

FHIR RDF and ShEx

RDF Changes

1. `fhir:Identifier.system [fhir:value "URI" ] —> [fhir:value <URI> ]`
2. `fhir:Coding.system [fhir:value "URI"] —> [ fhir:value <URI> ]`
3. No “a sct:227493005” at CodeableElement level
4. “a sct:227493005” —> “fhir:uri sct:227493005” at the coding level (to be discussed)
5. `@prefix sct: <http://snomed.info/sct/> —> @prefix sct: <http://snomed.info/id/> .`
6. `fhir:reference —> fhir:link` in References
7. ? “a fhir:TttReference” in Reference?

Metadata changes

- Add a new “extension” to the “_code” element in the primitive type definitions:

{ “url”: “<http://hl7.org/fhir/StructureDefinition/structureddefinition-rdf-type>”, “valueString”: “...”},

```
  "_code": {  
    "extension": [  
      {  
        "url": "http://hl7.org/fhir/StructureDefinition/structureddefinition-json-type",  
        "valueString": "string"  
      },  
      {  
        "url": "http://hl7.org/fhir/StructureDefinition/structureddefinition-xml-type",  
        "valueString": "anyURI"  
      }  
    ]  
  }
```

Also: double check the existing XML types...

Question

- Is this what we intend with multiple identifiers?

```
@prefix fhir: <http://hl7.org/fhir/> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .

<http://hl7.org/fhir//AllergyIntolerance/example> a fhir:AllergyIntolerance;
  fhir:AllergyIntolerance.identifier [
    fhir:index 0;
    fhir:id "abc"
  ];
  fhir:AllergyIntolerance.identifier [
    fhir:index 1;
    fhir:id "abd"
  ].
```

Suggestion

- Keep the “fhir:uri” element in Coding (code as well?)
- Add all the well known prefixes to the RDF header:

@prefix sct: <http://snomed.info/sct/> .

@prefix loinc: <http://loinc.org/.../> .

...

- Emit the fhir:uri items in the RDF

Earlier Slides

State of Affairs

- RDF available for all FHIR examples in the latest build
 - <http://hl7-fhir.github.io/allergyintolerance-examples.html>
 - <http://hl7-fhir.github.io/allergyintolerance-example.ttl.html>
- ShEx is available for all FHIR resources
 - <http://hl7-fhir.github.io/allergyintolerance.shex.html>

State of Affairs (continued)

- Grahame is working on integration of Jose Gayo's Scala based ShEx validator into the FHIR test suite
- Spot testing has been done using Eric Prud'hommeaux's "Fancy ShEx Demo"
 - <https://www.w3.org/2013/ShEx/FancyShExDemo>
 - Click on the "2" in the ShEx2 on the upper right part of the screen
 - Paste ShEx into left window
 - Paste RDF into middle window

