Health Level Seven Updates 2017

Durwin Day, Health Care Service Corporation
Today’s agenda

• HL7’s Current Activities
  – Events, Publications, NCVHS Recommendations, Attachment Work Group
  – LOINC Demo

• FHIR 101
  – About FHIR, Resources, Status, Why Need?, Who’s Using, Next Step

• Report out from a FHIR Connectathon
  – Relation of CDA to FHIR,
  – C-CDA to FHIR Track,
  – Attachments Track
  – FHIR or CDA?

• HL7 Payer User Group
  – Join now
About Health Level Seven International

- Founded in 1987, ANSI-accredited standards of electronic health information that supports clinical practice and the management, delivery and evaluation of health services. HL7 is supported by more than 1,600 members from over 50 countries, including 500+ corporate members representing healthcare providers, government stakeholders, payers, pharmaceutical companies, vendors/suppliers, and consulting firms.

Working group meetings – three a year
  - Each meeting is preceded by a FHIR connectathon
  - One meeting includes a Plenary Session
  - One meeting includes a Payer Summit

Trends
  - Interoperability – not just Exchanging Clinical Data
  - Developing FHIR Standards
  - Support for Payment Reform and New Delivery Models

Ballots
  - begin a month before each meeting
  - potential to become normative standards

Payer interests
  - Aligning Claim Attachment standards with C-CDA Documents in 2009
  - Obtain HL7 ADT and Lab Results version 2.5+
  - Value Based Care – Care Plans
  - Clinical Quality Measures – Clinical Decision Support
  - Electronic Health Records
HL7 Events in 2017

• Work Group Meeting in San Antonio, Jan. 14-20
  – FHIR Connectathon, Jan. 14&15
  – Payer Summit, Jan. 16&17

• FHIR Application Roundtable, March 7&8
  – a showcase for FHIR Apps & Development tools and provides opportunity for collaboration

• Partners in Interoperability, March 21&22
  – coalition of stakeholders collaborating on a single platform reusing the data for many purposes

• VBC Mini-FHIR Connectathon, April 11&12
  – Co-Sponsored by BCBSA, HL7 and Microsoft
  – 101 for Managers
  – VBC = 5 tracks:
    • Attachments and C-CDA on FHIR
    • Care Plan
    • Clinical Reasoning (quality measure data)
    • Financial
    • Patient (for first-time attendees)

• HL7 Plenary Meeting in Madrid, Spain, May 6-12
  – Attachment WG Out-of-cycle meeting, w/WEDI, May 18 & 19

• Working Group Meeting in San Diego, Sept. 9-15
  – FHIR Connectathon, Sept. 9-10

• TBD – Fall FHIR App. Roundtable, Partners in Interoperability, VBC Mini-Connectathon
HL7 Publications

- HL7 FHIR Release 3 – STU, March 2017
  - 1st Draft 2012 - 1st Normative version in 2018
- HL7 Periodontal Attachment – May 2017
- HL7 Attachment Imp. Guide: Exchange of C-CDA based Documents
- LOINC – Relma Updates – twice a year
- HL7 Payer User Group (FREE as member, $100/yr for non-members)
  - May – Intro to FHIR and C-CDA on FHIR
    - FHIR 101 for Managers
    - Connectathon: Attachments and C-CDA on FHIR
  - June – Testing and Version Identification
- HL7 Partners in Interoperability List Serve
Current NCVHS Recommendation

Response – for an Attachment: Message Content/Format

- HL7 CDA R2 – Consolidated CDA Templates for Clinical Notes R2.1
- HL7 Attachment Supplement Specification Request and Response Implementation Guide R1
- ASC X12N 275 Additional Information to Support a Health Care Claim or Encounter

Request for Attachments:

- ASC X12N 277 Health Care Claim Request for Additional Information (for all claim-related attachment requests) (*)
- ASC X12N 278 Health Care Service Review – Request for Review and Response – Response (for non-claim-related attachment requests) (*)

Codes for Attachments

- Attachment Type Value Set: Logical Observation Identifier Names and Codes (LOINC) developed and maintained by the Regenstrief Institute, Inc.,
  - HIPAA Panel Solicited and Unsolicited Lists.
Use of LOINC

