

FHIR RDF Sample side by side comparisons

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Legend

Most of the RDF is generated by verbatim logic (e.g. An unidentified element becomes a blank node).

Where RDF is generated by special transformation it is **marked in red**

Where RDF is inferred by a reasoner it is **marked in green**.

1 Primitive Datatypes (section 1.18.0.1)

Difference in the treatment of datatypes code, string and uri as classes with primitive values as rdf:Datatypes.

1.1 Subgroup example

1.1.1 FHIR XML

```
<coding>
  <system value="http://example.org/local"/>
  <code value="admin"/>
  <display value="Admin"/>
</coding>
```

1.1.2 FHIR Structure Definition

CodeableConcept

```
<[name] xmlns="http://hl7.org/fhir">
  <!-- from Element: extension -->
  <coding><!-- 0..* Coding Code defined by a terminology system --></coding>
  <text value="[string]"/><!-- 0..1 Plain text representation of the concept -->
</[name]>
```

35 Coding

```
36 <[name] xmlns="http://hl7.org/fhir">
37 <!-- from Element: extension -->
38 <system value="[uri]"/><!-- 0..1 Identity of the terminology system -->
39 <version value="[string]"/><!-- 0..1 Version of the system - if relevant -->
40 <code value="[code]"/><!-- 0..1 Symbol in syntax defined by the system -->
41 <display value="[string]"/><!-- 0..1 Representation defined by the system -->
42 <primary value="[boolean]"/><!-- 0..1 If this code was chosen directly by the user -->
43 </[name]>
```

44

45 Code-primitive and code

```
46 <xs:simpleType name="code-primitive">
47 <xs:restriction base="xs:token">
48 <xs:minLength value="1"/>
49 </xs:restriction>
50 </xs:simpleType>
51 <xs:complexType name="code">
52 <xs:complexContent>
53 <xs:extension base="Element">
54 <xs:attribute name="value" type="code-primitive"/>
55 </xs:extension>
56 </xs:complexContent>
57 </xs:complexType>
58
```

59

60 Uri-primitive and uri

```
61 <xs:simpleType name="uri-primitive">
62 <xs:restriction base="xs:anyURI"/>
63 </xs:simpleType>
64 <xs:complexType name="uri">
65 <xs:complexContent>
66 <xs:extension base="Element">
67 <xs:attribute name="value" type="uri-primitive" use="optional"/>
68 </xs:extension>
69 </xs:complexContent>
70 </xs:complexType>
71
```

72

73 String-primitive and string

```
74 <xs:simpleType name="string-primitive">
75 <xs:restriction base="xs:string">
76 <xs:minLength value="1"/>
77 </xs:restriction>
78 </xs:simpleType>
79 <xs:complexType name="string">
80 <xs:complexContent>
81 <xs:extension base="Element">
82 <xs:attribute name="value" type="string-primitive" use="optional"/>
83 </xs:extension>
84 </xs:complexContent>
85 </xs:complexType>
```

86

87 1.1.3 RDF Data for Coding Instance

```
88 .coding [ rdf:type fhir:Coding ;  
89 fhir:Coding.system [ a fhir:uri ; fhir:value http://example.org/local^^fhir:uri-primitive ] ;  
90 fhir:Coding.code [ a fhir:code ; fhir:value "admin"^^fhir:code-primitive ] ;  
91 fhir:Coding.display [ a fhir:string ; fhir:value "Admin"^^fhir:string-primitive ] ;  
92 ];
```

