

FHIR in RDF

HL7 ITS RDF Subgroup

with W3C HCLS

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David Booth

Tony Mallia

Requirements

- **1. FHIR Instance Mappings**
- **(MUST)** We must define lossless bi-directional transformations from FHIR XML/JSON resource instances to FHIR RDF resource instances and vice versa. FHIR RDF resource instance data that is transformed into FHIR XML resource instance data must validate against schemas and declared profiles. This round-tripping must not be dependent on any information other than the definition of FHIR resources and data types. (I.e. round-tripping must not be dependent on FHIR profiles, vocabulary definitions or other external information.)
- **2. FHIR Ontology Mappings**
- **(MUST)** We must define lossless bi-directional transformations from FHIR Profile instances (XML/JSON/RDF) to OWL/RDFS ontology representations and vice versa
- **3. Complete FHIR Coverage**
- **(MUST)** The RDF representation of FHIR resource instance data must be capable of expressing all legal FHIR instances that make use of any valid FHIR profiles, including extensions. An RDF instance data representation that is limited to only a subset of possible FHIR instances is not acceptable.
- **4. Monotonic with Modifier Extensions**
- **(MUST)** FHIR RDF data with modifier extensions must be "safe" for RDF reasoning, i.e., the semantics of the RDF must be monotonic even in the presence of modifier extensions.
- **5. Vocabulary Bindings**
- **(MUST)** The FHIR ontology must support vocabulary bindings to code, Coding and CodeableConcept - including dealing with extensible value sets and multi-code system value sets.
- **(SHOULD)** The FHIR vocabulary representation should be able to leverage existing semantic web terminology representations (e.g. SNOMED-CT)
- **6. Enforce Constraints**
- **(SHOULD)** The FHIR ontology should enforce constraints that are representable in OWL/RDF whenever possible, e.g. schema constraints, regular expressions, etc.
- **7. Annotation Information**
- **(SHOULD)** In the RDFS/OWL Ontology representation, should expose at least minimal annotation information for display in an ontology editor for use by humans
- **9. Datatype IRIs**
- **(SHOULD)** To support inference, datatypes (date, dateTime, value, etc.) should be represented as IRIs (xsd) rather than as string literals.
- **11. Enable Inference**
- **(MUST)** The FHIR ontology must support inference on FHIR instance data, both in use cases based on the open world assumption and in use cases based on the closed world assumption.
- **14. RDF Quality**
- **(MUST)** Transformations into RDF must meet software quality checks including ontological closure. The RDF instance which is transformed from FHIR XML or FHIR JSON must be capable of being opened without further modification by widely available tools including Protégé and the RDF must meet quality checks including successful closure of graphs - all the links are understood by the tool.
- **15. Auto Generated**
- **(MUST)** The FHIR ontology and FHIR RDF instance data mappings should be auto-generatable from the FHIR

Topics of the mapping

Red is still to do

- Generic mappings
 - Complex type to Class
 - Element to Object Property
 - Nested elements and naming
- Structural Definition Mapping
- Message and Resource Identity
- Datatype special treatment
 - Id, Decimal, CodeableConcept, Coding, code
- Terminology
 - Code system, Concept, ConceptBase
 - Bindings to external terminologies in RDF/OWL e.g. SNOMED CT

1. FHIR RDF page on the HL7 site,
explaining FHIR RDF serialization
(equivalent to existing FHIR XML and
JSON pages)

Editors: Grahame Grieve

2. FHIR ontology explanation page,
(TODO: Add link) explaining how FHIR
structure definitions and other
conformance resource can be
expressed using OWL

Tooling

- Instance transformation
(bidirectional)
- Structural Definition to Ontology
- Conformance testing