• Demo of RELMA
  – The LOINC website maintains an Attachments Page documenting three methods to identify LOINC codes that are valid for attachments:
    • The LOINC Table – the master database that associates codes with their component parameters (type, provider type, etc.) Useful when you want a copy of all 60,000+ LOINC codes.
    • The RELMA application – a browsing and mapping application with a special form for attachment codes. Useful when you need to see a list of LOINC codes used for Attachments.
    • The online LOINC search application search.loinc.org. Useful when you want to check on a specific LOINC code.
  – All three methods access the same sets of codes.
  
  http://loinc.org/attachments

• Discussion on a Constraint for Provider use of LOINC codes for Unstructured Documents
  – AIGEX-UD2: The US Realm Header for all unstructured documents SHALL contain exactly one LOINC code where the @code SHOULD be selected from the LOINC document type code and accurately represents the content of the unstructured body.
HL7 Attachments workgroup

Attachment Supplemental Guide including conformance statements. Now titled:

HL7 CDA® R2 Attachment Implementation Guide: Exchange of C-CDA Based Documents, Release 1

Periodontal Chart is modeled to the ADA 1079 Standard.

LOINC code access:

• HIPAA Panel Lists codes for Structured and Unstructured documents
• Display document that have implementation guides vs no implementation guide

Unstructured Documents:

• C-CDA approach - must use HL7 Header and unstructured body
• Provider’s response LOINC code – SHOULD vs. SHALL? (accept/reject?)

Exploring use of C-CDA on FHIR for Attachments:

• Real time, and access to specific clinical data (vs. document)
• Ease of development using FHIR, convert to/from C-CDA
About FHIR
The Fundamentals of FHIR

- FHIR: Fast Healthcare Interoperability Resources
  - The web, for healthcare
- A next generation **standards framework & platform**, built on 30 years of HL7 experience and industry best practice, with a focus on simplicity and implementation
- Advanced RESTful Services technology platform (used by Facebook, Twitter…)
  - Can Create, Read, Update and Mark Deletion
- Based on Resources: essential modular information components easily assembled into working systems
- Flexible outputs: messages, documents, data, services
Principles of FHIR

- Data resides at the **source of truth**
- **APIs** access data: *pull* what you need, instead of taking what’s *pushed*
- Focus on a vast, open community of **implementers**
- Include rigorous **semantics**
- Design for the common **80%**; extensions for the rest
- Off-the-shelf **security and authorization**
- **Speed, scalability**
- Human **readable**, ease of understanding
- Open source, **freely** available, open community.

© 2016 Health Level Seven ® International. All Rights Reserved. HL7 and Health Level Seven are registered trademarks of Health Level Seven International. Reg. U.S. TM Office.
FHIR RESOURCES
FHIR solutions

Resources + Extensions = Solution
Resources

“Resources” are:

- Small logically discrete units of exchange
- Defined behavior and meaning
- Known identity / location
- Smallest unit of transaction
- “of interest” to healthcare

- V2: Sort of like Segments
- V3: Sort of like CMETs
What’s a Resource?

Examples

- Administrative
  - Patient, Practitioner, Organization, Location, Coverage, Invoice

- Clinical Concepts
  - Allergy, Condition, Family History, Care Plan

- Infrastructure
  - Document, Message, Profile, Conformance

Non-examples

- Gender
  - Too small

- Electronic Health Record
  - Too big

- Blood Pressure
  - Too specific

- Intervention
  - Too broad

100-150 total - ever
Why resources?

- Increases re-use
  - Can use the same resource structures (and profiles on them) in many solutions

- Lighter-weight communication
  - Can point to resources “by reference” rather than sending all data

- Aligns well with how data is stored
What’s in a resource definition?