FHIR Allergyintolerance

Structure

UML

XML

JSON

All

Structure

Name	Flags	Card.	Type	Description & Constraints
AllergyIntolerance			DomainResource	Allergy or Intolerance (generally: Risk Of Adverse reaction to a substance)
identifier	Σ	0..*	Identifier	External ids for this item
status	?! Σ	0..1	code	active unconfirmed confirmed inactive resolved refuted entered-in-error AllergyIntoleranceStatus (Required)
type	Σ	0..1	code	allergy intolerance - Underlying mechanism (if known) AllergyIntoleranceType (Required)
category	Σ	0..1	code	food medication environment other - Category of Substance AllergyIntoleranceCategory (Required)
criticality	Σ	0..1	code	low high unable-to-assess AllergyIntoleranceCriticality (Required)
substance	Σ	1..1	CodeableConcept	Substance, (or class) considered to be responsible for risk AllergyIntolerance Substance and Negation Codes (Example)
patient	Σ	1..1	Reference(Patient)	Who the sensitivity is for
recordedDate	Σ	0..1	dateTime	When recorded
recorder	Σ	0..1	Reference(Practitioner Patient)	Who recorded the sensitivity
reporter	Σ	0..1	Reference(Patient RelatedPerson Practitioner)	Source of the information about the allergy
onset	Σ	0..1	dateTime	Date(/time) when manifestations showed
lastOccurrence	Σ	0..1	dateTime	Date(/time) of last known occurrence of a reaction
note		0..*	Annotation	Additional text not captured in other fields
reaction		0..*	BackboneElement	Adverse Reaction Events linked to exposure to substance
substance	Σ	0..1	CodeableConcept	Specific substance considered to be responsible for event Substance Code (Example)
certainty	Σ	0..1	code	unlikely likely confirmed - clinical certainty about the specific substance AllergyIntoleranceCertainty (Required)
manifestation	Σ	1..*	CodeableConcept	Clinical symptoms/signs associated with the Event SNOMED CT Clinical Findings (Example)
description		0..1	string	Description of the event as a whole
onset	Σ	0..1	dateTime	Date(/time) when manifestations showed
severity	Σ	0..1	code	mild moderate severe (of event as a whole) AllergyIntoleranceSeverity (Required)
exposureRoute	Σ	0..1	CodeableConcept	How the subject was exposed to the substance SNOMED CT Route Codes (Example)
note		0..*	Annotation	Text about event not captured in other fields

```
<AllergyIntolerance> { a [fhir:AllergyIntolerance],
  fhir:nodeRole [fhir:treeRoot],
  fhir:Resource.id @<id>?,
  fhir:Resource.meta @<Meta>?,
  fhir:Resource.implicitRules @<uri>?,
  fhir:Resource.language @<code>?,
  fhir:DomainResource.text @<Narrative>?,
  fhir:DomainResource.contained @<Resource>*,
  fhir:DomainResource.extension @<Extension>*,
  fhir:DomainResource.modifierExtension @<Extension>*,
  fhir:AllergyIntolerance.identifier @<Identifier>*,
  fhir:AllergyIntolerance.status @<code>?,
  fhir:AllergyIntolerance.type @<code>?,
  fhir:AllergyIntolerance.category @<code>?,
  fhir:AllergyIntolerance.criticality @<code>?,
  fhir:AllergyIntolerance.substance @<CodeableConcept>?,
  fhir:AllergyIntolerance.patient @<PatientReference>?,
  fhir:AllergyIntolerance.recordedDate @<dateTime>?,
  fhir:AllergyIntolerance.recorder (
    @<PractitionerReference> OR
    @<PatientReference>
  )?,
  fhir:AllergyIntolerance.reporter (
    @<PatientReference> OR
    @<RelatedPersonReference> OR
    @<PractitionerReference>
  )?,
  fhir:AllergyIntolerance.onset @<dateTime>?,
  fhir:AllergyIntolerance.lastOccurrence @<dateTime>?,
  fhir:AllergyIntolerance.note @<Annotation>*,
  fhir:AllergyIntolerance.reaction @<AllergyIntolerance.reaction>*,
  fhir:index xsd:integer?
}
```

Collections

1. Collections — decision not to use RDF Lists.
Had to add:

```
<Identifier> {fhir:Element.id @<id>?,  
  fhir:Element.extension @<Extension>*,  
  fhir:Identifier.use @<code>?,  
  fhir:Identifier.type @<CodeableConcept>?,  
  fhir:Identifier.system @<uri>?,  
  fhir:Identifier.value @<string>?,  
  fhir:Identifier.period @<Period>?,  
  fhir:Identifier.assigner @<OrganizationReference>?,  
  fhir:index xsd:integer?  
}
```

to ALL definitions because ordering occurs inside:

```
fhir:DomainResource.extension @<Extension>*,  
fhir:DomainResource.modifierExtension @<Extension>*,  
fhir:AllergyIntolerance.identifier @<Identifier>*,  
fhir:AllergyIntolerance.status @<code>?,  
fhir:AllergyIntolerance.type @<code>?,  
fhir:AllergyIntolerance.category @<code> fhir:AllergyIntolerance.identifier [  
  fhir:index 0;  
  fhir:Identifier.system [ fhir:value "http://acme.com/ids/patients/risks" ];  
  fhir:Identifier.value [ fhir:value "49476534" ]  
];
```

Types

2. Type closure

- Data types — *Extension pretty much makes type closure a fixed quantity*

```
<id> {fhir:extension @<Extension>*,  
    fhir:value xsd:string?,  
    fhir:index xsd:integer?  
}
```

```
<Extension> {fhir:Element.id @<id>?,  
    fhir:Element.extension @<Extension>*,  
    fhir:Extension.url @<uri>?,  
    (  
        fhir:valueboolean @<boolean> |  
        fhir:valueinteger @<integer> |  
        fhir:valuedecimal @<decimal> |  
        fhir:valuebase64Binary @<base64Binary> |  
        fhir:valueinstant @<instant> |  
        fhir:valuestring @<string> |  
        fhir:valueuri @<uri> |  
        fhir:valuedate @<date> |  
        fhir:valuedateTime @<dateTime> |  
        fhir:valuetime @<time> |  
        fhir:valuecode @<code> |  
        fhir:valueoid @<oid> |  
        fhir:valueid @<id> |
```

Types (cont)

Primitive Types: (_code)

id.profile.json

```
],  
  "_code": {  
    "extension": [  
      {  
        "url": "http://hl7.org/fhir/StructureDefinition/structureddefinition-json-type",  
        "valueString": "string"  
      },  
      {  
        "url": "http://hl7.org/fhir/StructureDefinition/structureddefinition-xml-type",  
        "valueString": "xs:string+"  
      }  
    ]  
  }  
}
```

code.profile.json

```
,"_code": {  
  "extension": [  
    {  
      "url": "http://hl7.org/fhir/StructureDefinition/structureddefinition-json-type",  
      "valueString": "string"  
    },  
    {  
      "url": "http://hl7.org/fhir/StructureDefinition/structureddefinition-xml-type",  
      "valueString": "xs:token"  
    }  
  ]  
}
```

