ahdis
making health data agile

HL7 CDA to FHIR mapping hands-on

16.6.2022, workshop with HL7 Italy, Via Alessandria, 220, 00198 Roma RM, Italien

Agenda

10.00 – 10.30	High Level Introduction CDA and FHIR Mapping (Differences between Standards, FHIR Mapping Language as independent Mapping Exchange format)
10.30 – 11.00	FHIR Logical Model of CDA - Exercise
11.15 – 12.15	FHIR Mapping Language Introduction with conversion to StructureMap - Exercise
14.00 – 15.00	CDA to FHIR mapping hands-on with matchbox - Exercise (based on provided Italian example)
15.00 – 15.30	Summary, Questions and answers - Exercise

Oliver Egger

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oliver.egger@ahdis.ch
twitter: @oliveregger

2015 - founder ahdis

2003 - 2014 visionary AG, docbox
2002 - 2003 Ecofin Research & Consulting AG
1994 - 2001 SPEAG

2016 - Dozent BFH Bern, ZHAW Winterthur

Medizininformatik, Interoperabilität

HL7.ch

Technical Manager, member hl7 since 2009

IHE Suisse Member since 2015

IHE International ITI Technical Committee Co-Chair

Dipl. Inf. ETH, ETH Zürich, 1996

IHE XDS Advanced Training, 2015
Certified HL7 CDA Specialist, 2015
Certified Scrum Master, 2014
NDK eHealthcare, Nottwil, 2009

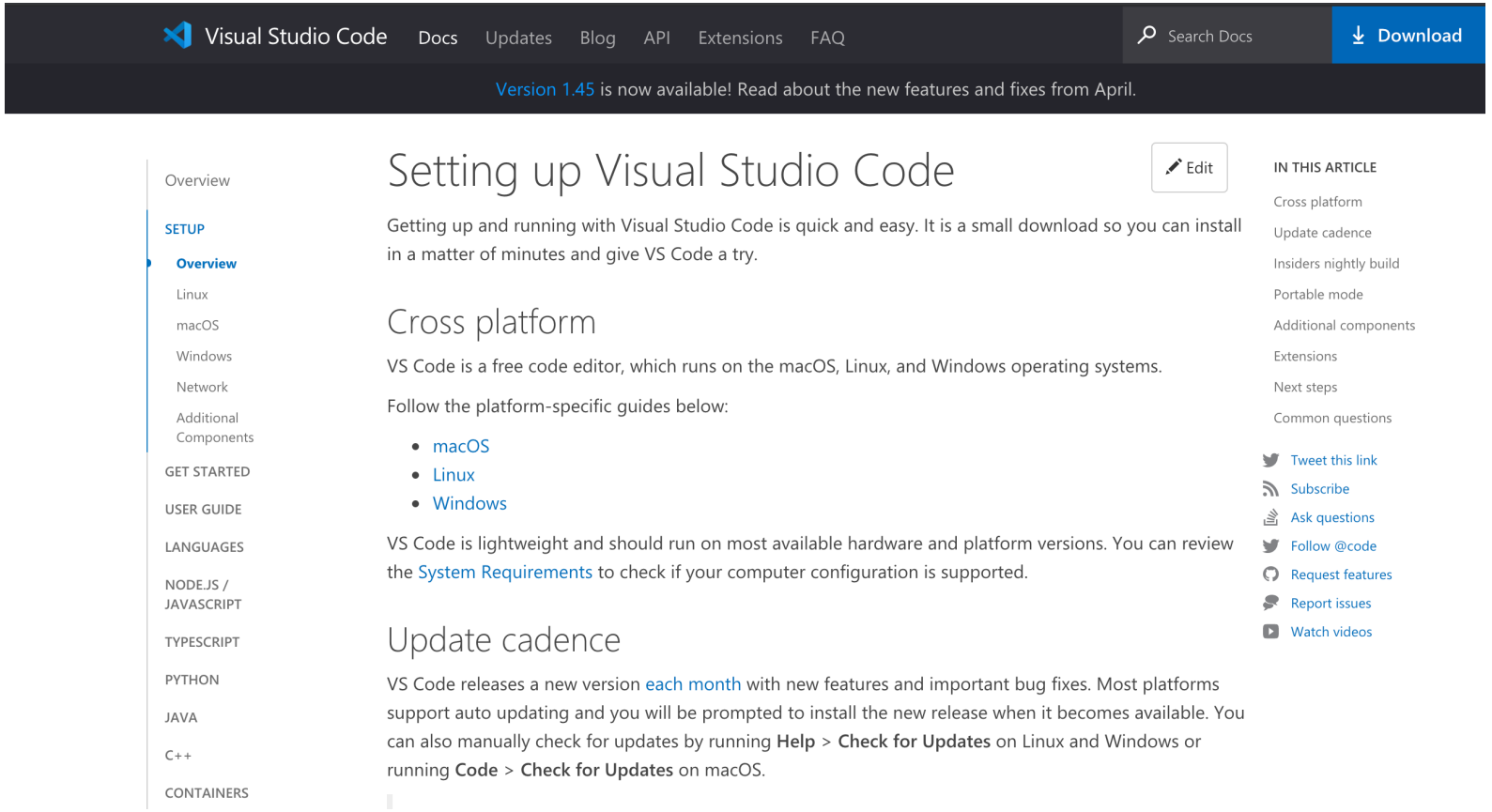
offering

- Consulting and Teaching in eHealth topics from HL7 (FHIR, V2, CDA), IHE and Swiss EPR
- Design and Architecture of eHealth Information systems: API‘s, Exchange formats, Architecture, Hosting, Security
- Implementation Coordination and Integration of eHealth Software-Projects, PoC