- Each resource defines:
  - What elements are part of “core”
  - Names
  - Definitions
  - Cardinality
  - Code lists
  - Mappings (to RIM, v2 and other specs)
  - Constraints

- All in a computable form
  - Create spec, schemas, reference implementations
STATUS OF FHIR
The FHIR Maturity Model allows developers to assess the stability of FHIR components and realize the value of FHIR as it evolves.
Maturity levels

- Intended to indicate level of stability
  - FMM1 – Resource is “done”, no build warnings
  - FMM2 – Tested at approved Connectathon
  - FMM3 – Passes QA, has passed ballot
  - FMM4* – Tested across scope, published, prototype implementation
  - FMM5* – 5 distinct production implementations, multiple countries, 2

- Non-compatible changes at level 4 and 5 will face increased hurdles
FHIR Timeline (planned)

- First Draft
- 1st STU
- ~ 2nd STU
- ~ 3rd STU
- ~ 1st Norm?

Timeline:
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020
The Current State of FHIR

- Release 3 published this week!
  - Improved stability of API, infrastructure, conformance
  - Extended clinical support & measures, decision support
- Release 4 ballot (in 2018) will include normative content (infrastructure/framework, resources)
- Argonaut, US Core and Structured Data Capture IGs now available
  - Argonaut Phase 2 underway
- Preparing credentialing program for developers
- Next Connectathons: 5/6 Madrid; 9/9 San Diego.
Normative FHIR

- Will include
  - Core specification
  - Structural resources
  - Subset of other resources
    - Some resources won’t go normative right away

- Future releases
  - Add more resources
  - Add profiles on existing resources
  - May add elements to resources
    - Very rare
The Common Clinical Data Set

<table>
<thead>
<tr>
<th>Patient name</th>
<th>Lab values/results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Vital signs</td>
</tr>
<tr>
<td>Date of birth</td>
<td>Procedures</td>
</tr>
<tr>
<td>Race</td>
<td>Care team members</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Immunizations</td>
</tr>
<tr>
<td>Preferred language</td>
<td>Unique device identifiers for implantable devices</td>
</tr>
<tr>
<td>Problems</td>
<td>Assessment and plan of treatment</td>
</tr>
<tr>
<td>Medications</td>
<td>Goals</td>
</tr>
<tr>
<td>Medication allergies</td>
<td>Health concerns</td>
</tr>
<tr>
<td>Lab tests</td>
<td></td>
</tr>
</tbody>
</table>

ONC Interoperability Roadmap Goal

2015-2017
Send, receive, find and use a common clinical data set to improve health and health care quality.
WHY FHIR?
The Need

- Has been a need to share healthcare information electronically for a long time
  - HL7 v2 is nearly 30 years old
- Increasing pressure to broaden scope of sharing
  - Across organizations, disciplines, even borders
  - Mobile & cloud-based applications
  - Faster – integration in days or weeks, not months or years
What we have – v2

- Works relatively well within institutions
- But
  - Legacy, custom syntax (learning curve, tools)
  - Messaging design limits architectures
  - Doesn’t scale well across organization boundaries
  - Security/privacy infrastructure is minimal
  - A potpourri of segments and fields with no means to distinguish the common from edge case
Implementer Focus

- Specification is written for one target audience: implementers (that’s not just programmers)
  - Rationale, modeling approaches, etc. kept elsewhere
- Multiple reference implementations from day 1
- Publicly available test servers
- Starter APIs published with spec
  - C#, Java, Pascal, Swift, more coming
- Connectathons to verify specification approaches
- Instances you can read and understand 😊
- Lots of examples (and they’re valid too)
Support “Common” Scenarios

- Inclusion of content in core specification is based on “80%” rule
  - Only include data elements we are confident that most (~80%) of normal implementations using that resource will make use of
  - Other content in extensions (more on this later)
  - Easy to say, governance challenge to achieve

- Resources are simple and easy to understand & use
Won’t extensions break interoperability?

- The 80% + narrative helps provide “base” interoperability

- For “robust” interoperability
  - Profile – constrains structure
  - Conformance – constrains behavior
    - Needed to claim “I’m FHIR conformant”
Freely available

- Unencumbered – free for use, no membership required
- [http://hl7.org/fhir](http://hl7.org/fhir) + other versions
- Licensed under CC0: True public domain
- Any use is allowed
- HL7 enforces the trademark protection

Business model:
- If you want to vote, you need to pay
FHIR & Cost of Integration

- These factors will drive down the cost of integration and interoperability
  - Easier to Develop
  - Easier to Troubleshoot
  - Easier to Leverage in production
  - More people to do the work (less expensive consultants)

- Competing approaches will have to match the cost, or disappear – effect is already being felt
So why use anything else?

