each release.**

  - **RTF is owned by Microsoft and expresses only presentation format not meaning.**

  - **XML allows you to define a document format that expresses meaning that can last!**

What is XML?

XML is composed of two types of tags:

One tag which can contain content:

Attributes   End Tag
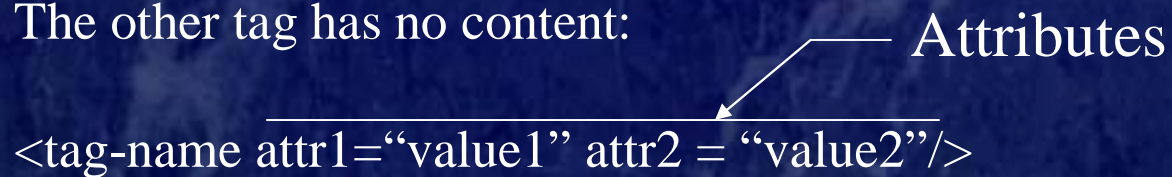
`<tag-name attr1= "value1" attr2 = "value2">` content `</tag-name>`

Start Tag

Content can contain text and or other tags.

The other tag has no content:

Attributes

`<tag-name attr1="value1" attr2 = "value2"/>`

Empty Tag

Document VS Message

- ## Persistence
  - A clinical document continues to exist in an unaltered state, for a time period defined by local and regulatory requirements.

- ## Stewardship
  - A clinical document is maintained by a person or organization entrusted with its care.

- ## Potential for authentication
  - A clinical document is an assemblage of information that is intended to be legally authenticated.

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Document VS Message

- **Wholeness**
  - **Authentication of a clinical document applies to the whole and does not apply to portions of the document without   the full context of the document.**

- **Human readability**
  - **A clinical document is human readable, guarantees that a receiver of a CDA document can readily display the clinical content of the note on a standard Web browser.**

- **Context   (Release 2.0)**
  - **A clinical document establishes the default context for its contents.**

CDA - Header

- **The CDA Header is derived from the HL7 Reference Information Model (RIM) and contains:**

    - Document information
    - Encounter data
    - Service actors (such as providers)
    - Service targets (such as patients)
    - Local markup

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CDA Release 1.0

- **CDA Release 1.0 specifies a highly structured header, yet utilizes generic clinical document body markup.**

    - **Supporting**
        - **Multiple sections containing:**
            - Tables
            - List
            - Paragraphs
            - Sections

            Which can contain text, links to other documents or images, coded_entries and local markup.

CDA Release 1.0
at Mayo

MICS Notes Editor

Goals for MICS Notes

- **Strong desire to maintain:**
    - Templated document entry
    - Entry automation
    - Digital dictation compatibility
    - Standards compliance
- **Support to work with HL7 on Structured Documents Standards (CDA).**
- **Replacement of Notes-I & CDM Reports with a integrated document management system.**

MICS Notes Editor

- **MICS Notes Editor [xmIDP]**

  - Co-developed with Pen!etics Development Inc www.penetics.com

    - Java-based text editor

    - Derived from a history of PDA and tablet entry

    - Writes "pure" XML documents (Unicode)

    - Powerful knowledge base (KB) and KB manager behind editor

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MICS Notes Editor

- **Use case analysis identified a need to support both:**
  - **Transcriber**
  - **Self-entry provider**

- **3 Usability & Process labs for Notes-II XML editor were used to refined the design.**

Mayo Usability Lab

Hurt, John T., Mr.

3-982-540

DOB: 8Jul1935   **Note Date:** 26Nov2003   **Service:** ONCL
Age: 68 years   **Type/Desc:** SV   **Facility:** MCR
Sex: M   **Provider:** Takuya Nakagawa (mrh7030)

Edit

File   Edit   View   Tools   Goto   Window   Help   Debug

Save   Save&Sign   Quit | ✂   📋   📋   ✓   🔍   HPI   I/R/P   Diagnosis

Referral Source Prev Document

Chief Complaint / Reason for Visit Prev Document

Mr. Hurt returns for reassessment of his clinical stage II (T2 N1 NO)grade 3 squamous carcinoma of the lung.

