

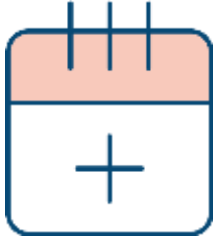


Building a Scenario using clinFHIR

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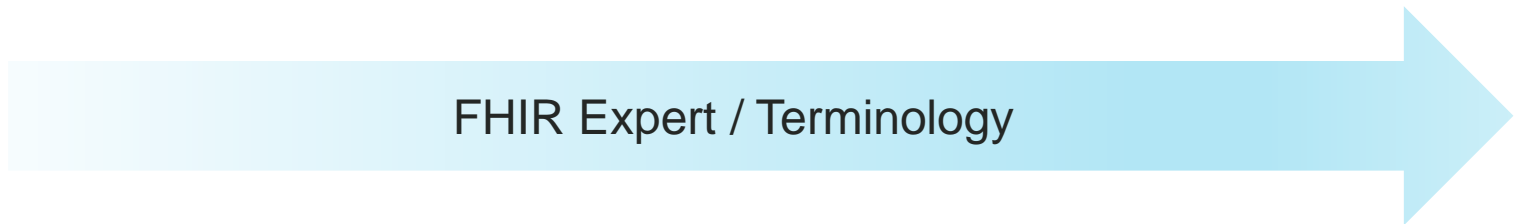
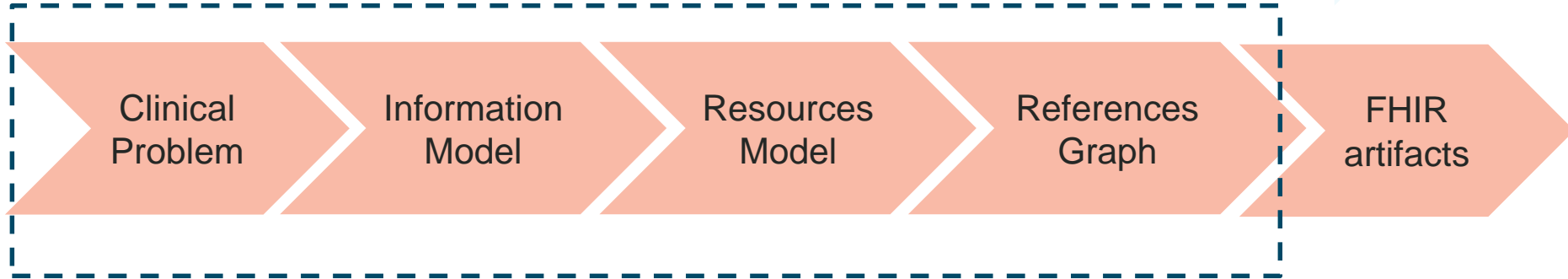
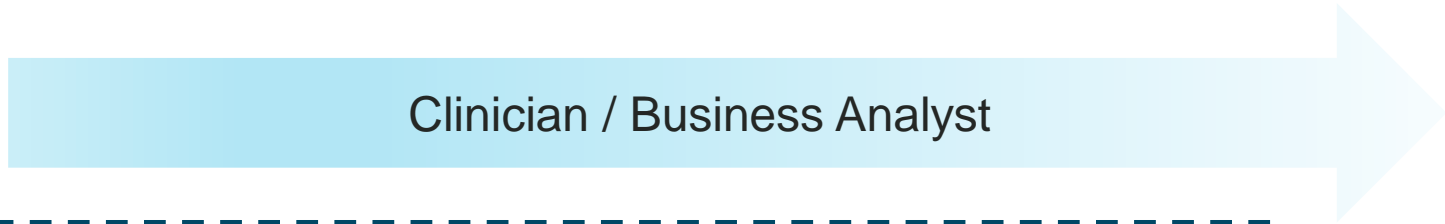
Devdays | November 2017

Plan for the sessions



-
- ▶ Today
 - ▶ Review overall process
 - ▶ Review key FHIR elements
 - ▶ ‘Clinical’ Models
 - ▶ Information, Resources, References
 - ▶ Tomorrow
 - ▶ Structured and Coded data
 - ▶ Create/View FHIR artifacts
 - ▶ Extension Definition
 - ▶ ValueSet
 - ▶ Profile
 - ▶ Implementation Guide
-

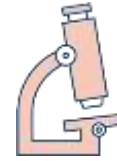
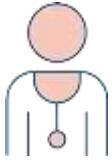
The road to FHIR (aka the process)





Review basics of FHIR

Resources



General

AllergyIntolerance
Condition (Problem)
Procedure
ClinicalImpression
FamilyMemberHistory
RiskAssessment
DetectedIssue

Care Provision

CarePlan
CareTeam
Goal
ReferralRequest
ProcedureRequest
NutritionOrder
VisionPrescription

Medication & Immunization

Medication
MedicationRequest
MedicationAdministration
MedicationDispense
MedicationStatement
Immunization
ImmunizationRecommendation

Diagnostics

Observation
DiagnosticReport
ProcedureRequest
Specimen
BodySite
ImagingStudy
Sequence