- FHIR is brand new
  - Minimal market share
  - Not yet normative
  - Limited track record

- Business case
  - No-one dumps existing working systems just because something new is “better”
  - Most Large projects committed to one standard won’t change direction quickly (or even at all)
USING FHIR
Where can FHIR be used?

- Classic in-institution interoperability
- Back-end e-business systems (e.g. financial)
- Regional Health Information Organizations (RHIO)
- National EHR systems
- Social Web (Health)
- Mobile Applications
Implementation during STU

- FHIR is new
  - No commitment yet to backward compatibility
  - No stability guarantee until 2018+
  - Some resources didn’t exist in initial version
    - Appointment, Referral, Insurance, Nutrition, etc.
- However, implementers are choose to build with it anyhow and have continued to do so
Who’s working with FHIR?

- >200 organizations declared
  - attended a Connectathon and/or
  - signed up on wiki

- Aware of many others not on either list

- Over 1300 participants on the FHIR Implementer’s chat
  - [http://chat.fhir.org](http://chat.fhir.org)

- 25+ countries involved so far
Who’s using FHIR?

Systems accessing HAPI server in 2015
Governments

- **US – ONC**
  - Sponsoring 3 projects, including mapping meaningful use to FHIR

- **UK**
  - One implementation live, lots more in the pipeline

- **Lithuania**
  - Chose FHIR as the basis for their national EHR
EHR Vendors

- Many significant EHR vendors have made commitments to FHIR implementation
  - AllScripts, Cerner, Epic, McKesson, Meditech

- Voluntarily investing in accelerating the standard
  - E.g. Argonaut, participating in standards development
Other support

- Large and small healthcare organizations
  - E.g. Mayo, Intermountain Healthcare, University Health Network

- Small vendors, start-ups
  - Lots and lots – all over the world
FHIR & CDA

- HL7 developing FHIR profiles for CCDA
- HL7 project to define “Clinical Document Architecture” in FHIR
- At least 3 projects looking at providing automated transformation between CCDA and FHIR
Healthy Services Platform Consortium

- Intermountain Healthcare, Veterans Affairs, Harris, Telus, Dignity Health, IBM, Epic, Cerner, Mayo, HP, Kaiser, +++ (not all are official members)
- Leverage FHIR + security and additional layers to allow plug & play EHR modules
- Stems from SMART on FHIR work
Case Study

- **Who**
  - Intermountain Healthcare – provider org (USA)

- **What**
  - Converting 3000+ detailed clinical models and their accompanying value sets to FHIR
  - Plan to use them with HSPCS

- **When**
  - Completed public review in 2015
Risks with FHIR

- FHIR is new
  - Be ready to migrate
  - Caution for mission critical applications

- FHIR is cool
  - Be realistic about what’s achievable
  - Work with others (HL7, IHE, etc.) to build profiles

- FHIR is coming
  - At minimum, monitor
  - Consider whether to pilot to build experience
Next Steps

- Is this something your organization wants/needs to track?

- Monitor
  - Have someone sign up to the FHIR list or Zulip chats
    (instructions on the wiki)

- Engage
  - Have someone read through the specs
  - Send someone to development tutorials
  - Have your organization participate in or observe a connectathon
  - Participate in the upcoming STU ballot
Education opportunities

- Attend a Working Group Meeting
  - Tutorials, **Connectathons**
  - May 5-12 Madrid

- Attend an Implementation Workshop
  - Intensive tutorials, hands-on
  - Evaluating if/how these will happen in 2017

- FHIR Institute Webinars
  - Aug 7-11

- Custom education available via HL7
Final Message

• FHIR
  – is easy and cheaper to implement
  – is being implemented now
  – is likely to significantly impact Health IT

• Decision Options for National Delivery & Value-based Care:
  – Discharge Summary & Care Plan next-gen CM/DM
  – Medication access from PBM and/or Surescripts
  – Lab data access and exchange
  – Real time ADT
About the FHIR Connectathon

Payer User Group Report by Rick Geimer, Lantana Group

- Relation of CDA to FHIR
- C-CDA to FHIR Track
- Attachments Track
- FHIR or CDA?
Why are Documents Important?

