FHIR Packages and Versioning

Martijn Harthoorn
Who am I?

Martijn Harthoorn

Lead Developer & Architect

SIMPLIFIER.NET
Scouting the area

data contracts:
- profiles
- conformance resources
- canonical
Data Contracts

a.k.a.

Conformance Resources

a.k.a.

Profiles
Data Contracts
(Conformance Resources)

- Are all FHIR resources
- Have to be shared (once) between interoperating parties

Resource definitions:
Profiles (StructureDefinition)
Extensions (StructureDefinition)

Terminology:
ValueSets
CodeSystems
NamingSystems
ConceptMaps
LogicalModels

Server configuration:
CapabilityStatements
CompartmentDefinitions
OperationDefinitions
SearchParams

Primitive Data types:
time
date
boolean
string
uri
code
decimal

Terminology:
Period
Range
Quantity
Address
CodeableConcept
Age
....
Each data contract can be uniquely identified by a canonical URL.

FHIR Base Resource Definition for Patient
http://hl7.org/fhir/StructureDefinition/Patient

FHIR Base Resource Definition for Allergy Intolerance
http://hl7.org/fhir/StructureDefinition/AllergyIntolerance

FHIR string data type
http://hl7.org/fhir/StructureDefinition/string

Canadian eReferral Practice Setting Code ValueSet
http://hl7.org/fhir/ValueSet/c80-practice-codes
The problem
And then ... came the next version

Base Resource Definition for Patient in FHIR DSTU1
http://hl7.org/fhir/StructureDefinition/Patient

Base Resource Definition for Patient in FHIR DSTU2
http://hl7.org/fhir/StructureDefinition/Patient

Base Resource Definition for Patient in FHIR STU3
http://hl7.org/fhir/StructureDefinition/Patient

Base Resource Definition for Patient in FHIR R4
(the final and last version - muhahahaha)
http://hl7.org/fhir/StructureDefinition/Patient
Attempt 1.

The author solves versioning by changing the canonical.
Attempt 1.
special syntax

**Problem 1:** Hard to read

In Reality:
- http://yourorg.net/patient
- http://yourorg.net/patient-R2017
- http://yourorg.net/patient-R2018
Attempt 1.
special syntax

Problem 2: Mistakes are ‘hard coded’

In Reality:
http://yourorg.net/patient-R2018-1
http://yourorg.net/patient-R3018-2
Attempt 1.

special syntax

Problem 3: identification lost

In Reality:

http://yourorg.net/patient
http://yourorg.net/patient-R2016
http://yourorg.net/patient-R2017
http://yourorg.net/patient-R2018
http://yourorg.net/patient-R2018-FIX-JUNE
Attempt 2.

The standard solves versioning with special syntax.
Attempt 2.

Special syntax

**Problem 1:** dependency ‘hell’
Attempt 2.  
special syntax

Problem 2: non synchronous updates

A new realization

http://myorg.gov/patient|1.0
http://myorg.gov/organization|1.0
http://myorg.gov/allergy|1.0
http://myorg.gov/observation|1.0
http://myorg.gov/careplan|1.0

http://myorg.gov/patient|1.6
http://myorg.gov/organization|1.4
http://myorg.gov/allergy|1.3
http://myorg.gov/observation|1.0
http://myorg.gov/careplan|1.1
Attempt 3.

The authoring tools solve versioning with bulk updates
Attempt 3.

Bulk version updates

**Problem 1:** false breaking changes

http://myorg.gov/patient | 1.0
http://myorg.gov/organization | 1.0
http://myorg.gov/allergy | 1.0
http://myorg.gov/observation | 1.0
http://myorg.gov/careplan | 1.0

http://myorg.gov/patient | 1.4
http://myorg.gov/organization | 1.4
http://myorg.gov/allergy | 1.4
http://myorg.gov/observation | 1.4
http://myorg.gov/careplan | 1.4
Attempt 3.