93 1.1.4 FHIR OWL Schema (Turtle)

```
94 fhir:CodeableConcept rdf:type owl:Class ;  
95 rdfs:subClassOf fhir:Element ,  
96 [ rdf:type owl:Restriction ;  
97 owl:onProperty fhir:CodeableConcept.coding ;  
98 owl:allValuesFrom fhir:Coding  
99 ] ,  
100 [ rdf:type owl:Restriction ;  
101 owl:onProperty fhir:CodeableConcept.text ;  
102 owl:onClass fhir:string ;  
103 owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger  
104 ] ;  
105 ] ;
```

```
106 fhir:Coding rdf:type owl:Class ;  
107 rdfs:subClassOf fhir:Element ,  
108 fhir:Term ,  
109 [ rdf:type owl:Restriction ;  
110 owl:onProperty fhir:Coding.primary ;  
111 owl:onClass fhir:boolean ;  
112 owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger  
113 ] ,  
114 [ rdf:type owl:Restriction ;  
115 owl:onProperty fhir:Coding.system ;  
116 owl:onClass fhir:uri ;  
117 owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger  
118 ] ,  
119 [ rdf:type owl:Restriction ;  
120 owl:onProperty fhir:Coding.version ;  
121 owl:onClass fhir:string ;  
122 owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger  
123 ] ,  
124 [ rdf:type owl:Restriction ;  
125 owl:onProperty fhir:Coding.code ;  
126 owl:onClass fhir:code ;  
127 owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger  
128 ] ,  
129 [ rdf:type owl:Restriction ;  
130 owl:onProperty fhir:Coding.display ;  
131 owl:onClass fhir:string ;  
132 owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger  
133 ] .  
134 ] .  
135 ] .
```

136
137 This approach will be implemented by creating CodeableConcept individuals as blank nodes.

138 2 Concept Binding external (section 1.17.3.3.5)

139 2.1 Github example

```
140 @prefix loinc: <http://loinc.org/owl#> .  
141 :resource a fhir:Observation;  
142   fhir:Observation.code [  
143     fhir:CodeableConcept.coding [  
144       fhir:Coding.system <http://loinc.org>;  
145       fhir:Coding.code "54411-4";  
146       fhir:Coding.display "Rh immune globulin given Qualitative";  
147       ex:concept loinc:54411-4;  
148     ];  
149     fhir:CodeableConcept.text "Rh immune globulin";  
150   ].
```

151 Extension adds a new object property “concept” which points to an instance “http://loinc.org/owl#54411-4”
152 which has a type - probably http://loinc.org/54411-4 which returns Turtle for the type not the HTML
153 description. Notice that Coding instance is not typed but could be inferred from the range of
154 CodeableConcept.coding.

155 2.2 Subgroup example

156 2.2.1 FHIR XML

157 The following is a Resource instance fragment in FHIR XML showing the equivalent example:

```
158 <Observation xmlns="http://hl7.org/fhir">  
159   <code>  
160     <coding>  
161       <system value="http://Loinc.org"/>  
162       <code value="54411-4"/>  
163       <display value=" Rh immune globulin given Qualitative "/>  
164     </coding>  
165     <text value="Rh immune globulin"/>  
166   </code>  
167   .....
```

168 2.2.2 FHIR Structure definition

169 See section 1.2.2

170 2.2.3 RDF Data with Terminology blank nodes in RDF

```
171 @prefix loinc: <http://loinc.org/> .  
172 @prefix fhir: <http://hl7.org/fhir/> .  
173 <sourceNamespace/Observation/resource.id> a fhir:Observation;  
174   fhir:Observation.code [ a fhir:CodeableConcept , <http://loinc.org/54411-4> ;  
175     fhir:CodeableConcept.coding [ a fhir:Coding , <http://loinc.org/54411-4> ;  
176       fhir:Coding.system [fhir:value <http://loinc.org^^fhir:uri-primitive ] ;  
177       fhir:Coding.code [fhir:value "54411-4"^^fhir:code-primitive ] ;  
178       fhir:Coding.display [fhir:value "Rh immune globulin given Qualitative"^^fhir:string-primitive ] ;  
179     ];  
180   fhir:CodeableConcept.text [fhir:value "Rh immune globulin" ]  
181 ].
```

182 sourceNamespace is the namespace from which the resource instance came. Resource.id is the unique name of
183 the Observation instance within the source namespace and type (Observation).

184 The type on the Coding instance is calculated based on the formation of the URL for that terminology. The type
185 in the Coding instance is carried up to the CodeableConcept blank node.

