ClinFHIR Tutorial

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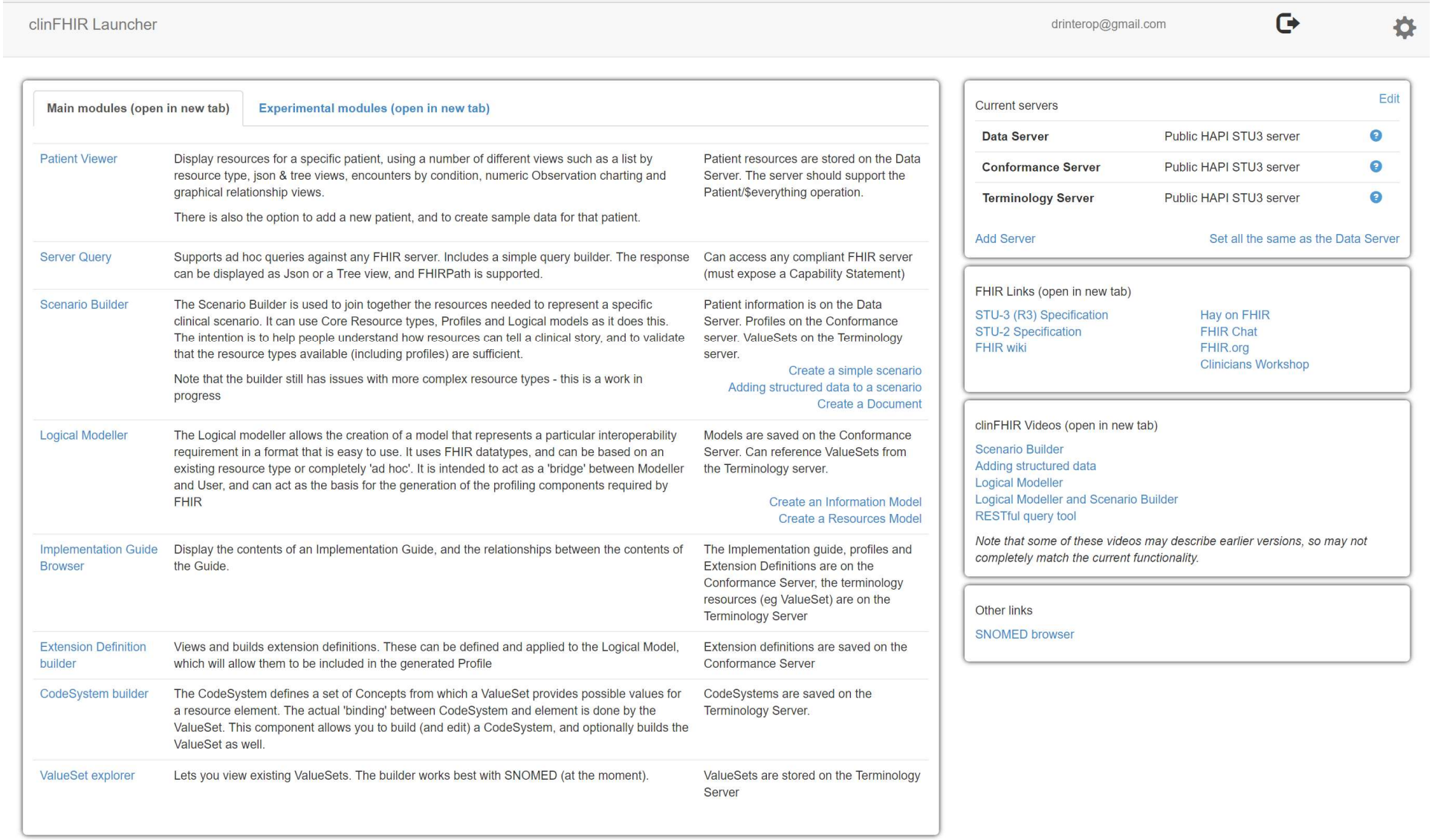
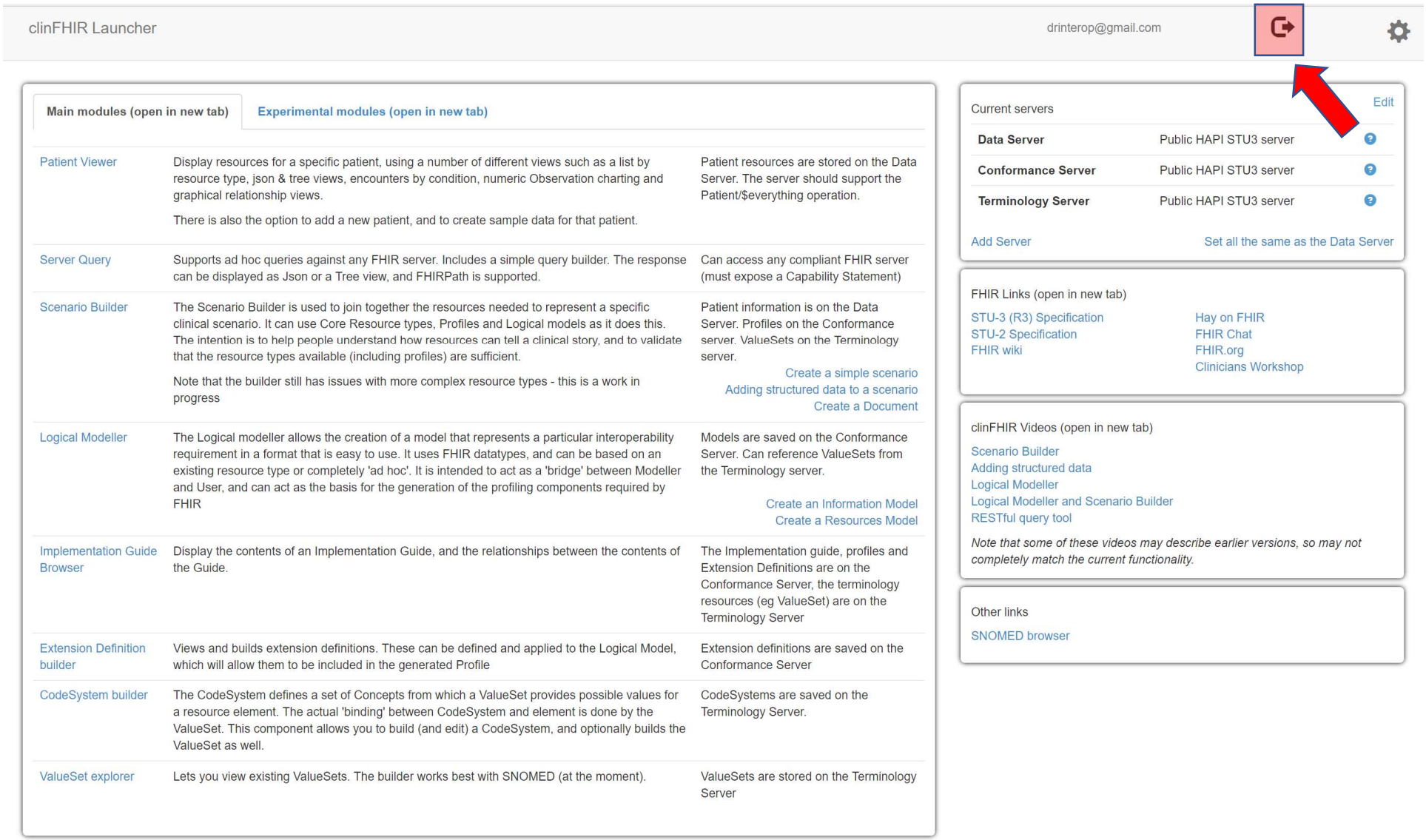
Initial Setup

- Chrome Browser
- Use the Zoom in/out function (CTRL-) if you don’t see buttons
- Keep a notepad handy to jot down information

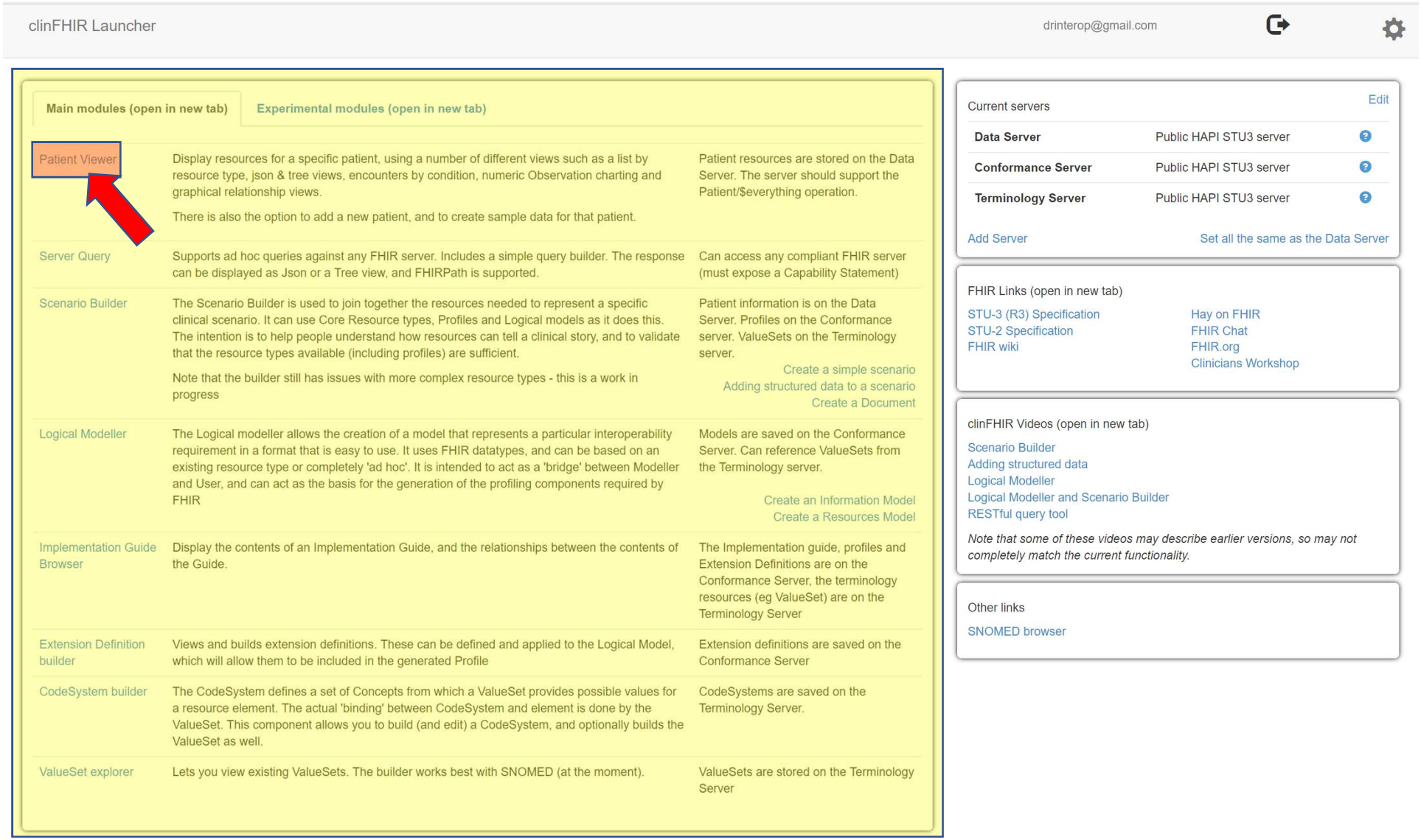
ClinFHIR.com Main Page



User Settings



Modules


clinFHIR Launcher
drinterop@gmail.com
Main modules (open in new tab)
Experimental modules (open in new tab)
Patient Viewer
Display resources for a specific patient, using a number of different views such as a list by resource type, json & tree views, encounters by condition, numeric Observation charting and graphical relationship views.
There is also the option to add a new patient, and to create sample data for that patient.
Patient resources are stored on the Data Server. The server should support the Patient/$everything operation.
Server Query
Supports ad hoc queries against any FHIR server. Includes a simple query builder. The response can be displayed as Json or a Tree view, and FHIRPath is supported.
Can access any compliant FHIR server (must expose a Capability Statement)
Scenario Builder
The Scenario Builder is used to join together the resources needed to represent a specific clinical scenario. It can use Core Resource types, Profiles and Logical models as it does this. The intention is to help people understand how resources can tell a clinical story, and to validate that the resource types available (including profiles) are sufficient.
Note that the builder still has issues with more complex resource types - this is a work in progress
Patient information is on the Data Server. Profiles on the Conformance server. ValueSets on the Terminology server.
Create a simple scenario
Adding structured data to a scenario
Create a Document
Logical Modeller
The Logical modeller allows the creation of a model that represents a particular interoperability requirement in a format that is easy to use. It uses FHIR datatypes, and can be based on an existing resource type or completely 'ad hoc'. It is intended to act as a 'bridge' between Modeller and User, and can act as the basis for the generation of the profiling components required by FHIR
Models are saved on the Conformance Server. Can reference ValueSets from the Terminology server.
Create an Information Model
Create a Resources Model
Implementation Guide Browser
Display the contents of an Implementation Guide, and the relationships between the contents of the Guide.
The Implementation guide, profiles and Extension Definitions are on the Conformance Server, the terminology resources (eg ValueSet) are on the Terminology Server
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CodeSystem builder
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CodeSystems are saved on the Terminology Server.
ValueSet explorer
Lets you view existing ValueSets. The builder works best with SNOMED (at the moment).
ValueSets are stored on the Terminology Server
Current servers
Edit
Data Server
Public HAPI STU3 server
Conformance Server
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Terminology Server
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Add Server
Set all the same as the Data Server
FHIR Links (open in new tab)
STU-3 (R3) Specification
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FHIR wiki
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Adding structured data
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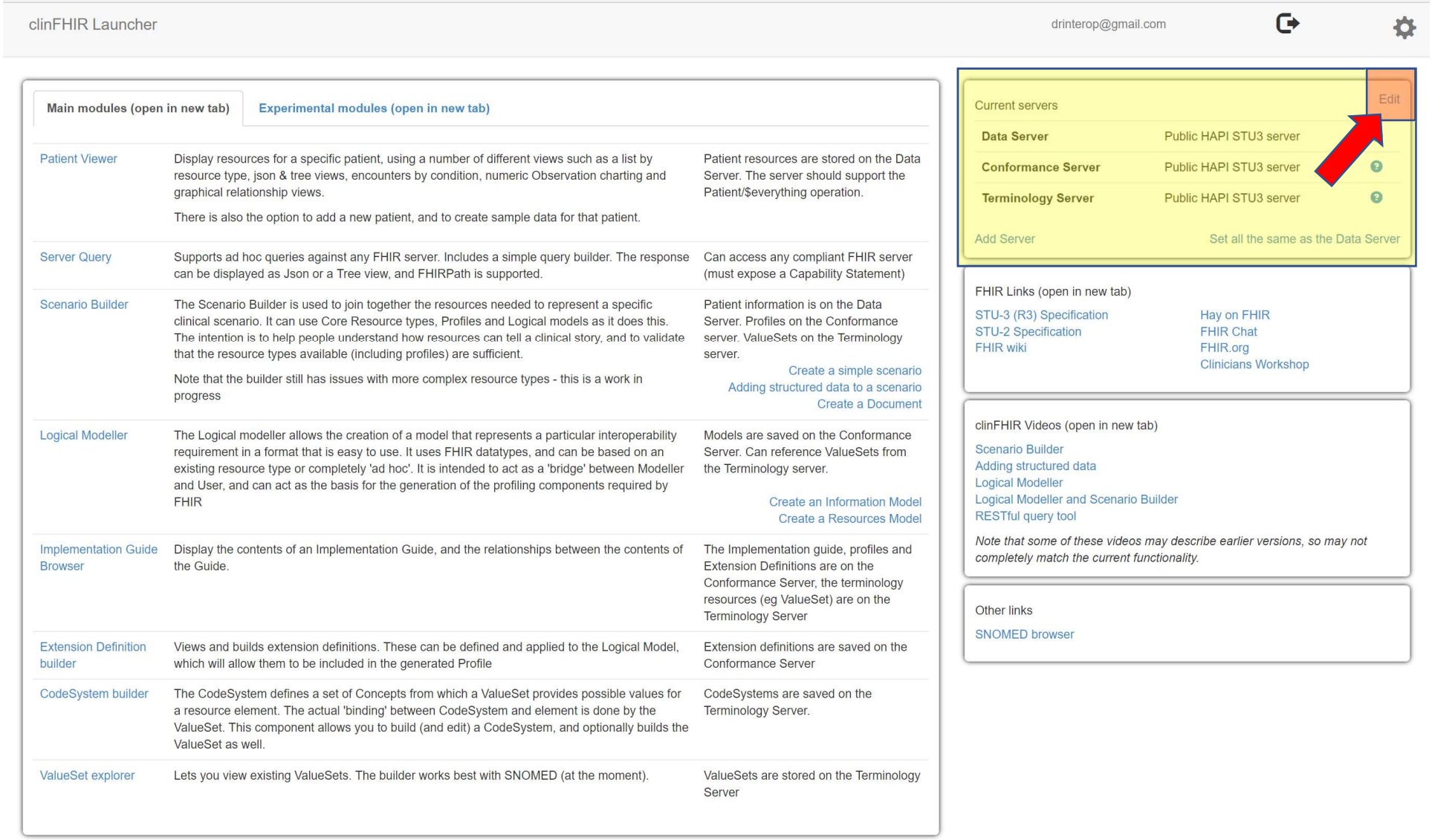
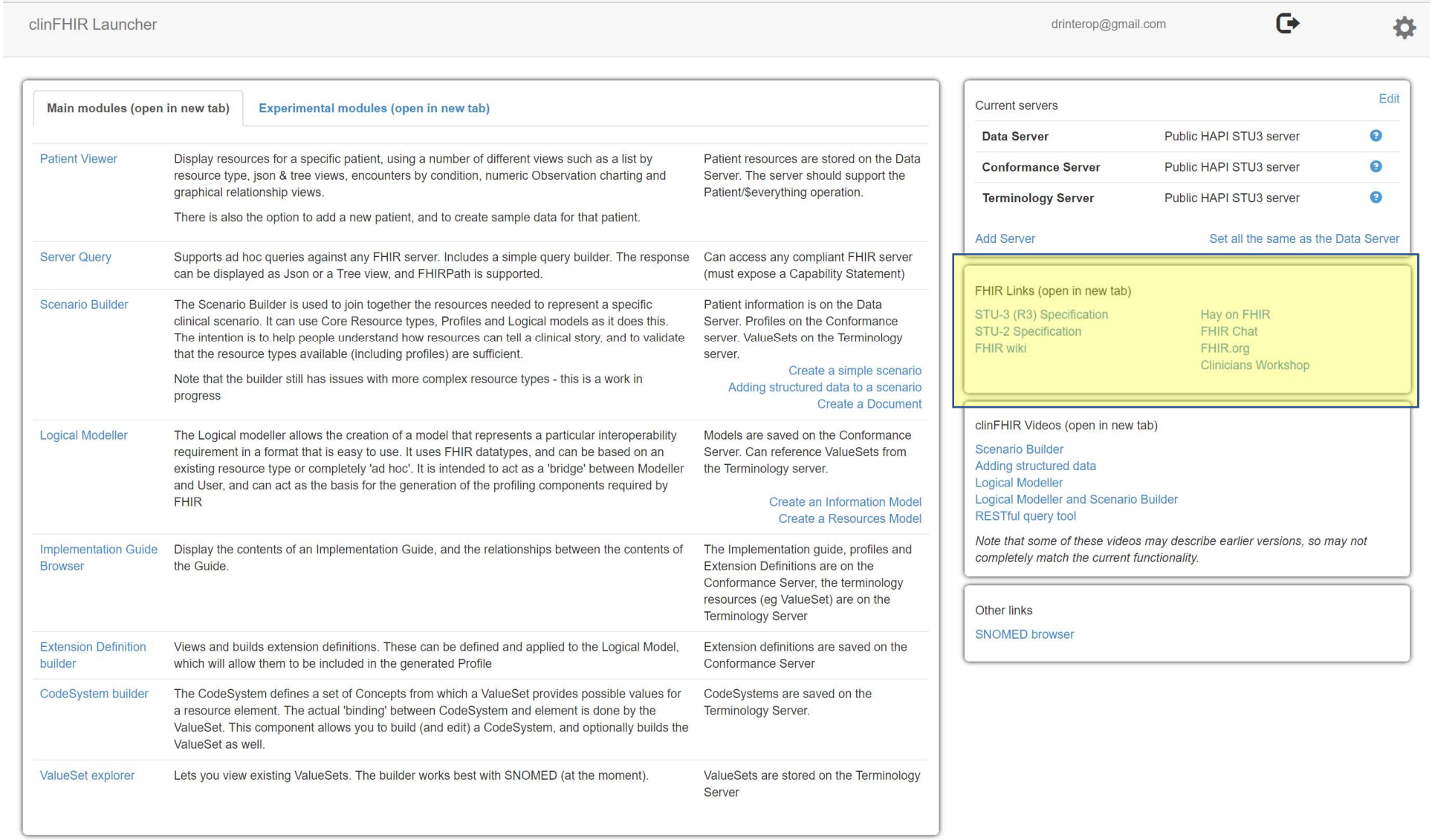
Logical Modeller and Scenario Builder
RESTful query tool
Note that some of these videos may describe earlier versions, so may not completely match the current functionality.
Other links
SNOMED browser