• The dual nature of the clinical record:
  – Data
  – Narrative

• Documents support that duality
  – Essential for disparate teams—different disciplines, contexts, or clinical systems
  – Developers need coded data to drive applications
  – Clinicians often say that the most important part of the clinical record is the narrative written by their colleagues
  – Clinicians attest to what they see (the narrative) vs. any behind the scenes coding
C-CDA on FHIR

- US Realm FHIR implementation guide
- Goal: FHIR profiles for the C-CDA use case
C-CDA on FHIR Scope

• Represent Consolidated CDA Templates for Clinical Notes (C-CDA) 2.1 templates using FHIR profiles

• This first stage of the project defines all the C-CDA document-level profiles on the Composition resource and contained sections.

• Coded data is represented using relevant U.S. Core FHIR profiles.
Finding C-CDA on FHIR

- January 2017 ballot

- All versions
  http://hl7.org/fhir/us/ccda/history.html
FHIR Documents are Bundles of Resources

- Composition Resource
  - Section
  - Metadata
  - Attester
  - Observation Resource
  - Device Resource
  - Prescription Resource
  - Patient Resource

```
<Bundle>
  <entry>
    <Composition />
  </entry>
  <entry>
    <Observation />
  </entry>
  <entry>
    <Device />
  </entry>
  <entry>
    <Prescription />
  </entry>
  <entry>
    <Patient />
  </entry>
</Bundle>
```
<section>
<title value="Allergies and Intolerances"/>
<code>
  <coding>
    <system value="http://loinc.org"/>
    <code value="48765-2"/>
    <display value="Allergies and adverse reactions"/>
  </coding>
</code>
<text>
  <status value="generated"/>
  <div xmlns="http://www.w3.org/1999/xhtml">
    <ul>
      <li>Penicillin - Hives</li>
      ...
    </ul>
  </div>
</text>
...</section>

Allergies and Intolerances

- Penicillin - Hives
<AllergyIntolerance xmlns="http://hl7.org/fhir">
  <clinicalStatus value="active"/>
  <verificationStatus value="confirmed"/>
  <category value="medication"/>
  <criticality value="high"/>
  <code>
    <coding>
      <system value="http://snomed.info/sct"/>
      <code value="418038007"/>
      <display value="allergy to penicillin"/>
    </coding>
  </code>
  <patient>
    <reference value="Patient/1"/>
    <display value="Henry Levin"/>
  </patient>
  <assertedDate value="2000"/>
  <reaction>
    <manifestation>
      <coding>
        <system value="http://snomed.info/sct"/>
        <code value="247472004"/>
        <display value="hives"/>
      </coding>
    </manifestation>
    <severity value="mild"/>
  </reaction>
</AllergyIntolerance>
- Generic constraints that apply to all US Realm documents
- References common US Realm extensions
- Abstract
  - Not mean to be implemented standalone
  - Base profile for all C-CDA on FHIR Composition profile
## Document Types

- Based on the US Realm Header
- Each adds additional constraints specific to that document type
- Each defines the legal sections and coded data for that document type

<table>
<thead>
<tr>
<th>Care Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuity of Care Document (CCD)</td>
</tr>
<tr>
<td>Consultation Note</td>
</tr>
<tr>
<td>Diagnostic Imaging Report</td>
</tr>
<tr>
<td>Discharge Summary</td>
</tr>
<tr>
<td>History and Physical</td>
</tr>
<tr>
<td>Operative Note</td>
</tr>
<tr>
<td>Procedure Note</td>
</tr>
<tr>
<td>Progress Note</td>
</tr>
<tr>
<td>Referral Note</td>
</tr>
<tr>
<td>Transfer Summary</td>
</tr>
</tbody>
</table>
C-CDA on FHIR Key Benefits

- Implementer focus of FHIR - easier to create/process documents
- XHTML vs. CDA-specific markup
- Modular and reusable
- Both XML and JSON supported
- Public test servers, APIs, reference implementations, etc.
- Safe extraction of coded data
- Support of the FHIR community
C-CDA on FHIR Connectathon Track

- **Purpose**
  - Test the exchange of Clinical Documents (using document Bundle resources containing a Composition and other supporting resources) that conform to the profiles of the in-progress C-CDA on FHIR Implementation Guide.