186 2.3 Allergy Intolerance Subgroup Example

187 2.3.1 FHIR XML

```
188 <AllergyIntolerance xmlns=http://hl7.org/fhir >  
189   <id value="1"/>  
190   <text>  
191  
192   </text>  
193   <!-- the date that this entry was recorded -->  
194   <recordedDate value="2010-03-01"/>  
195   <!-- the patient that actually has the risk of adverse reaction -->  
196   <patient>  
197     <reference value="http://record/Patient/PeterPatient"/>  
198     <display value="Peter Patient"/>  
199   </patient>  
200   <!-- substance, coded from SNOMED CT-->  
201   <substance>  
202     <coding>  
203       <system value="http://snomed.info/id/">  
204       <code value="90614001"/>  
205       <display value="beta-Lactam antibiotic"/>  
206     </coding>  
207   </substance>  
208   <status value="confirmed"/>  
209   <criticality value="high"/>  
210   <category value="medication"/>  
211 </AllergyIntolerance>
```

212

213

214 2.3.2 RDF Example

215 This is the raw instance before processing and after **in green for inference** and **red for specific processing**

```
216 @prefix : <http://record/AllergyIntolerance/> .
217 @prefix owl: <http://www.w3.org/2002/07/owl#> .
218 @prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
219 @prefix sct: <http://snomed.info/id/> .
220 @prefix xml: <http://www.w3.org/XML/1998/namespace> .
221 @prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
222 @prefix fhir: <http://hl7.org/fhir/> .
223 @prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
224 @prefix profile: <http://PatientSafetyProfile/> .
225 @base <http://record/AllergyIntolerance/1> .
226
227
228 <http://record/AllergyIntolerance/> rdf:type owl:Ontology ;
229     owl:imports <http://PatientSafetyProfile> .
230
231 ### http://record/AllergyIntolerance/1
232
233 <http://record/AllergyIntolerance/1> rdf:type profile:DomainResource , owl:NamedIndividual ,
234 profile:AllergyIntolerance ;
235     fhir:tag "AllergyIntolerance" ;
236     fhir:AllergyIntolerance.status [ rdf:type fhir:code , <http://hl7.org/fhir/vs/allergyIntoleranceStatus> ,
237     <http://hl7.org/fhir/vs/allergyIntoleranceStatus#confirmed> ;
238     fhir:value "confirmed"
239 ] ;
240     fhir:AllergyIntolerance.patient [ rdf:type fhir:Reference ;
241     fhir:Reference.reference [ fhir:value "http://record/Patient/PeterPatient" ] ;
242     fhir:Reference.display [ fhir:value "Peter Patient" ] ;
243     fhir:Reference.link <http://record/Patient/PeterPatient> ;
244 ] ;
245     fhir:AllergyIntolerance.substance [ rdf:type fhir:CodeableConcept , http://snomed.info/id/90614001 ;
246     rdfs:label "beta-lactam (antibiotic)" ;
247     fhir:CodeableConcept.coding [ rdf:type fhir:Coding , http://snomed.info/id/90614001 ;
248     fhir:Coding.code [ rdf:type fhir:code ; fhir:value "90614001" ] ;
249     fhir:Coding.system [ rdf:type fhir:uri ; fhir:value "http://snomed.info/id/90614001" ] ;
250     fhir:Coding.display [ rdf:type fhir:string ; fhir:value "beta-lactam (antibiotic)" ]
251 ] ;
252     fhir:CodeableConcept.text [ rdf:type fhir:string ; fhir:value "beta-lactam (antibiotic)"
253 ]
254 ] .### Generated by the OWL API (version 3.5.1) http://owlapi.sourceforge.net
255
```

256

257 Note the use of a profile binding through the type “profile:DomainResource”. The fhir:tag causes the inference
258 of the type to be “profile:AllergyIntolerance” which then restricts the valuesets of Coding instances.