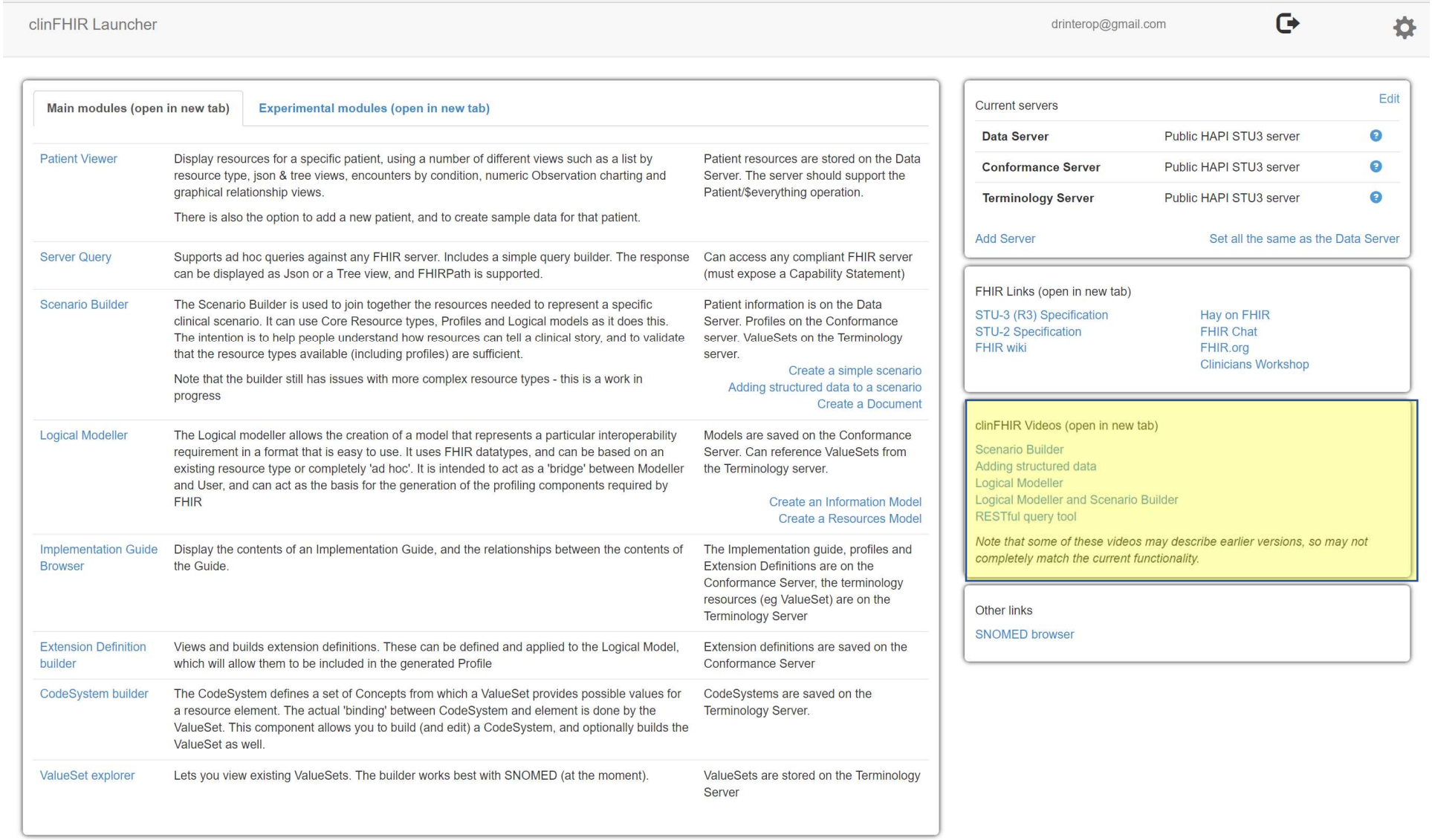
Server Selection



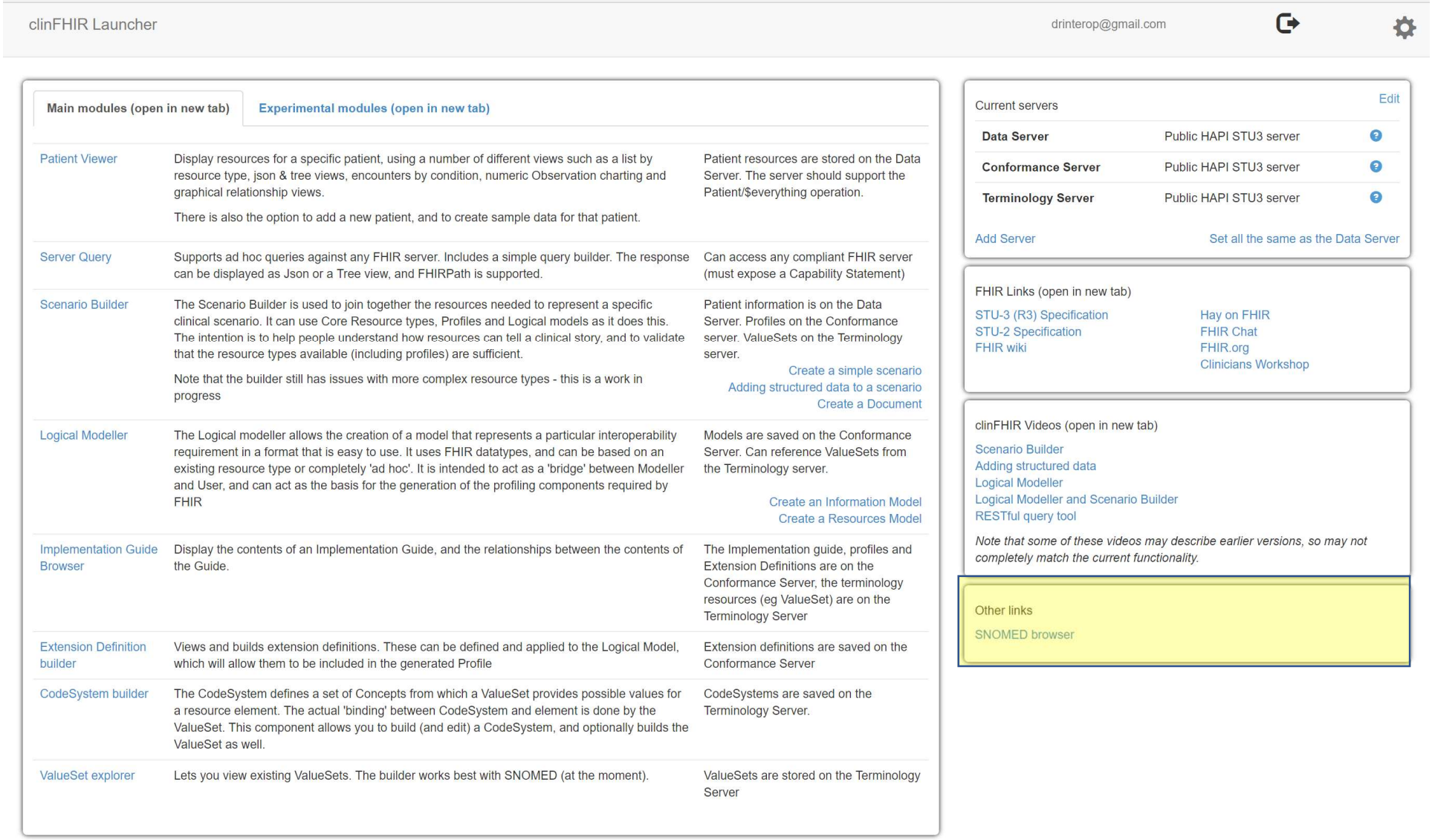
Useful FHIR Links



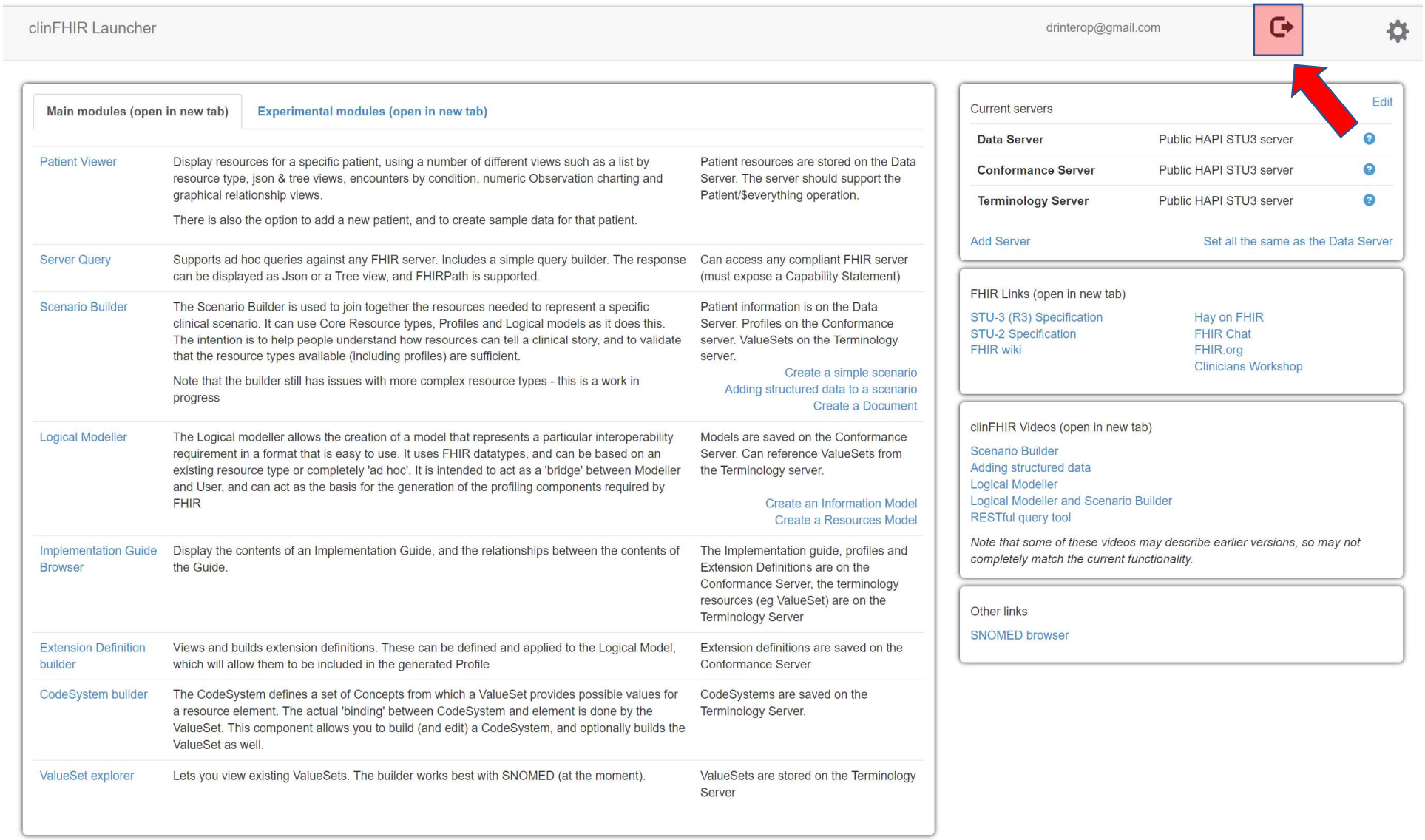
ClinFHIR Video Demos



Terminology Links



Create User Account



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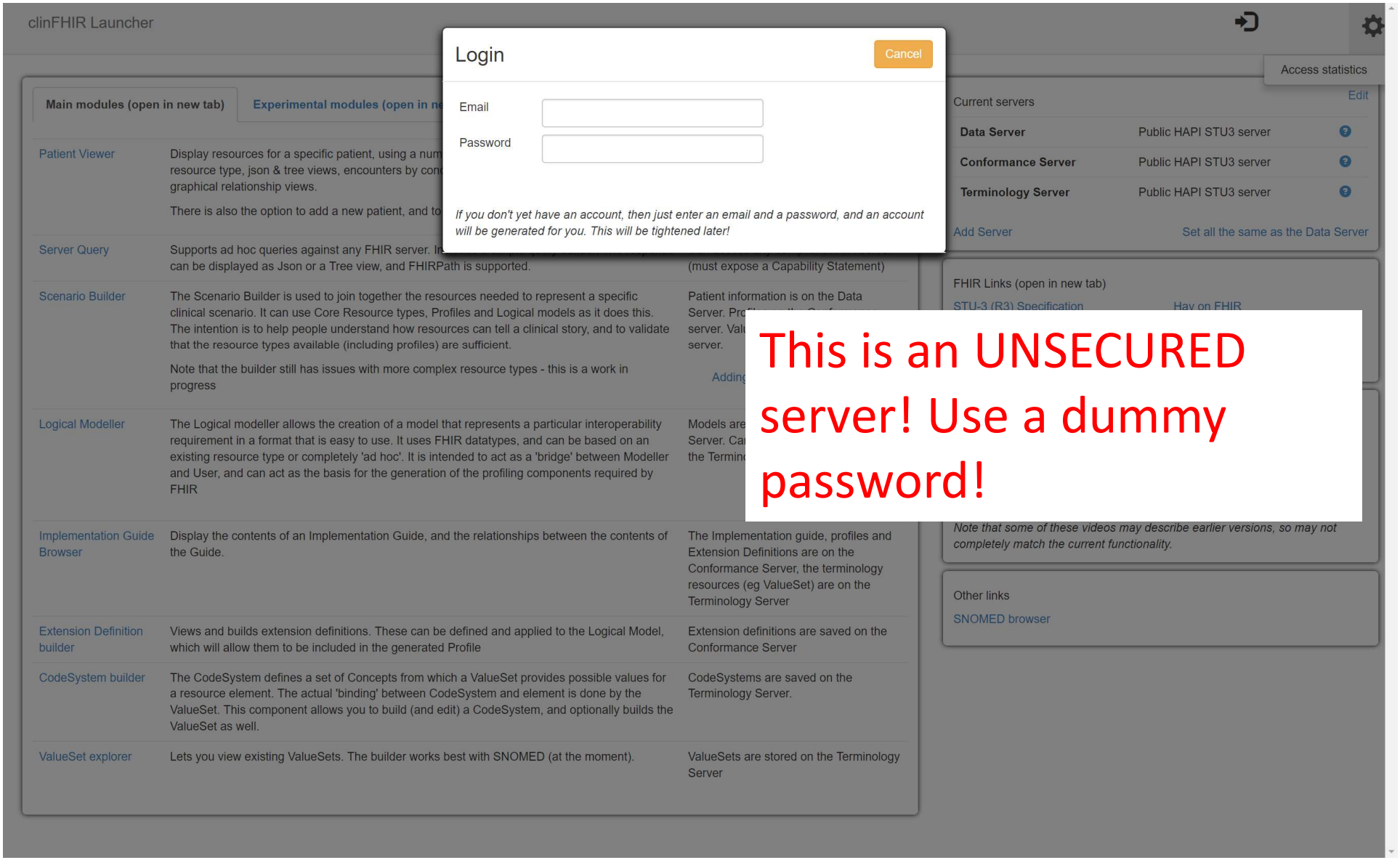

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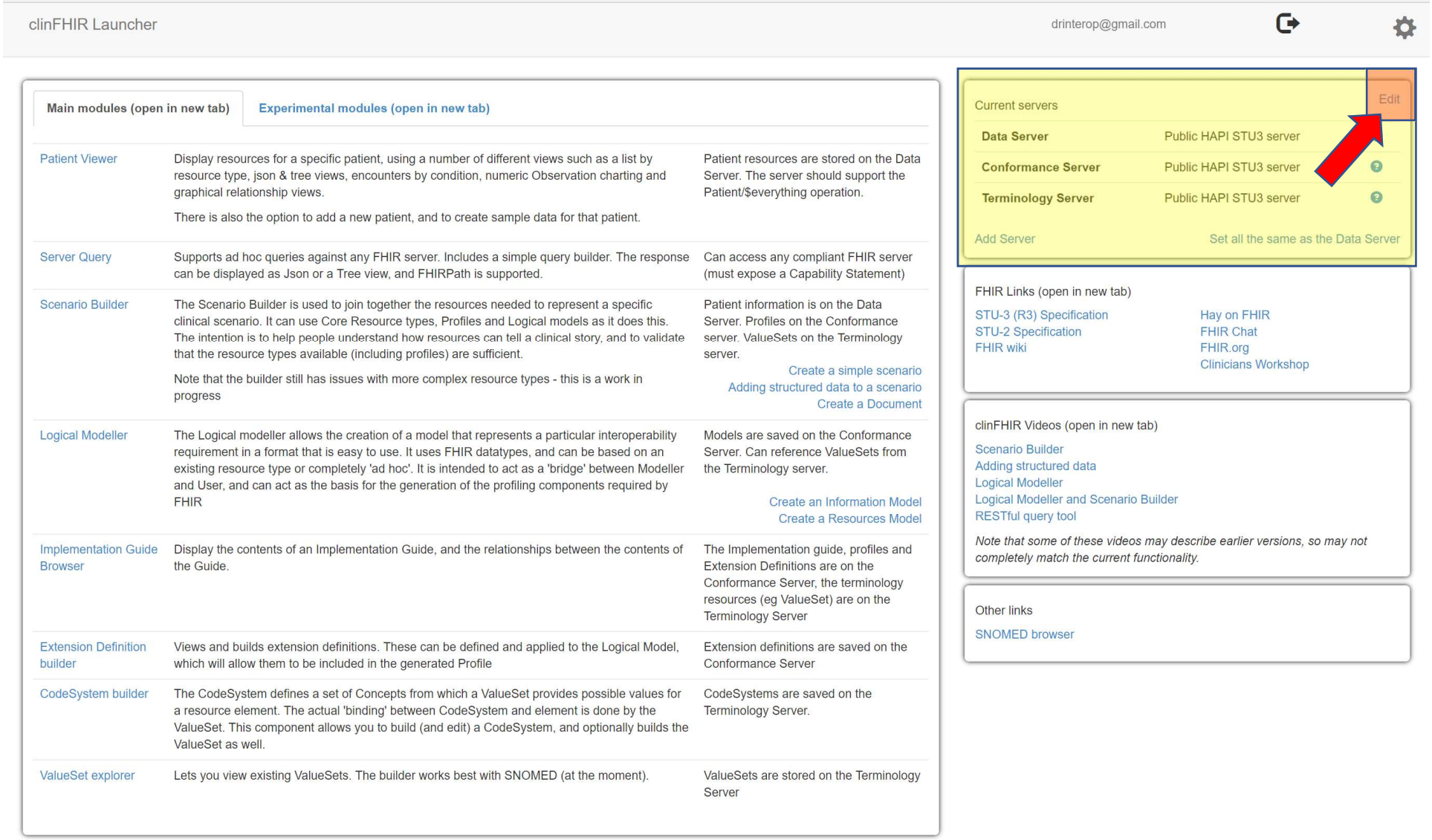

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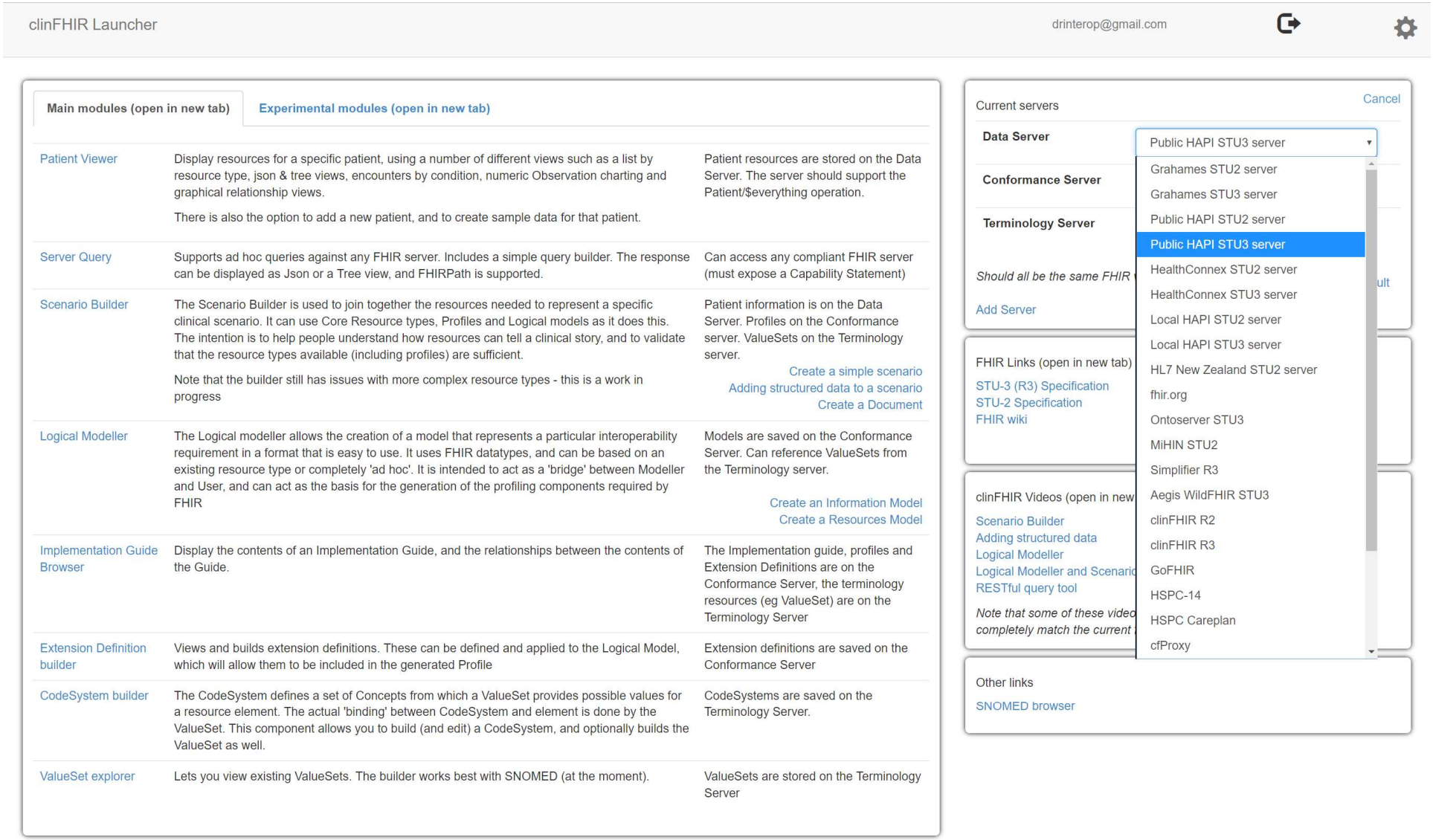
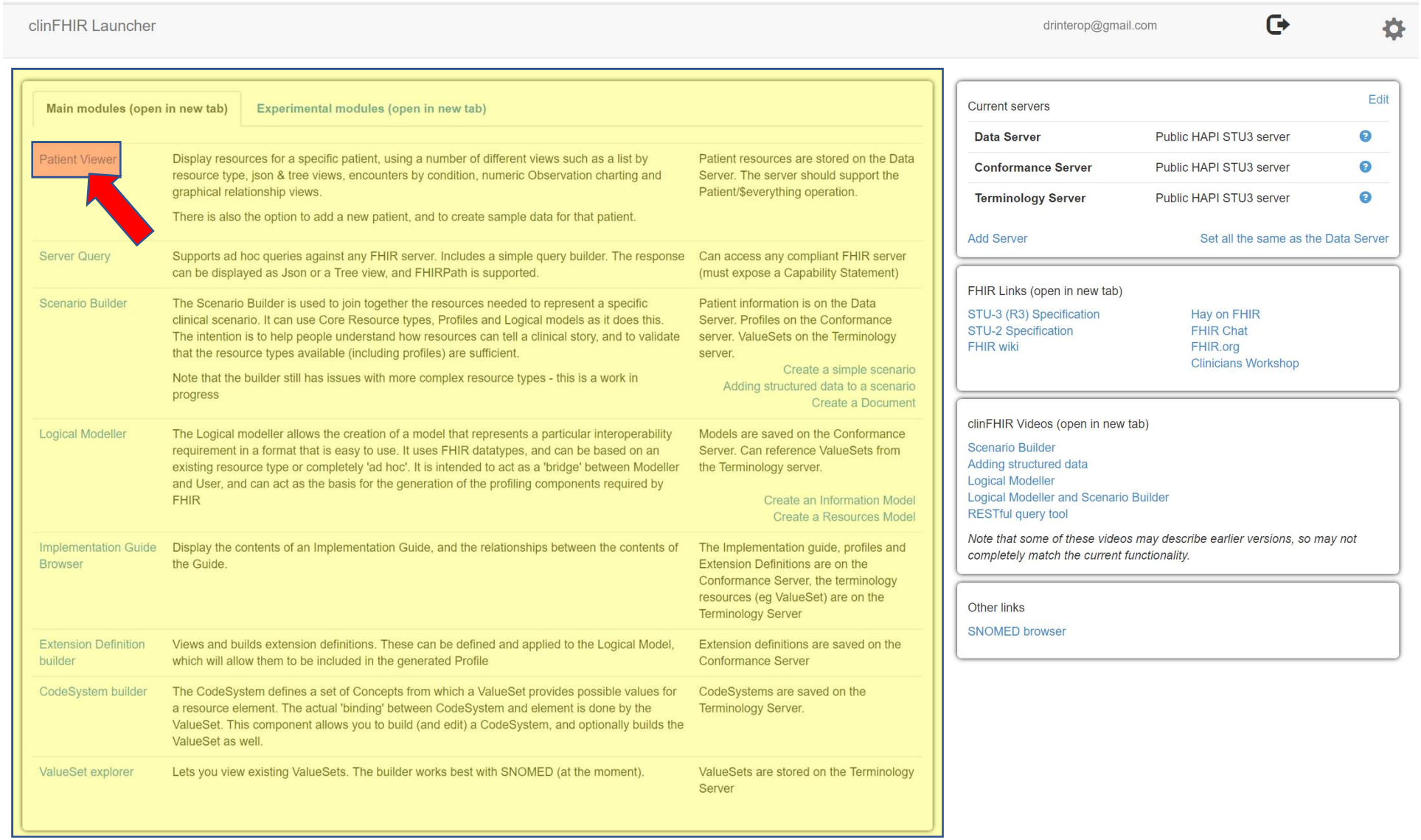


Task

- Open clinfhir.com
- Set up an account – DO NOT REUSE AN OLD PW
- Set up your 3 servers – HAPI3
- Lower your laptop lid when you're done