History of Present Illness Prev Document

Mr. Hurt has done quite well since we saw him a year ago and denies any new problems. He and his wife spent the winter in Las Vegas and are planning to return to that area sometime within the next several weeks. He denies any new respiratory symptoms figuring he has not had any chest discomfort, cough, breathlessness. He has had no bowel or bladder problems since we had last saw him. He does take one aspirin a day and that is basically his only medication.

PFH & CVI Dates

PFH Date: **CVI Date:**

Current Medications Prev Document From PPI

Allergies Pull MICS Allergies Append Restore Original

Medication :
   ERYTHROMYCIN - Nausea and Vomiting
   AMOXICILLIN - Nausea and Vomiting
   CAFFEINE - hyperactivity
   CEPHALOSPORINS

Hurt, John T., Mr.

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DOB: 8Jul1935 **Note Date:** 26Nov2003 **Service:** ONCL
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Sex: M **Provider:** Takuya Nakagawa (mrh7030)

Edit

File Edit View Tools Goto Window Help Debug

Save Save&Sign Quit | Cut Copy Paste | Spell Find | HPI I/R/P Diagnosis

Current Medications [Prev Document] [From PPI]

Allergies [Pull MICS Allergies] [Append] [Restore Original]

Medication :
  ERYTHROMYCIN - Nausea and Vomiting
  AMOXICILLIN - Nausea and Vomiting
  CAFFEINE - hyperactivity
  CEPHALOSPORINS
  ASPIRIN - SHA complete
  CODEINE - Itching, Pruritis
  PENICILLINS - stomach upset
  ANTI-BIOTICS - Fever,itching,bloating
Non-Medication / Food :
  LOBSTER - vomiting
  FISH - GI Upset
  DUST - Contact Dermatitis
  CAT HAIR - Itching, Pruritis
  LOBSTER - Shortness of Breath
  MILK - Increased Heart Rate, Palpitations
  PEANUTS - Anaphylaxis
  MORE THEN 16 ALLERGIES EXIST - see Clinical Note
Contrast Media :

Allergies above current as of Thursday, February 5, 2004 at 09:11 AM

Systems Review [Prev Document] [From PPI]

Hurt, John T., Mr.

3-982-540

DOB: 8Jul1935   **Note Date:** 26Nov2003   **Service:** ONCL
Age: 68 years   **Type/Desc:** SV   **Facility:** MCR
Sex: M   **Provider:** Takuya Nakagawa (mrh7030)

Edit

File   Edit   View   Tools   Goto   Window   Help   Debug

Save   Save&Sign   Quit | HPI   I/R/P   Diagnosis

Vital Signs

Height: 189 cm   74.4 in   **BMI: 24.92 kg/m²**   **Temp:** 37 °C   98.6 °F

Weight: 89 kg   196.21 lbs   **BSA: 2.17 m²**   **Head Circ:** cm

Pulse	Rhythm	SBP	DBP	Position	Date	Time	
68	regular	148	/ 76	sitting	26Nov2003	0:00	Delete
70	irregular		/		26Nov2003		Delete

Add Row

Physical Exam

Area	Exam Text	
COMB	Laboratory studies today showed a hemoglobin of 14 g with a white blood count of 5200 and a platelet count of 225,000. His chemistries showed a minimal elevation of his glucose of 101 mg/dL with normal alkaline phosphatase, ST, creatinine levels. His total cholesterol was 200 mg/dL with an HDL cholesterol of 49 mg/dL and a calculated level of 131 mg/dL. Triglycerides were 101 mg/dL. Chest x-ray showed postop changes from his previous right thoracotomy, but it was otherwise negative and was unchanged compared to his film from a year ago.	Delete
RECT	Rectum: The prostate was small with rather prominent lateral edges but symmetrically so with a well defined central sulcus. There were no palpable nodules within the substance of the gland.	Delete
REST	Except as noted above, the following were examined and were normal or unremarkable: Abdomen, Breasts, ENT, Extremities, Eyes, Gait, Genitalia, Head, Heart, Joints, Lungs, Lymph, Mental, Neuro, Skin, Spine, Thyroid, and Vessels.	Delete
		Delete

Add Row

New Approaches

- **Generating Structured Content**

    - One of the significant challenges in creating structured documents is the development of an efficiently means to create content.