Resource instance example



```
<Patient xmlns="http://hl7.org/fhir">
  <id value="100"/>
  <meta>
    <lastUpdated value="2017-03-04T11:40"/>
  </meta>
  <text>
    <status value="generated"/>
    <div xmlns="http://www.w3.org/1999/xhtml">
      <p>John Doe, Male, DOB: 12/12/1979</p>
    </div>
  </text>
  <extension url="http://hl7.org/fhir/StructureDefinition/patient-religion">
    <valueString value="Jedi"/>
  </extension>
  <identifier>
    <system value="http://hl7.org/fhir/sid/us-ssn"/>
    <value value="123-4465-8762"/>
  </identifier>
  <name>
    <family value="Doe"/>
    <given value="John"/>
  </name>
  <gender value="male"/>
</Patient>
```

→ Resource Identity & Metadata

→ Human Readable Summary

→ Extension with URL to definition

→ Structured Data:

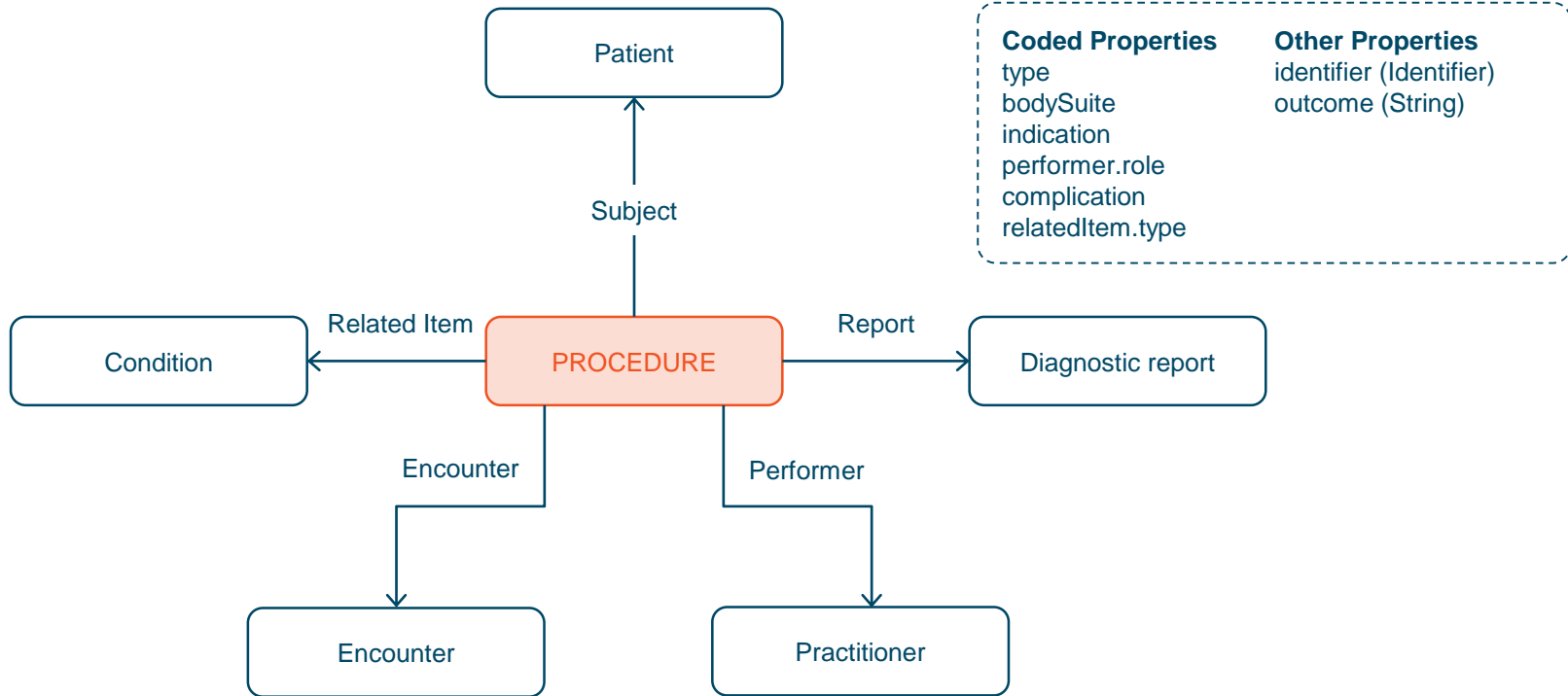
- MRN
- Name
- Gender
- Birth Date
- Provider

FHIR datatypes (for Information model)



-
- ▶ What is a Data Type
 - ▶ Most useful ones (for now)
 - ▶ String
 - ▶ Date
 - ▶ Quantity
 - ▶ CodeableConcept
 - ▶ Coded data, eg SNOMED
-