Modules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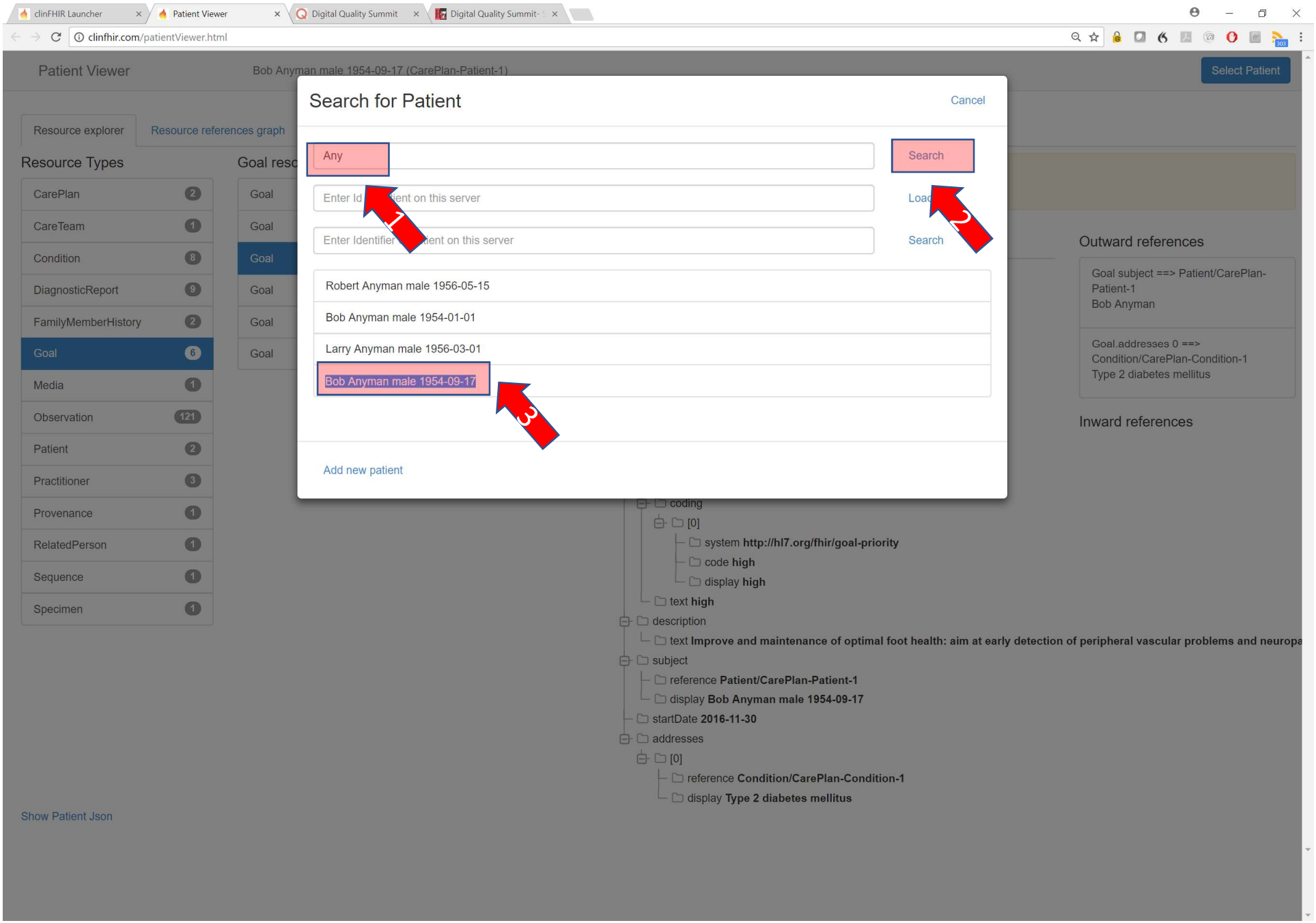
Patient Viewer

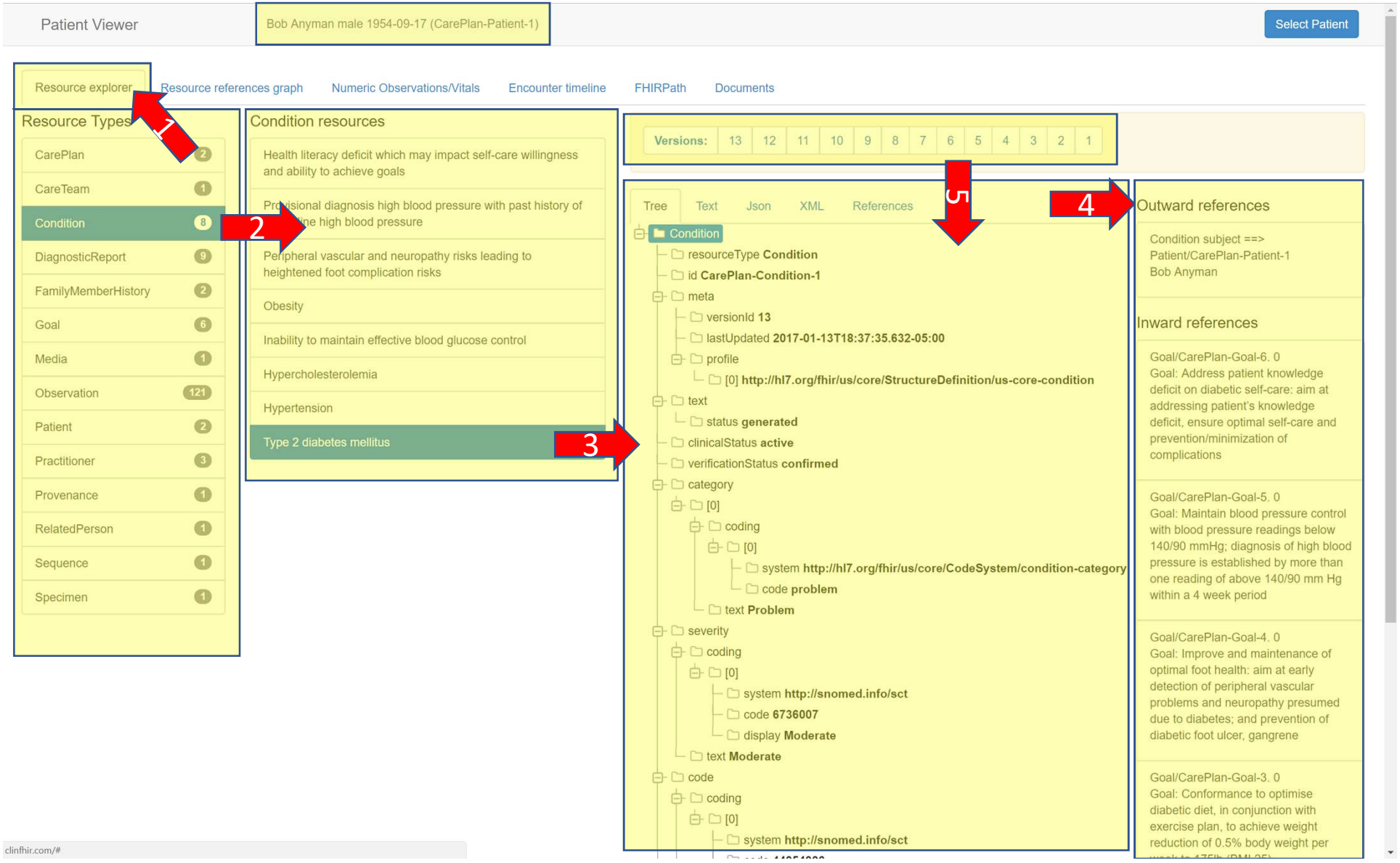
Select Patient

Please select a patient using the 'Select Patient' button at the upper right

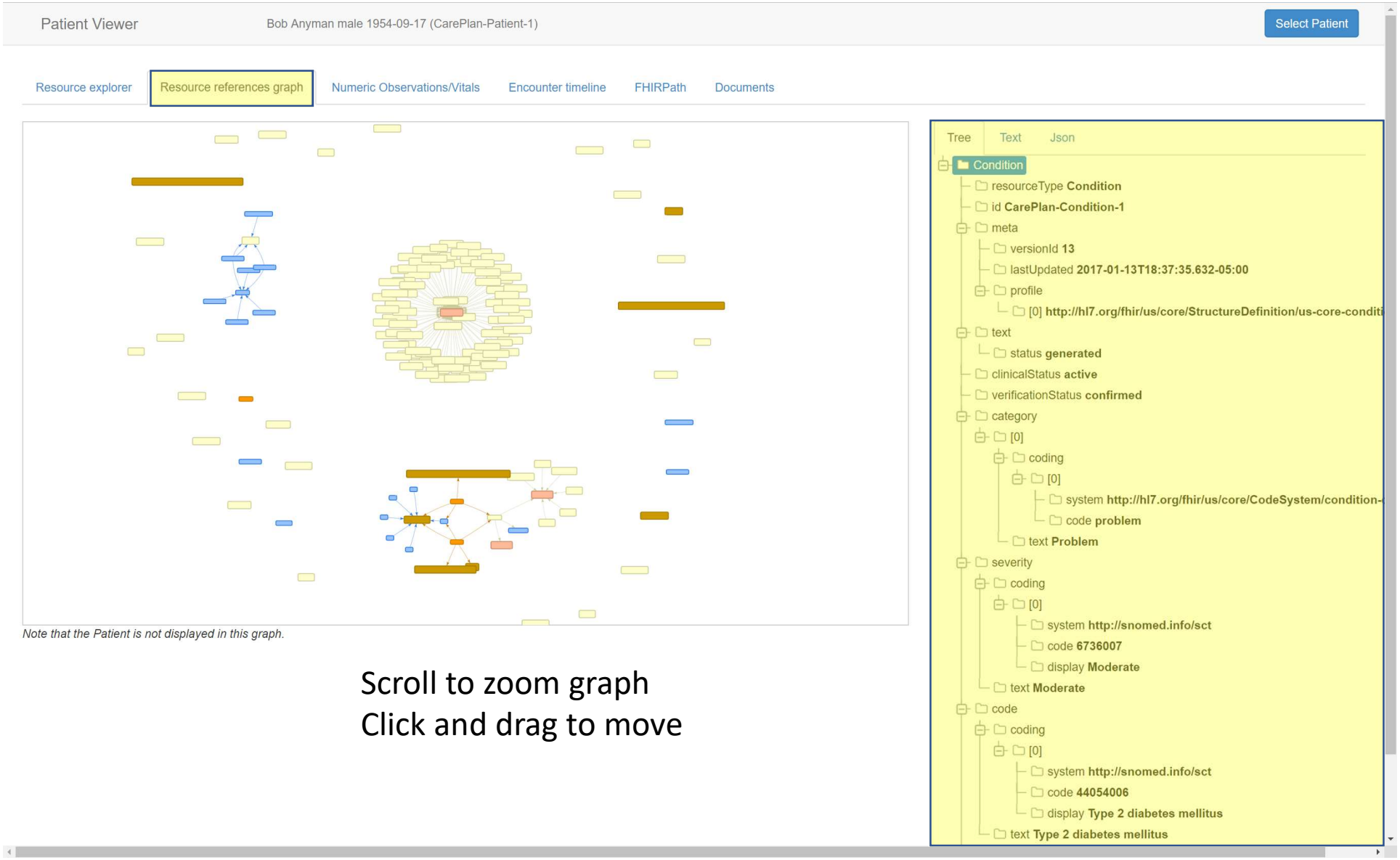
If you want to add a new patient, then click the 'Select Patient' button, and in the modal dialog that appears, there's a link to add a new patient.


clinFHIR Launcher
Patient Viewer
Digital Quality Summit
clinfhir.com/patientViewer.html
Patient Viewer
Bob Anyman male 1954-09-17 (CarePlan-Patient-1)
Select Patient
Search for Patient
Cancel
Any
Search
Enter Id
ent on this server
Load
Enter Identifier
ent on this server
Search
Robert Anyman male 1956-05-15
Bob Anyman male 1954-01-01
Larry Anyman male 1956-03-01
Bob Anyman male 1954-09-17
Add new patient
1
2
3
Resource explorer
Resource references graph
Resource Types
CarePlan 2
CareTeam 1
Condition 8
DiagnosticReport 9
FamilyMemberHistory 2
Goal 6
Media 1
Observation 121
Patient 2
Practitioner 3
Provenance 1
RelatedPerson 1
Sequence 1
Specimen 1
Goal resc
Goal
Goal
Goal
Goal
Goal
Outward references
Goal subject ==> Patient/CarePlan-Patient-1
Bob Anyman
Goal.addresses 0 ==> Condition/CarePlan-Condition-1
Type 2 diabetes mellitus
Inward references
coding
[0]
system http://hl7.org/fhir/goal-priority
code high
display high
text high
description
text Improve and maintenance of optimal foot health: aim at early detection of peripheral vascular problems and neuropa
subject
reference Patient/CarePlan-Patient-1
display Bob Anyman male 1954-09-17
startDate 2016-11-30
addresses
[0]
reference Condition/CarePlan-Condition-1
display Type 2 diabetes mellitus
Show Patient Json

Patient Viewer – Resource Explorer



Patient Viewer – Resource Reference Graph



Note that the Patient is not displayed in this graph.

Scroll to zoom graph
Click and drag to move

Task – Select and View Patient

- Go to Patient Viewer Module
- Enter “Fram” in Patient Search
- Select Patient
- Other interesting patients
  - Joseph Framingham
  - Aric734 Hoppe202 male 1928-02-28 on **GoFHIR** server
- Explore other servers and try out names like “Smith”
- Create a sample patient and view the data

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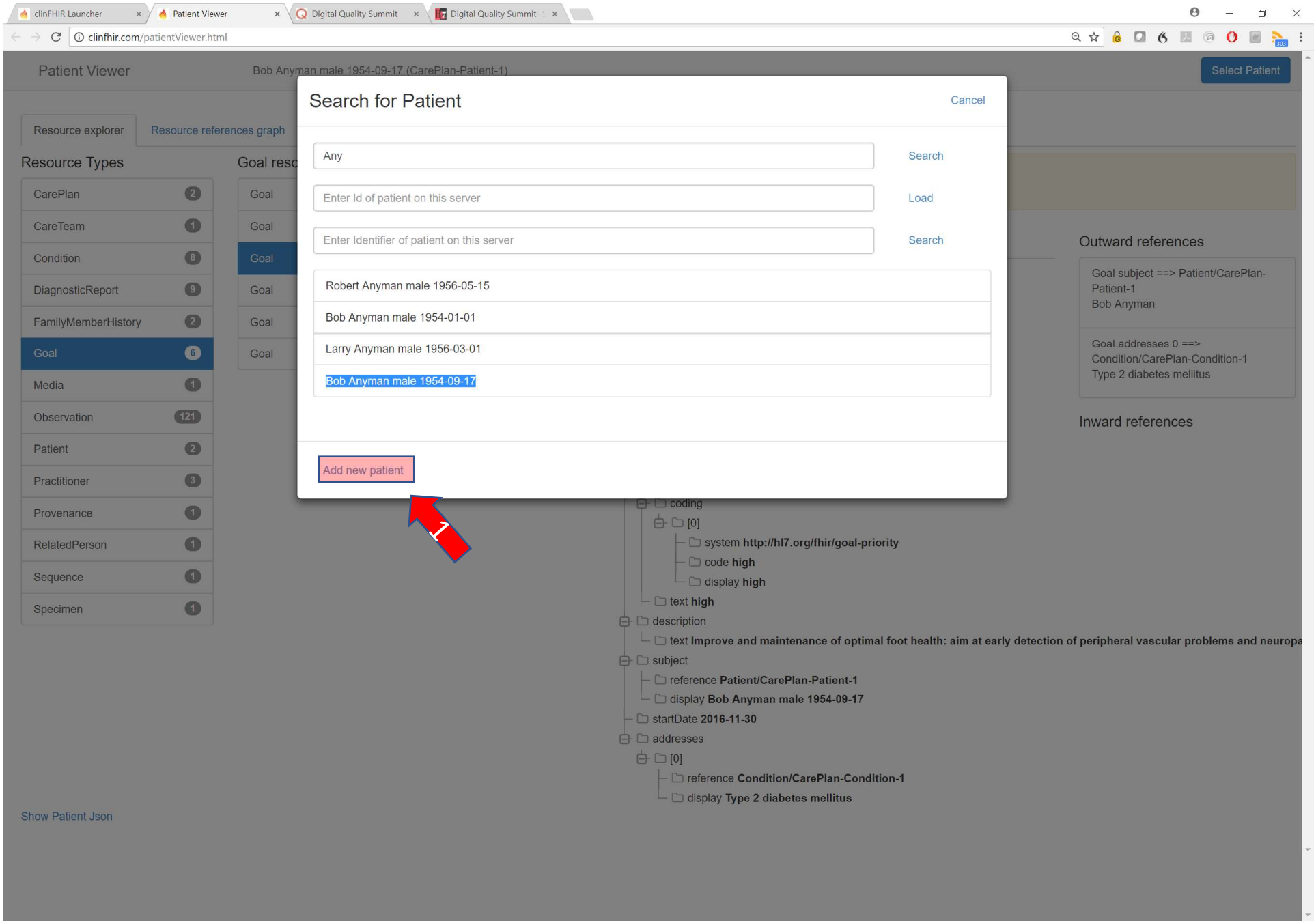
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display Bob Anyman male 1954-09-17
startDate 2016-11-30
addresses
[0]
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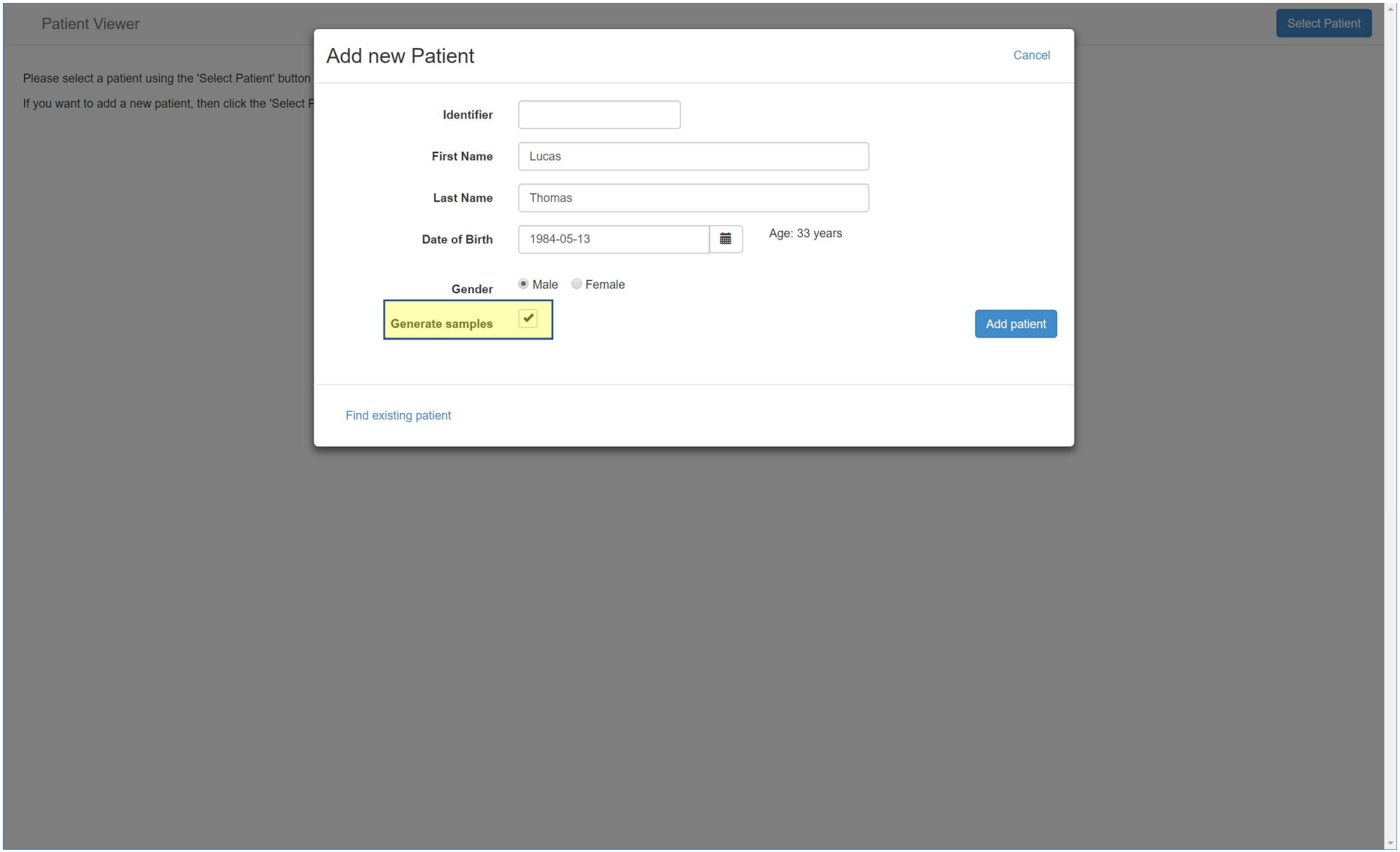
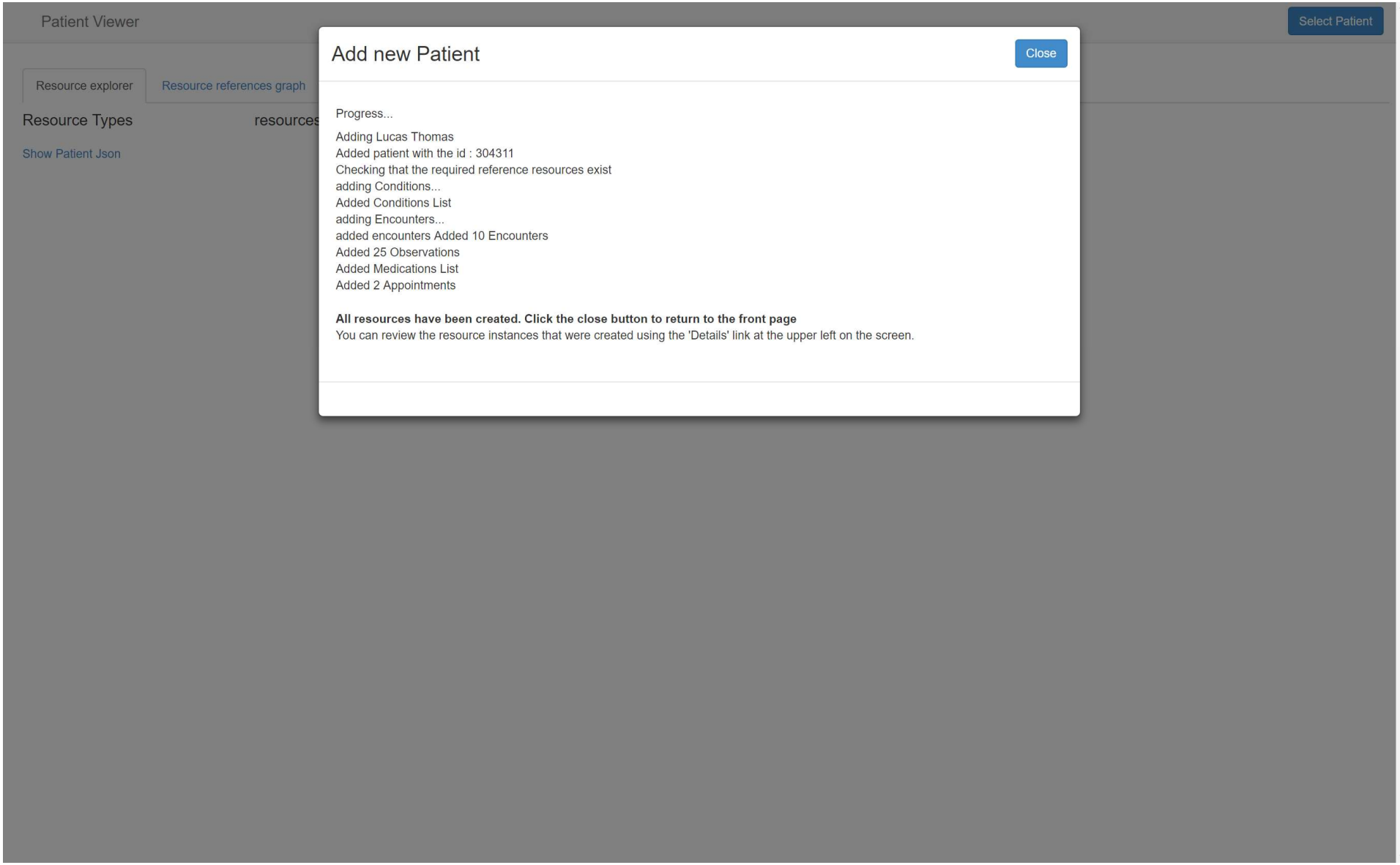
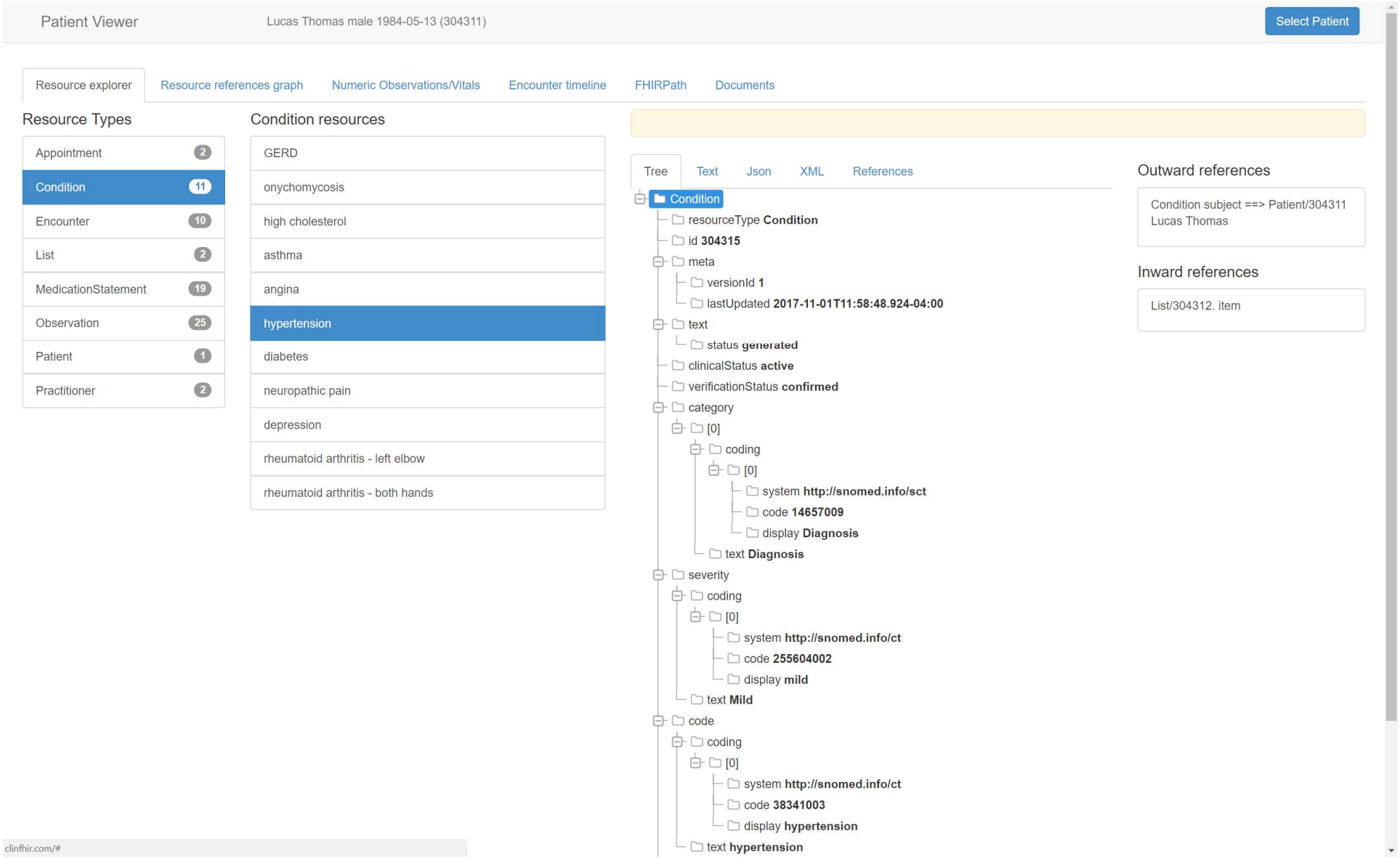
display Type 2 diabetes mellitus
Show Patient Json