    - For the MICS Notes editor, a mixture of custom dialogs and an integrated knowledge base are our principle solutions to this problem.

Vital Signs Panel

- **MICS Editor uses panels like these to capture highly structured content.**

- **Vital Signs data is needed for Growth Charts.**

RIM - Act & Observation

- The Act and Observation classes are found in the HL7 Reference Information Model (RIM). These classes are used to model findings in the RIM and are useful references when considering the modeling of clinical findings within the Vital Signs table.

RIM - Act & Observation

Required Act Attributes:

ü **1. activity_time**   The time when the action happened.

   2. availability_dttm   The time at which a receiving system obtained information.

ü **3. confidentiality_cd**   A code that limits disclosure of information about this act.

   4. critical_time   The biologically relevant time of the action.

ü **5. id**   The instance identifier for the act.

   6. interruptible_ind   Indicates if an act can be interrupted by asynchronous events.

   7. max_repeat_nmr   This is the maximum number of repetitions of an act.

   8. mood_cd   Set for observation mood, as opposed to ordered, master reference or goal.

   9. orderable_ind   Used in master reference mood for orderable acts.

   10. priority_cd   Specifies the urgency under which an act is scheduled or performed.

   11. status_cd   State of an action, pending, active, completed, cancelled or deleted.

   12. txt   Description of the act.

ü **13. type_cd**   A code to specify the act conceptually.

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RIM - Act & Observation

Required Observation Attributes:

- *1. body_site_cd*   Focus on a particular anatomic site, body part or body system.

  2. derivation_expr   Supports construction of associative expression based relationships.

  3. interpretation_cd   Allows for a very rough interpretation of the course or outcome.

- *4. method_cd*   Several methods maybe used to obtain results, this says which was used.

ü **5. value**   The result value of an observation action, finding.

  In addition to the act / observation attributes identified, a number of classes related to Act are required to define the context of the observation. They include :

  has service target   for Patient
  has a service actor   for Originator
  has a service actor   for Legal Authenticator

Vital Signs Elements

- Id   Instance Identifier
- Value   The quantity or text associated
- Activity time   The time of the observation
- Type code   LOINC concept code
- Patient   Context required
- Authentication   Context required

Ü Confidentiality   Level One

Ü Originator   Level One

Table Caption Code

<caption_cd> - The caption code element

- The caption code in the CDA / Notes II DTD is used to identify the concept associated with a container in the document. At CDA Level 1, no safe context can be assume, outside human readability.

- For Notes II, a locally defined table caption_cd will be assigned to the Vital Signs table. This code will identify Vital Sign tables and by policy, establish the **Patient** and **Authenticator** context.

  - For the Vital Signs table, the patient and authenticator contexts will assumed to be the document's.

- In addition, assignment of this code to a table stipulates that the table honor the **XPATH constraints** that have been defined for later machine processing.

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Vital Signs Markup

```
<section>
   <caption>
      <caption_cd V="12345-0" S="LOINC-OID-value"/> VITAL SIGNS
   </caption>
   <table>
      <caption><caption_cd V="2000-1" S="MAYO-OID-value"/></caption>
      <tr><th>Date / Time</th>
          <th>18-Apr-2000 14:30</th></tr>
      <tr><th>Height</th>
          <td>177.0 cm (69.7 in)</td></tr>
      <tr><th>Weight</th>
          <td> 88.0 kg (194.0 lbs.)</td></tr>
   </table>
</section>
```

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Identifiers

<id> - The identifier element

- The <id> element is not required if the observation was originally entered into this document. In these cases, the identifier is assumed to be the document's identifier.

