The Evolution of HL7 FHIR Implementation Across the Healthcare Continuum
Speakers

Charles Jaffe, MD, PhD
CEO, Health Level Seven International

Stan Huff, MD
CMIO, Intermountain Healthcare
Fresh Look asked, “What would interoperability look like if only we could start over?”

And not throw out the good stuff we learned on the way.
Fast Healthcare Interoperability Resources
“You can accomplish anything in life, if you don’t mind who gets the credit.”

Harry Truman
What makes FHIR fast?

Faster to learn
Faster to develop
Faster to implement
FHIR is composed of reusable resources*

*Built on an information model, without the need for implementers to know or learn the model or modeling.
Resources are the smallest unit of transaction, logically discrete, with defined behaviour and meaning, and known identity and location.
FHIR was developed from modern web technologies and RESTful services.*

* And familiar web specifications like XML, JSON, HTTP, Atom, OAuth.
FHIR relies upon the rule of 80/20*

*And, we’re sticking to it.
“Perfection is achieved, not when there is nothing more to add, but when there is nothing left to take away.”

Antoine de Saint-Exupery
Extensions are “what happens” when the rule of 80/20 does not satisfy the clinical requirements.
FHIR Extensions

- FHIR has a standard extension framework
- Every FHIR element can be extended
- Every extension *must have*
  - Reference to a computable definition
  - Value, from a set of known types
- Every system can read, write, store and exchange all legal extensions
- All extensions are valid by schema
FHIR makes no assumptions about the **Architecture** of the system
FHIR supports leading specifications* for Privacy & Security

* OAuth2 & OpenID
FHIR solutions are human-readable
“If I had asked my customers what they wanted, they would have asked for a faster horse.”

Henry Ford
FHIR supports EHR Lookup and Queries
FHIR enables an evolutionary development path with other HL7 standards*

*Many are embedded in US Federal regulation
FHIR focuses on implementation*
FHIR also supports application development for

- Mobility & Mobile Health
- Social Media
- Personal Health Records
- Public Health
- Payment Systems
- Clinical Research
FHIR development is global*

*FHIR development workshops in UK, Canada, Australia, Netherlands, Argentina, and Japan
“FHIR is the HTML of Healthcare.”
John Halamka
FHIR Maturity Model

5 stages of development that estimate market readiness
FHIR is Free

* The FHIR name and logo are trademarked, but the specification is licensed without restriction or royalty.
“If I had more time, it would have been shorter.”

Mark Twain
Argonaut Project Origins

- JASON Task Force recommendations on market-based interoperability governance and coordination, and call to action on “public APIs”
- Market experience with MU 2 and associated certification
JASON Task Force & the Argonauts
Argonaut Project Members

Accenture
athenahealth
Beth Israel Deaconess Medical Center
Cerner
Epic
Intermountain Healthcare
Mayo Clinic
Meditech
McKesson
Partners HealthCare System
SMART at the Boston Children’s Hospital
Surescripts
The Advisory Board Company
Argonaut Phase I

- **Accelerate the development** of the FHIR specification for the balloting of the Draft Standard for Trial Use (DSTU) Release 2
- Support the creation of a community of FHIR implementers
Argonaut Phase I

- FHIR data-level API
- MU Common Dataset resources/profiles
document-level APIs
- Argonaut Implementation Guide
Argonaut Security Phase I

• Final Use Case document
• Risk Assessment Report
• Argonaut SMART on FHIR Authorization Profile
Argonaut Phase II

- Support the development of resources for a FHIR implementation registry, FHIR conformance testing, and a robust source of stable resources and artifacts

- Complete the development of reliable specifications for security and authorization
Argonaut Phase II
FHIR Development

- Publish Argonaut Implementation Guide
- Enhance specifications
- Develop constraints on resources, profiles, and queries to satisfy operational demands
Argonaut Phase II
FHIR Development Enhancements

- **Iterative testing** & enhancement program
- **FHIR.org** web site
- Add data elements for CCDA & MU3
- Augment Security Services to include AuditEvent, Provenance, Consent
- Add Terminology Services
Argonaut Phase II
Implementation Program

- Formalize implementation program
- Develop focused sprint initiatives
- Implement testing tooling & artifacts
- Publish test results for internal and external audiences
Argonaut Phase II
Implementation Program Support

- Provide **Argonaut Test Server**
- Maintain implementers test outcomes site
- Enhance testing tooling for resources, profiles & solutions
- Deploy **virtual Help Desk**
- Provide in-person testing program
To date, there are over 150 healthcare systems, vendor companies, academic institutions, government agencies, pharmaceutical companies, payer organizations, and independent developers committed to supporting and implementing solutions based upon FHIR specifications.
FHIR.ORG Web Site

- Home for the Implementation Community
- Implementation Registry
- Reference implementations & Task tracking
- Community Forum
- Resources for conformance testing and public reference implementations
A gentle word of caution about FHIR

Current Status

The Gartner Hype Cycle

Argonaut Project

2016-2017
“We can’t solve problems with the same kind of thinking when we created them.”