References between resources



Recording a consultation



12-year-old-boy

First consultation

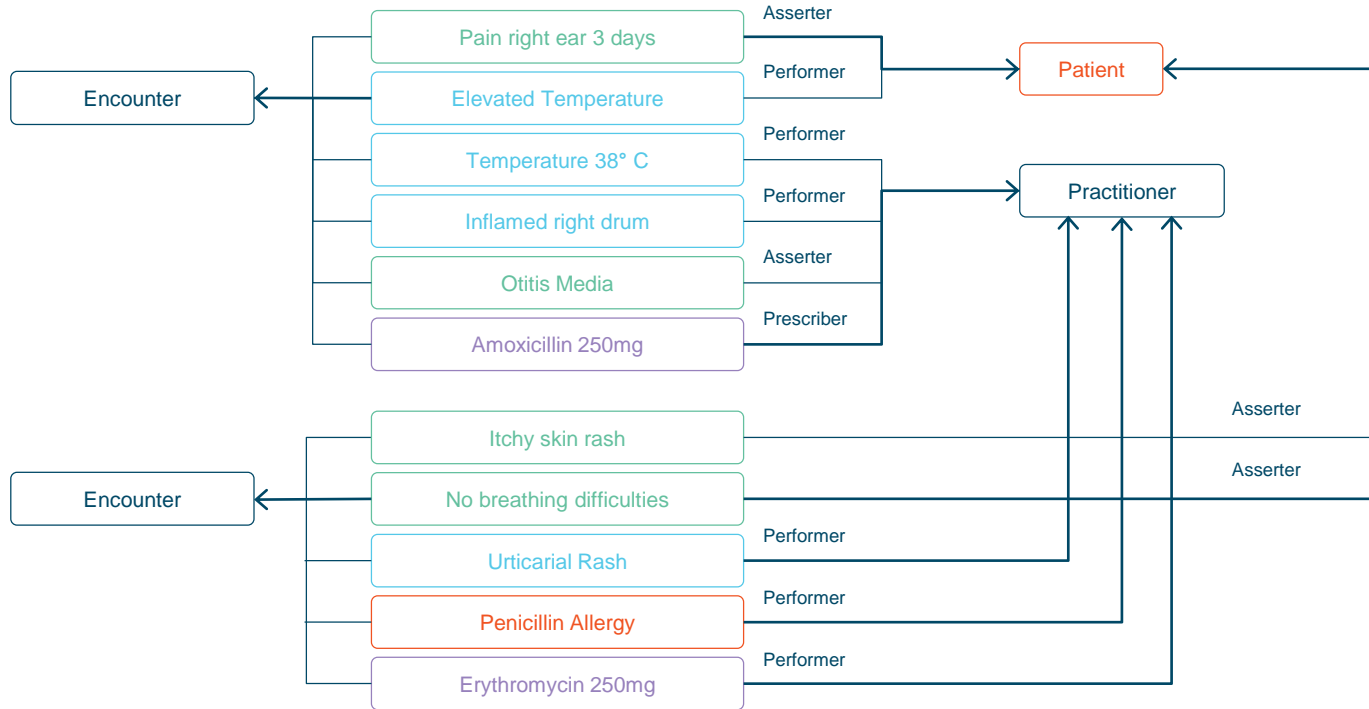
Complaining of pain in the right ear for 3 days with an elevated temperature. On examination, temperature 38°C and an inflamed right eardrum with no perforation. Diagnosis Otitis Media, and prescribed Amoxicillin 250mg 3 times per day for 7 days.

Follow up consultation

2 days later returned with an itchy skin rash. No breathing difficulties. On examination, urticarial rash on both arms. No evidence meningitis. Diagnosis of penicillin allergy. Antibiotics changes to Erythromycin 250mg 4 times per day for 10 days.

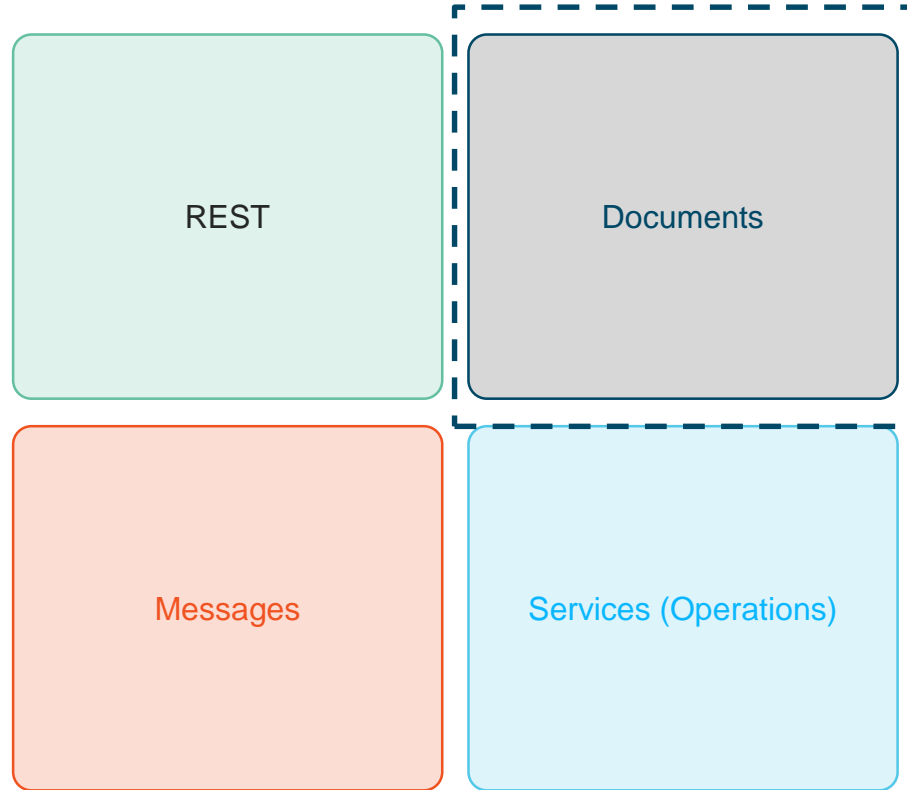
- Patient
- Encounter
- Condition
- Observation
- Medication
- Allergy Intolerance