- If the content of the observation was obtained from another source – such as a findings table in the LastWord system, then the <id> could be assigned the key value for the observation in the LastWord relational database.

Vital Signs Markup

```
<section>
   <caption>
      <caption_cd V="12345-0" S="LOINC-OID-value"/> VITAL SIGNS
   </caption>
   <table>
      <caption><caption_cd V="2000-1" S="MAYO-OID-
value"/></caption>
      <tr><th>Date / Time</th>
         <th>18-Apr-2000 14:30</th></tr>
      <tr><th>Height</th>
         <td><id EX="id-value" RT="OID-value"/>
            177.0 cm (69.7 in)</td></tr>
      <tr><th>Weight</th>
         <td><id EX="id-value" RT="OID-value"/>
            88.0 kg (194.0 lbs.)</td></tr>
   </table>
</section>
```

Value

<value> - The value element

- The <value> element is used to provide a structured representation of the observations found within the Vital Signs table. Value is derived from the Observation class in the RIM and is used when the content of the observation is a Quantity, I.E. a measure with a unit. The reference for units is taken from "The Unified Code for Units of Measure", which can be obtained from : **http://aurora.rg.iupui.edu/UCUM/**

- In the situation where the observation is free text, we propose that we use PCDATA within the <content> element.

- When English measures and units are to be depicted within the table, a second optional <value> element will be included for its representation.

Vital Signs Markup

```
<section>
  <caption>
    <caption_cd V="12345-0" S="LOINC-OID-value"/> VITAL SIGNS
  </caption>
  <table>
    <caption><caption_cd V="2000-1" S="MAYO-OID-value"/></caption>
    <tr><th>Date / Time</th>
        <th>18-Apr-2000 14:30</th></tr>
    <tr><th>Height</th>
        <td><id EX="id-value" RT="OID-value"/>
            <value V="177.0" U="cm"/>177.0 cm
            <value V="69.7" U="[in_i]"/> 69.7 in</td></tr>
    <tr><th>Weight</th>
        <td><id EX="id-value" RT="OID-value"/>
            <value V="88.0" U="kg"/>88.0 kg
            <value V="194.0" U="[lb-av]"/>194.0 lbs.</td></tr>
  </table>
</section>
```

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Activity Time

<activity_tmr> - The activity time

- The Vital Signs table will be defined with date / time entries running across the top, in the first row. The date and time specification is the activity time associated with the individual reading. The activity times will run in chronological order, with oldest entries occurring in the second column, just after the heading entries for each of the vitals and proceeding to the most current entry recorded in the right most column.

- The choice between ACT.activity_time Vs ACT.critical_time needs to be discussed. For now we will specify activity time, however critical time maybe more appropriate. I will review at HL7 with other experts.

Vital Signs Markup

```
<section>
   <caption>
      <caption_cd V="12345-0" S="LOINC-OID-value"/> VITAL SIGNS
   </caption>
   <table>
      <caption><caption_cd V="2000-1" S="MAYO-OID-value"/></caption>
      <tr><th>Date / Time</th>
         <th><activity_tmr V="20000418T1430"/>
            18-Apr-2000 14:30</th></tr>
      <tr><th>Height</th>
         <td><id EX="id-value" RT="OID-value"/>
            <value V="177.0" U="cm"/>177.0 cm
            <value V="69.7" U="[in_i]"/> 69.7 in</td></tr>
      <tr><th>Weight</th>
         <td><id EX="id-value" RT="OID-value"/>
            <value V="88.0" U="kg"/>88.0 kg
            <value V="194.0" U="[lb-av]"/>194.0 lbs.</td></tr>
   </table>
</section>
```

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Vital Type

<caption_cd> - The type specification

- Within the Vital Signs table the <caption_cd> element is used to identify the concept of the observation that is recorded in the following <td> cells of the table row. The concept will be encoded using the LOINC coding system.