259 Creation of import statements is TBD.

260 2.3.3 FHIR OWL Schema

261 See section 1.2.4.

262 The example applies the rdf:type at the Coding instances.

263 This works directly with RDF terminologies such as SNOMED CT and ICD-11.

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2.3.4 FHIR Allergy Intolerance OWL Schema

```
### http://hl7.org/fhir/AllergyIntolerance
fhir:AllergyIntolerance rdf:type owl:Class ;

    rdfs:subClassOf fhir:DomainResource ,
    [ rdf:type owl:Restriction ;
      owl:onProperty fhir:AllergyIntolerance.recorder ;
      owl:onClass fhir:dateTime ;
      owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
    ] ,
    [ rdf:type owl:Restriction ;
      owl:onProperty fhir:AllergyIntolerance.patient.link ;
      owl:onClass fhir:Patient ;
      owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
    ] ,
    [ rdf:type owl:Restriction ;
      owl:onProperty fhir:AllergyIntolerance.comment ;
      owl:onClass fhir:string ;
      owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
    ] ,
    [ rdf:type owl:Restriction ;
      owl:onProperty fhir:AllergyIntolerance.identifier ;
      owl:allValuesFrom fhir:Identifier
    ] ,
    [ rdf:type owl:Class ;
      owl:intersectionOf ( fhir:DomainResource
        [ rdf:type owl:Restriction ;
          owl:onProperty fhir:tag ;
          owl:hasValue "AllergyIntolerance"
        ]
      )
    ] ,
    [ rdf:type owl:Restriction ;
      owl:onProperty fhir:AllergyIntolerance.patient ;
      owl:onClass fhir:Reference ;
      owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
    ] ,
    [ rdf:type owl:Restriction ;
      owl:onProperty fhir:AllergyIntolerance.reporter ;
      owl:onClass fhir:Reference ;
      owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
    ] ,
    [ rdf:type owl:Restriction ;
      owl:onProperty fhir:AllergyIntolerance.lastOccurence ;
      owl:onClass fhir:dateTime ;
      owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
    ] ,
    [ rdf:type owl:Restriction ;
      owl:onProperty fhir:AllergyIntolerance.type ;
      owl:onClass <http://hl7.org/fhir/vs/allergy-intolerance-type> ;
      owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
    ] ,
    [ rdf:type owl:Restriction ;
      owl:onProperty fhir:AllergyIntolerance.status ;
      owl:onClass <http://hl7.org/fhir/vs/allergy-intolerance-status> ;
      owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
    ] ,
    [ rdf:type owl:Restriction ;
      owl:onProperty fhir:AllergyIntolerance.criticality ;
      owl:onClass <http://hl7.org/fhir/vs/allergy-intolerance-criticality> ;
      owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
    ] ,
    [ rdf:type owl:Restriction ;
      owl:onProperty fhir:AllergyIntolerance.recordedDate ;
      owl:onClass fhir:Reference ;
      owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
    ] ,
```

```
332 [ rdf:type owl:Restriction ;
333 owl:onProperty fhir:AllergyIntolerance.substance ;
334 owl:onClass fhir:CodeableConcept ;
335 owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
336 ] ,
337 [ rdf:type owl:Restriction ;
338 owl:onProperty fhir:AllergyIntolerance.category ;
339 owl:onClass <http://hl7.org/fhir/vs/allergy-intolerance-category> ;
340 owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
341 ] .
342 ### http://hl7.org/fhir/AllergyIntolerance.Event
343 fhir:AllergyIntolerance.Event rdf:type owl:Class ;
344 rdfs:subClassOf fhir:BackboneElement .
```

345

346 From the SNOMED RDF:

```
347 <http://snomed.info/id/105590001> rdf:type owl:Class ;
348 rdfs:label "Substance (substance)" ;
349 rdfs:subClassOf <http://snomed.info/id/138875005> .
350
351 <http://snomed.info/id/373873005> rdf:type owl:Class ;
352 rdfs:label "Pharmaceutical / biologic product (product)" ;
353 rdfs:subClassOf <http://snomed.info/id/138875005> .
354
355 <http://snomed.info/id/346325008> rdf:type owl:Class ;
356 rdfs:label "Antibacterial drugs (product)" ;
357 rdfs:subClassOf <http://snomed.info/id/373873005> .
358
359 <http://snomed.info/id/105590001> rdf:type owl:Class ;
360 rdfs:label "beta-Lactam antibiotic" ;
361 rdfs:subClassOf <http://snomed.info/id/346325008> .
```