Create Basic Set of Resources

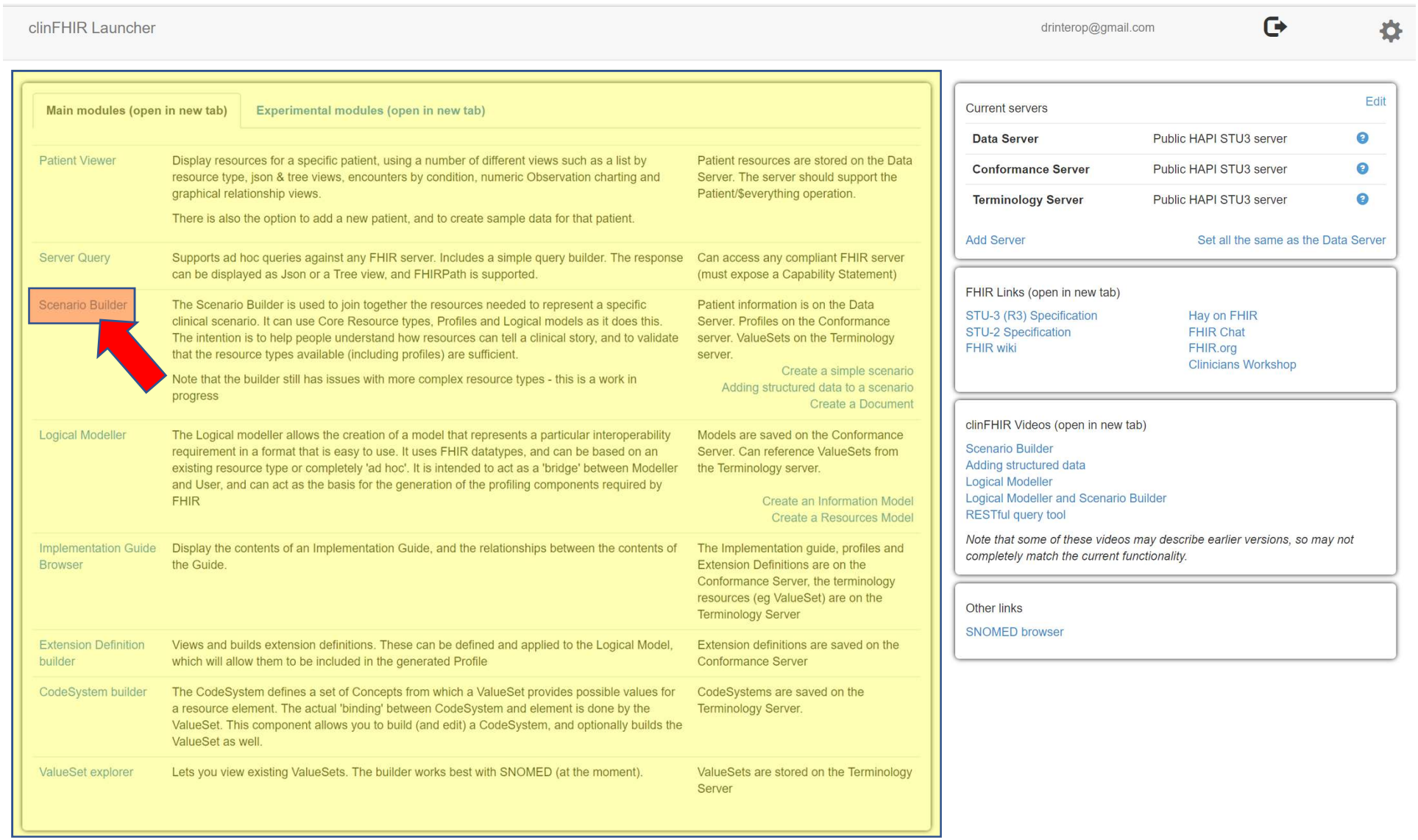



Patient Viewer
Select Patient
Resource explorer
Resource references graph
Resource Types
resources
Show Patient Json
Add new Patient
Close
Progress...
Adding Lucas Thomas
Added patient with the id : 304311
Checking that the required reference resources exist
adding Conditions...
Added Conditions List
adding Encounters...
added encounters Added 10 Encounters
Added 25 Observations
Added Medications List
Added 2 Appointments
All resources have been created. Click the close button to return to the front page
You can review the resource instances that were created using the 'Details' link at the upper left on the screen.

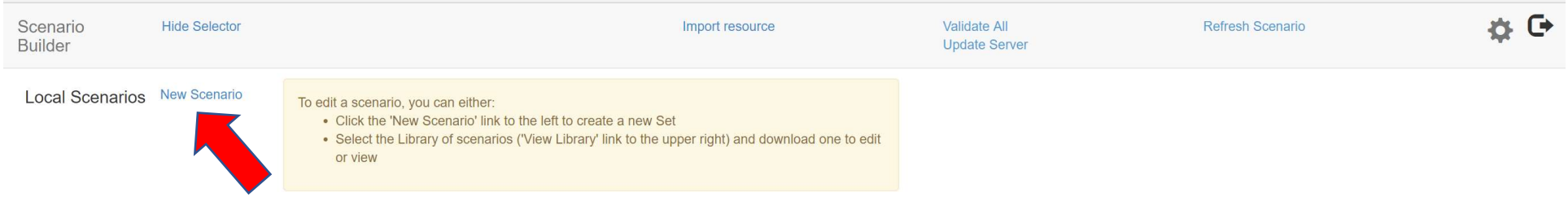

Patient Viewer
Lucas Thomas male 1984-05-13 (304311)
Select Patient
Resource explorer
Resource references graph
Numeric Observations/Vitals
Encounter timeline
FHIRPath
Documents
Resource Types
Appointment 2
Condition 11
Encounter 10
List 2
MedicationStatement 19
Observation 25
Patient 1
Practitioner 2
Condition resources
GERD
onychomycosis
high cholesterol
asthma
angina
hypertension
diabetes
neuropathic pain
depression
rheumatoid arthritis - left elbow
rheumatoid arthritis - both hands
Tree
Text
Json
XML
References
Condition
resourceType Condition
id 304315
meta
versionId 1
lastUpdated 2017-11-01T11:58:48.924-04:00
text
status generated
clinicalStatus active
verificationStatus confirmed
category
[0]
coding
[0]
system http://snomed.info/sct
code 14657009
display Diagnosis
text Diagnosis
severity
coding
[0]
system http://snomed.info/ct
code 255604002
display mild
text Mild
code
coding
[0]
system http://snomed.info/ct
code 38341003
display hypertension
text hypertension
Outward references
Condition subject ==> Patient/304311 Lucas Thomas
Inward references
List/304312. item
clinfhir.com/#

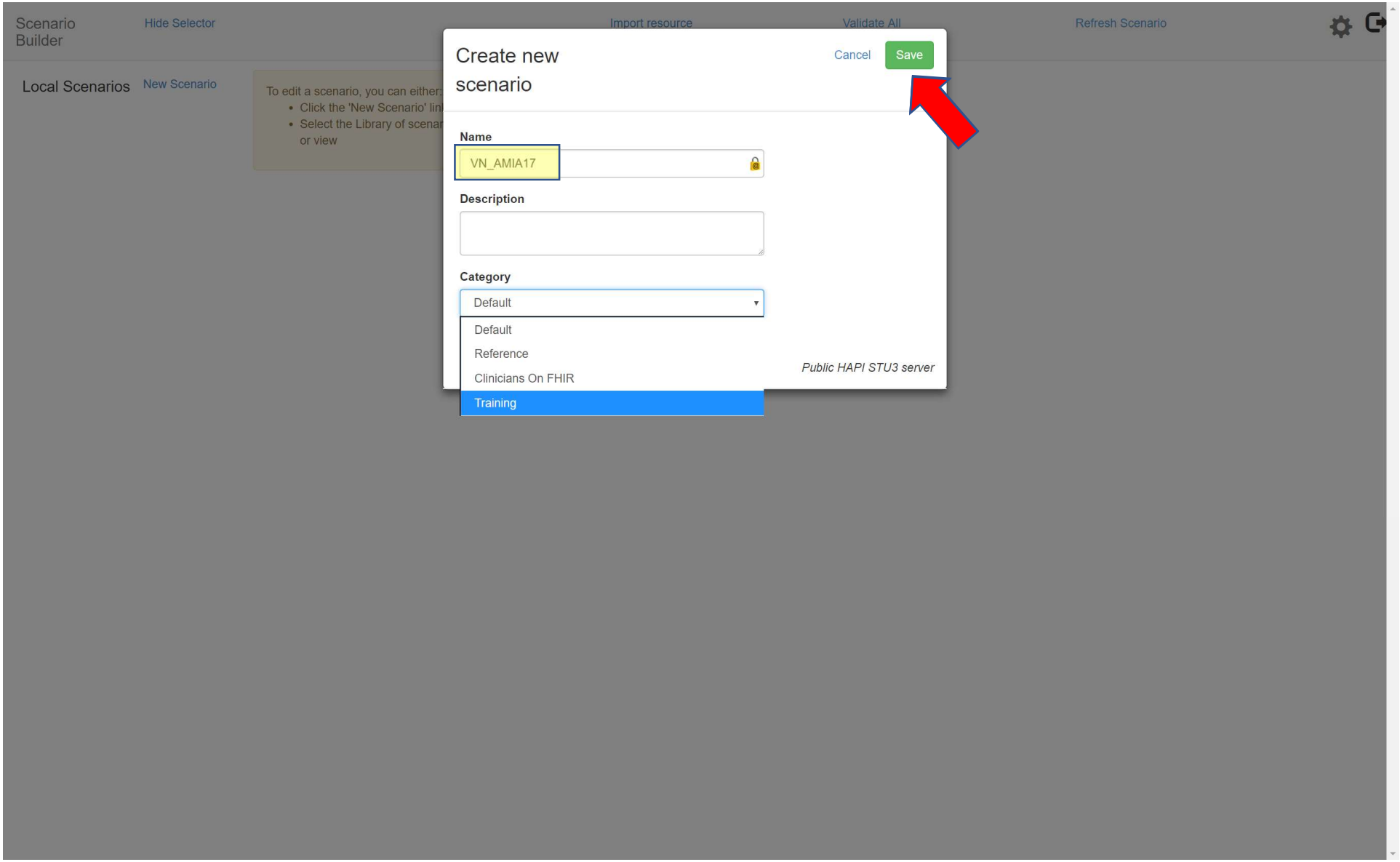
Creating FHIR Resource INSTANCES

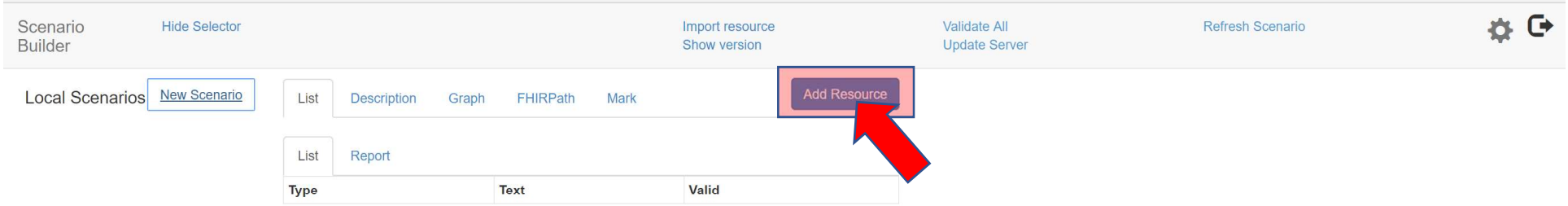
Scenario Builder Module



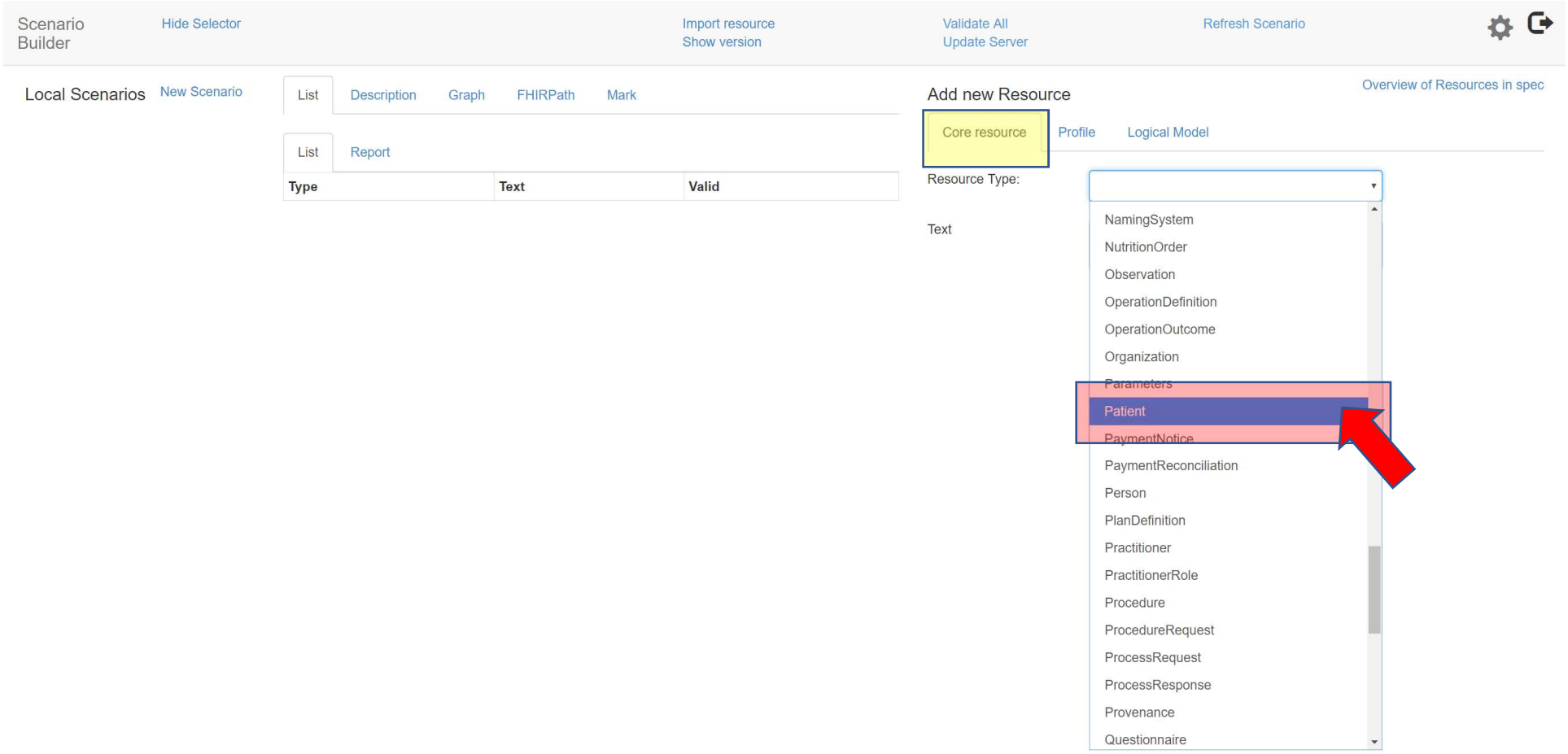
Create New Scenario

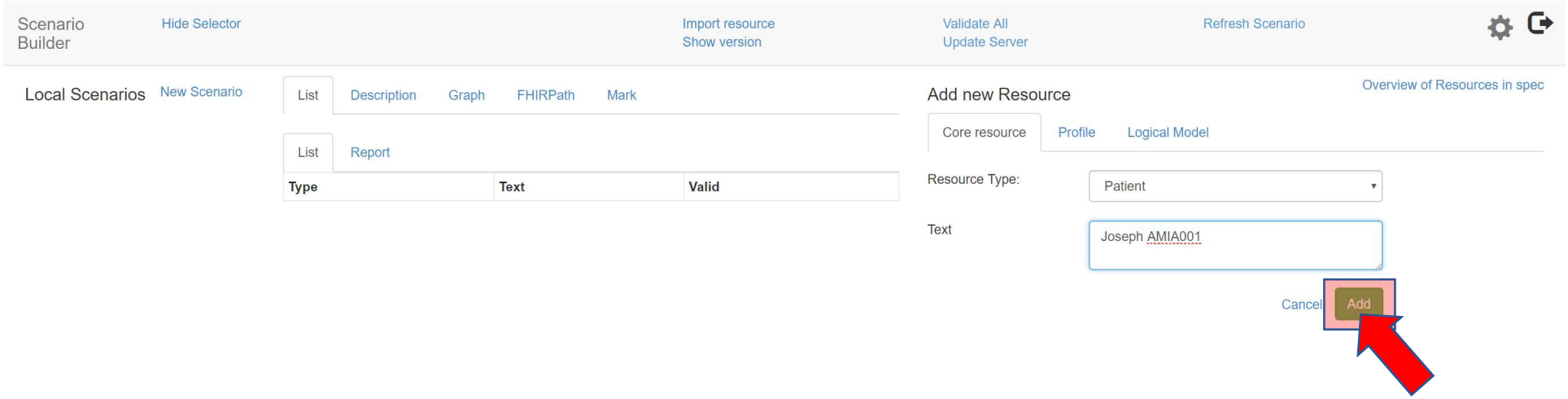



Scenario Builder
Hide Selector
Import resource
Validate All
Refresh Scenario
Local Scenarios
New Scenario
To edit a scenario, you can either:
Click the 'New Scenario' lin
Select the Library of scenar
or view
Create new scenario
Cancel
Save
Name
VN_AMIA17
Description
Category
Default
Default
Reference
Clinicians On FHIR
Training
Public HAPI STU3 server



Note: Scenarios are saved locally and need to be posted to a server in order to be shared. Stay tuned!