As linked resources...

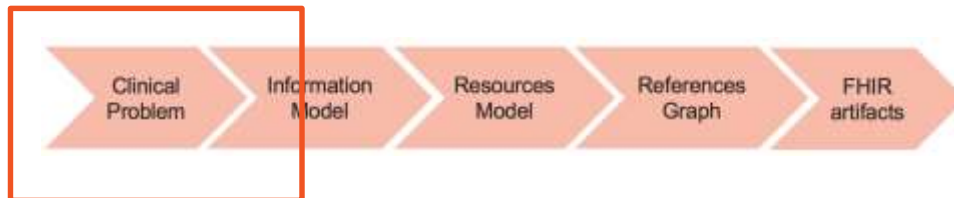


Not all references shown

Exchange Paradigms



The clinical problem

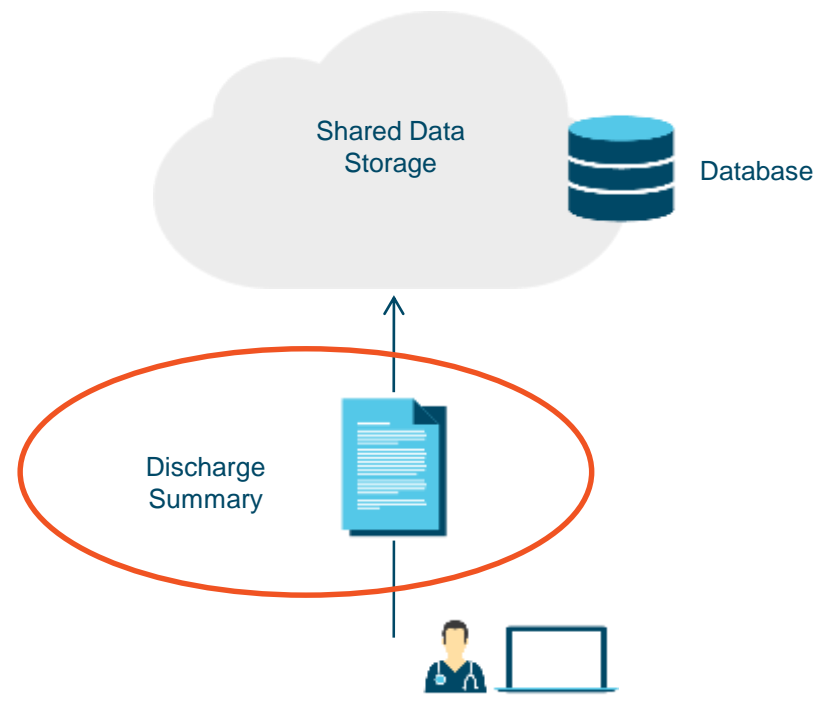


Electronic Discharge Summary

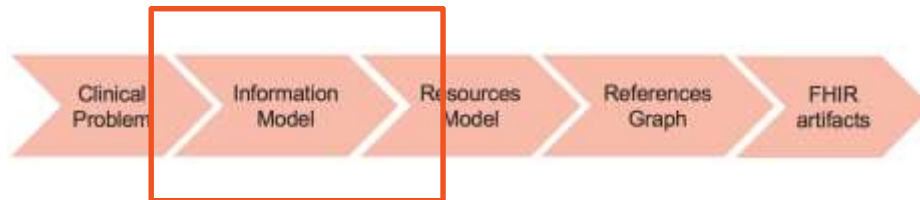


-
- ▶ A summary of a Hospitalization
 - ▶ Document paradigm
 - ▶ Part of the clinical record
 - ▶ CDA equivalent
 - ▶ Header
 - ▶ Patient, Author, Admission details
 - ▶ Sections
 - ▶ The clinical information
-