- This carries the concept of the container encoding to its lowest level. The container that is being coded is the <tr> or table row.

- The presentation name for the concept is displayed redundantly as PCDATA in the <th> element. Although, not absolutely required, it simplifies the task of viewing the caption text within the editor that we are using to create and update the document.

Vital Signs Markup

```
<section>
    ...
    <table>
        <caption><caption_cd V="2000-1" S="MAYO-OID-value"/></caption>
        <tr><th>Date / Time</th>
            <th><activity_tmr V="20000418T1430"/>
                18-Apr-2000 14:30</th></tr>
        <tr><th><caption_cd V="3137-3" S="LOINC-OID-value"
                        DN="BODY HEIGHT"/>Height</th>
            <td><id EX="id-value" RT="OID-value"/>
                <value V="177.0" U="cm"/>177.0 cm
                <value V="69.7" U="[in_i]"/> 69.7 in</td></tr>
        <tr><th><caption_cd V="3141-9" S="LOINC-OID-value"
                        DN="BODY WEIGHT"/>Weight</th>
            <td><id EX="id-value" RT="OID-value"/>
                <value V="88.0" U="kg"/>88.0 kg
                <value V="194.0" U="[lb-av]"/>194.0 lbs.</td></tr>
    </table>
</section>
```

CDA Level 3 - T

Vital Signs	
Date / Time	18-Apr-2000 14:30
Height	177 cm (69.7 in)
Weight	88.0 kg (194.0 lbs.)

```
<section>
   <caption>
      <caption_cd V="12345-0" S="LOINC-OID-value"/> VITAL SIGNS
   </caption>
   <table>
      <caption><caption_cd V="2000-1" S="MAYO-OID-
value"/></caption>
      <tr><th>Date / Time</th>
         <th><activity_tmr V="20000418T1430"/>
            18-Apr-2000 14:30</th></tr>
      <tr><th><caption_cd V="3137-3" S="LOINC-OID-value"
                     DN="BODY HEIGHT"/>Height</th>
         <td><id EX="id-value" RT="OID-value"/>
            <value V="177.0" U="cm"/>177.0 cm
            <value V="69.7" U="[in_i]"/> 69.7 in</td></tr>
      <tr><th><caption_cd V="3141-9" S="LOINC-OID-value"
                     DN="BODY WEIGHT"/>Weight</th>
         <td><id EX="id-value" RT="OID-value"/>
            <value V="88.0" U="kg"/>88.0 kg
            <value V="194.0" U="[lb-av]"/>194.0 lbs.</td></tr>
   </table>
</section>
```

MAYO

Vital Signs - Presentation

Vital Signs

Date / Time	18-Apr-2000 14:30	18-Apr-2000 15:30
Height	177 cm (69.7 in)	177 cm (69.7 in)
Weight	88.0 kg (194.0 lbs.)	88.0 kg (194.0 lbs.)
BMI	28.1 kg/m²	28.1 kg/m²
BSA	2.05 m²	2.05 m²
Temperature	36.9 °C (98.5 °F)	36.9 °C (98.5 °F)
Head Circ	61 cm	61 cm
Pulse	76 /minute	74 /minute
Rhythm	Regular	Regular
Systolic	132 mmHg	135 mmHg
Diastolic	86 mmHg	88 mmHg
Position / Cuff	Left Arm	Left Arm

Activity time use to record the ACT.Activity_time of the service act.

Caption code used to record Act.type_cd for the vital entries on current row.

Value use to encode the Observation.value (finding) of the activity.

Id use to identify the Act.id of the vital in an external source.

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Vital Signs - Conformance

XPATH Access Methods

- To ensure proper machine processing of the Vital Signs entries within tables with caption_cd = 2000-1. A series of XPATH expressions have been created as a conformance specification.

- Implementations at Mayo will need to be validated using these expressions and certified before being allowed to create Vital Sign tables.