Albert Einstein
Access to More FHIR Information

FHIR on Twitter @HL7 #HL7 #FHIR

FHIR news @FHIRNews

FHIR Standard – Free access: www.HL7.org/FHIR

FHIR Wiki

FHIR Training Videos
https://vimeo.com/channels/hl7fhir
Special Thanks

Doug Fridisma
Micky Tripathi
Grahame Grieve
HSPC MISSION

Improve health by creating a vibrant, open ecosystem of interoperable applications.
Decision Support Modules

- Antibiotic Assistant
- Ventilator weaning
- ARDS protocols
- Nosocomial infection monitoring
- MRSA monitoring and control
- Prevention of Deep Venous Thrombosis
- Infectious disease reporting to public health

- Diabetic care
- Pre-op antibiotics
- ICU glucose protocols
- Ventilator disconnect
- Infusion pump errors
- Lab alerts
- Blood ordering
- Order sets
- Patient worksheets
- Post MI discharge meds
We can’t keep up!

• We have ~150 decision support rules or modules

• We have picked the low hanging fruit

• There is a need to have 5,000+ decision support rules or modules

• There is no path from 150 to get to 5,000 unless we fundamentally change the ecosystem
Strategic Goal

• Be able to share data, applications, reports, alerts, protocols, data entry screens, and decision support modules with anyone

• Goal is “plug-n-play” interoperability
The cost of medical software

- Becker’s Health IT & CIO Review
  - Partners HealthCare: $1.2 billion
    Boston-based Partners HealthCare is one of more recent implementations, going live the first week of June to the tune of $1.2 billion. This is the health system's biggest investment to date. The implementation process took approximately three years, and in that time, the initial price tag of $600 million doubled.

- Intermountain Medical Center $550 million
More Reasons

• Every useful piece of software has to be created in each EHR system
  – As a society, we pay the cost of creating all of those copies of useful programs

• Agile development
  – Usability of software, creativity, innovation
Why HSPC?
Sharing Data by Copying

EHR1

Interface Engine

EHR2
Sharing Data via Services

Standard Services (APIs)

EHR1

EHR2
SMART on FHIR® – Open Platform Architecture

SOA Orchestration

mHealth

OAuth

FHIR Profiles from CIMI Models (using standard terminology)

Heterogeneous Systems

Commercial EHR

Home Grown System

System Integrator

Others…

FHIR REST API

Web Apps

http://smartplatforms.org/smart-on-fhir/
HL7 FHIR and HSPC

- FHIR defines high level objects
- You need further specification to get to “true” interoperability
  - Creation of FHIR profiles
- Risk: Everyone uses different profiles
  - “The Tower of Babel on FHIR”
FHIR: Core Resources

AdverseReaction  Group  OrderResponse
Alert  ImagingStudy  Organization
AllergyIntolerance  Immunization  Other
CarePlan  ImmunizationRecommendation  Patient
Composition  List  Practitioner
Condition  Location  Procedure
Conformance  Media  Profile
Device  Medication  Provenance
DeviceObservationReport  MedicationAdministration  Query
DiagnosticOrder  MedicationDispense  Questionnaire
DiagnosticReport  MedicationPrescription  RelatedPerson
DocumentManifest  MessageHeader  Specimen
Encounter  Observation  Substance
FamilyHistory  OperationOutcome  Supply

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Profile for “Blood pressure”

Observation = Blood Pressure
Subject.reference: Patient URL
Coding: LOINC 55284-4

Related:

- type: has-component
target.reference: Observation URL

Observation = Systolic BP
name: “Systolic”
coding: LOINC 8480-6
value.units: “mmHg”

Observation = Diastolic BP
name: “Diastolic”
coding: LOINC 8462-4
value.units: “mmHg”
Getting to “True” Interoperability

- Fully and explicitly specified detailed clinical models
  - This is the work CIMI is trying to do
- Broad, industry wide agreement about which models will be used for interoperability in specific contexts
- Framework for integrating applications into EHR systems
  - This is one of the goals of SMART
- Agreement among clinicians and professional societies about what data needs to be shared
HSPC Internet Sites

• Wiki: https://healthservices.atlassian.net/wiki/display/HSPC/Healthcare+Services+Platform+Consortium

• Website: http://hspconsortium.org/#/
Q & A