Workshop
Übungen Computer Setup

- Editor: Visual Studio Code
  - REST Client Extension
  - fhir-tools Extension
  - FHIR Mapping Language Extension
- Github Desktop or git client locally
- Java Runtime for running HL7 Java Validator
- Docker

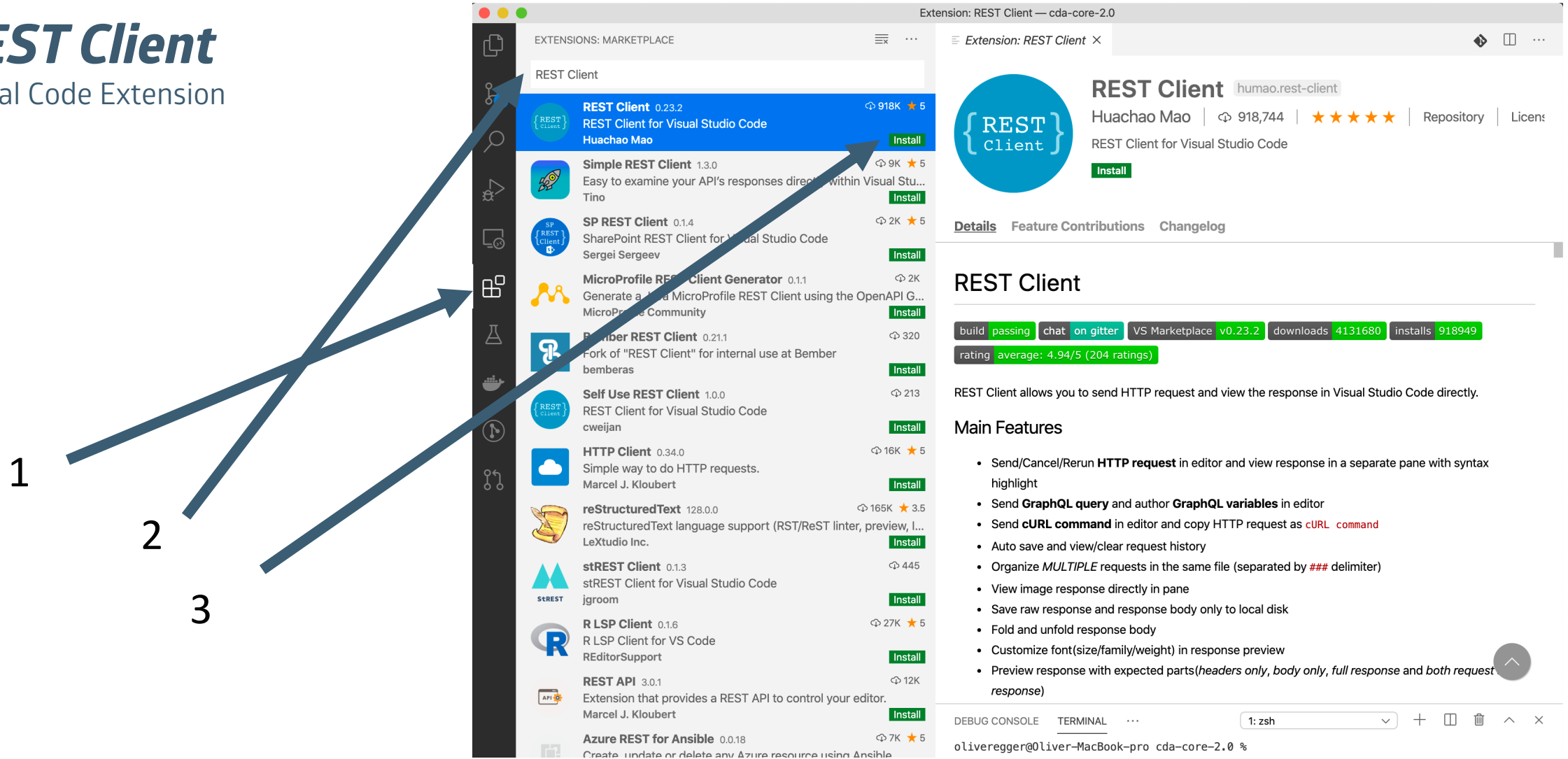
Visual Studio Code



https://code.visualstudio.com/docs/setup/setup-overview

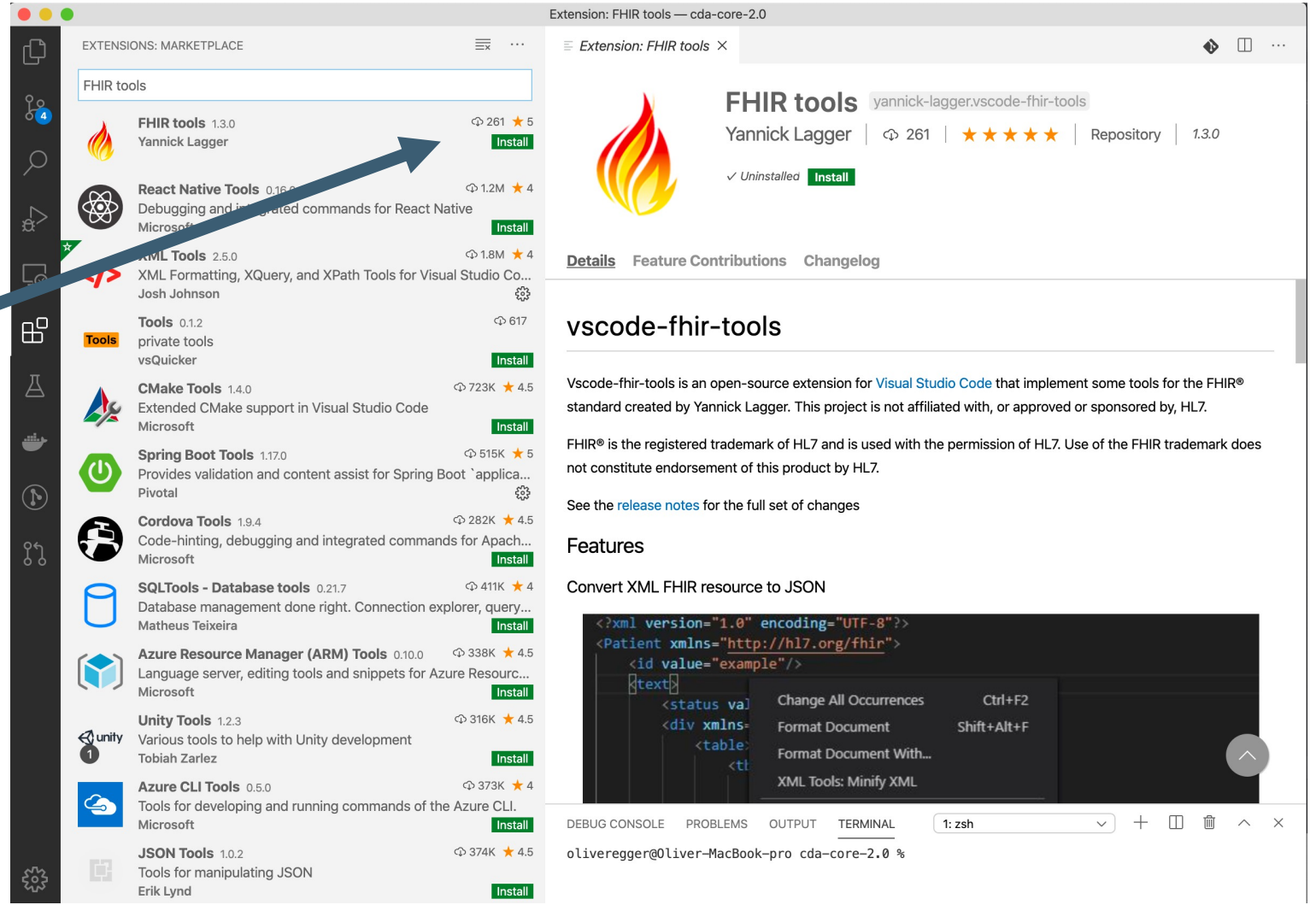
REST Client

Visual Code Extension