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Vital Signs - Conformance

Entries	XPath Expression	Notes
Vitals Table	/table[caption/caption_cd/@V = "2000-1"]	Only one vital signs table is assumed.
Activity Time	tr/th [n]/@activity_tmr	n = vitals column + 1
Observation(s)		
Height	tr[th/caption_cd/@V="3137-3"]/td [m]	m = vitals observation column
Weight	tr[th/caption_cd/@V ="3141-9"]/td [m]	m = vitals observation column
BMI	tr[th/caption_cd/@V ="????-?"]/td [m]	m = vitals observation column
BSA	tr[th/caption_cd/@V ="????-?"]/td [m]	m = vitals observation column
Temperature	tr[th/caption_cd/@V ="8310-5"]/td [m]	m = vitals observation column
Respiratory	tr[th/caption_cd/@V ="????-?"]/td [m]	m = vitals observation column
Pulse	tr[th/caption_cd/@V ="????-?"]/td [m]	m = vitals observation column
Rhythm	tr[th/caption_cd/@V ="????-?"]/td [m]	m = vitals observation column
Systolic	tr[th/caption_cd/@V ="????-?"]/td [m]	m = vitals observation column
Diastolic	tr[th/caption_cd/@V ="????-?"]/td [m]	m = vitals observation column
Position / Cuff	tr[th/caption_cd/@V ="????-?"]/td [m]	m = vitals observation column
ID / Value / Unit		
ID	id/@id	
Metric Value	value/@V[1]	
Metric Unit	value/@U[1]	
English Value	value/@V[2]	
English Unit	value/@U[2]	

Vital Signs Conformance

Ü Id   Optionally in <td> elements.

Ü Value   Found in <td> elements.

Ü Activity time   Found in row = 1, column > 1

Ü Type code Found in column =1, row > 1

Ü Patient   Context taken from doc header

Ü Authentication   Context taken from doc header

Ü Confidentiality   Level One

Ü Originator   Level One

Summary

- **The Vital Signs representation at Release 1.0 is not directly supported by the CDA standard. Local markup was used to support our machine processing requirements defined at Mayo.**

- **XPath expressions can be useed in defining conformance expectations for complex XML objects.**

- **Basing our extensions upon the HL7 – Reference Information Model, has assured us a means to transform our content from Release 1.0 to 2.0.**

MICS Notes Editor

- **In addition, to standardized panels, the new editor supports scripting similar to Shorthand™.**

  - Support for End User scripting.
  - Scripting works for some areas.
  - Support placing codes within the text of a document.
  - Leverage KB scripts to enrich content of clinical documents.

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MICS Notes Editor

- **Notes-II XML Editor - Knowledge base**

  ü Nodes created in KB Admin

  ü Each node represents atomic info for charting

  ü Node links are parent : child

  ü Node display = KB tree

  ü Extensive keyboard automation

MICS Notes Editor

- Pilot release, supporting Clinical Notes entry:
  - Standard panels for: Vital Signs, Physical Exams
  - Transcription and Physician entry supported
  - Extensive keyboard automation
  - MS-Word™ like interface

- This year we will be incorporating:
  - Provider KB scripting support
  - Hospital Summaries entry

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Regional Use of CDA

- **Add graphic here…**

Acceptance of CDA World Wide

- **Since it's approval in 2000, CDA release 1 has been used world wide at a number of sites.**

- **HL7 International CDA Conference cosponsored by HL7 Germany and HL7 Finland.**

  October 7-9, 2002

Conference Presentations

- **GMS PICNIC: Ireland, Denmark, Crete**
  - **Pharmacy Patient Validation & Electronic Claims Reimbursement**

- **Seamless Care and CDA: Finland**
  - **Regional Electronic Patient Record System**

- **SCIPHOX: Germany**
  - **Standardization of Communication between Information Systems in Physician Offices and Hospitals using XML**

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Conference Presentations

- **HL7 CDA in HYGEIAnet : Crete**
  - Regional Health Information Network of Crete

- **CDA at the University of Munster**
  - Discharge Patient Documentation and more.