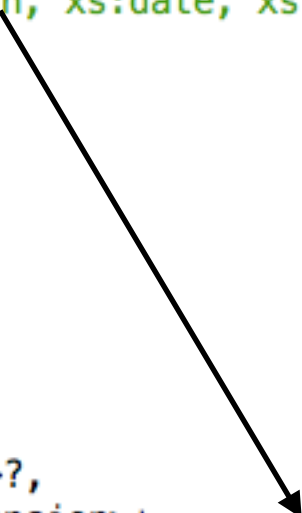
code type

```
fhir:Identifier.system [ fhir:value "http://demo.com/123/patients/123";  
  fhir:Identifier.value [ fhir:value "49476534" ]  
];  
fhir:AllergyIntolerance.status [ fhir:value "confirmed"^^xs:token];  
fhir:AllergyIntolerance.type [ fhir:value "allergy"^^xs:token];  
fhir:AllergyIntolerance.category [ fhir:value "food"^^xs:token];  
fhir:AllergyIntolerance.criticality [ fhir:value "high"^^xs:token];  
fhir:AllergyIntolerance.substance [
```

DateTime type

```
1,  
"_code": {  
  "extension": [  
    {  
      "url": "http://hl7.org/fhir/StructureDefinition/structureddefinition-json-type",  
      "valueString": "string"  
    },  
    {  
      "url": "http://hl7.org/fhir/StructureDefinition/structureddefinition-xml-type",  
      "valueString": "xs:gYear, xs:gYearMonth, xs:date, xs:dateTime"  
    }  
  ]  
}
```

```
<dateTime> {fhir:id @<id>?,  
  fhir:extension @<Extension>*,  
  fhir:value xsd:gYear OR xsd:gYearMonth OR xsd:date OR xsd:dateTime?,  
  fhir:index xsd:integer?  
}
```



uri type

```
"/_code": {  
  "extension": [  
    {  
      "url": "http://hl7.org/fhir/StructureDefinition/structureddefinition-json-type",  
      "valueString": "string"  
    },  
    {  
      "url": "http://hl7.org/fhir/StructureDefinition/structureddefinition-xml-type",  
      "valueString": "anyURI"  
    }  
  ]  
}
```

```
<uri> {fhir:id @<id>?,  
  fhir:extension @<Extension>*,  
  fhir:value IRI?,  
  fhir:index xsd:integer?  
}
```

Coding

```
@prefix sct: <http://snomed.info/sct/> .  
fhir:AllergyIntolerance.reaction.exposureRoute [  
  a sct:34206005;  
  fhir:CodeableConcept.coding [  
    fhir:index 0;  
    a sct:34206005;  
    fhir:Coding.system [ fhir:value "http://snomed.info/sct" ];  
    fhir:Coding.code [ fhir:value "34206005" ];  
    fhir:Coding.display [ fhir:value "Subcutaneous route" ]      ]    ]
```

```
@prefix sct: <http://snomed.info/id/> .  
  
fhir:AllergyIntolerance.reaction.exposureRoute [  
  fhir:CodeableConcept.coding [  
    fhir:index 0;  
    fhir:uri sct:34206005;  
    fhir:Coding.system [ fhir:value snomed: ];  
    fhir:Coding.code [ fhir:value "34206005"^^xs:token ];  
    fhir:Coding.display [ fhir:value "Subcutaneous route" ]      ]    ]
```

Reference

```
fhir:AllergyIntolerance.reporterReference [
  fhir:reference <http://hl7.org/fhir/Patient/example>;
  fhir:Reference.reference [ fhir:value "Patient/example" ]
];
```

```
fhir:AllergyIntolerance.reporter [
  fhir:link <http://hl7.org/fhir/Patient/example>;
  fhir:Reference.reference [ fhir:value "Patient/example" ]
];
```

identifier

```
fhir:AllergyIntolerance.identifier [
  fhir:index 0;
  fhir:Identifier.system [ fhir:value "http://acme.com/ids/patients/risks" ];
  fhir:Identifier.value [ fhir:value "49476534" ]
];
```

uri becomes URI rather than string

```
fhir:AllergyIntolerance.identifier [
  fhir:index 0;
  fhir:Identifier.system [ fhir:value <http://acme.com/ids/patients/risks> ];
  fhir:Identifier.value [ fhir:value "49476534" ]
];
```

Reference

```
<PatientReference> {  
  a [fhir:PatientReference]?,  
  fhir:Element.id @<id>?,  
  fhir:Element.extension @<Extension>*,  
  fhir:link (@<Patient> OR IRI)?,  
  fhir:Reference.reference @<string>?,  
  fhir:Reference.display @<string>?,  
  fhir:index xsd:integer?  
}
```