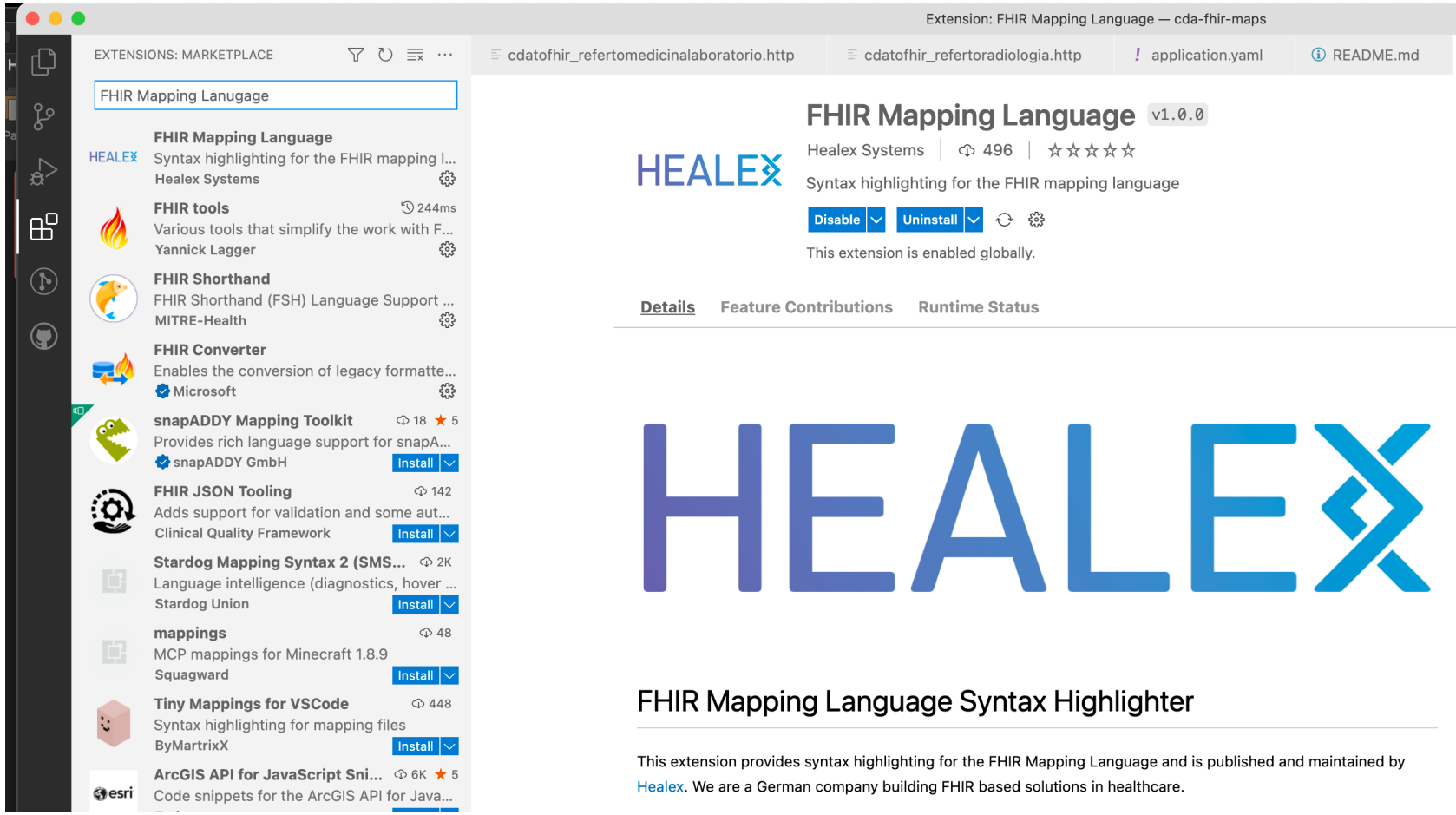
FHIR tools

Visual Studio Code Extension



FHIR Mapping Langauge

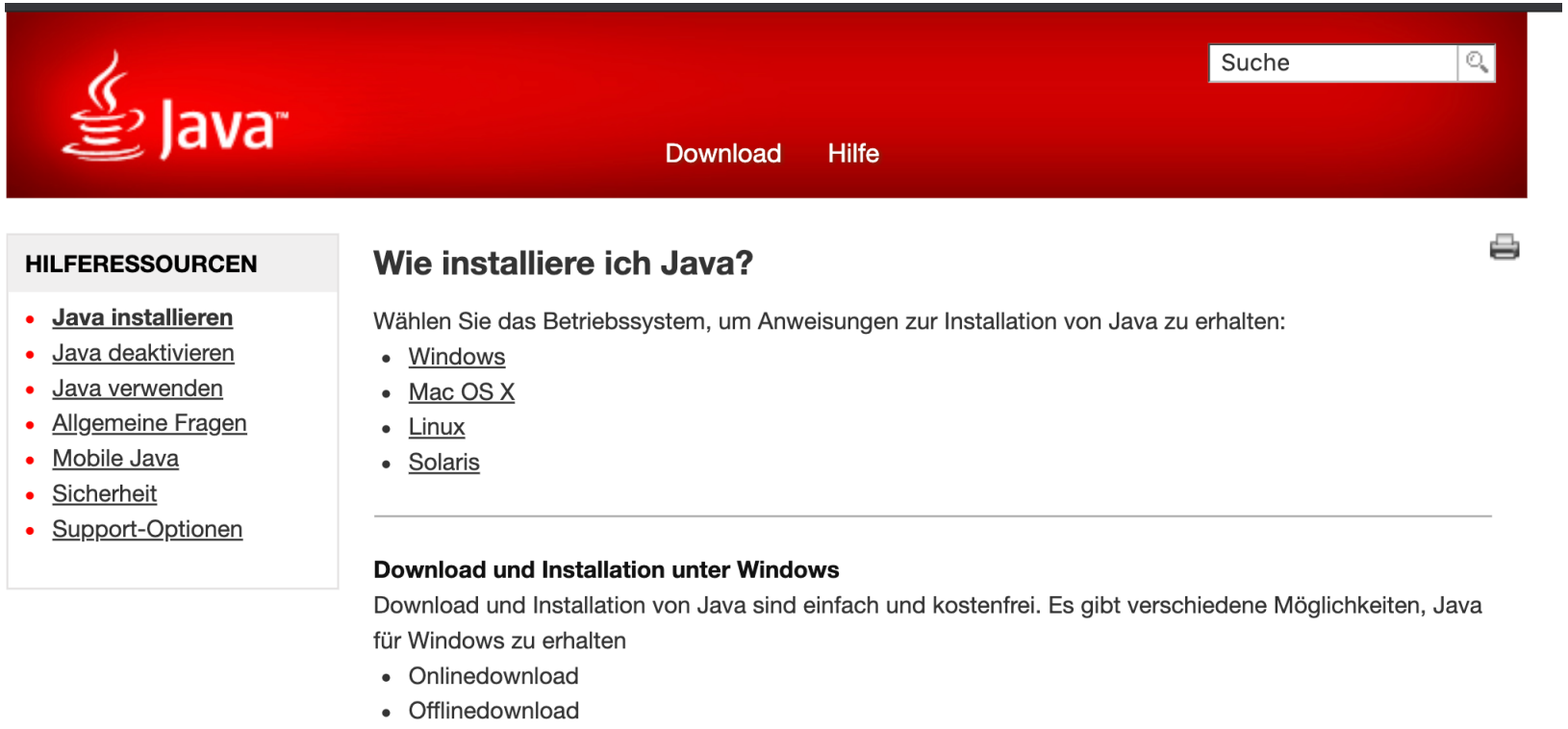
Visual Studio Code Extension



Github Desktop

https://desktop.github.com/

Java



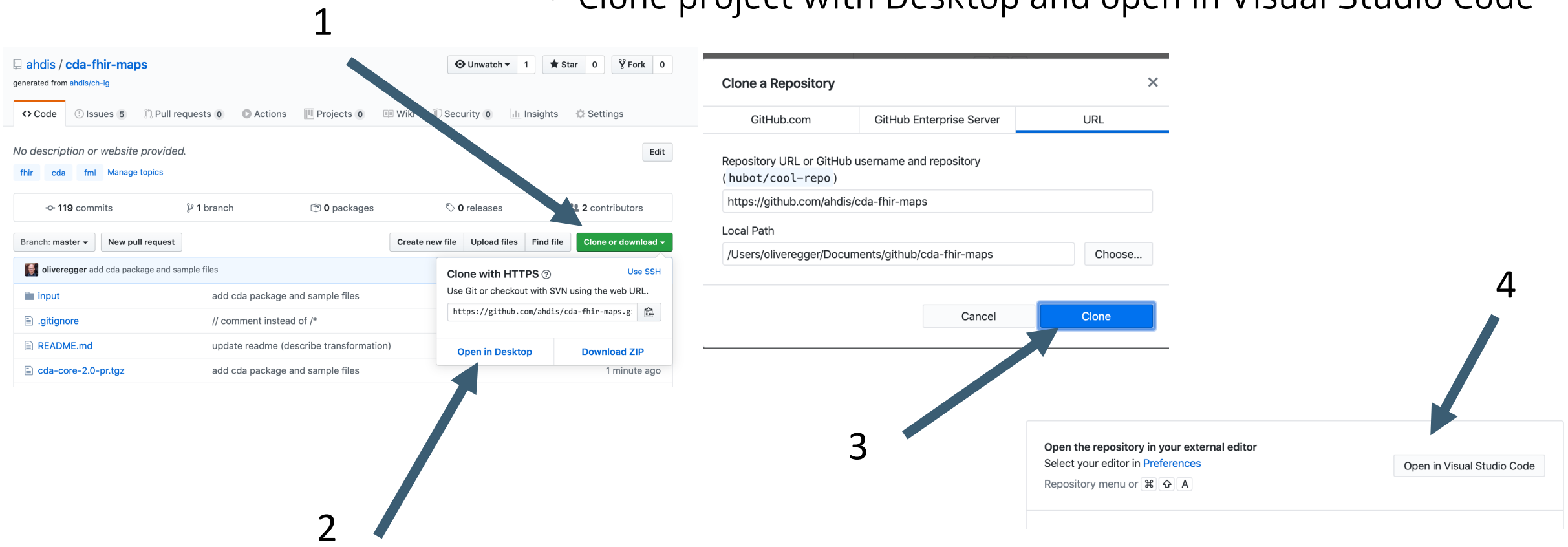
https://www.java.com/de/download/help/download_options.xml

Docker

https://docs.docker.com/get-docker/

Preparation exercise

- https://github.com/ahdis/cda-fhir-maps