- **CDA for MERIT-9: Japan**
  - Research projects of Japanese Ministry of Health and Welfare to facilitate clinical data exchanges.

Conference Presentations

- **CDA in Staffordshire EHR: UK**
  - **Clinical content for emergency care scenarios**

- **CDA in Taiwan**
  - **Discharge Summary Case Study**

- **CDA at the University of Heidelberg**
  - **XML based discharge letters in internal medicine using CDA Level One.**

  …

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2004 Annual HIMSS Conference and Exhibition

- **Dictaphone**
  - CCR
  - Discharge Summary
  - Imaging Report /Release 1 / Level 1
  - Surgical Report / Release 1 / Level 1

- **Epic**
  - Discharge Summary

- **Microsoft InfoPath**
  - CCR referral for admission / Release 2
  - Pathology Report

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Overall Interest in CDA continues to grow.

- Over 3000+ Google hits on "HL7 CDA", the number of projects is growing world wide.

- The International HL7 Affiliates have underwritten a 2'nd International CDA Conference in Oct, 2004.

- CDA Next Generation – Release 2.0

CDA Release 2

The basic model of CDA is essentially unchanged. A CDA document has a similar header, however it is the body which has been enhanced, it contains a much richer assortment of entries to use within CDA structures.

CDA, Release Two enables clinical content to be formally expressed to the extent that is it modeled in the RIM.

CDA Release 2.0

- **New Features & Enhancements:**
  - Greater structured content support
  - Transform document relationships
  - Authenticated content defined
  - Region of Interest support
  - Delete and Insert support   (Revisions)
  - Bold, Italic and Underline support
  - Greater V3 conformance (More RIM)

HL7 RIM Model

RIM 2.02
November 21, 2003

CDA – Refined Message Information Mode (R-MIM)

Release 1 à Release 2

Structured Header

Section
w/ paragraphs, tables
and lists containing
text w/ coded entries

Section
w/ paragraphs, tables
and lists containing
text w/ coded entries

Structured Header

Section
w/ paragraphs, tables
and lists containing text.

CDA
R-MIM Entries

Section
w/ paragraphs, tables
and lists containing text.

CDA
R-MIM Entries

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CDA Entries

- ~~Coded Entry~~   (Deprecated)

- ACT
  - FutureEncounter
  - Observation
  - ObservationMedia
  - Procedure
  - RegionOfInterest
  - SubstanceAdministration

CDA Entries

**An ACT can be expressed in different tenses
or MOODS : Order for, Plan to, Occurrence of, …**

- **ACT**
  - **FutureEncounter**
  - **Observation**
  - **ObservationMedia**
  - **Procedure**
  - **RegionOfInterest**
  - **SubstanceAdministration**

**10 types of
relationships exist
between acts:**

Summary of CDA Release 2.0 Goals in the Future…

- **Support for a standardized means of modeling structured content for the purposed of exchange.**

- **Continued enhancement to the standard based upon demonstrated use cases.**

Why CDA?

- **Readable**
  - **CDA Level 1 - looked like our documents: narrative, multi-sectioned**
  - **Version 3 modeling approach promises machine processability**

- **Durable**
  - **Our documents needed to survive technology changes**
  - **Our paper based system has lasted 100 years**

- **Shareable**
  - **Standards based document exchange - $$ savings**
  - **Developing needs for Regional partners and others**

- **Flexible**
  - **Multi-media & web technology support - day one**
  - **An architecture to cover all the documentation needs of Mayo.**

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MICS Notes II Team

Development Team

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- **Bolduan, Eric**
- **Huhn, Jeff**
- **Rosemark, Jim**
- **Nakagawa, Takuya**
- **Mohsin, Mohammad**

Implementation Team

- **Jasperson, Jan**
- **Krahn, Linda**
- **Voller, David**
- **Lucas, Tom**

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Thank You

- **Dr Paul Carpenter,**
  - **Document Oversight Chair**

- **Dr David Mohr**
  - **MICS Oversight Chair**

Questions