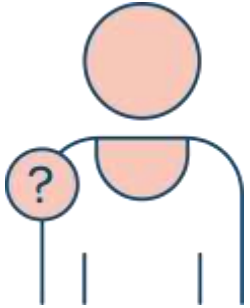
Data Flow



Information (Logical) Model

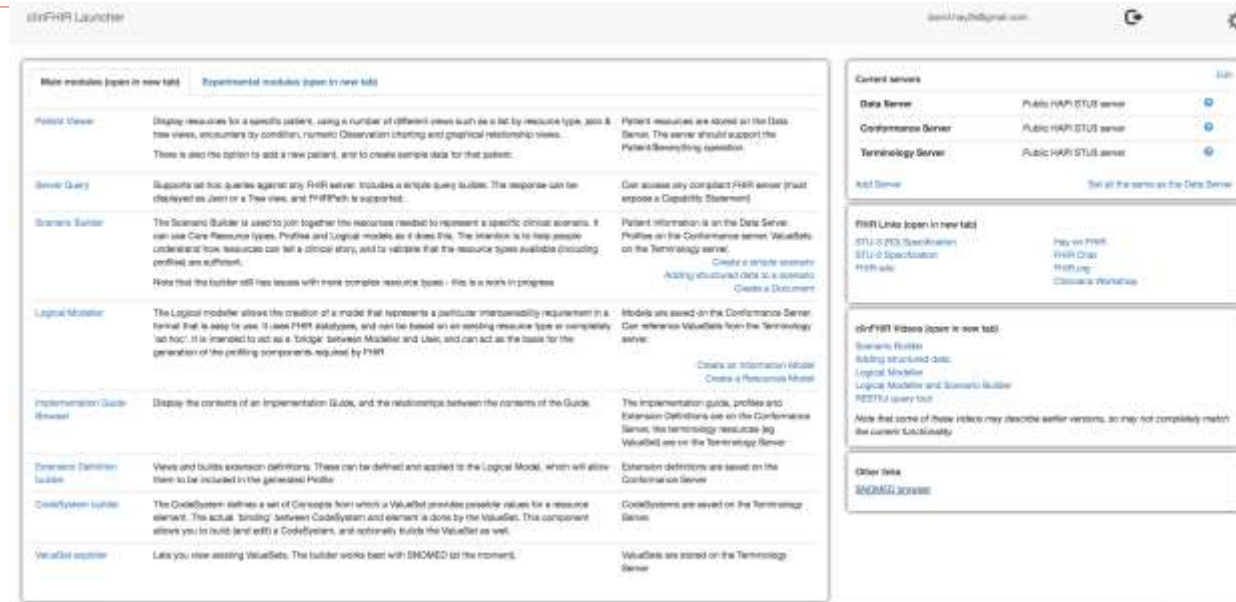


Information / Logical Model



-
- ▶ What is an Information model
 - ▶ It's the information being shared in 'clinician speak'
 - ▶ A form of Logical Model
 - ▶ Different ways to represent
 - ▶ FHIR
 - ▶ openEHR
 - ▶ CIMI
-

- ▶ Developed as development / training tool
- ▶ Evolving!
- ▶ What does clinFHIR do
 - View Patient data
 - Logical Modeler
 - Scenario Builder
 - ValueSet explorer
 - Extension Definition editor
 - Implementation Guide viewer



The screenshot shows the 'clinFHIR Launcher' interface. It features a top navigation bar with the user's email 'beckley.fh@gmail.com' and a settings icon. The main content area is divided into two columns of tool modules, each with a description and a 'View' button.

Module Name	Description	Notes
Patient Viewer	Display resources for a specific patient, using a number of different views such as a list by resource type, join & tree views, encounters by condition, timeline 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 PatientIdentifier extension.
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 (just specify 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 Modeler	The Logical modeler 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 Modeler 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 Resource Model
Implementation Guide Viewer	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.
Extension Definition Editor	Views and builds extension definitions. These can be defined and applied to the Logical Model, which will allow them to be included in the generated Profile.	Extension definitions are saved on the Conformance Server.
CodeSystem builder	The CodeSystem builder takes a set of Concepts from which a ValueSet provides possible values for a resource element. The actual 'binding' between CodeSystem and element is done by the ValueSet. This component allows you to build (and edit) a CodeSystem, and optionally build the ValueSet as well.	CodeSystems are saved on the Terminology Server.
ValueSet explorer	Allows you view existing ValueSets. The builder works best with SNOMED at the moment.	ValueSets are stored on the Terminology Server.

On the right side, there are two panels:

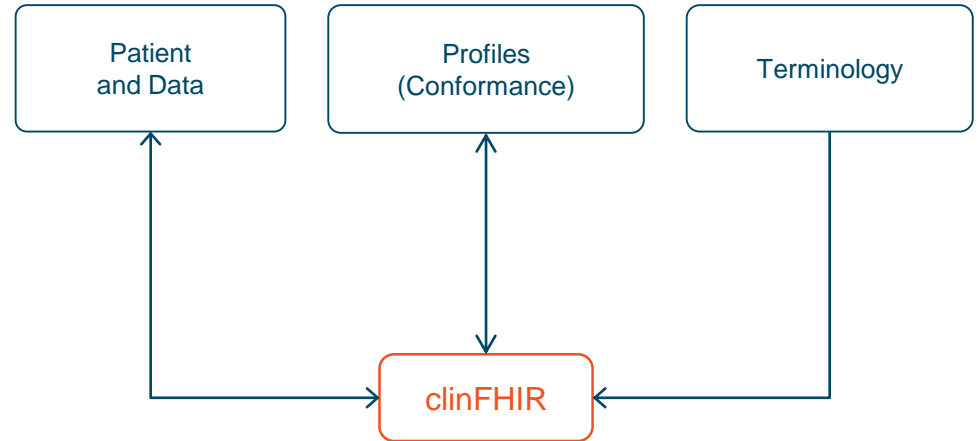
- Current servers:** A table listing 'Data Server' (Public HAPI STU3 server), 'Conformance Server' (Public HAPI STU3 server), and 'Terminology Server' (Public HAPI STU3 server). An 'Add Server' button is at the bottom.
- FHIR Links (open in new tab):** A list of links including 'STU3 R5C Specification', 'STU3 Specification', and 'FHIR wiki'.
- clinFHIR Videos (open in new tab):** A list of video links for 'Scenario Builder', 'Logical Modeler', and 'FHIR wiki'.
- Other links:** A section with the heading 'SANDRA JONES'.

clinFHIR: Server roles

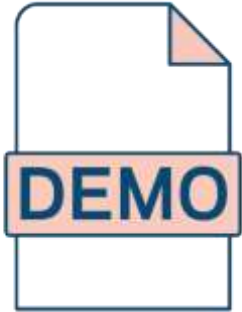


▸ Specific FHIR server roles

- Data/patient – patient related (clinical) and 'reference' (Practitioner, Organization)
 - Conformance – profile, extension definition, NamingSystem
 - Terminology – ValueSet & Terminology operations
-



Demo



-
- ▶ Clinfhir.com
 - ▶ Login
 - ▶ Email, password
 - ▶ Set the servers
 - ▶ HAPI R3
 - ▶ Describe each module, & what it is for
 - ▶ Show Logical Modeler
 - ▶ Show Information Model
-

Resources Model & References Graph



Resources Model



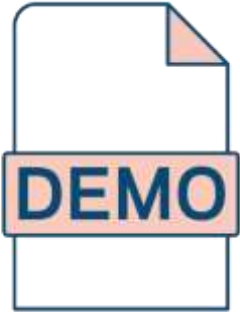
- ▶ Link between Information Model and FHIR artifacts
- ▶ Also use Logical Model to show Resources
- ▶ Need FHIR knowledge to build

The screenshot displays the Logical Modeler interface for the EdsResource model. The top bar shows the model name "Logical Modeler: EdsResource", the server "Local FHIR STU3 server", and a "File Selector" button. The main workspace is divided into three panels:

- Model Selector:** A list of models including ADRForm2, MyCondition, MyObs, MyCarePlan, ResourceTest, and EdsResource (selected).
- Designer:** A tree view of the EdsResource model structure. The "demographics" element is selected and highlighted in blue. Its sub-elements include "name", "hospitalizationDetails", "medication", "dataAscertained", "allergy", and "type".
- Element path demographics properties:** A table showing the properties of the selected element.

Element path demographics properties	
Model path	EdsResource.demographics
Short	demographics
Description	The demographics (patient details)
Comments	
Multiplicity	0..1
Outlay path	Reference http://hl7.org/fhir/StructureDefinition/Patient View Log
Actions	↑ ↓ Edit Element Add Element Remove Element Only Element