- Clone project with Desktop and open in Visual Studio Code



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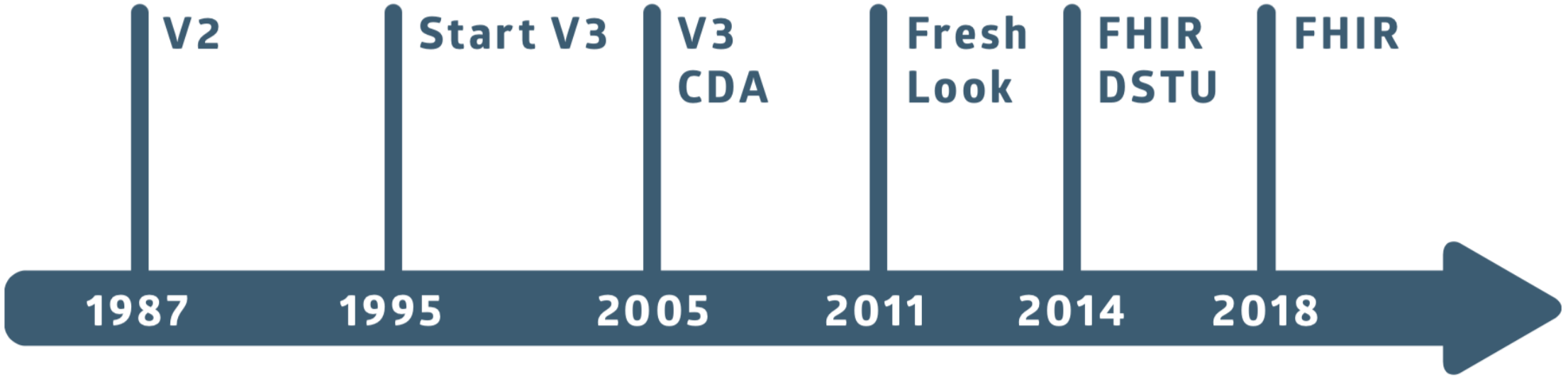
HL7
Standards

HL7 International

HL7 Affiliate | Switzerland



http://www.hl7.ch

http://www.hl7.org

HL7 CDA

Clinical Document Architecture

Dr. med. Allzeit Bereit
Facharzt für Allgemeine Medizin
Gruppenpraxis CH

Doktorgasse 2
8888 Musterhausen

bereit@gruppenpraxis.ch
http://www.gruppenpraxis.ch
Tel. 032 234 55 66
Fax 032 234 66 77

Kopfzeile des Absenders des Dokumentes

RoDiag
Radiologieinstitut
Röntgenstr. 1
8888 Musterhausen
Dokumentempfänger

Musterhausen, 03.10.2007/
Dokumentdatum / -ersteller
(z.B. Kurzzeichen der MPA)

ZUWEISUNG ZUR RADIOLOGISCHEN DIAGNOSTIK
Dokumentart

Betrifft: MUSTER Max, 12.12.1938, Leidensweg 10, 9999 Specimendorf
Tel. P: 032 685 12 34 G: 032 123 77 88
Patientenstammdaten, ev. Angaben zum Kostenträger