Scenario Builder
Hide Selector
Import resource
Show version
Validate All
Update Server
Refresh Scenario
Local Scenarios
New Scenario
List
Description
Graph
FHIRPath
Mark
List
Report
Type
Text
Valid
Add new Resource
Overview of Resources in spec
Core resource
Profile
Logical Model
Resource Type:
Text
NamingSystem
NutritionOrder
Observation
OperationDefinition
OperationOutcome
Organization
Parameters
Patient
PaymentNotice
PaymentReconciliation
Person
PlanDefinition
Practitioner
PractitionerRole
Procedure
ProcedureRequest
ProcessRequest
ProcessResponse
Provenance
Questionnaire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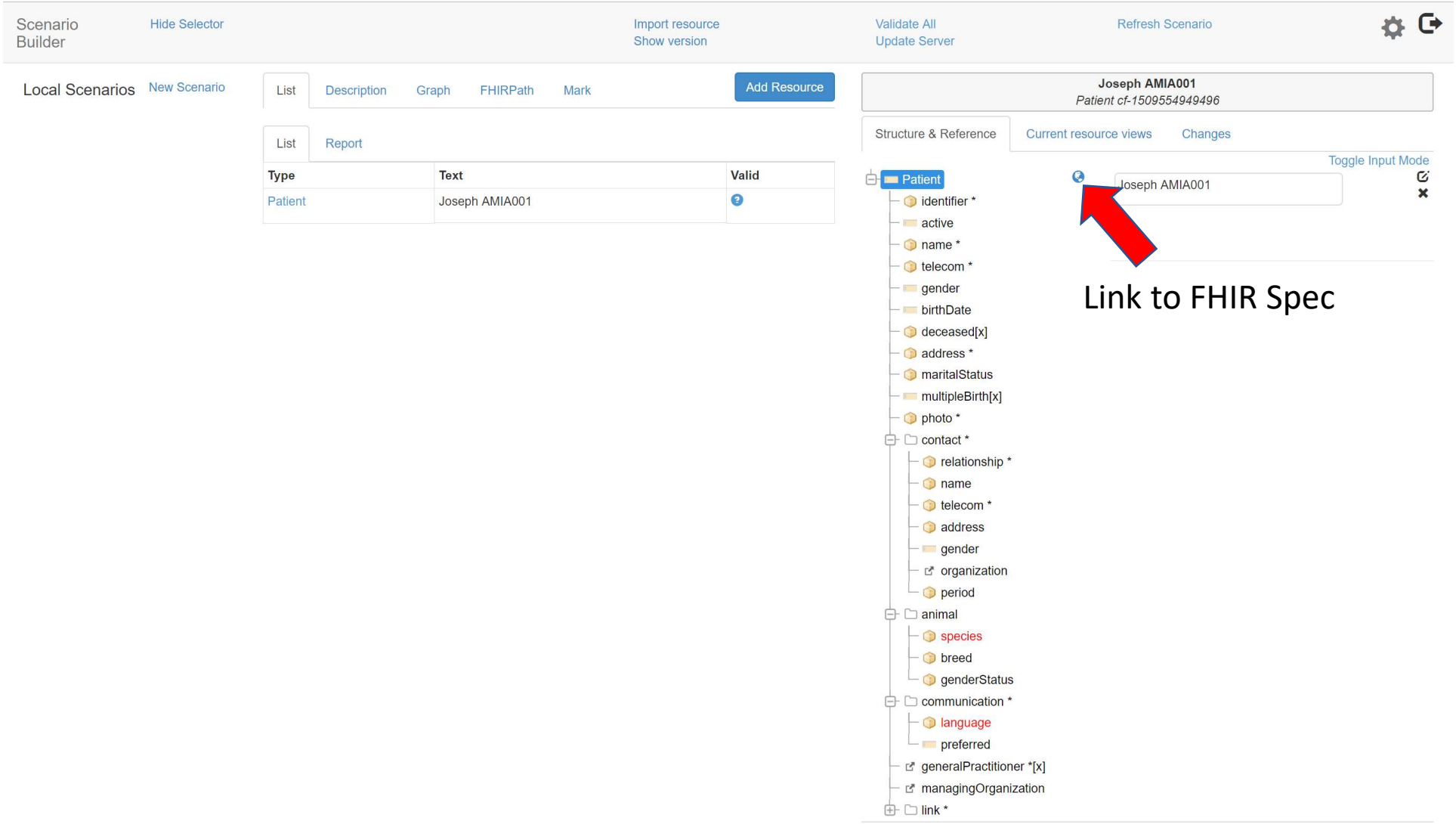
Overview of Resources in spec
Core resource
Profile
Logical Model
Resource Type:
Patient
Text
Joseph AMIA001
Cancel
Add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Type
Text
Valid
Patient
Joseph AMIA001
Joseph AMIA001
Patient cf-1509554949496
Structure & Reference
Current resource views
Changes
Toggle Input Mode
Patient
Joseph AMIA001
identifier *
active
name *
telecom *
gender
birthDate
deceased[x]
address *
maritalStatus
multipleBirth[x]
photo *
contact *
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name
telecom *
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species
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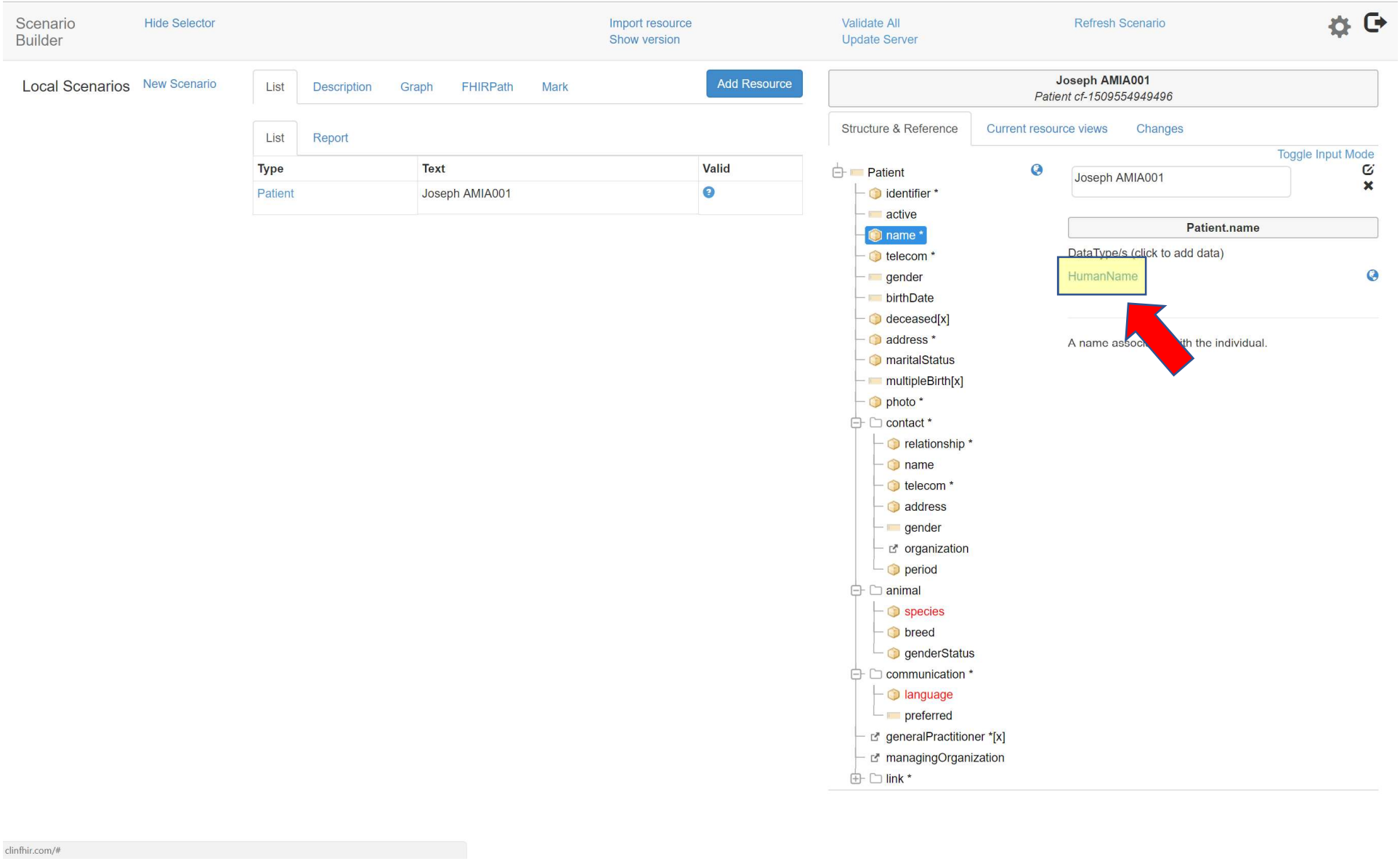
language
preferred
generalPractitioner *[x]
managingOrganization
link *
Link to FHIR Spec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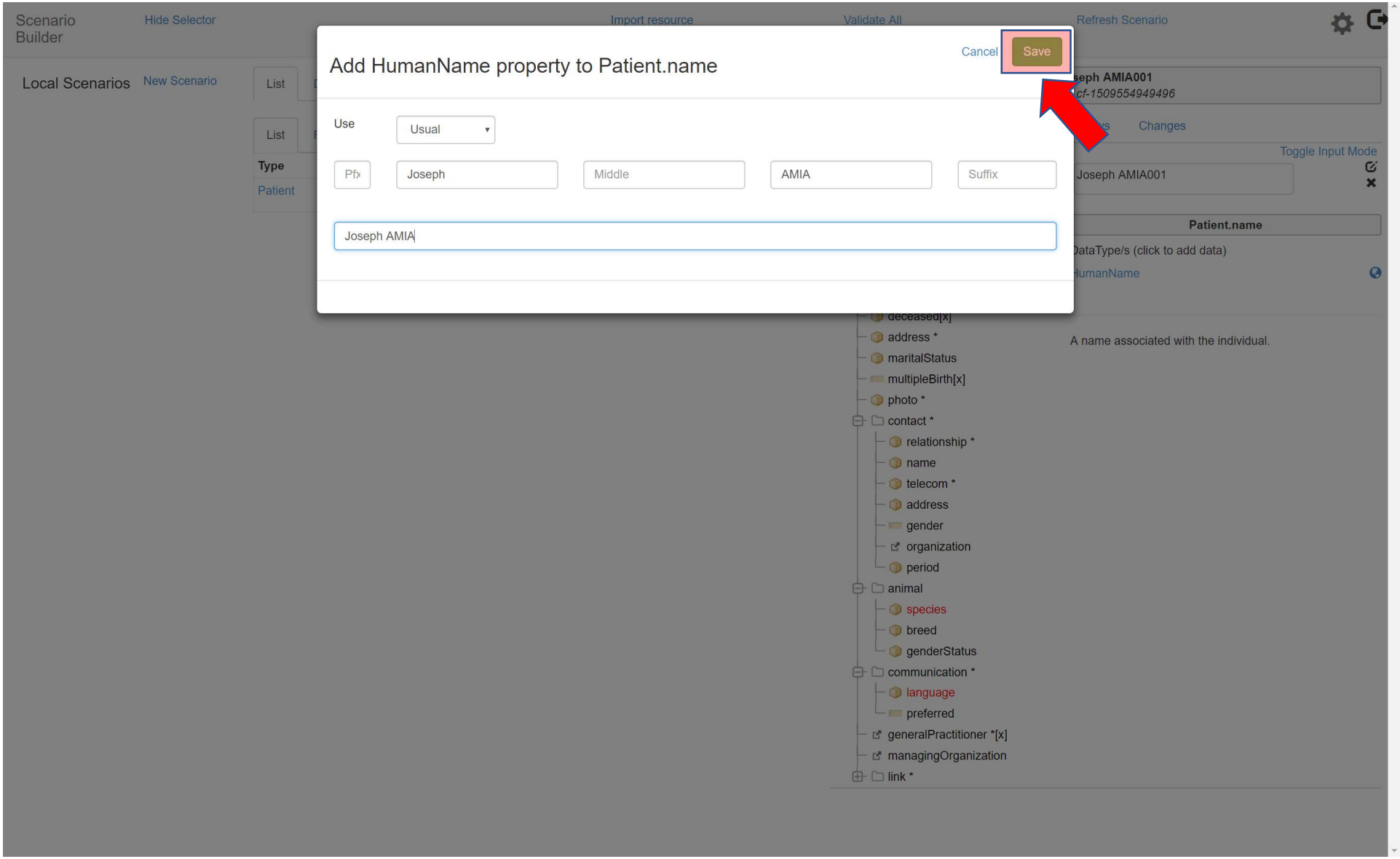
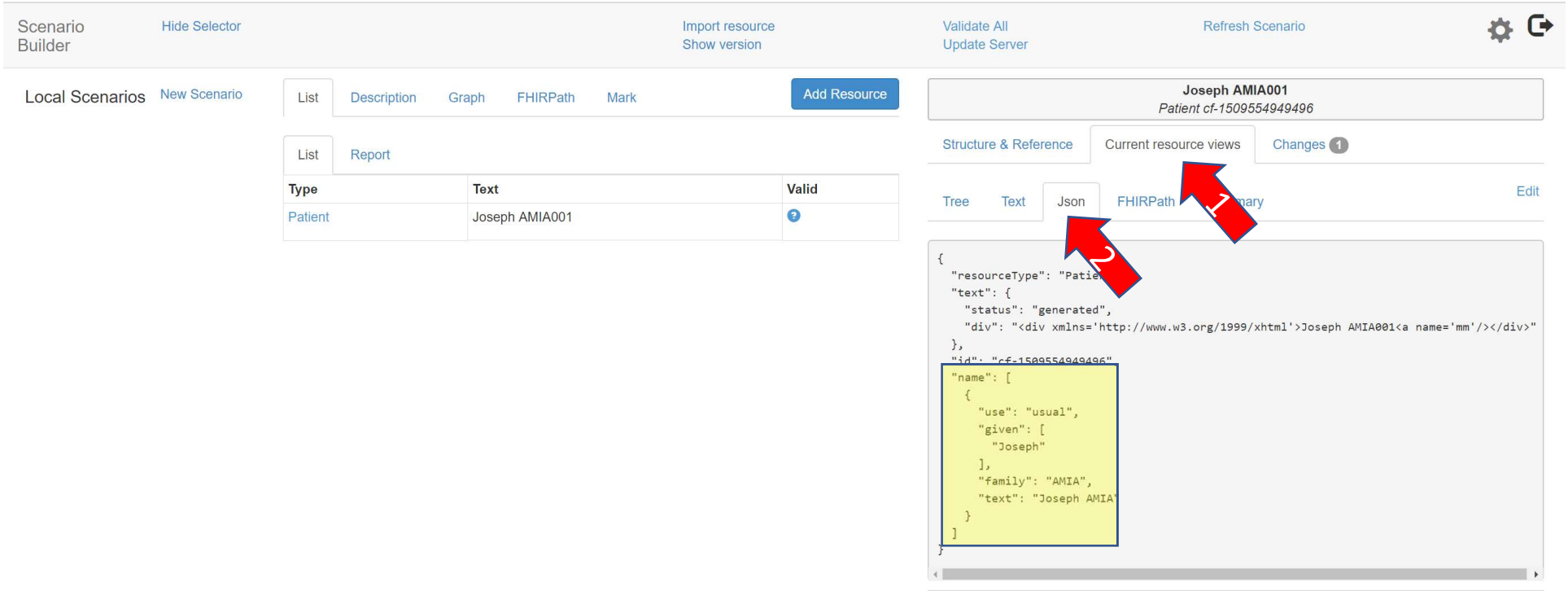
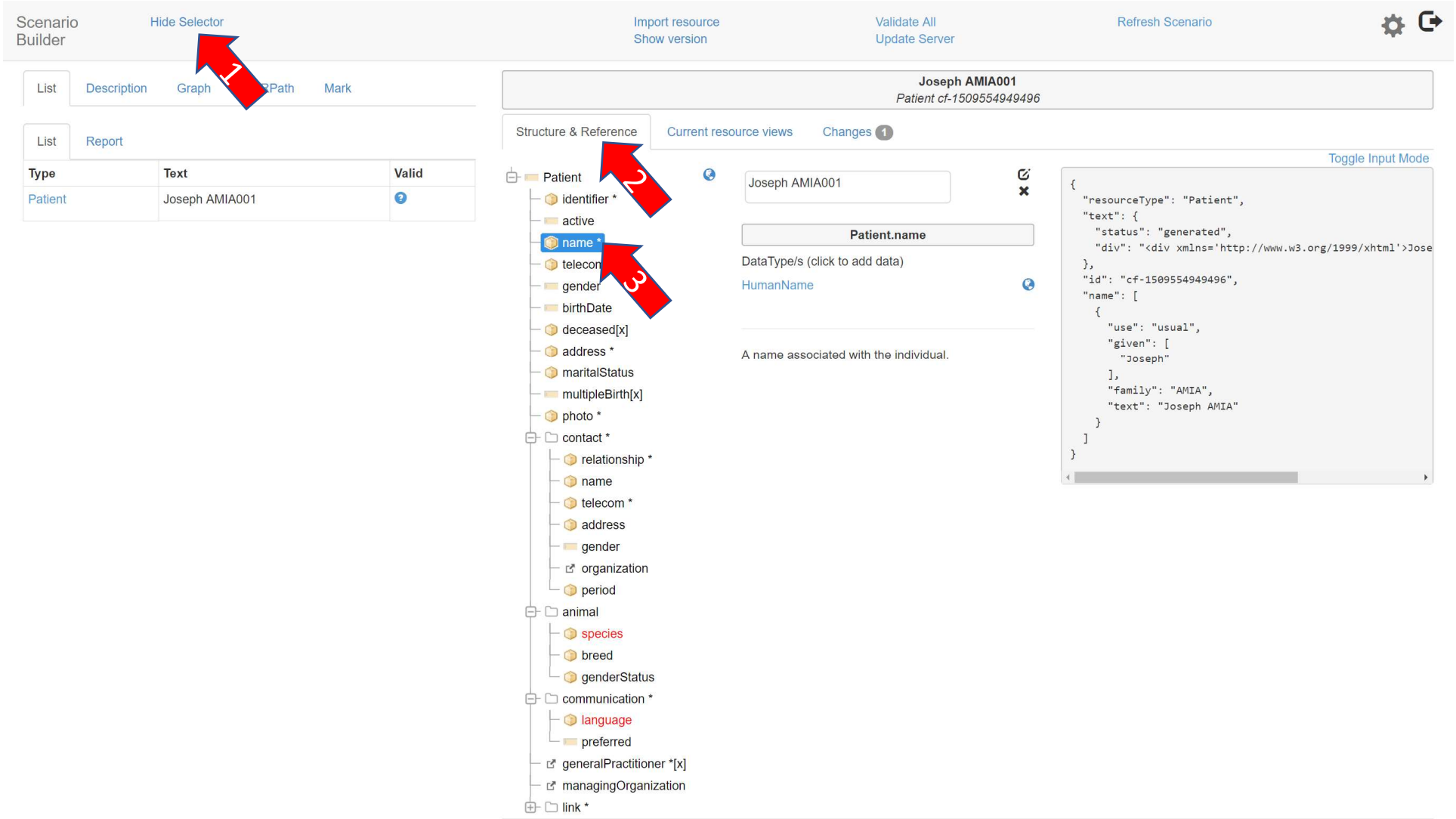
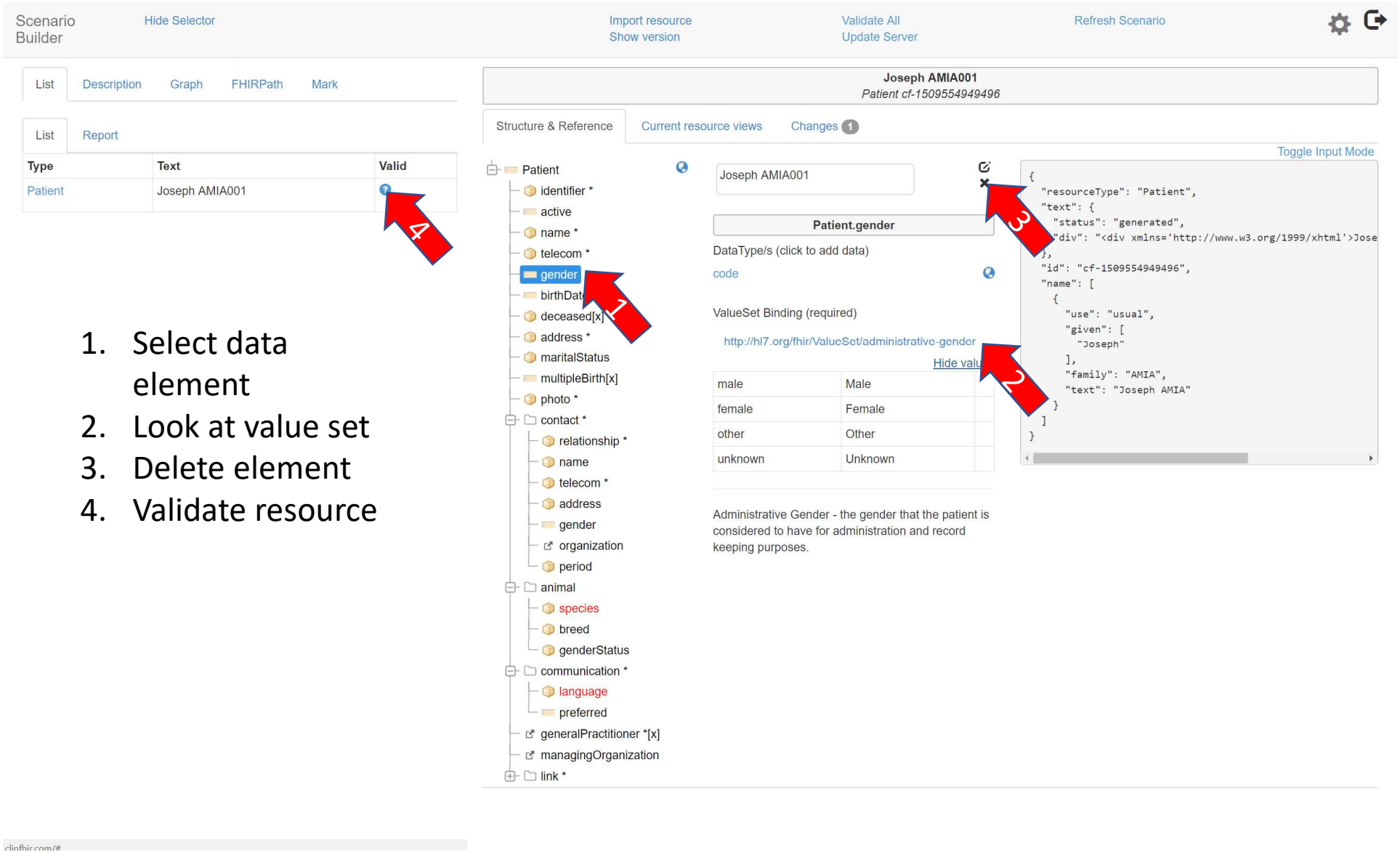
Patient
Joseph AMIA001
Joseph AMIA001
Patient cf-1509554949496
Structure & Reference
Current resource views
Changes
Toggle Input Mode
Patient
identifier *
active
name *
telecom *
gender
birthDate
deceased[x]
address *
maritalStatus
multipleBirth[x]
photo *
contact *
relationship *
name
telecom *
address
gender
organization
period
animal
species
breed
genderStatus
communication *
language
preferred
generalPractitioner *[x]
managingOrganization
link *
Joseph AMIA001
Patient.name
DataType/s (click to add data)
HumanName
A name associ ith the individual.
clinfhir.com/#


Scenario Builder
Hide Selector
Import resource
Validate All
Refresh Scenario
Local Scenarios
New Scenario
List
Add HumanName property to Patient.name
Cancel
Save
Use
Usual
Pfx
Joseph
Middle
AMIA
Suffix
Joseph AMIA
Changes
Toggle Input Mode
Joseph AMIA001
Patient.name
DataType/s (click to add data)
HumanName
A name associated with the individual.
Type
Patient
deceased[x]
address *
maritalStatus
multipleBirth[x]
photo *
contact *
relationship *
name
telecom *
address
gender
organization
period
animal
species
breed
genderStatus
communication *
language
preferred
generalPractitioner *[x]
managingOrganization
link *