362

363

364 3 Concept Binding Internal

365 3.1 Github example

366 No example

367 3.2 Subgroup example

368 The subgroup example is taken from the FHIR Current example of Allergy Intolerance to medication and
369 modified.

370 3.2.1 FHIR XML

```
371 <AllergyIntolerance xmlns="http://hl7.org/fhir">  
372   <id value="1"/>  
373   <text>  
374  
375   </text>  
376   <!-- the date that this entry was recorded -->  
377   <recordedDate value="2010-03-01"/>  
378   <!-- the patient that actually has the risk of adverse reaction -->  
379   <patient>  
380     <reference value="http://record/Patient/PeterPatient"/>  
381   </patient>  
382   <!-- substance, coded from SNOMED CT-->  
383   <substance>  
384     <coding>  
385       <system value="http://snomed.info/id"/>  
386       <code value="105590001"/>  
387       <display value="beta-Lactam antibiotic"/>  
388     </coding>  
389   </substance>  
390   <status value="confirmed"/>  
391   <criticality value="high"/>  
392   <category value="medication"/>  
393 </AllergyIntolerance>
```

394 3.2.2 RDF Data After processing

```
395 fhir:AllergyIntolerance.status [ rdf:type <http://hl7.org/fhir/allergy-intolerance-status/confirmed> ;  
396                               fhir:value "confirmed"  
397 ] ;
```

398 This is due to the status Object property being restricted to the valueset and the term controlling the type
399 binding.

400 3.2.3 FHIR OWL Schema

401 Same mechanism as external terminologies –see 2.2.5.

402 Internal terminology expressed as Class hierarchy

```
403 fhir:AllergyIntolerance.status rdf:type owl:ObjectProperty ;
404                               rdfs:range fhir:allergy-intolerance-status .
405
406 fhir:AllergyIntolerance rdf:type owl:Class ;
407                               rdfs:subClassOf fhir:DomainResource ,
408                               [ rdf:type owl:Restriction ;
409                                 owl:onProperty fhir:AllergyIntolerance.status ;
410                                 owl:onClass <http://hl7.org/fhir/vs/allergy-intolerance-status> ;
411                                 owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
412                               ] ,
413
414
415 <http://hl7.org/fhir/vs/allergy-intolerance-status> rdf:type owl:Class ;
416                               rdfs:label "Allergy Intolerance Status ValueSet" ;
417                               owl:equivalentClass [ rdf:type owl:Class ;
418                                 owl:unionOf ( <http://hl7.org/fhir/allergy-intolerance-status#confirmed>
419                                                 <http://hl7.org/fhir/allergy-intolerance-status#entered-in-error>
420                                                 <http://hl7.org/fhir/allergy-intolerance-status#refuted>
421                                                 <http://hl7.org/fhir/allergy-intolerance-status#resolved>
422                                                 <http://hl7.org/fhir/allergy-intolerance-status#unconfirmed>
423                                               )
424                               ] ;
425                               rdfs:subClassOf fhir:InternalValueSet .
426
427 <http://hl7.org/fhir/allergyIntoleranceStatus/confirmed> rdf:type owl:Class ;
428                               rdfs:label "confirmed" ;
429                               owl:equivalentClass [ rdf:type owl:Class ;
430                                 owl:intersectionOf ( <http://hl7.org/fhir/vs/allergyIntoleranceStatus>
431                                                         [ rdf:type owl:Restriction ; owl:onProperty fhir:value ; owl:hasValue "confirmed"
432                                                         ] ) ] ;
433                               rdfs:subClassOf <http://hl7.org/fhir/vs/allergyIntoleranceStatus> .
434
```

435 4 Resource References

436 4.1 Githib example

```
437 :resource a fhir:Observation;
438   fhir:contained fhir:Observation\#23;
439   fhir:Observation.subject [
440     fhir:Reference.reference fhir:Observation\#23
441   ].
442
443 fhir:Observation\#23 a fhir:Patient;
444   fhir:Patient.name [ fhir:text "John Smith ].
```

445 This example is partially in line with the resolved example below. Even if it were a URL it will not be understood
446 by reasoners or SPARQL.

