

Reasoning with FHIR

Outline

- FHIR Ontology – what it is, what it isn't and its current state
- W5 Ontology
- FHIR Examples – Ontology headers
- Ontology version issues
- Getting more coded data into ontologies

FHIR Ontology

- Ontology about clinical records (aka. “resources” from the FHIR perspective)
 - Says nothing about patients, diseases, drugs, diagnoses, treatments, etc.
 - Addresses information *about* patients, diseases, drugs, ...
- Complementary to ShEx
 - ShEx defines instance *conformance* – what must / may / cannot be in a FHIR instance
 - Ontology defines classes of records – the subject of an Observation instance is a patient or a device, the observation status is defined in ontology X, ...

FHIR Ontology

Current State

- Defines all *core* Resources, Elements and DataTypes
- Domains and Ranges for all Predicates
- Cardinality
 - 0..* -- allValuesFrom
 - 0..1 -- allValuesFrom, maxCardinality 1
 - 1..* -- allValuesFrom, SomeValuesFrom
 - 1..1 -- someValueFrom, MaxCardinality 1

FHIR Ontology

Current State (continued)

- Some edge case types and restrictions omitted because of issues with FACT++ reasoner
- <http://build.fhir.org/fhir.ttl>

W5 Ontology

- Builds as a separate ontology
 - Some information synthesized
 - no subclasses/superclasses means ObjectProperty
 - who.performer is assumed to be a subproperty of who
- Imported into FHIR Ontology
- FHIR Ontology defines subclasses and subproperties of W5
- <http://build.fhir.org/w5.ttl>

FHIR Examples

- Protégé currently requires import fhir.ttl to work correctly
 - We will be talking to Protégé folks about this...
- Import requires ontology header
- Header put at end
 - Less disconcerting to Prud'hommeaux crowd
 - Better chance of default ShEx validators still working
- See: <http://build.fhir.org/diagnosticreport-example-f201-brainct.ttl.html>

Ontology Versioning

- We need:
 1. Fixed identity – fhir.ttl / w5.ttl / diagnosticreport-example-f201-brainct.ttl has to have permanent identity
 2. We need to know which “version” is being used
- `<URI> a owl:Ontology ;`
`owl:versionIRI <URI> .`

Designed to handle these requirements

Ontology Versioning (continued)

- Is Ontology Version IRI == FHIR build?
 - <http://hl7.org/fhir/fhir.ttl>
 - <http://hl7.org/fhir/2016Sep/fhir.ttl>
 - <http://build.fhir.org/fhir.ttl>
- How to keep resolvers from going to main site?
- Issues with Protégé imports
 - Will be discussing with them
- Build information isn't available when building (!)

Links

- Many decisions about classification are going to have to include what the Observation / DiagnosticReport / etc. is *about*
 - Subject can be Patient, Device, Sample, ...
 - FHIR currently has no guaranteed way to figure this out w/o access to full FHIR resolution service
 - Another argument for strongly recommending a type arc in the HCLS Profile

Codes

- We only assign URI's to well known systems (SNOMED CT / LOINC and maybe others)
- We need to know when a DiagnosticReport is “final” for classification
 - This information is non-trivial – “final” (probably) includes “amended” as well as sub-types of “amended”
 - This information belongs in an ontology – not a particular classifier definition (!)
- Recommendation – URI's for *all* codes and ontologies for all FHIR code systems.