SNOMED CT on FHIR

New paradigms in health information exchange

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FHIR Starter Workshop

Held last week at AEHRC
Facilitated by Grahame Grieve
More than 30 attendees, ~15 from CSIRO
Day 1, Intro to FHIR
Day 2, FHIR and Terminology

- Android App – medication reminder and administration recording
- Exploration of CDA -> FHIR
- Pathology Information Terminology Units and Standardisation (PITUS) in FHIR
- Minimal HAPI-based FHIR ValueSet layer over Ontoserver
- High-level review of SMART Genomics API from Harvard
What is FHIR?
The acronym

- F – Fast (to design & to implement)
  - Relative – No technology can make integration as fast as we’d like
- H – Health
  - That’s why we’re here
- I – Interoperable
  - Ditto
- R – Resources
  - Building blocks – more on these to follow
FHIR Manifesto*

- Focus on **Implementers**
- Target support for **common scenarios**
- Leverage cross-industry **web technologies**
- Require **human readability** as base level of interoperability
- Make content **freely available**
- Support multiple **paradigms** & architectures
- Demonstrate best practice **governance**
Adoption

- FHIR is a draft standard
  - A ‘beta’ standard
  - subject to ongoing change

- In spite of this, it is being adopted quickly
  - Cited in US MU3 regulations (implicitly)
  - Argonaut / HSPC projects – large US vendors
  - National EHRs going live this year
Scope

- Enables information exchange to support the provision of healthcare
- Standard industry RESTful practices
  - But more than just REST
- Scope of FHIR is broad
  - human and veterinary
  - clinical care, public health, clinical trials
  - administration and financial aspects
“Resources” are:

- Small logically discrete units of exchange
- Defined behaviour 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
Resource Documentation

For each Resource:

- Scope and Usage Notes
- Resource Content (UML and XML)
- Terminology Bindings
- Constraints
- Implementation Issues
- Search Parameters
- Examples, Profiles, Formal Definitions
- Mappings to RIM, CDA, v2, etc
Terminology and FHIR
Terminology Sub-system

- SNOMED CT / LOINC / RxNORM
- HGVS, ICPC, MIMS + 100s more
- ICD-X+
- ANZSCO, METEOR
- A drug formulary
- A config table in an application
- A list of enums in a Java class
- Australian state codes
Terminology Sub-system

Code System
- Defines a set of concepts with a coherent meaning
  - Code
  - Display
  - Definition

Value Set
- A selection of a set of codes for use in a particular context

Selects
Code System vs Value Set

- Often mixed in common usage
- E.g. an application table that mixes LOINC codes and custom (self defined) codes
- The only way to know it’s a LOINC code is it has the distinctive NNN-N syntax
- HL7 says: keep your definitions clean, or you’ll get in trouble when you exchange data
- Separate the definition and use of a ‘concept’
Code Systems

- Defines a set of concepts (or a framework)
- Each concept has a meaning – a **definition**
- Each concept has a ‘**code**’ to identify it (>1?)
- Each concept has one or more ‘**display**’s – words that describe it, for some use (language, context)
- Concepts may also have 0..* **property** (name/value) and 0..* **relationship** (triple)
- May be able to build concepts using a grammar
Value sets

- A list of codes
  - Define your own, include codes from other code system (e.g. LOINC)

- Used to define conformance rules, UI functionality, system capabilities

- Functional service built around this
Value Set Resource

3 parts to a value set:

• Metadata – identity, version, publisher, description

• Content – rules for what codes are in the value set

• Expansion – the result of applying the rules to the value set
ValueSet operations

$expand
• apply the definition rules and return the set of resulting codes

$validate
• don’t need the list of codes, just tell me if this code is a member or not
FHIRE Terminology Services Connectathon
Feb 24-25, Washington DC

- Apelon (on behalf of openHIE)
- VSAC/NLM
- IMO
- Regenstrief
- Lantana
- Nictiz
- CSIRO
- Smart Platforms
- HL7

Focus on $expand and $validate

Key outcomes:
- at least 4 implementations
- increased knowledge of spec
- improvements in spec
- strong desire to make Terminology standard part of general FHIR Connectathons

SNOMED CT on FHIR
FHIRE fills the implementation gaps

• Terminology is foundation of semantic interoperability
  • reference terminologies represent pre-agreement of meaning

• SNOMED CT does not deliver an implementation story

• One of few areas where FHIRE has an opinion on best practice

• FHIRE commoditises the Terminology API
SNOMED CT implementation challenges

- What are the set of valid codes in this context?
  - $expand with filter on display text
  - ValueSets fill the Reference Set gap

- Some contexts need customised display strings
  - ValueSet-specific display text allows for Interface terminology

- Post coordination
  - In FHIR, a SNOMED CT expression is a valid code
  - The terminology service handles the semantics
Terminology mapping
- ConceptMap supports semantic maps (equal, subsumes, specialises, ...)
- Maps are context-specific

Analytics – connecting the data to the terminology
- Closure Table
- API to subsumption computations
FHIR Status

Draft Standard for Trial Use 2 (DSTU2)

- due mid year
- ballot due out in a couple of weeks

- http://hl7.org/implement/standards/FHIR-Develop/
- http://latest.fhir.me
Thank you

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