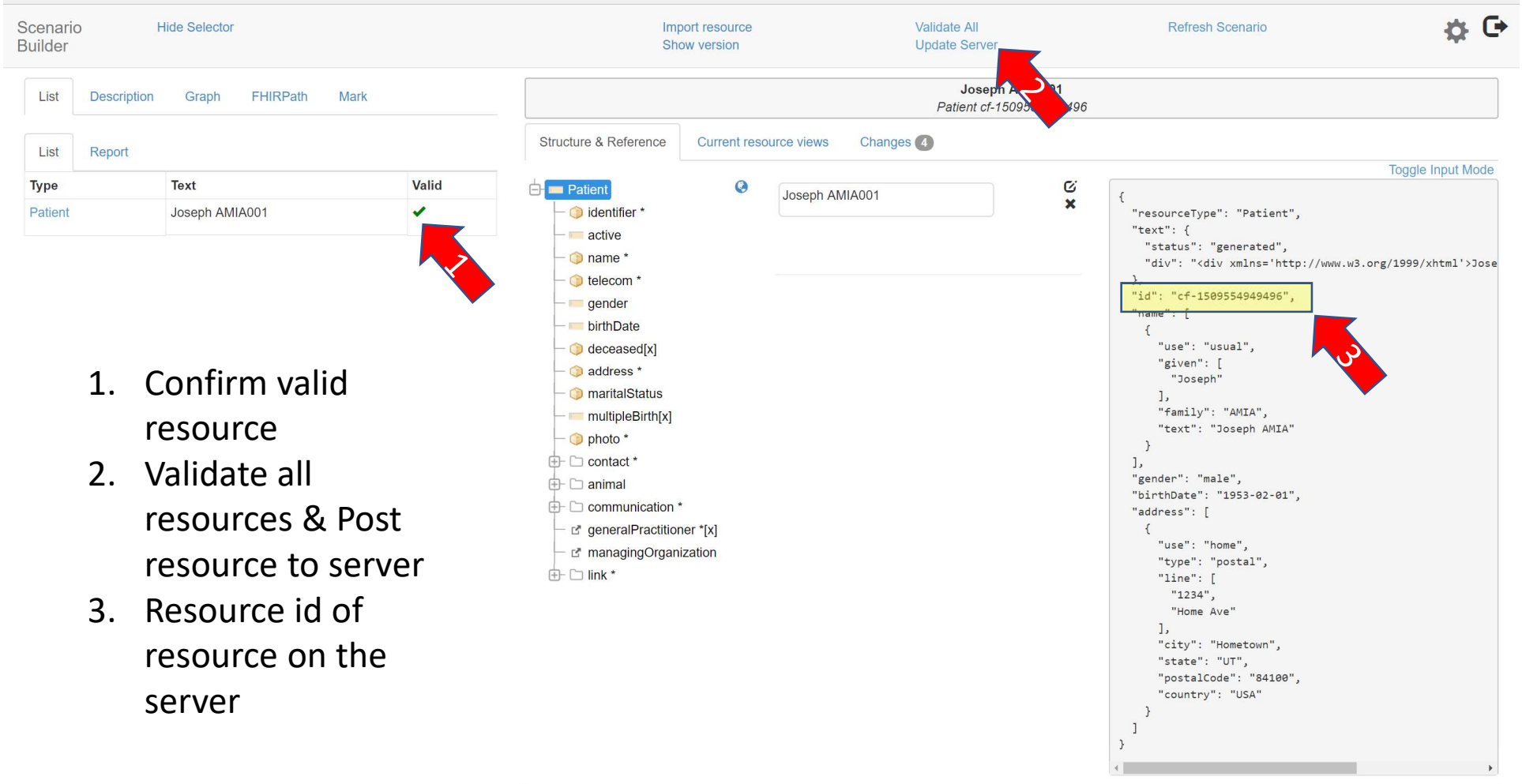

Scenario Builder
Hide Selector
Import resource
Show version
Validate All
Update Server
Refresh Scenario
Local Scenarios
New Scenario
List
Description
Graph
FHIRPath
Mark
Add Resource
List
Report
Type
Text
Valid
Patient
Joseph AMIA001
Joseph AMIA001
Patient cf-1509554949496
Structure & Reference
Current resource views
Changes 1
Tree
Text
Json
FHIRPath
Edit
1
2
{
"resourceType": "Patie
"text": {
"status": "generated",
"div": " Joseph AMIA001<a name='mm'/> "
},
"name": [
{
"use": "usual",
"given": [
"Joseph"
],
"family": "AMIA",
"text": "Joseph AMIA
}
]
}


Scenario Builder
Hide Selector
Import resource
Show version
Validate All
Update Server
Refresh Scenario
List
Description
Graph
FHIRPath
Mark
List
Report
Type
Text
Valid
Patient
Joseph AMIA001
Joseph AMIA001
Patient cf-1509554949496
Structure & Reference
Current resource views
Changes 1
Toggle Input Mode
Patient
identifier *
active
name *
telecom
gender
birthDate
deceased[x]
address *
maritalStatus
multipleBirth[x]
photo *
contact *
relationship *
name
telecom *
address
gender
organization
period
animal
species
breed
genderStatus
communication *
language
preferred
generalPractitioner *[x]
managingOrganization
link *
Joseph AMIA001
Patient.name
DataType/s (click to add data)
HumanName
A name associated with the individual.
{
"resourceType": "Patient",
"text": {
"status": "generated",
"div": " Jose
},
"id": "cf-1509554949496",
"name": [
{
"use": "usual",
"given": [
"Joseph"
],
"family": "AMIA",
"text": "Joseph AMIA"
}
]
}



1. Select data element
2. Look at value set
3. Delete element
4. Validate resource

Validate Resource

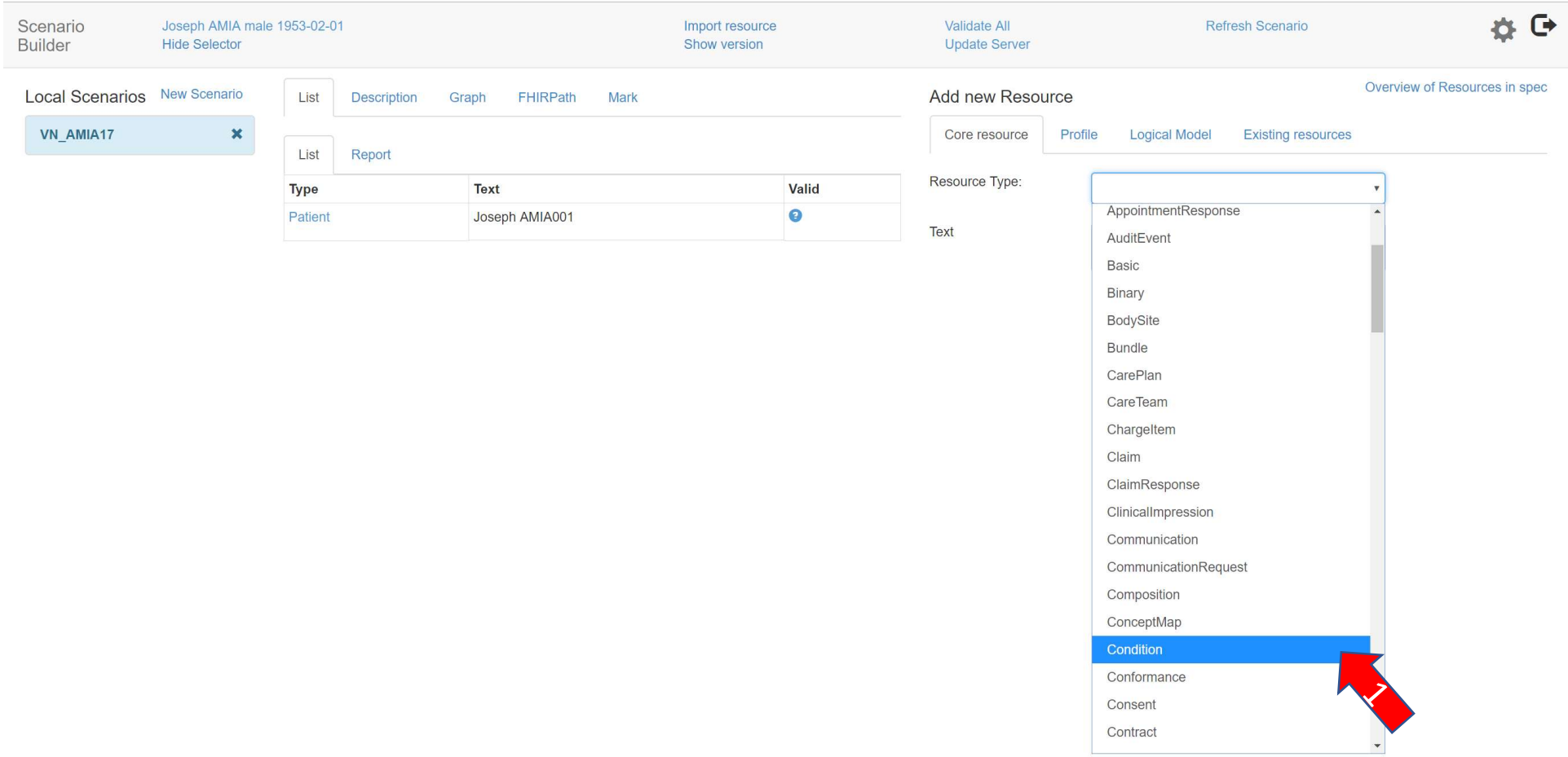


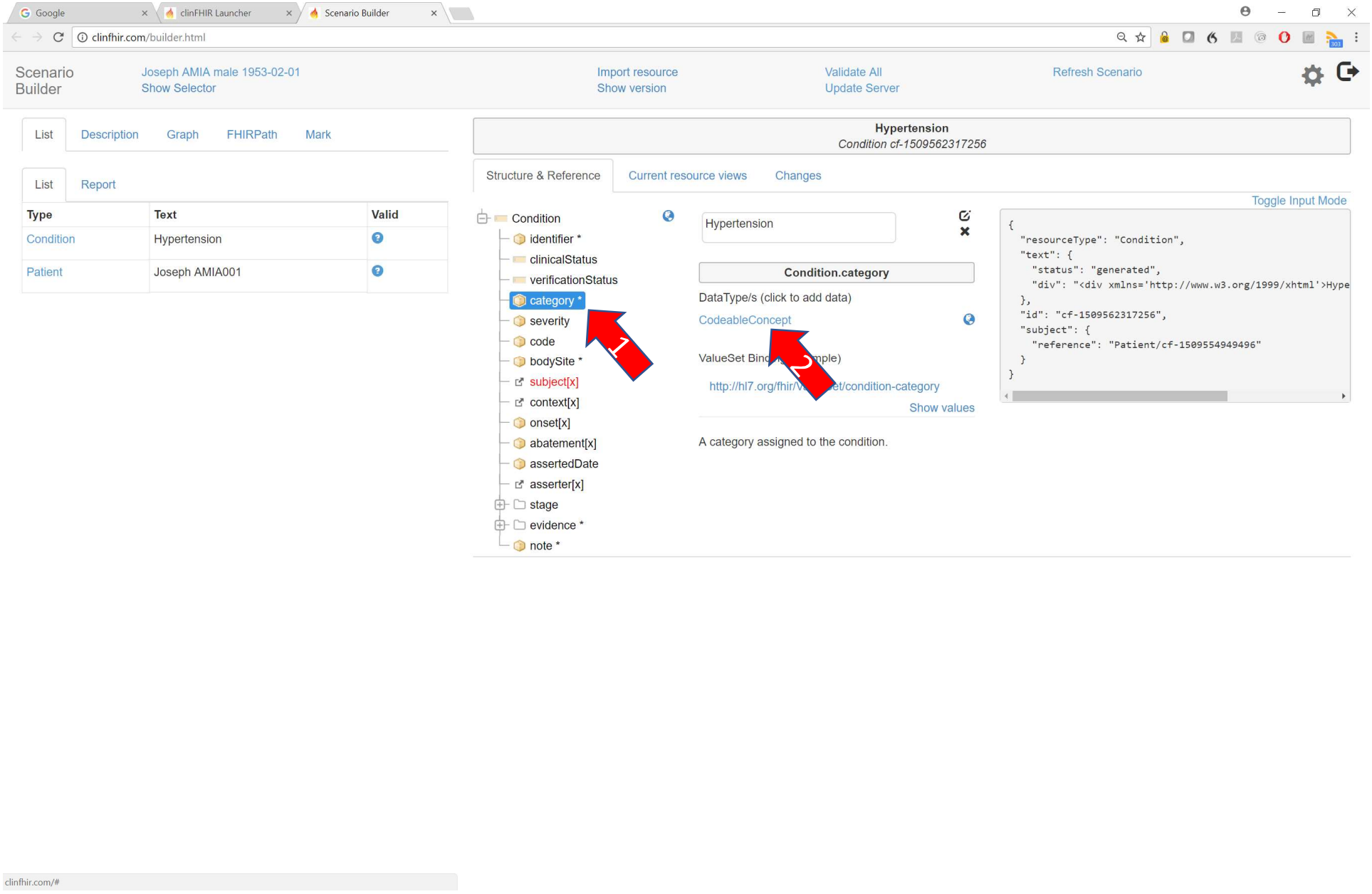
1. Confirm valid resource
2. Validate all resources & Post resource to server
3. Resource id of resource on the server

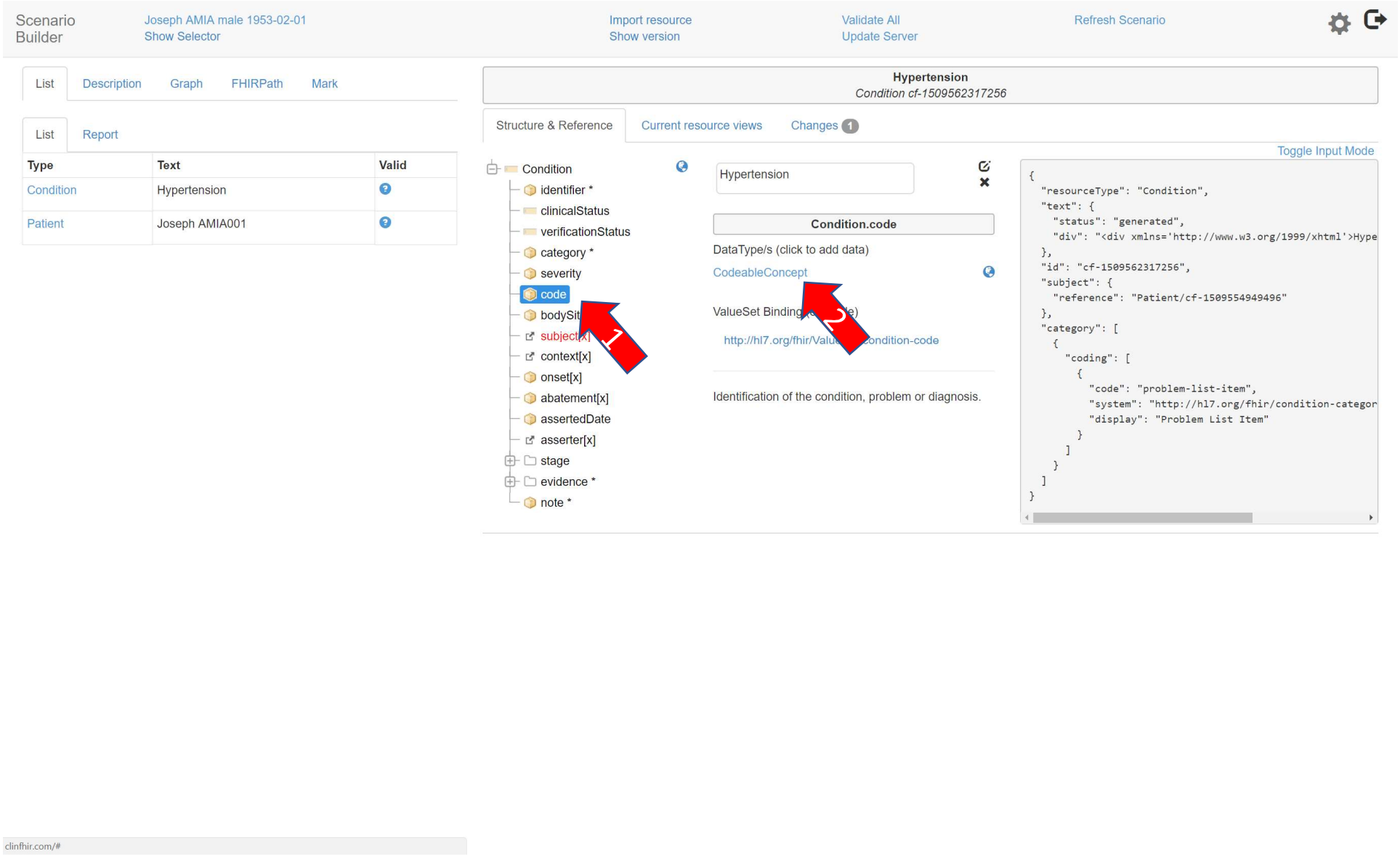
Task – Create a Patient (15 min)

- Use Scenario Builder module to create your own patient
  - Include a name, gender and birthdate
  - Record patient name and id on your note to find it later
- Validate your resource instance
- Update (POST) the resource to the data server
- Confirm that your patient is on the data server using the Patient Viewer module and the patient id

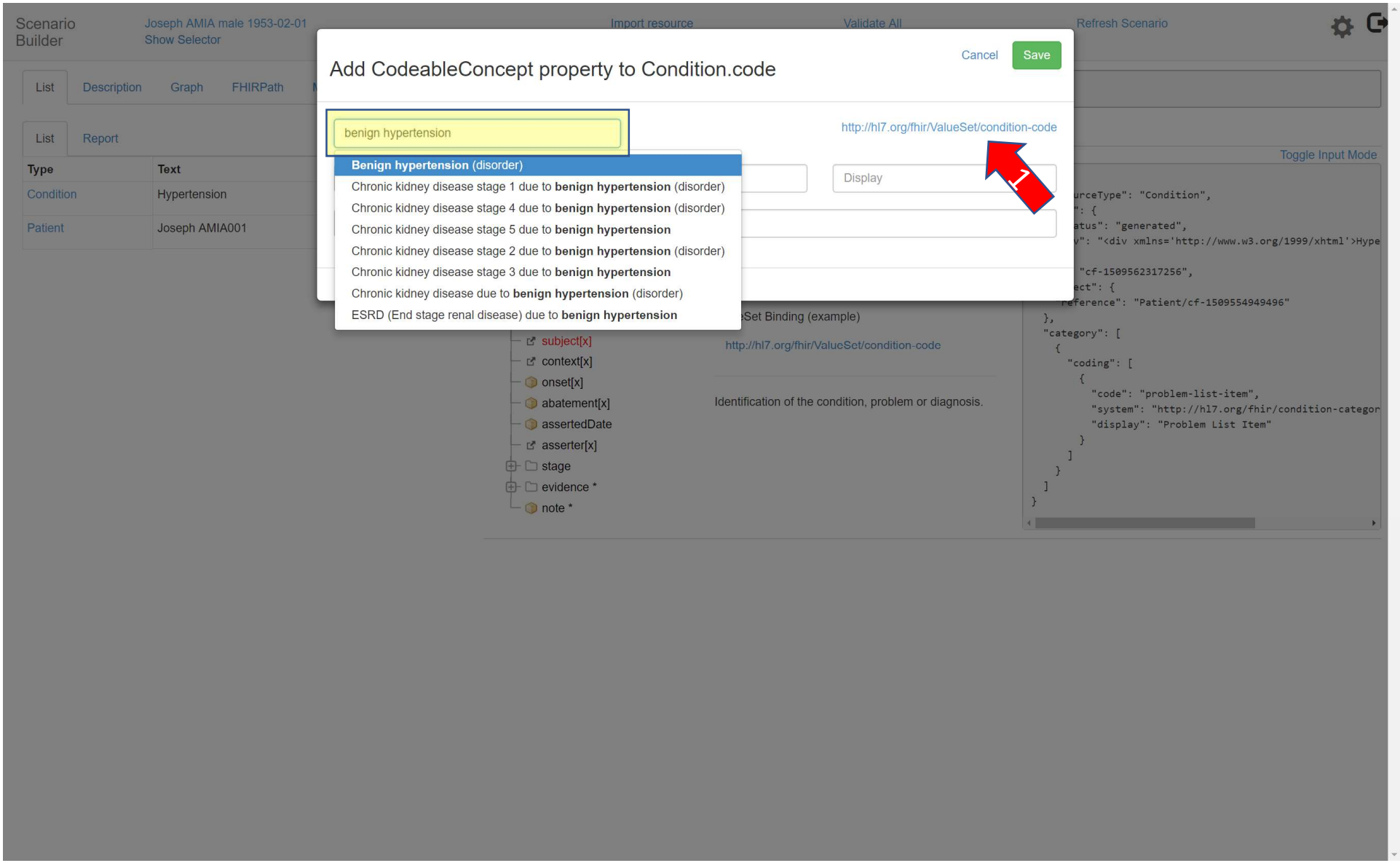
Create FHIR Condition Instance


Scenario Builder
Joseph AMIA male 1953-02-01
Hide Selector
Import resource
Show version
Validate All
Update Server
Refresh Scenario
Local Scenarios
New Scenario
VN_AMIA17
List
Description
Graph
FHIRPath
Mark
List
Report
Type
Text
Valid
Patient
Joseph AMIA001
Add new Resource
Overview of Resources in spec
Core resource
Profile
Logical Model
Existing resources
Resource Type:
Text
AppointmentResponse
AuditEvent
Basic
Binary
BodySite
Bundle
CarePlan
CareTeam
ChargeItem
Claim
ClaimResponse
ClinicalImpression
Communication
CommunicationRequest
Composition
ConceptMap
Condition
Conformance
Consent
Contract
1

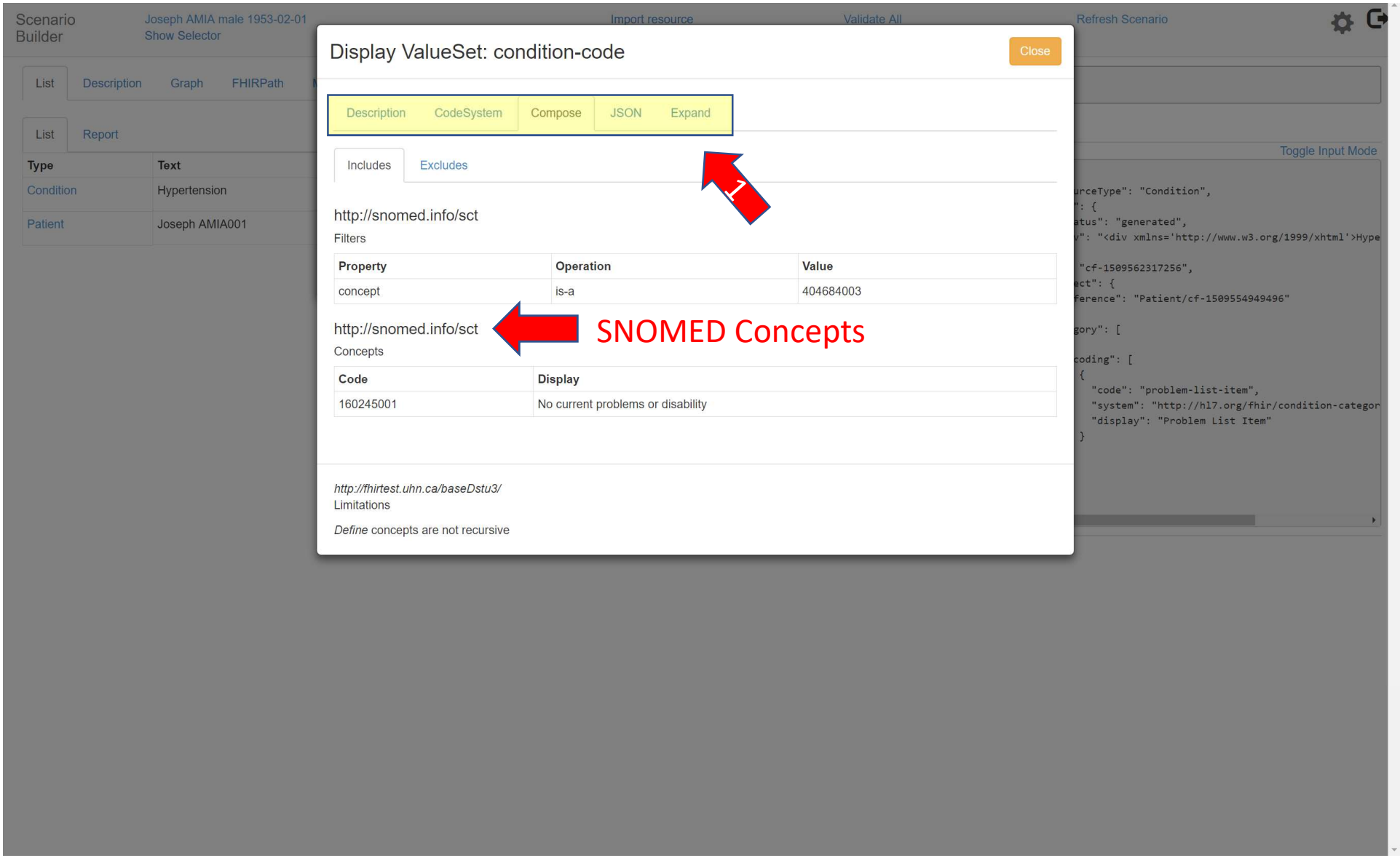

Google
clinFHIR Launcher
Scenario Builder
clinfhir.com/builder.html
Scenario Builder
Joseph AMIA male 1953-02-01
Show Selector
Import resource
Show version
Validate All
Update Server
Refresh Scenario
List
Description
Graph
FHIRPath
Mark
List
Report
Type
Text
Valid
Condition
Hypertension
Patient
Joseph AMIA001
Hypertension
Condition cf-1509562317256
Structure & Reference
Current resource views
Changes
Toggle Input Mode
Condition
identifier *
clinicalStatus
verificationStatus
category *
severity
code
bodySite *
subject[x]
context[x]
onset[x]
abatement[x]
assertedDate
asserter[x]
stage
evidence *
note *
Hypertension
Condition.category
DataType/s (click to add data)
CodeableConcept
Show values
A category assigned to the condition.
{
"resourceType": "Condition",
"text": {
"status": "generated",
"div": " Hype
},
"id": "cf-1509562317256",
"subject": {
"reference": "Patient/cf-1509554949496"
}
}
clinfhir.com/#