Bulk version updates

Problem 2: content changes after procurement

http://myorg.gov/patient|1.0

Authoring:
http://myorg.gov/patient|1.4-draft17

Procured:
http://myorg.gov/patient|1.4-final-draft

Release:
http://myorg.gov/patient|1.4
Attempt 3.
Bulk version updates

Problem 3: Yet Another Tool

http://myorg.gov/patient|1.0
http://myorg.gov/organization|1.0
http://myorg.gov/allergy|1.0
http://myorg.gov/observation|1.0
http://myorg.gov/careplan|1.0

http://myorg.gov/patient|1.4
http://myorg.gov/organization|1.4
http://myorg.gov/allergy|1.4
http://myorg.gov/observation|1.4
http://myorg.gov/careplan|1.4
**Attempt 3.**

**Bulk version updates**

**Problem 4:** You can still choose

- **EHR**
  - http://myorg.gov/patient|1.2
  - http://myorg.gov/diagnosticreport|1.2

- **Lab**
  - http://myorg.gov/patient|1.2
  - http://myorg.gov/diagnosticreport|1.3
Real problem

Versioning individual resources
Scenario

Three organizations exchanging data

H \rightarrow \text{GP}_A

H \rightarrow \text{GP}_B
API 1.1
http://h.org/Patient 1.1
http://h.org/Organization 1.1
http://h.org/Observation 1.1
http://h.org/BloodPressureObservation 1.1
http://h.org/BmiObservation 1.1

API 1.7
http://h.org/Patient 1.7
http://h.org/Organization 1.7
http://h.org/Observation 1.7
http://h.org/BloodPressureObservation 1.7
http://h.org/BmiObservation 1.7

API 2.0
http://h.org/Patient 2.0
http://h.org/Organization 2.0
http://h.org/Observation 2.0
http://h.org/BloodPressureObservation 2.0
http://h.org/BmiObservation 2.0

http://gpa.com/Patient 1.3
http://gpa.com/bmi 1.7.8

http://gpb.com/Patient 2.0
http://gpb.com/bmiobs 2.0
API 1.1
http://h.org/Patient
http://h.org/Organization
http://h.org/Observation
http://h.org/BloodPressureObservation
http://h.org/BmiObservation

API 1.7
http://h.org/Patient
http://h.org/Organization
http://h.org/Observation
http://h.org/BloodPressureObservation
http://h.org/BmiObservation

API 2.0
http://h.org/Patient
http://h.org/Organization
http://h.org/Observation
http://h.org/BloodPressureObservation
http://h.org/BmiObservation

http://gpa.com/Patient 1.3
http://gpa.com/bmi 1.7.8

http://gpb.com/Patient 2.0
http://gpb.com/bmiobs 2.0
Don’t version the items. Version the set.
FHIR

FHIR Core Resources already work that way.
(by accident)
Attempt 4.

Don’t version the items, version the set.
If you can version the package, let’s package the version
What are packages?
What are packages?

A collection of resources that can be distributed under one name.

A zip file containing the files you want to publish.
Packages is / are an Ecosystem
What are HL7® FHIR® packages?
The package ecosystem
The package ecosystem

Profile editor

FHIR Server

HL7 FHIR
Validation tool

Resolver Context
- hl7.fhir.core 3.1
- us.core.lab 3.1

Local cache
- hl7.fhir.core 3.1
- us.core.lab 2.0
- us.core.lab 3.1

Package Server
- hl7.fhir.core 3.0
- hl7.fhir.core 3.1
- us.core 2.0
- us.core 2.1
- us.core 3.1
- us.core.lab 2.0
- us.core.lab 3.1
Full dependency tree

hl7.fhir.core 3.1

us.core.lab 3.1

Local cache

hl7.fhir.core 3.1

us.core.lab 2.0

us.core.lab 3.1

Package Server

hl7.fhir.core 3.0

Hl7.fhir.core 3.1

us.core 2.0

us.core 2.1

us.core 3.1

us.core.lab 2.0

us.core.lab 3.1
What do HL7® FHIR® packages solve?
What do FHIR packages solve?

1. Maintenance

- No need to version individual resources
- No cascading profile updates
- No version ‘hell’
What do FHIR packages solve?

2. Distribution

- Automated publication
- Automated discovery
- Automated consumption
- Automated updates
What do FHIR packages solve?