Demo: Create a Resources Model from an Information model

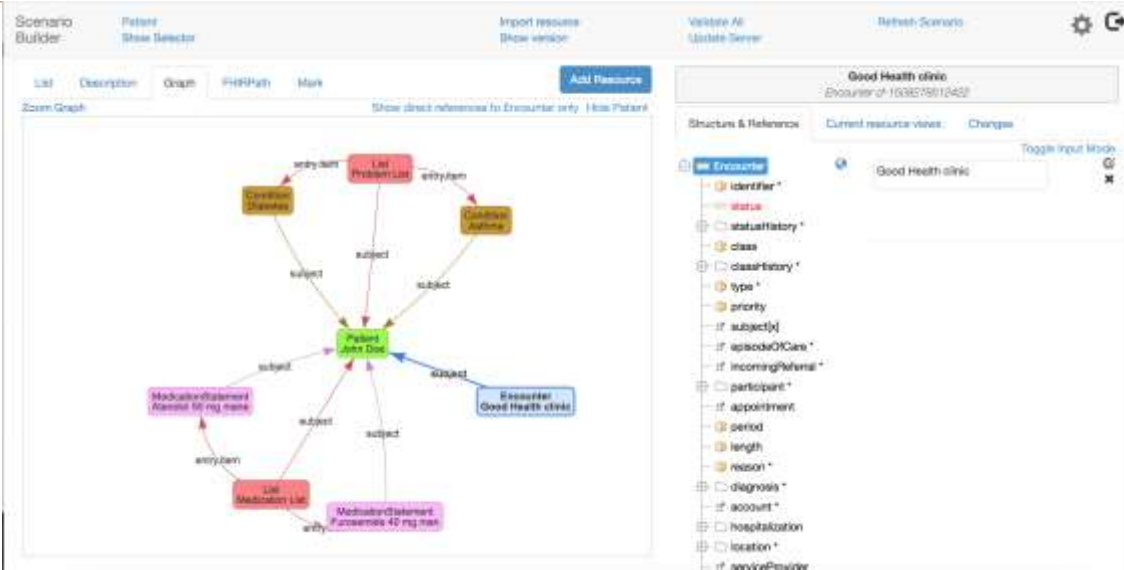


-
- ▶ Show resources model of EDS
-

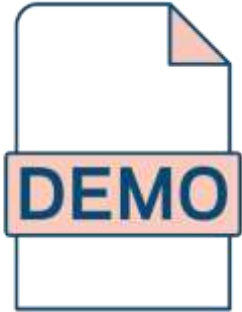
References Graph



- ▶ Shows relationships between resource instances graphically
- ▶ Uses 'Instances' of resource types
- ▶ Scenario Builder tool
- ▶ Don't need detailed FHIR knowledge
 - ▶ but do need Resources Model or to be able to choose the correct resource types
- ▶ Can also add data to instances



Demo: Scenario Builder



-
- ▶ Show relationship between resources graphically
 - ▶ Build examples of resources
 - ▶ Base on Resources model
-

Document paradigm

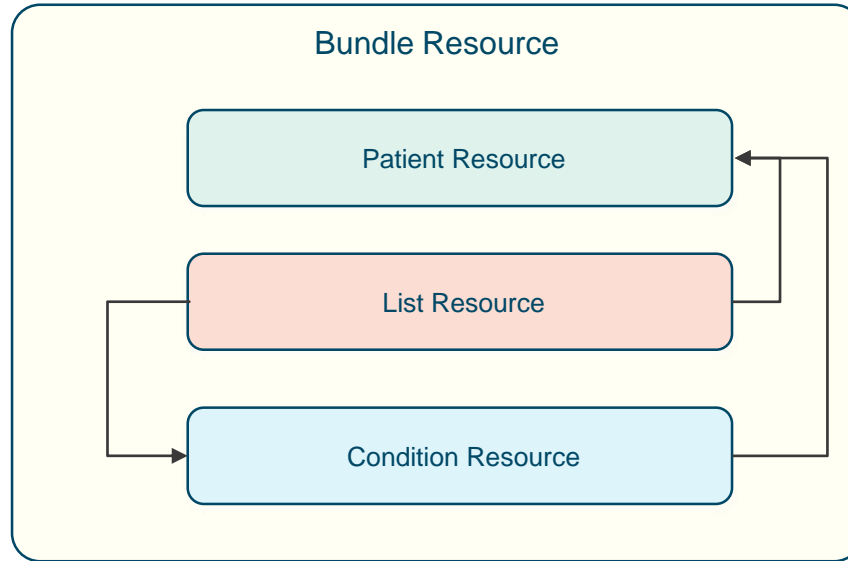


- ▶ Summary at a point in time
 - ▶ Part of record
 - ▶ Very common
 - ▶ Discharge Summary
 - ▶ Referral letter
 - ▶ Progress Note
 - ▶ CDA
 - CDA on FHIR
-