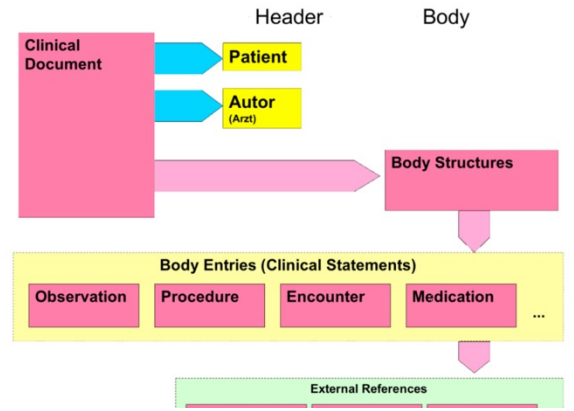
Gewünschte Untersuchung
Spezifizierung der gewünschten Untersuchung

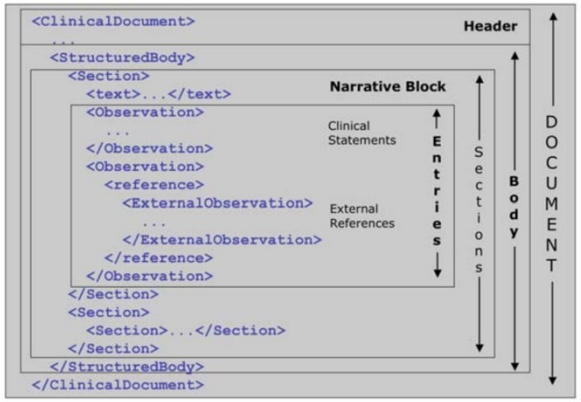
Dringlichkeit / Wunschtermin
Angaben zum gewünschten Termin

Fragestellung
Grund für die Durchführung der Untersuchung und Angaben zum aktuellen Leiden resp. zum Grund der Untersuchung

Angaben zum Patienten
Erfolgte Voruntersuchungen
Befundkopie – Empfänger

Klinische Angaben
Beschreibung des aktuellen Leidens
Schwangerschaft ja / nein
Laborwerte (Quick / Tc, Kreatinin)





https://www.hl7.ch/default/assets/File/Publikationen/20200406_CDA-CH-V2_1_de.pdf

HL7 FHIR

F Fast

H Healthcare
I Interoperability

R Resources

http://www.hl7.org/fhir/

Resource

FHIR uses a collection of information models that define the data elements, constraints and relationships for the “business objects” most relevant to healthcare

http://www.hl7.org/fhir/

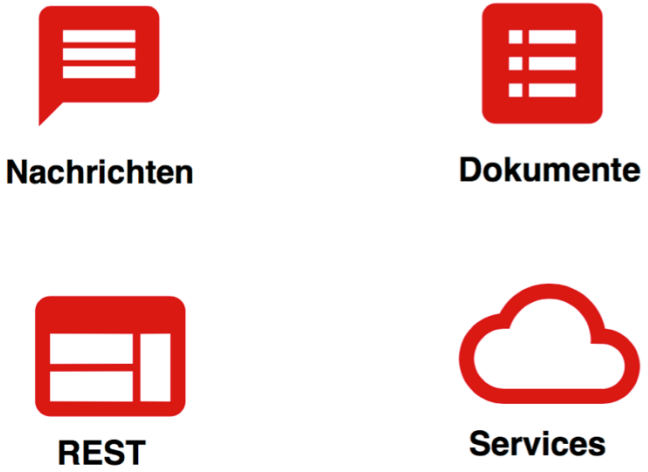
API

FHIR builds on modernen Web Technoloy and RESTful Services

XML, JSON, HTTP und OAuth.