Scenario Builder
Joseph AMIA male 1953-02-01
Show Selector
Import resource
Show version
Validate All
Update Server
Refresh Scenario
List
Description
Graph
FHIRPath
Mark
List
Report
Type
Text
Valid
Condition
Hypertension
Patient
Joseph AMIA001
Hypertension
Condition cf-1509562317256
Structure & Reference
Current resource views
Changes 1
Toggle Input Mode
Condition
identifier *
clinicalStatus
verificationStatus
category *
severity
code
bodySit
subject[x]
context[x]
onset[x]
abatement[x]
assertedDate
asserter[x]
stage
evidence *
note *
Hypertension
Condition.code
DataType/s (click to add data)
CodeableConcept
ValueSet Binding
http://hl7.org/fhir/Valu
condition-code
Identification of the condition, problem or diagnosis.
{
"resourceType": "Condition",
"text": {
"status": "generated",
"div": " Hype
},
"id": "cf-1509562317256",
"subject": {
"reference": "Patient/cf-1509554949496"
},
"category": [
{
"coding": [
{
"code": "problem-list-item",
"system": "http://hl7.org/fhir/condition-categor
"display": "Problem List Item"
}
]
}
]
}
clinfhir.com/#

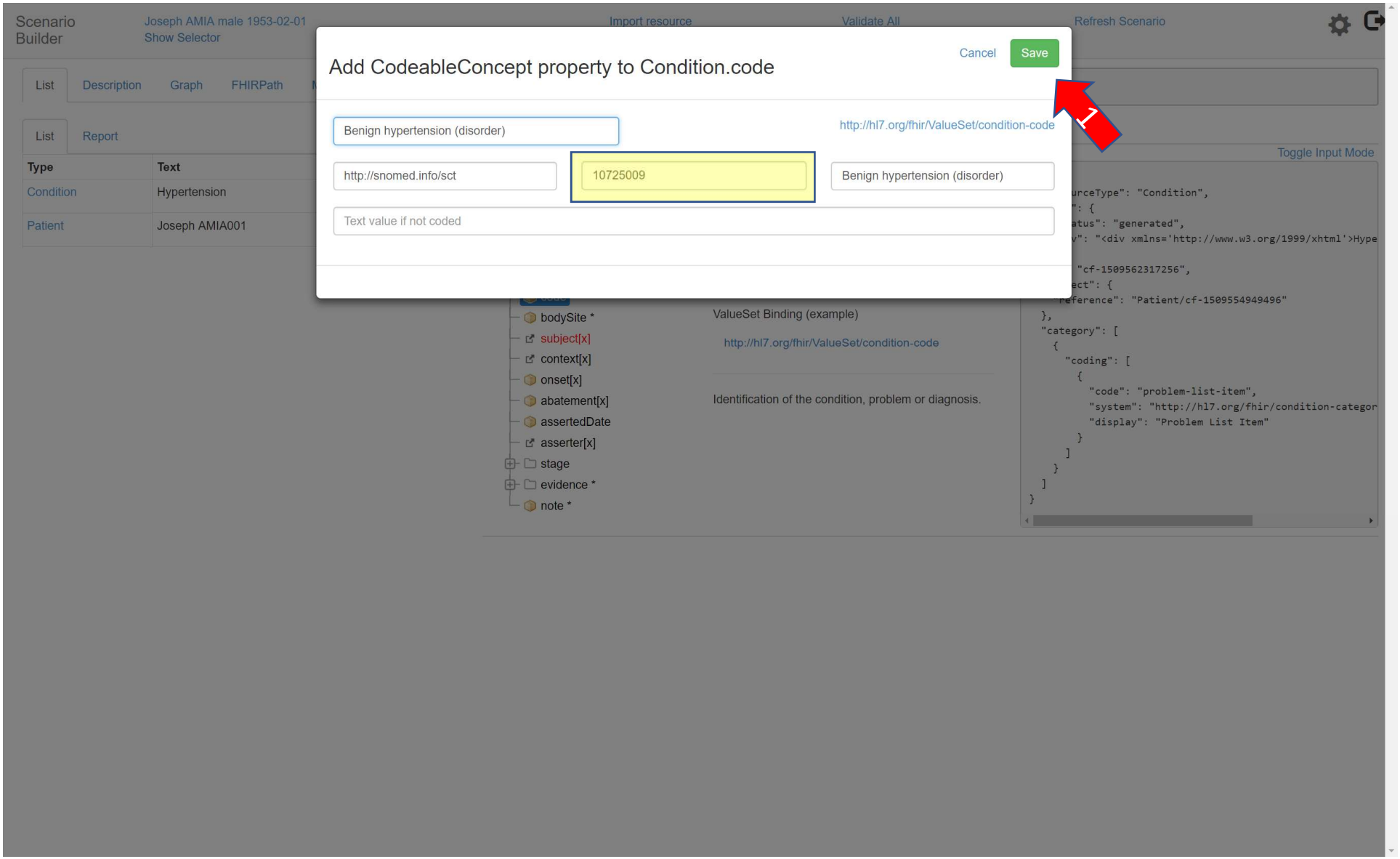
Enter search term

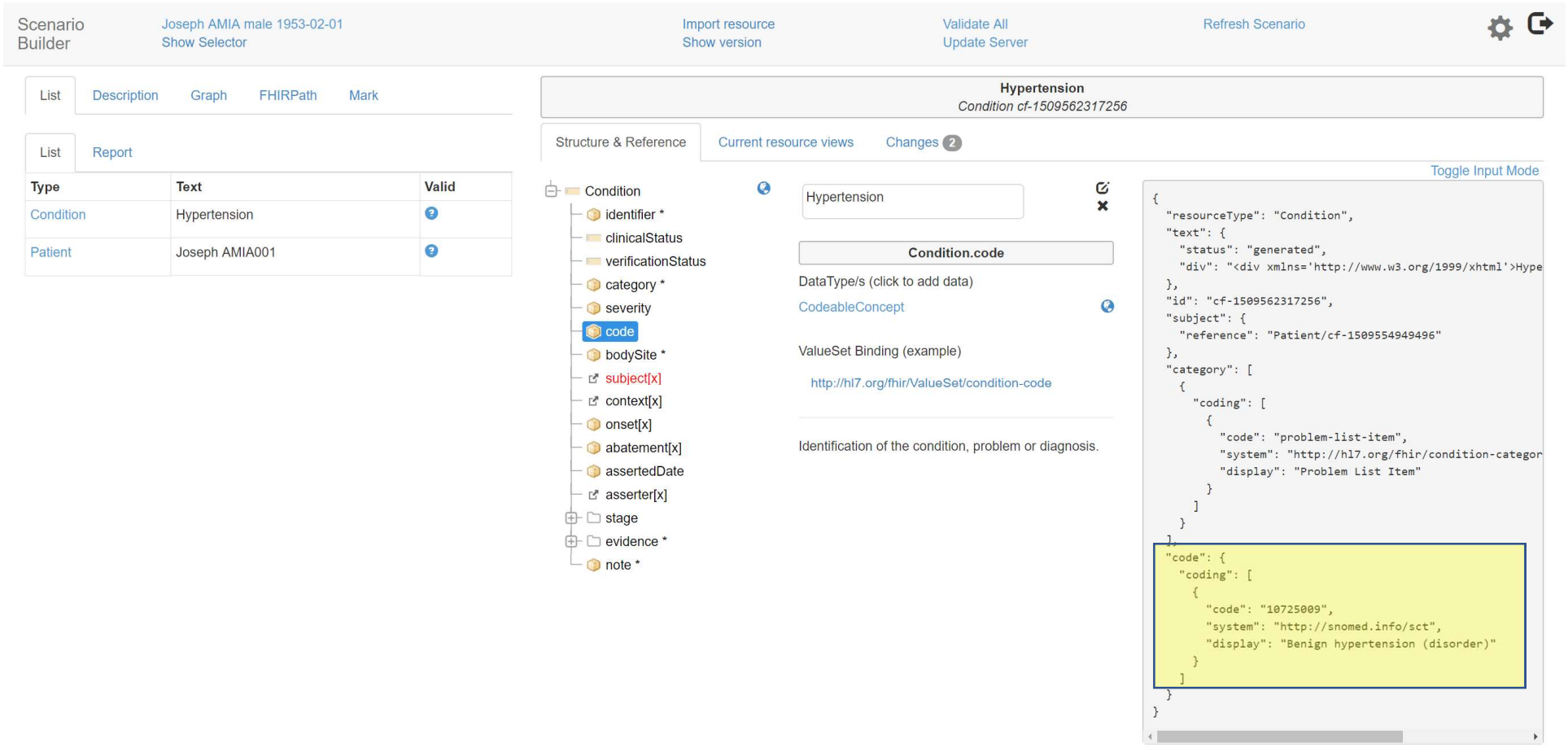


Explore Value Set

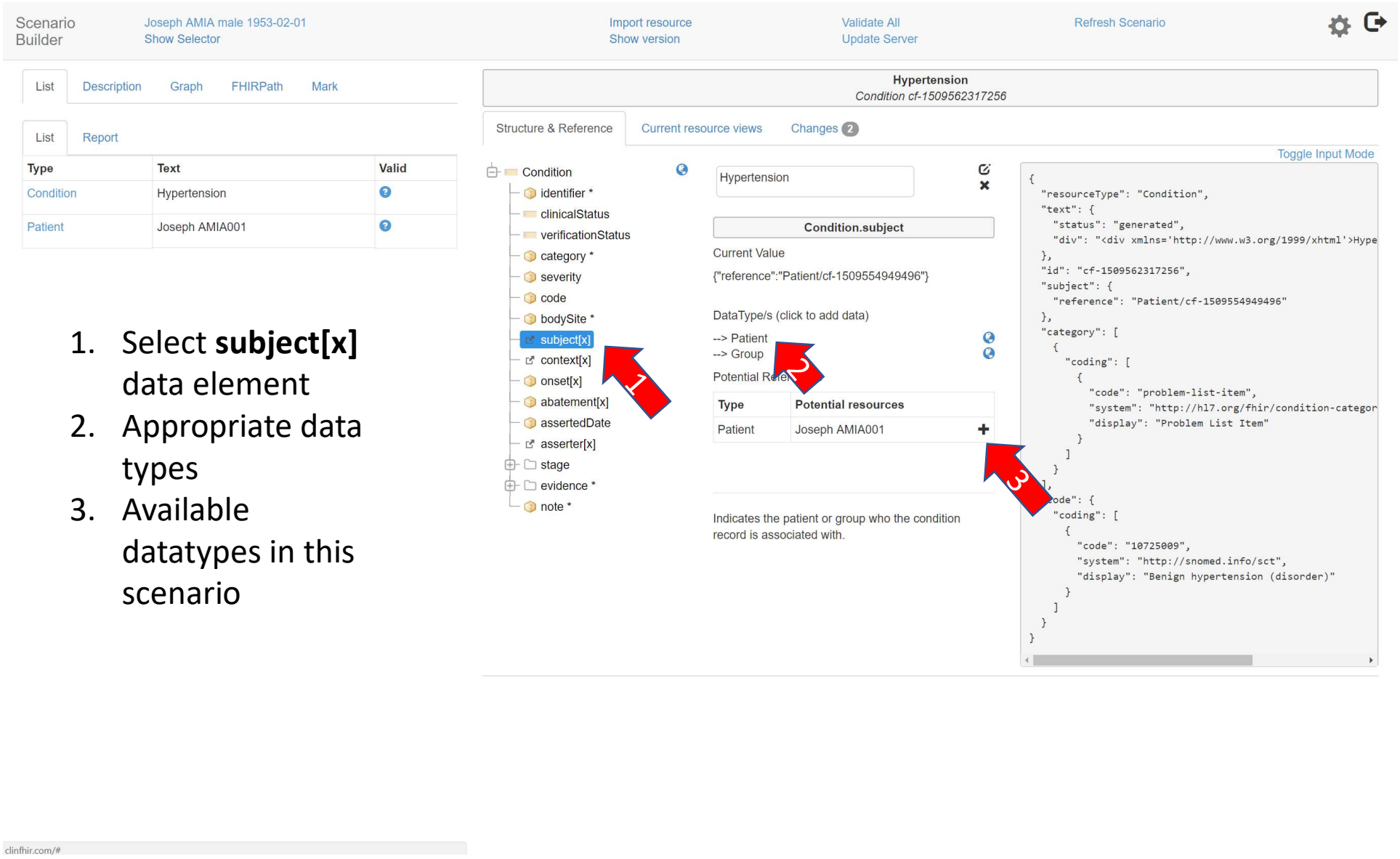


SNOMED Coded Condition Concept

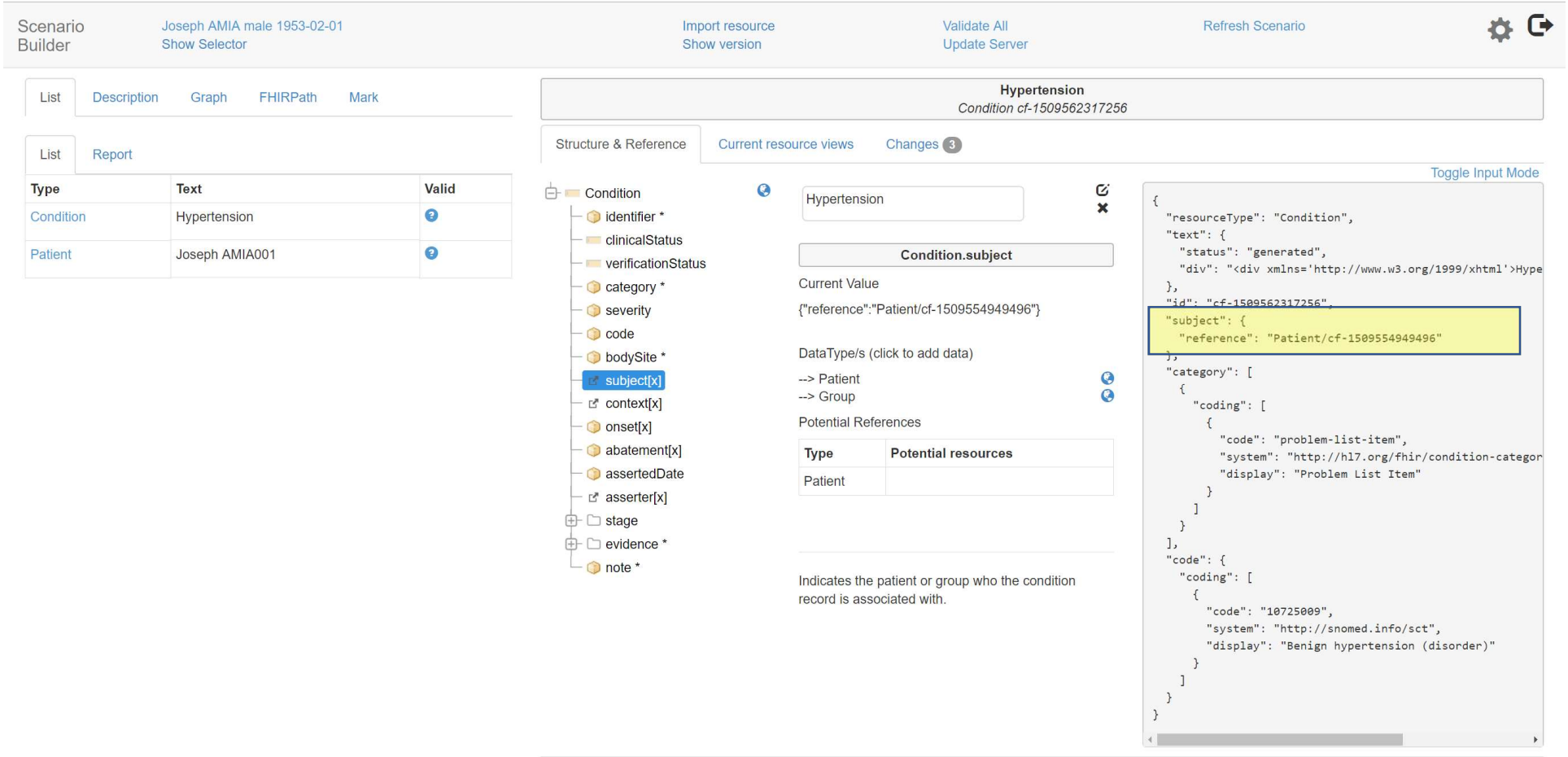



Scenario Builder
Joseph AMIA male 1953-02-01
Show Selector
Import resource
Show version
Validate All
Update Server
Refresh Scenario
List
Description
Graph
FHIRPath
Mark
List
Report
Type
Text
Valid
Condition
Hypertension
Patient
Joseph AMIA001
Hypertension
Condition cf-1509562317256
Structure & Reference
Current resource views
Changes 2
Toggle Input Mode
Condition
identifier *
clinicalStatus
verificationStatus
category *
severity
code
bodySite *
subject[x]
context[x]
onset[x]
abatement[x]
assertedDate
asserter[x]
stage
evidence *
note *
Hypertension
Condition.code
DataType/s (click to add data)
CodeableConcept
ValueSet Binding (example)
http://hl7.org/fhir/ValueSet/condition-code
Identification of the condition, problem or diagnosis.
{
"resourceType": "Condition",
"text": {
"status": "generated",
"div": " Hype
},
"id": "cf-1509562317256",
"subject": {
"reference": "Patient/cf-1509554949496"
},
"category": [
{
"coding": [
{
"code": "problem-list-item",
"system": "http://hl7.org/fhir/condition-categor
"display": "Problem List Item"
}
]
}
],
"code": {
"coding": [
{
"code": "10725009",
"system": "http://snomed.info/sct",
"display": "Benign hypertension (disorder)"
}
]
}
}

Link Condition to Patient Resource

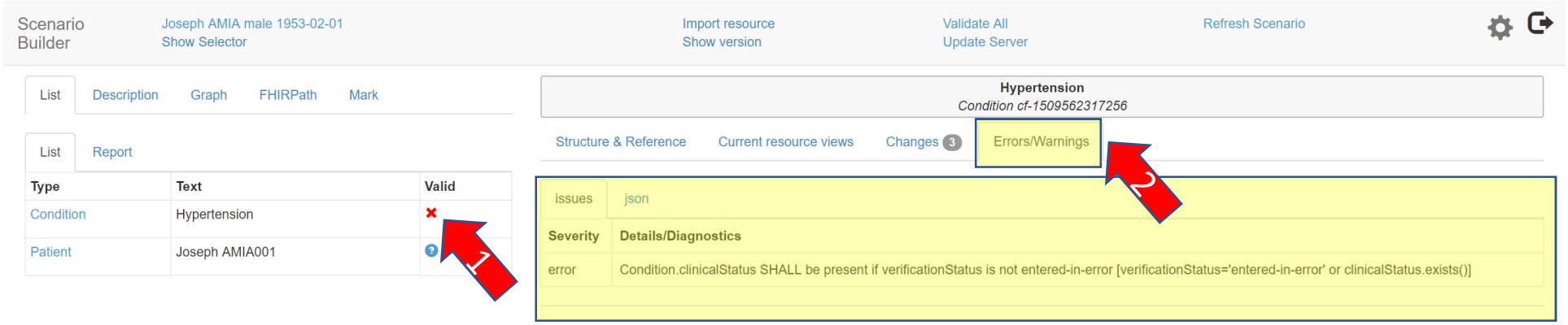


1. Select **subject[x]** data element
2. Appropriate data types
3. Available datatypes in this scenario



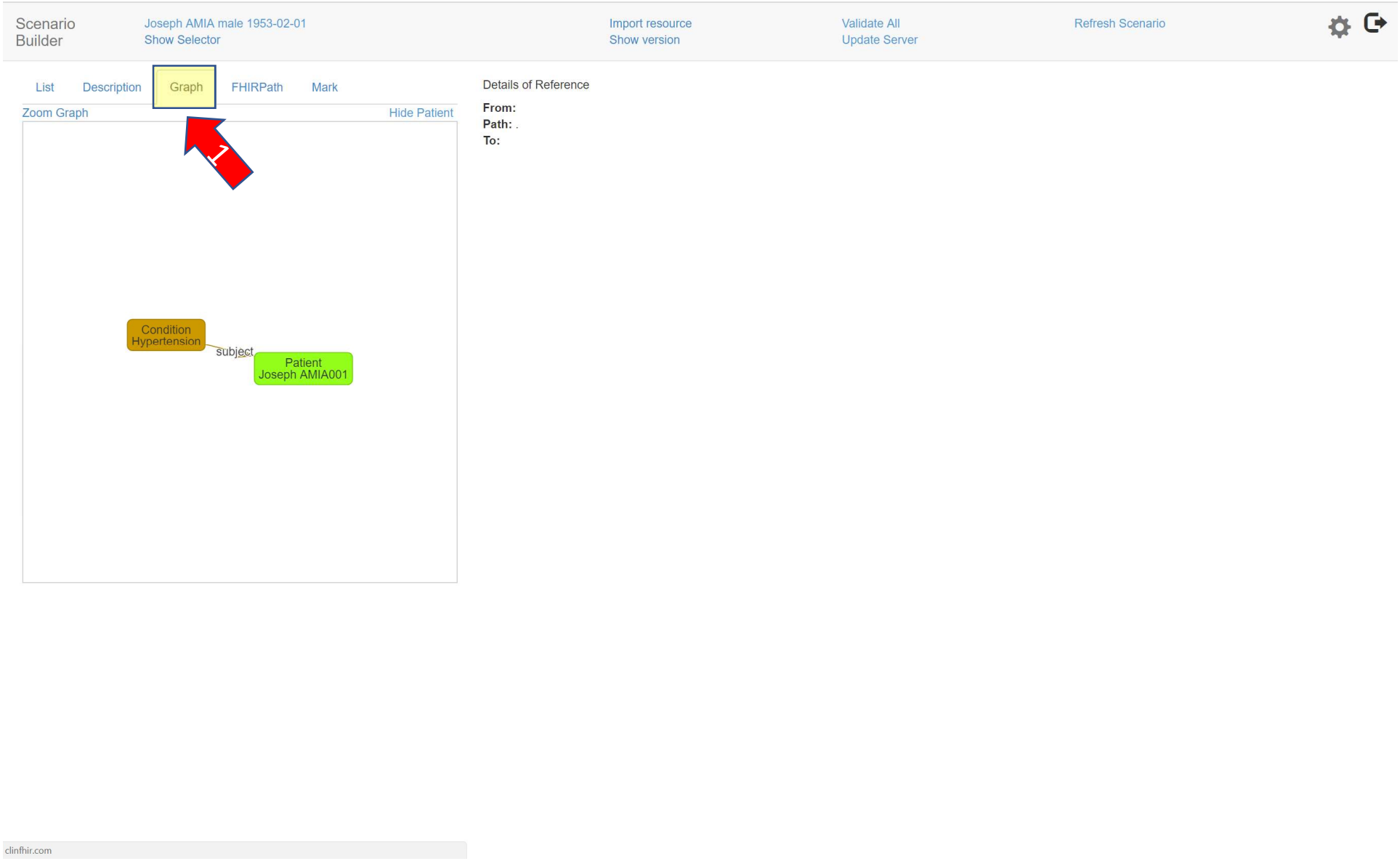
Note: ClinFHIR automatically links new resources to existing patient resource when appropriate