3. Communication

- A unique name for the set of resources
- A clear and simple way to communicate updates.
So, what do **PACKAGES** in FHIR look like?
1. Unique name

Examples:

hl7.fhir.core
hl7.fhir.us.qicore

Names should contain
1. Region
2. Author, organization
3. Subject
1. Unique name
2. Content

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>patient-ufp</td>
<td><a href="http://fhir.ufp/StructureDefinition/patient">http://fhir.ufp/StructureDefinition/patient</a></td>
</tr>
<tr>
<td>planet</td>
<td><a href="http://fhir.ufp/StructureDefinition/planets">http://fhir.ufp/StructureDefinition/planets</a></td>
</tr>
<tr>
<td>quadrant</td>
<td><a href="http://fhir.ufp/ValueSet/quadrant">http://fhir.ufp/ValueSet/quadrant</a></td>
</tr>
<tr>
<td>quadrant</td>
<td><a href="http://fhir.ufp/StructureDefinition/quadrant">http://fhir.ufp/StructureDefinition/quadrant</a></td>
</tr>
<tr>
<td>Starfleet Service ID</td>
<td><a href="http://fhir.ufp/NamingSystem/sfsid">http://fhir.ufp/NamingSystem/sfsid</a></td>
</tr>
<tr>
<td>species</td>
<td><a href="http://fhir.ufp/ValueSet/species">http://fhir.ufp/ValueSet/species</a></td>
</tr>
<tr>
<td>United Federation of Planets FHIR Implementations</td>
<td><a href="https://simplifier.net/ui/ig/UnitedFederationOfPlanets">https://simplifier.net/ui/ig/UnitedFederationOfPlanets</a></td>
</tr>
<tr>
<td>ietf-bcp-47</td>
<td>urn:ietf:bcp:47</td>
</tr>
</tbody>
</table>
1. Unique name
2. Content
3. Version

**SemVer**
Semantic Versioning

1.3.2-preview1

**MAJOR** incompatible changes
**MINOR** backward compatible additions
**PATCH** backward compatible fixes
**LABEL** annotations
1. Unique name
2. Content
3. Version

Demo.National.PatientCare 1.0.0
Demo.National.PatientCare 1.1.0
Demo.National.PatientCare 1.2.0
Demo.National.PatientCare 1.3.0-alpha1
Demo.National.PatientCare 1.3.0-alpha2
Demo.National.PatientCare 1.3.0-alpha3
Demo.National.PatientCare 1.3.0-beta1
Demo.National.PatientCare 1.3.0-beta2
Demo.National.PatientCare 1.3.0
1. Unique name
2. Content
3. Version
4. Manifest

package.json

```json
{
  "name": "Demo.National.PatientCare",
  "version": "1.0.0",
  "description": "Fictional National Patient Care Platform",
  "dependencies": {
    "hl7.fhir.Core": "3.0.1"
  }
}
```
PACKAGES

Dependencies
Dependencies

VA.Vaccination

VA.Patient.Care
Dependencies

VA.Vaccination

VA.Observations

VA.Patient.Care
Dependencies

Meta packages

VA.All

- VA.Vaccination
- VA.Observations
- VA.Patient.Care
Meta Packages

hl7.fhir.core

hl7.fhir.core.profiles

hl7.fhir.core.valuesets

hl7.fhir.core.codesystems

hl7.fhir.core.extensions

...
Dependencies

Version upgrades

- VA.All
- VA.Vaccination
- VA.Observations
- VA.Patient.Care 1.1
Dependencies

Version upgrades

- VA.All 1.1
- VA.Vaccination 1.1
- VA.Observations
- VA.Patient.Care 1.1
Trust
Trust

A package

- cannot be changed
- cannot be deleted
F.A.Q.
What is the state of packages in FHIR?
When do I need to create a package?
How do you create a package?
How do you publish a package?
How do I use a package?
What should I put into a package?
How big should I make my package?

“Granularity”
How can I remove a package from a registry?
What about mistakes and deprecations?

Delete

Unlist
No more versioned canonicals?

### Package name

Each package has a canonical name (a globally unique identifier). A package name consists of one or more names.

The first part of the namespace should identify the author, the authoring organization, or region. The second part of the namespace should identify a specific implementation guidance that is part of the package.

Examples:

- HL7.Family\_Provider\_Blood\_Type
Torinox
FHIR command line tool

Forge
Profile editor

Build tool
FHIR IG Build tool

Simplifier.net
FHIR Registry & publication platform

HL7 Core packages viewer
Official HL7 packages

Node package manager
NPM command line tool
Standard
Questions