- **C-CDA on FHIR IG**

- **Track Scenarios**
  - Create a narrative document
  - Create a narrative document with supporting US-Core resources
  - Create a document from US-Core resources and generate corresponding narrative
  - Extract US-Core resources from document
  - Extract US-Core resources from document, update content and replace document with new version or create an entirely new document with the content
Attachments Track

• Purpose
  Electronic attachments are a high priority for processing claims and other payer/provider interactions. Current thinking has attachment submissions occurring via X12 messaging. However, there is substantial interest in experimenting with FHIR-based messaging for exchanging attachments. This track will explore the feasibility of this approach.

• Roles
  • Payer
  • Provider
  • Clearinghouse
  • Scenarios
    • Solicited
    • Unsolicited
    • Prior Authorization
Related Projects

- US Core
- Published in April 2017 with FHIR STU 3
- Leveraged by C-CDA on FHIR for coded data

- ONC-HIP: Pharmacist Care Plan Document
- Dual CDA/FHIR implementation guides
- FHIR version is based on the C-CDA on FHIR Care Plan Document profile
- Project is developing C-CDA <-> FHIR bi-directional transforms for the Pharmacist Care Plan document type
Is your roadmap on FHIR?

• FHIR evaporates “V3 messaging”
• V2: if not broke… don’t replace
• CDA
  – FHIR retains CDA document concepts
  – Improves text/data management
  – Unified model/syntax with messages/API
  – C-CDA-on-FHIR maturing, nearing publication as an STU
How do you get there from here?

- **Vision**: A future standards landscape where
  - Clinical documents and APIs share a common syntax and set of resources
  - Data can be acquired through an API and incorporated into a document or pulled from a document and made available in an API
  - Clinical documents are used where appropriate, and not abused for use cases where APIs provide a better choice
C-CDA on FHIR Status

• First STU ballot, January 2017
  - Finalizing ballot reconciliation now

• Currently applying changes from ballot resolutions

• Targeting end of May 2017 for publication
HL7 Payer’s User Group

The PUG!

A collaboration between HL7 and Payers.
The mission of the Payer User Group is to support the payer community who work with HL7 standards and inform the HL7 community who are the stewards of those standards. The payer community often uses HL7 artifacts to better manage member care, to promote better medical outcomes and ensure an economically sustainable system by making health care more affordable. The focus for this group is:

• Education and training of the payer community on how to implement HL7 standards
• Share lessons learned during implementations
• Provide feedback to HL7 Workgroups that are responsible for creation of the standards that impact the payer community
• Be a collaborative resource for other stakeholders at HL7 for payer perspectives
When, Where, How?

- 1st Wednesday of each month
- 2:00 - 3:00 pm Central Time
- Webinar using HL7’s tools
- You do NOT have to be an HL7 member
- HL7 voting members are free
- Costs $100 per year
- Sign up on HL7’s website
Summary

You should:

➢ Know where FHIR fits in the broader healthcare landscape, including other HL7 specifications
➢ Talk about FHIR to others in your organization
➢ Evaluate whether and how FHIR is relevant to your organization
➢ Have a basic picture of what’s happening at HL7
Some of this presentation

- This was an abbreviated version of the FHIR for Executives tutorial.
- Is licensed for use under the Creative Commons, specifically:
  - Creative Commons Attribution 3.0 Unported License
- Can be downloaded here:
  - http://gforge.hl7.org/svn/fhir/trunk/presentations/2016-12%20Webinars/FHIR%20for%20Executives.pptx
  - Use “anonymous” and email address to logon