Errors in Validation



Note: Use the validation warnings/errors to correct your resource, then update the server

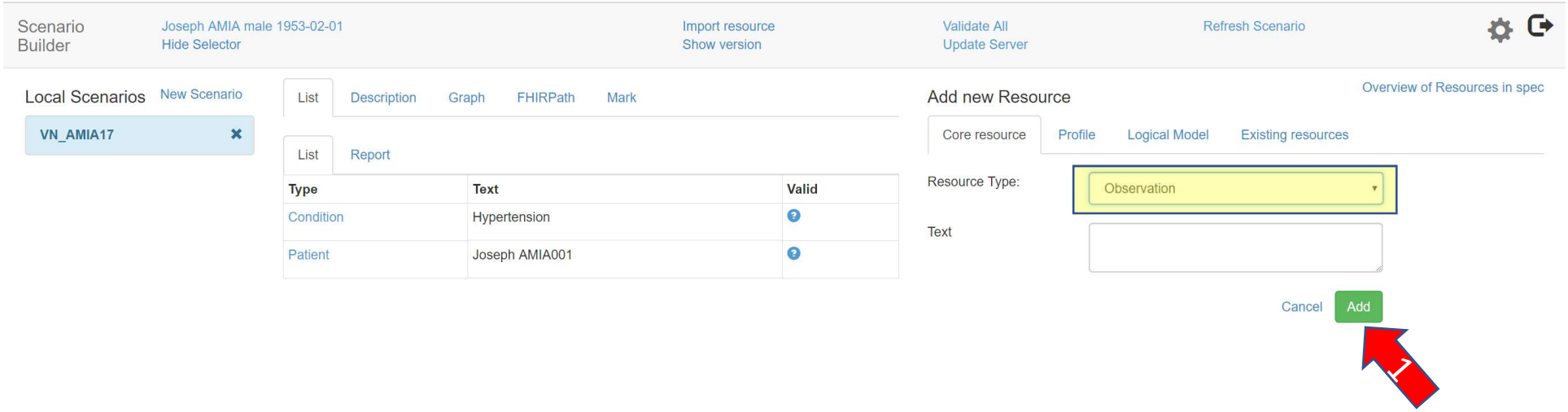
View Resource Graph of Scenario



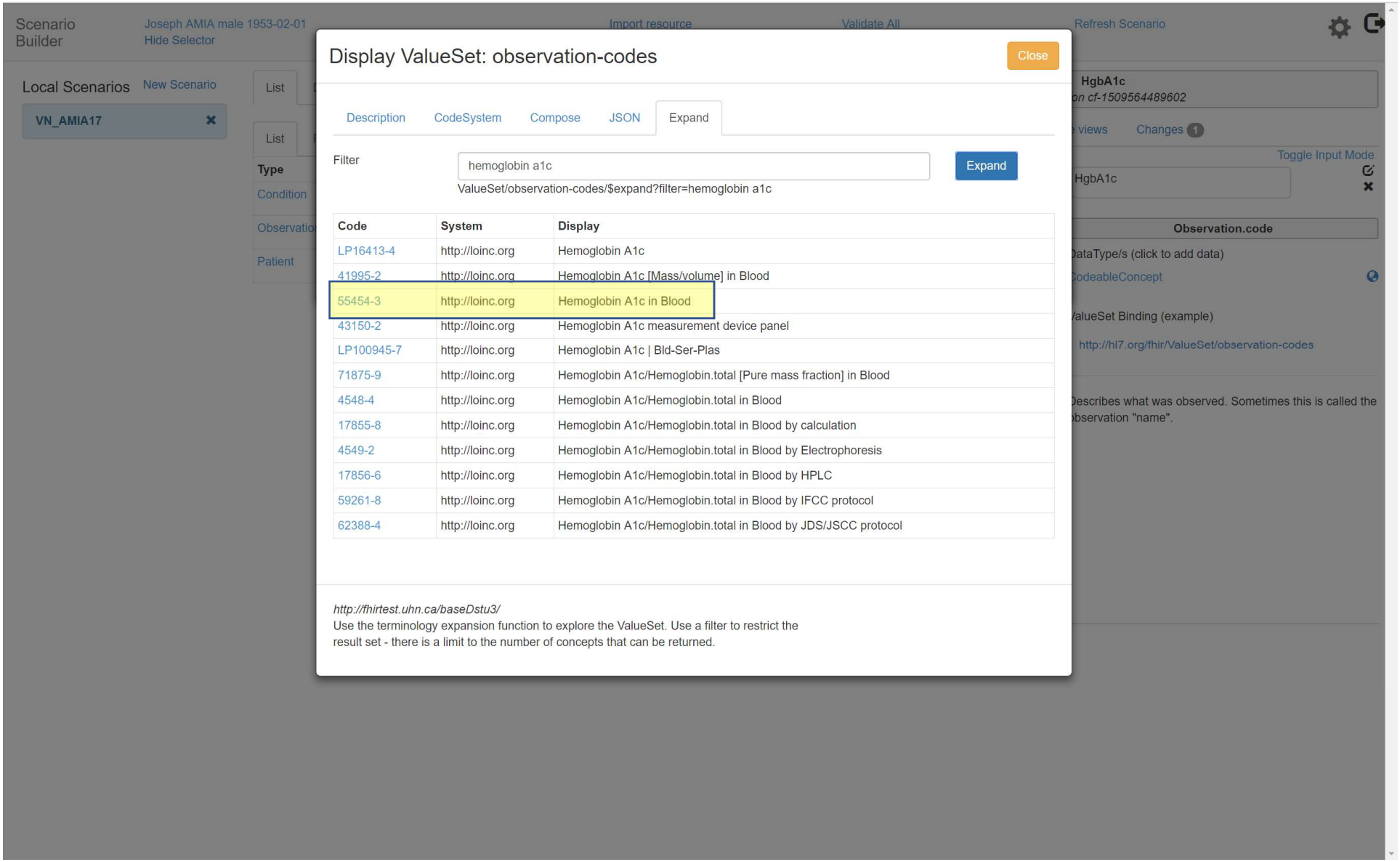
Task – Create a Condition (15 min)

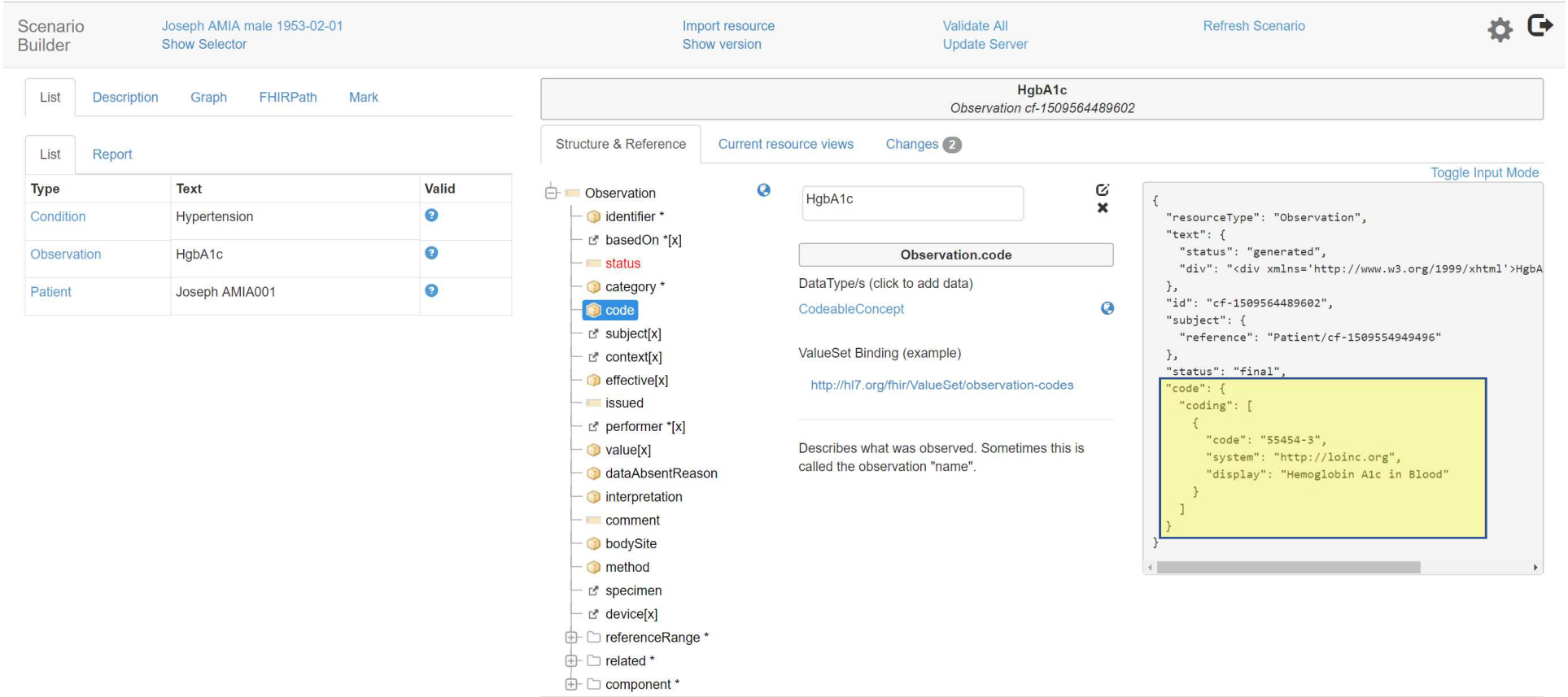
- Use Scenario Builder module to create your own condition
  - SNOMED Code and link to your patient
  - E.g. Diabetes mellitus type 2 (SCTID 44054006)
- Validate your resource instance
- Update (POST) the resource to the data server
- Confirm that your patient is on the data server using the Patient Viewer module and the patient id
- Add additional conditions if you are done early

Add HgbA1c Observation

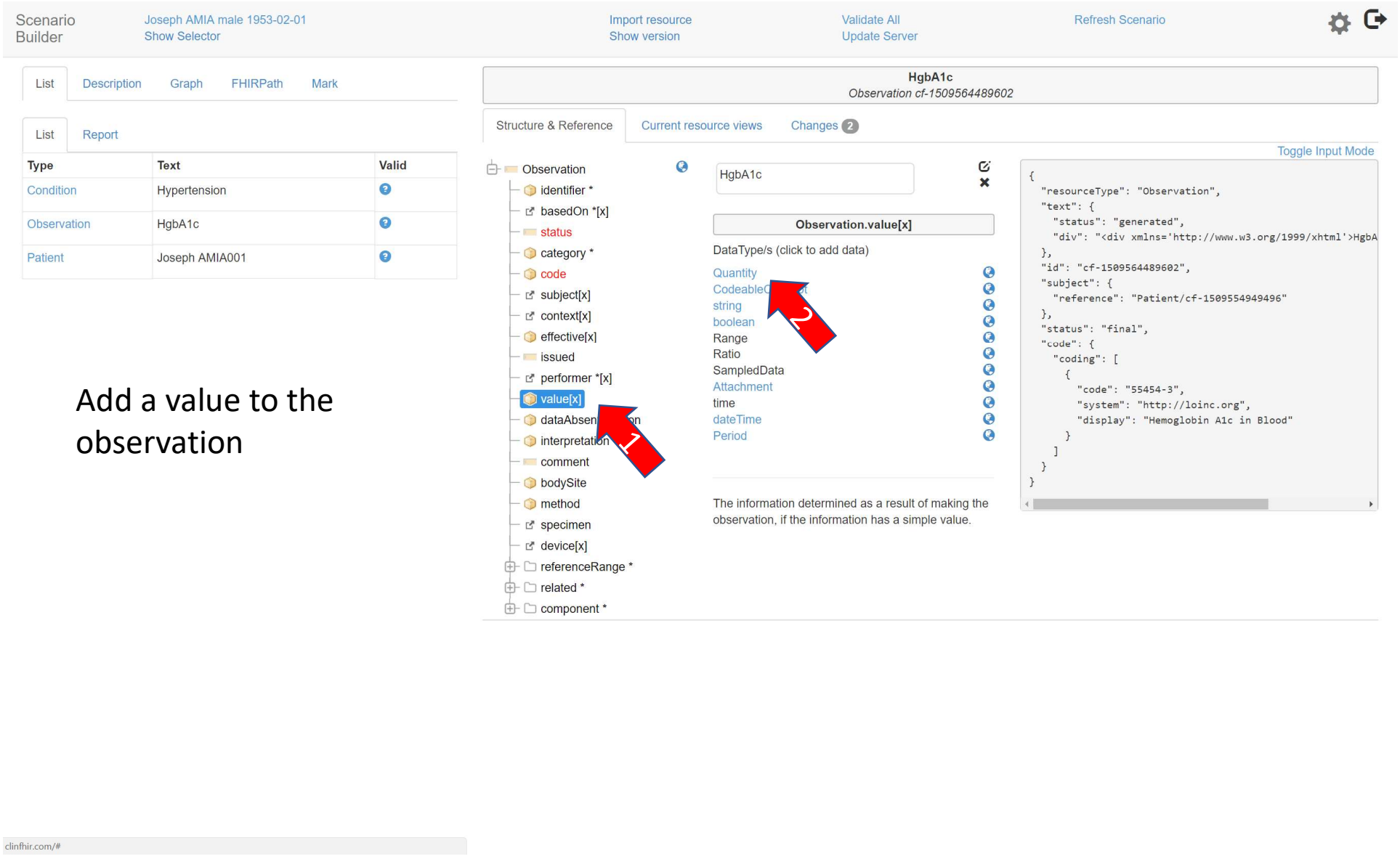


Use Value Set Expand to find code

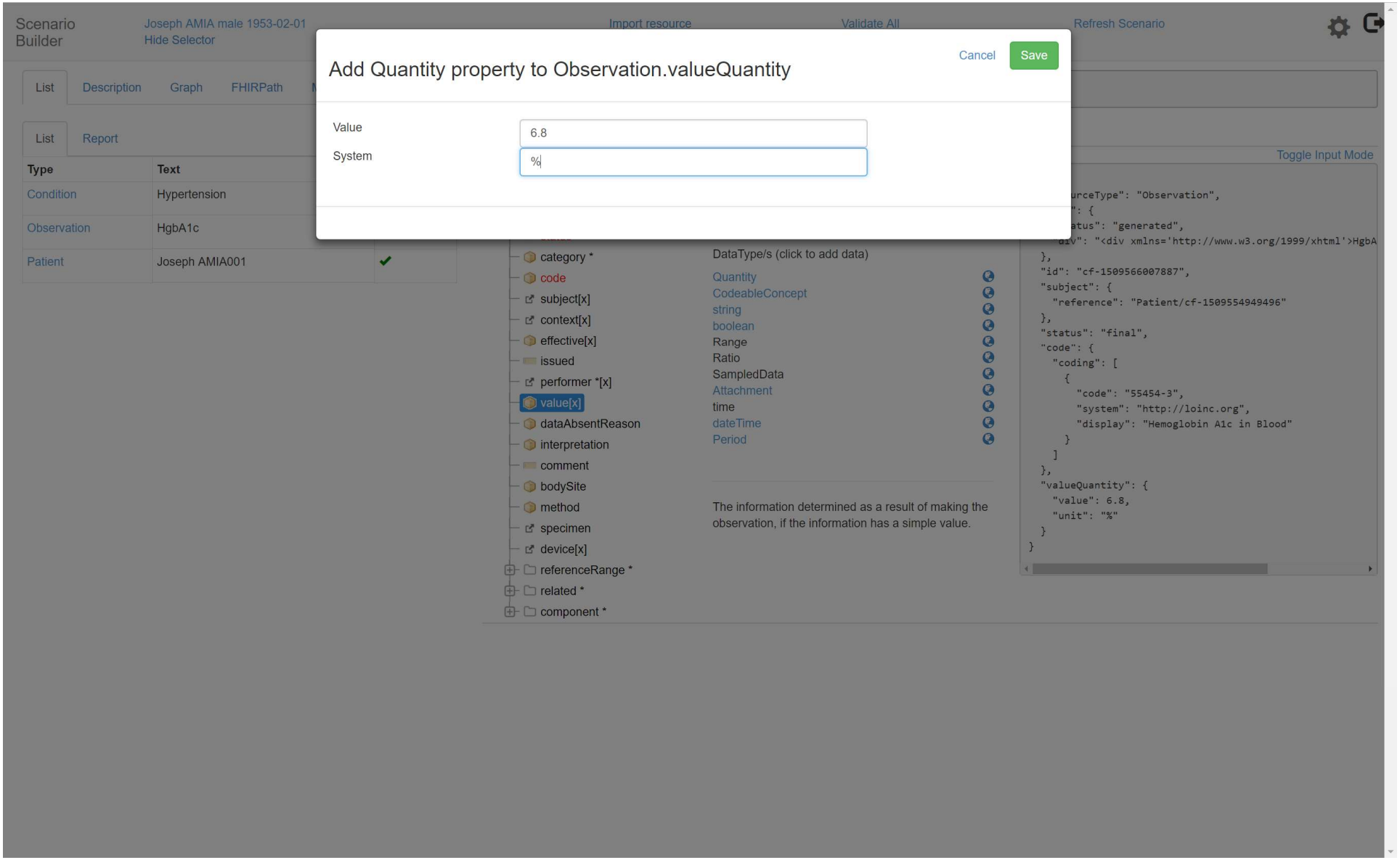



Scenario Builder
Joseph AMIA male 1953-02-01
Show Selector
Import resource
Show version
Validate All
Update Server
Refresh Scenario
List
Description
Graph
FHIRPath
Mark
List
Report
Type
Text
Valid
Condition
Hypertension
Observation
HgbA1c
Patient
Joseph AMIA001
HgbA1c
Observation cf-1509564489602
Structure & Reference
Current resource views
Changes 2
Toggle Input Mode
Observation
identifier *
basedOn *[x]
status
category *
code
subject[x]
context[x]
effective[x]
issued
performer *[x]
value[x]
dataAbsentReason
interpretation
comment
bodySite
method
specimen
device[x]
referenceRange *
related *
component *
HgbA1c
Observation.code
DataType/s (click to add data)
CodeableConcept
ValueSet Binding (example)
http://hl7.org/fhir/ValueSet/observation-codes
Describes what was observed. Sometimes this is called the observation "name".
{
"resourceType": "Observation",
"text": {
"status": "generated",
"div": " HgbA
},
"id": "cf-1509564489602",
"subject": {
"reference": "Patient/cf-1509554949496"
},
"status": "final",
"code": {
"coding": [
{
"code": "55454-3",
"system": "http://loinc.org",
"display": "Hemoglobin A1c in Blood"
}
]
}
}

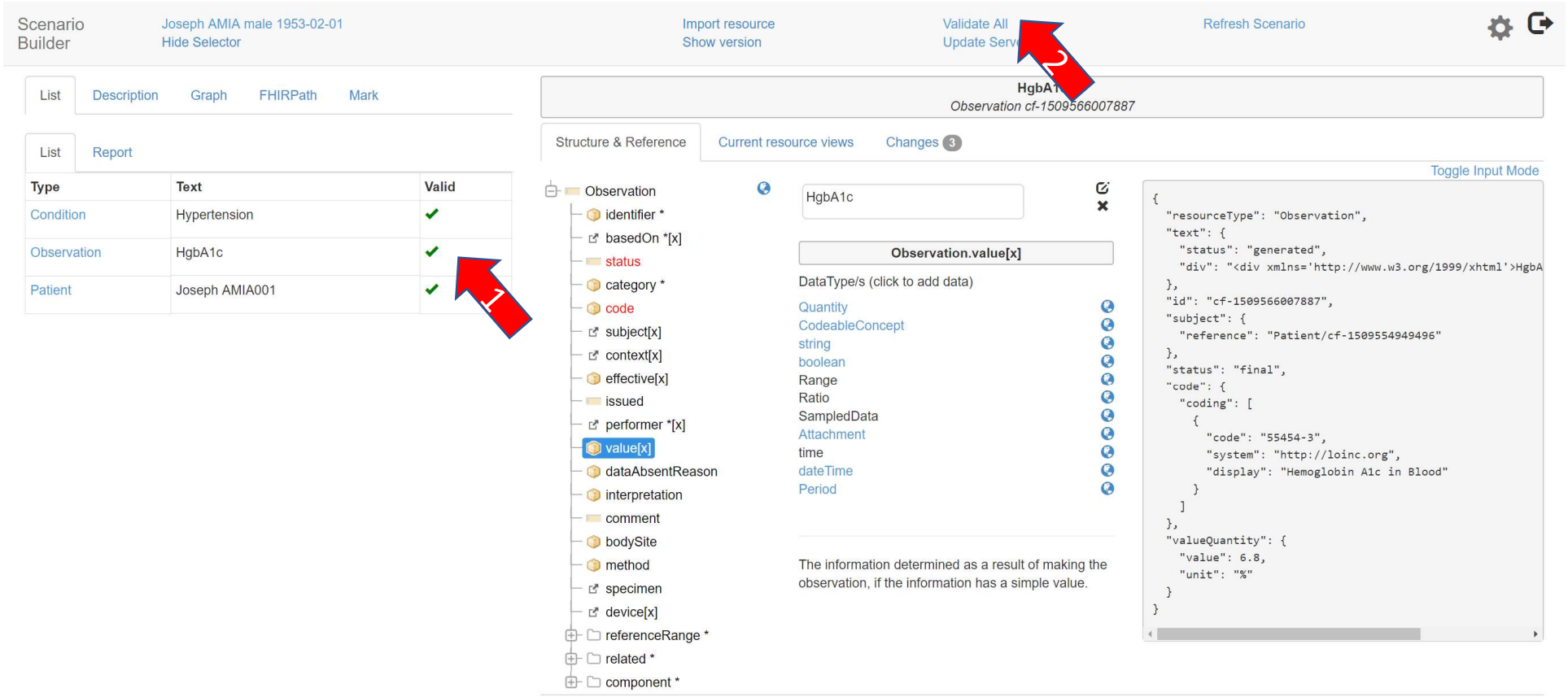
Add Quantity Value to Observation



Add a value to the observation


Scenario Builder
Joseph AMIA male 1953-02-01
Hide Selector
Import resource
Validate All
Refresh Scenario
List
Description
Graph
FHIRPath
List
Report
Type
Text
Condition
Hypertension
Observation
HgbA1c
Patient
Joseph AMIA001
Add Quantity property to Observation.valueQuantity
Cancel
Save
Value
6.8
System
%
Toggle Input Mode
category *
code
subject[x]
context[x]
effective[x]
issued
performer *[x]
value[x]
dataAbsentReason
interpretation
comment
bodySite
method
specimen
device[x]
referenceRange *
related *
component *
DataType/s (click to add data)
Quantity
CodeableConcept
string
boolean
Range
Ratio
SampledData
Attachment
time
dateTime
Period
The information determined as a result of making the observation, if the information has a simple value.
"resourceType": "Observation",
"status": "generated",
"id": "cf-1509566007887",
"subject": {
"reference": "Patient/cf-1509554949496"
},
"status": "final",
"code": {
"coding": [
{
"code": "55454-3",
"system": "http://loinc.org",
"display": "Hemoglobin A1c in Blood"
}
]
},
"valueQuantity": {
"value": 6.8,
"unit": "%"
}
}

Validate and POST Observation



Task – Create an Observation (15min)

- Use Scenario Builder module to create your own Observation
  - Try Fasting Blood Glucose, Height, Weight and BMI
- Use FHIR Spec, Google or LOINC Browser to find LOINC concept code
- Validate your resource instance
- Update (POST) the resource to the data server
- Confirm that your patient is on the data server using the Patient Viewer module and the patient id
- Additional task – add additional observations