http://www.hl7.org/fhir/

FHIR Architecture



http://www.hl7.org/fhir/

Document Paradigms

Persistence

Stewardship

Authentication

Wholeness

Human readable

HL7 CDA

Clinical Document Architecture

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Gruppenpraxis CH

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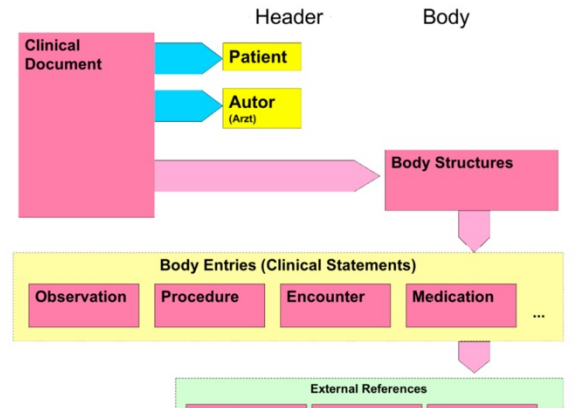
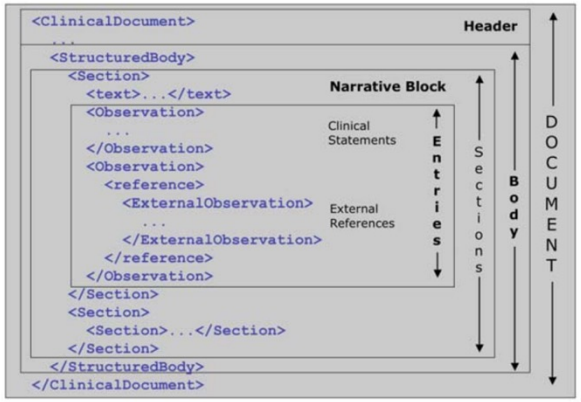
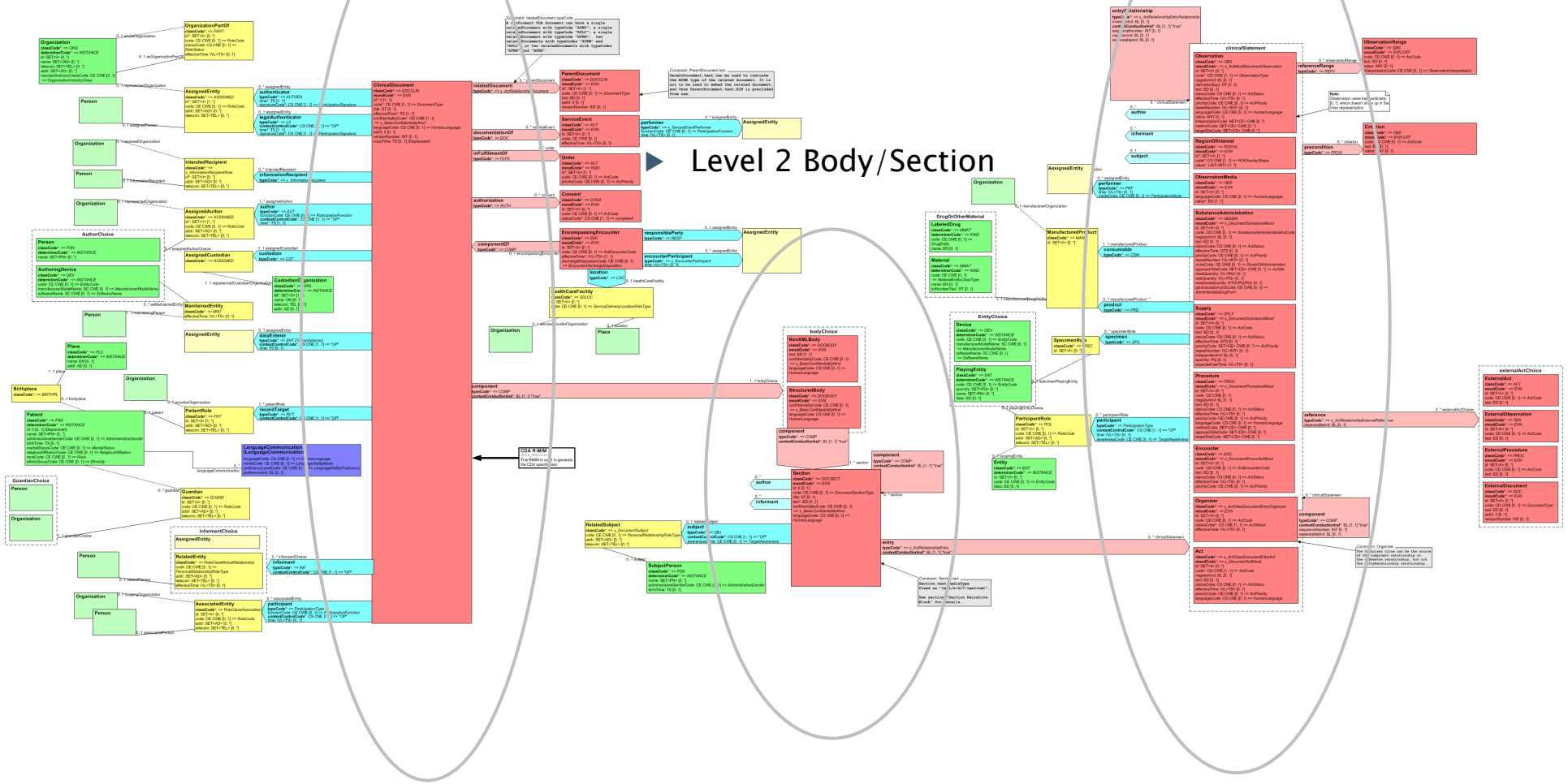