447 4.2 Subgroup example

448 4.2.1 FHIR XML

```
449 <AllergyIntolerance xmlns="http://hl7.org/fhir">
450   <id value="1"/>
451   <text>
452
453   </text>
454   <!-- the date that this entry was recorded -->
455   <recordedDate value="2010-03-01"/>
456   <!-- the patient that actually has the risk of adverse reaction -->
457   <patient>
458     <reference value="http://record/Patient/PeterPatient"/>
459     <display value="Peter Patient"/>
460   </patient>
461 </AllergyIntolerance>
```

462 4.2.2 RDF Data After processing (acquiring the resource and importing)

```
463 fhir:AllergyIntolerance.patient [ fhir:Reference.display [ fhir:value "Peter Patient" ] ;
464                               fhir:Reference.reference [ fhir:value "http://record/Patient/PeterPatient" ] ;
465                               fhir:Reference.link <http://record/Patient/PeterPatient>
466                               ] ;
```

467 Note that Reference object has been supplemented by the URI of the Reference.link.

468 AllergyIntolerance.patient.link can represent the property chain as shown earlier.

469 A reverse property of the property chain can get the resources for a particular patient.

```
470 ### http://hl7.org/fhir/AllergyForPatient
471 fhir:AllergyForPatient rdf:type owl:ObjectProperty ;
472                       owl:inverseOf fhir:AllergyIntolerance.patient.link .
473
474 ### http://hl7.org/fhir/AllergyIntolerance.patient.link
475
476 fhir:AllergyIntolerance.patient.link rdf:type owl:ObjectProperty ;
477                                     owl:propertyChainAxiom ( fhir:AllergyIntolerance.patient fhir:Reference.link ) .
```

478 4.2.3 FHIR OWL Schema

```
479 fhir:Reference rdf:type owl:Class ;
480               rdfs:subClassOf fhir:Element ,
481                               [ rdf:type owl:Restriction ;
482                               owl:onProperty fhir:Reference.link ;
483                               owl:onClass fhir:DomainResource ;
484                               owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
485                               ] ,
486                               [ rdf:type owl:Restriction ;
487                               owl:onProperty fhir:Reference.display ;
488                               owl:onClass fhir:string ;
489                               owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
490                               ] ,
491                               [ rdf:type owl:Restriction ;
492                               owl:onProperty fhir:Reference.reference ;
493                               owl:onClass fhir:string ;
494                               owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger
495                               ] .
```

496

497

498 **5 Bundle**

499 Some preliminary notes:

500 A Bundle instance has no special namespace semantics and therefore it can be referenced as an Ontology
501 record/Bundle/123.

502 The contents of the Bundle.Entry have URIs and would be imported into the Bundle Ontology.

503 The Bundle.Link will be treated as a Reference and Bundle.Link.link will be created when the referenced
504 resource has been resolved.

505 **6 URI Naming**

506 **6.1 Github example**

507 No example

508 **6.2 Subgroup example**

509 Detailed rules for URI construction must be made for internally referenced resource class instances. The
510 example has proposed URI constructs where

- 511 1. the Resource namespace precedes the assigned identifier for the contained instance
- 512 2. the root resource object has an URI identifier identical to the resource class instance URI

513 Thus <http://record/AllergyIntolerance/1> has “record/AllergyIntolerance” as the resource namespace with “1”
514 as the contained instance identifier.

515 It is also intended that the resource namespace should also be the ontology IRI. This is to be tested.

```
516 <http://record/AllergyIntolerance/> rdf:type owl:Ontology ;
```

517

518 **7 Ordering**

519 **7.1 Github example**

520 No example

521 **7.2 Subgroup example**

522 Simple integer DataProperty fhir:index can be applied to individuals of subclasses of fhir:Element

```

523   ### http://hl7.org/fhir/index
524   fhir:index rdf:type owl:DatatypeProperty ;
525             rdfs:range fhir:index-primitive .
526
527   ### http://hl7.org/fhir/index-primitive
528   fhir:index-primitive rdf:type rdfs:Datatype ;
529                       owl:equivalentClass [ rdf:type rdfs:Datatype ;
530                                             owl:onDatatype xsd:integer ;
531                                             owl:withRestrictions ( [ xsd:minInclusive 1 ] )
532                                           ] .
533   ### http://hl7.org/fhir/Element
534   fhir:Element rdf:type owl:Class ;
535              rdfs:label "Element" ;
536              rdfs:subClassOf [ rdf:type owl:Restriction ;
537                              owl:onProperty fhir:Element.extension ;
538                              owl:someValuesFrom fhir:Extension
539                            ] ,
540                            [ rdf:type owl:Restriction ;
541                              owl:onProperty fhir:Element.id ;
542                              owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger ;
543                              owl:onDataRange fhir:id-primitive
544                            ] ,
545                            [ rdf:type owl:Restriction ;
546                              owl:onProperty fhir:index ;
547                              owl:maxQualifiedCardinality "1"^^xsd:nonNegativeInteger ;
548                              owl:onDataRange fhir:index-primitive
549                            ] ;
550              rdfs:comment "The base element used for all FHIR elements and resources - allows for them to be
551 extended with extensions" .
552   .