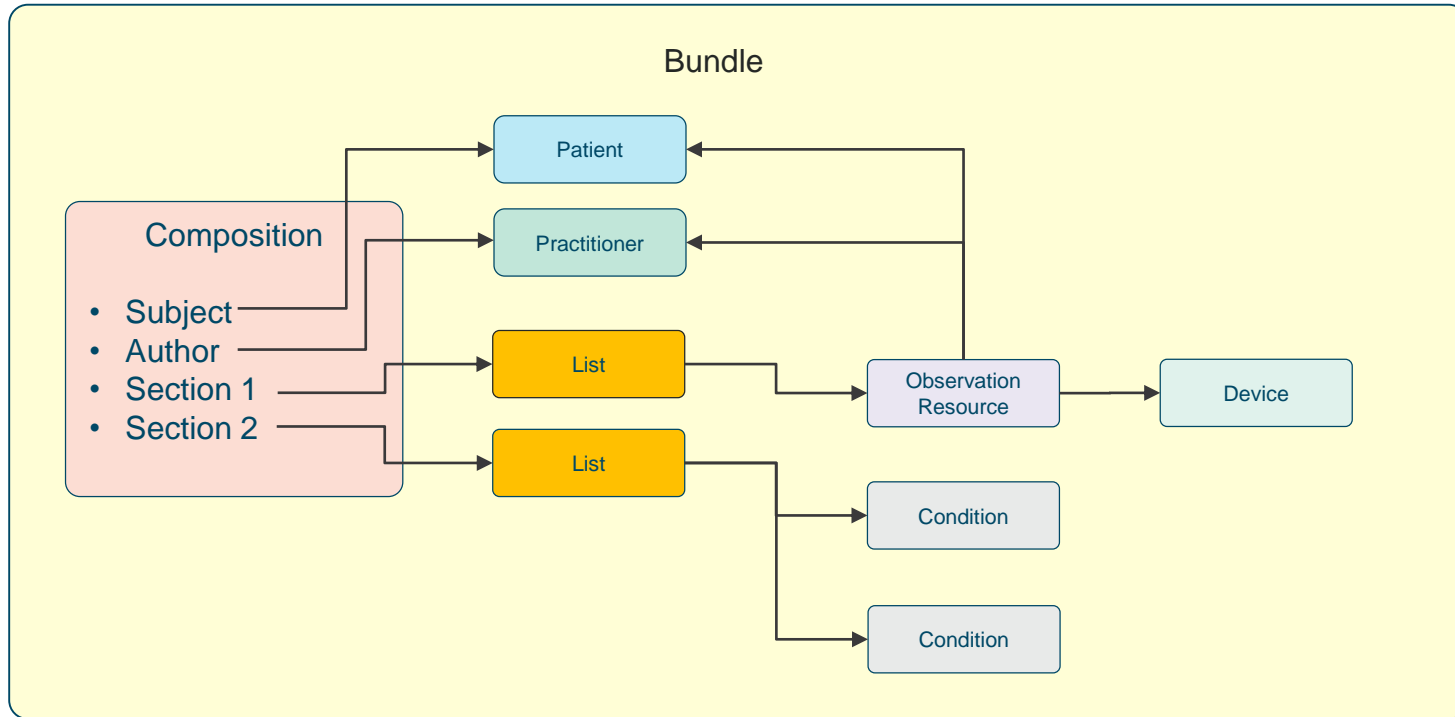
Bundles



- ▶ Container resource
- ▶ Types of Bundle
 - Searchset
 - Transaction
 - Document
 - Message
 - ...



Documents - are bundles



Note: Most resources have a reference to Patient

Documents



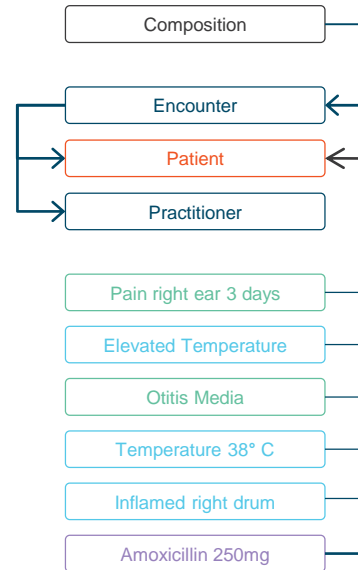
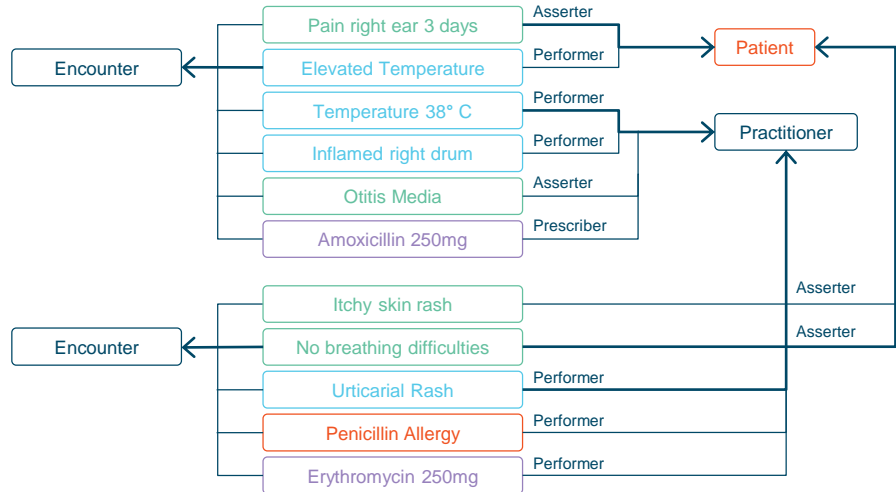
12-year-old boy

First consultation

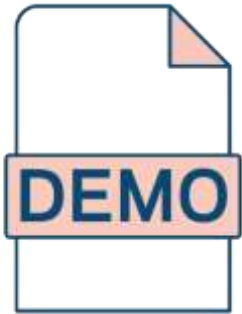
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Follow up consultation

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Demo



-
- ▶ Creating a Document
-

Exercises



Notes

- Getting started
 - Set servers (hapi-3)
 - Create user account
 - Use initials for model name
 - Remember to save models
-

Process

1. Document requirements
 2. Build Information Model
 3. Build Resources Model
 4. Create Resources Graph
 5. Convert to Document
-

A family silhouette consisting of a man, a woman, and a child stands on the left side of the frame, looking up at a vibrant night sky filled with colorful fireworks. The fireworks are exploding in various colors including blue, purple, pink, red, and orange, creating a starburst pattern against the dark sky. The ground is dark with some grass visible at the bottom. The text "That's it!" is centered in the upper half of the image.

That's it!