```

553 In general fhir:value and fhir:Element.id are converted to an attribute in XML. fhir:index dictates the sequence
554 only.

555 8 ValueSets

556 Valuesets are declared as metatypes where their individuals are puns of the individual and the term class.

557 Here is the ValueSet Allergy-Intolerance-Status as a Class

```

558 <http://hl7.org/fhir/vs/allergy-intolerance-status> rdf:type owl:Class ;
559           rdfs:label "Allergy Intolerance Status ValueSet" ;
560           owl:equivalentClass [ rdf:type owl:Class ;
561                                 owl:unionOf ( <http://hl7.org/fhir/allergy-intolerance-status#confirmed>
562                                                <http://hl7.org/fhir/allergy-intolerance-status#entered-in-error>
563                                                <http://hl7.org/fhir/allergy-intolerance-status#refuted>
564                                                <http://hl7.org/fhir/allergy-intolerance-status#resolved>
565                                                <http://hl7.org/fhir/allergy-intolerance-status#unconfirmed>
566                                              )
567                               ] ;
568           rdfs:subClassOf fhir:InternalValueSet .

```

569 A member of the valueset is a ValueSet.Concept. Here is the named individual “confirmed” as a ValueSet.Concept
570 instance. The concept instance is its own type.

```

571 <http://hl7.org/fhir/allergy-intolerance-status#confirmed> rdf:type fhir:ValueSet.Concept , owl:NamedIndividual ,
572 <http://hl7.org/fhir/allergy-intolerance-status#confirmed> ,
573 <http://hl7.org/fhir/vs/allergy-intolerance-status> .

```

574 Its type is inferred from the intersection of system “allergy-intolerance-status” and the value of the code.

```
575 <http://hl7.org/fhir/allergy-intolerance-status#confirmed> rdf:type owl:Class ;
576     owl:equivalentClass [ rdf:type owl:Class ; owl:intersectionOf
577         ( fhir:allergy-intolerance-status [ rdf:type owl:Restriction ;
578             owl:onProperty fhir:value ; owl:hasValue "confirmed" ]
579         )
580     ] .
```

581

582 This allows the AllergyIntolerance.status object property to be restricted to the union of the classes which are
583 declared in the ValueSet.

584 9 Profiles

585 The profile ontology restricts the Valueset of Substance:

586 AllergyIntolerance.substance.coding is defines as a property chain and allows constraints to be applied to the
587 codings for substance

```
588 allergy:AllergyIntolerance.substance.coding rdf:type owl:ObjectProperty ;
589     owl:inverseOf fhir:Coding.Resource ;
590     owl:propertyChainAxiom ( allergy:AllergyIntolerance.substance fhir:CodeableConcept.coding ) .
```

591

```
592 ### http://PatientSafetyProfile/AllergyIntolerance
593 profile:AllergyIntolerance rdf:type owl:Class ;
594     owl:equivalentClass [ rdf:type owl:Class ;
595         owl:intersectionOf ( profile:DomainResource
596             [ rdf:type owl:Restriction ; owl:onProperty fhir:tag ; owl:hasValue "AllergyIntolerance" ]
597         )
598     ] ;
599     rdfs:subClassOf fhir:AllergyIntolerance ,
600     [ rdf:type owl:Restriction ; owl:onProperty
601         <http://hl7.org/fhir/AllergyIntolerance/AllergyIntolerance.substance.coding> ;
602         owl:allValuesFrom [ rdf:type owl:Class ;
603             owl:unionOf ( <http://snomed.info/id/105590001> <http://snomed.info/id/373873005> )
604         ]
605     ] .
606 ### http://PatientSafetyProfile/DomainResource
607
608 profile:DomainResource rdf:type owl:Class ;
609     rdfs:subClassOf fhir:DomainResource .
```

610

611