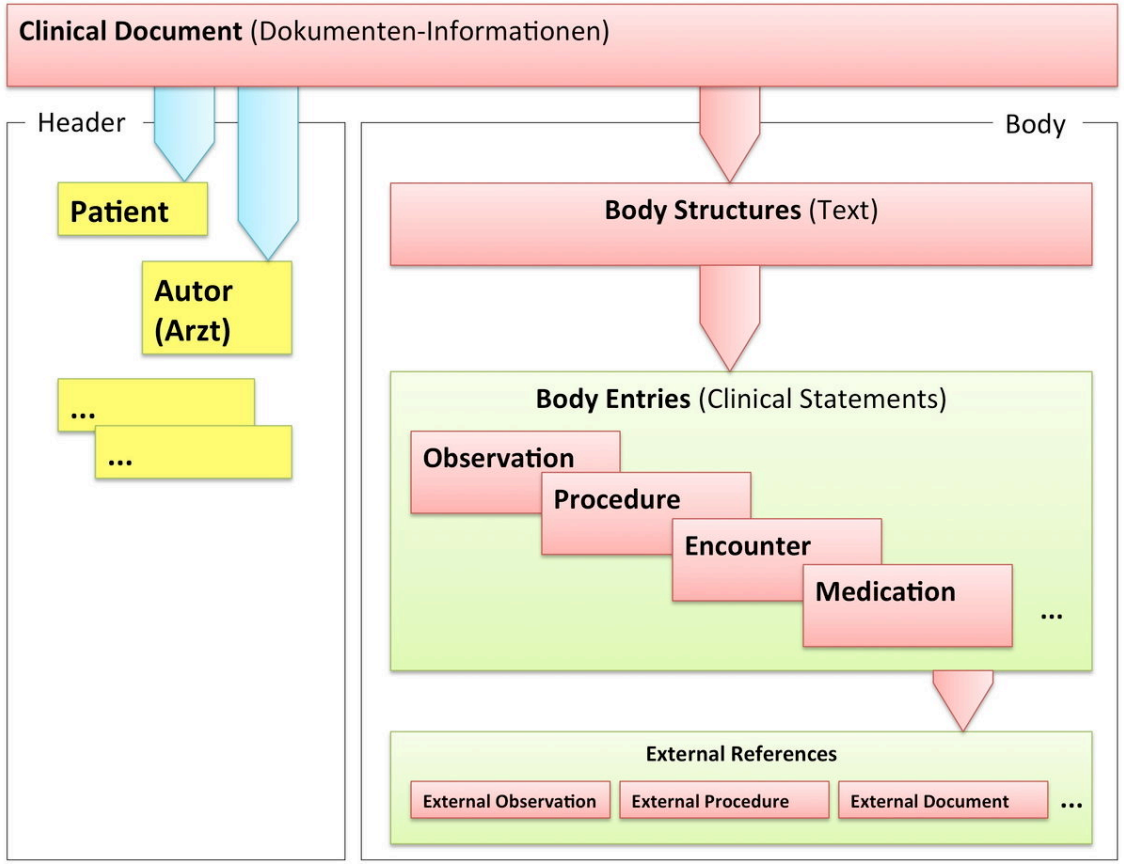
https://www.hl7.ch/default/assets/File/Publikationen/20200406_CDA-CH-V2_1_de.pdf

CDA RIM Modell

- Level 1 / Header
- Level 2 Body/Section
- Level 3 / Body / Entries

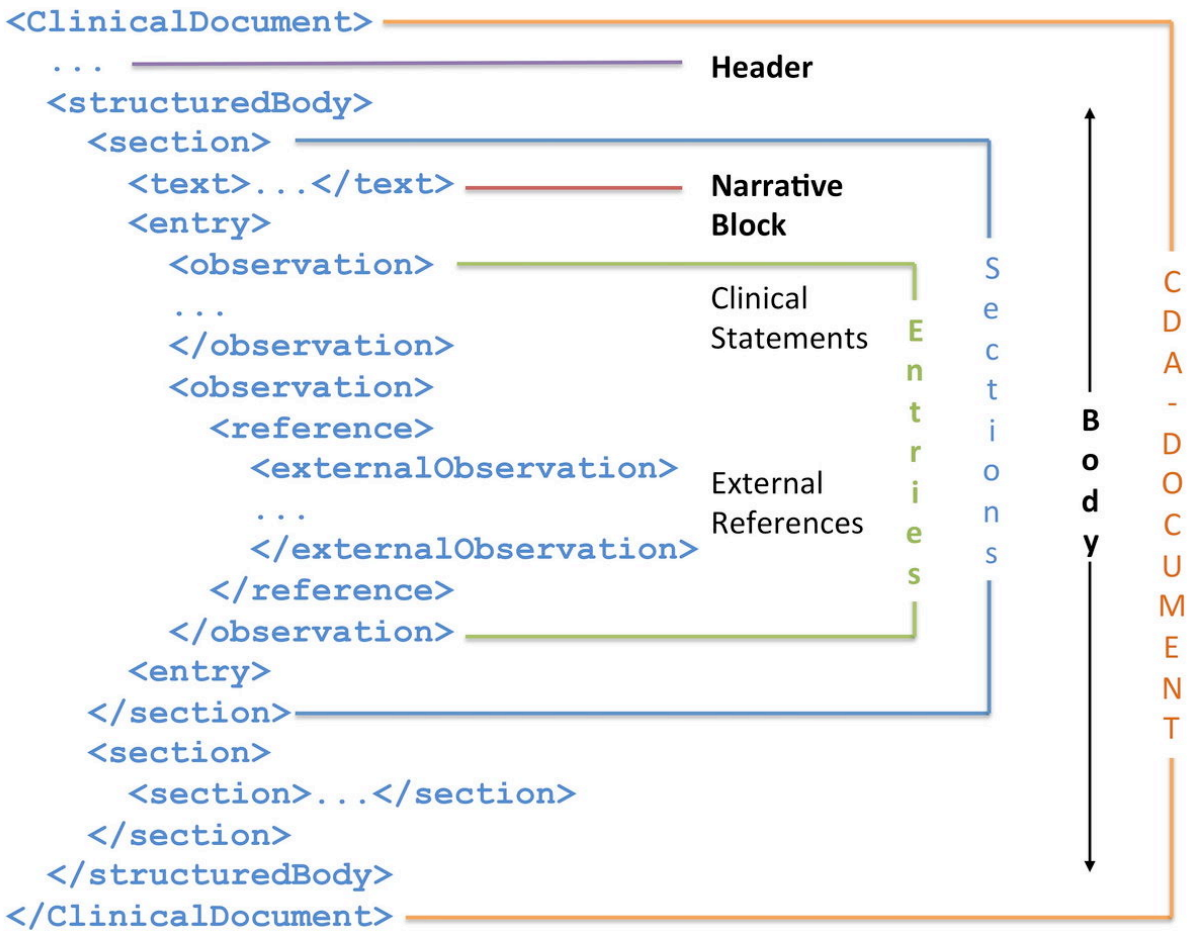


CDA Header and Body



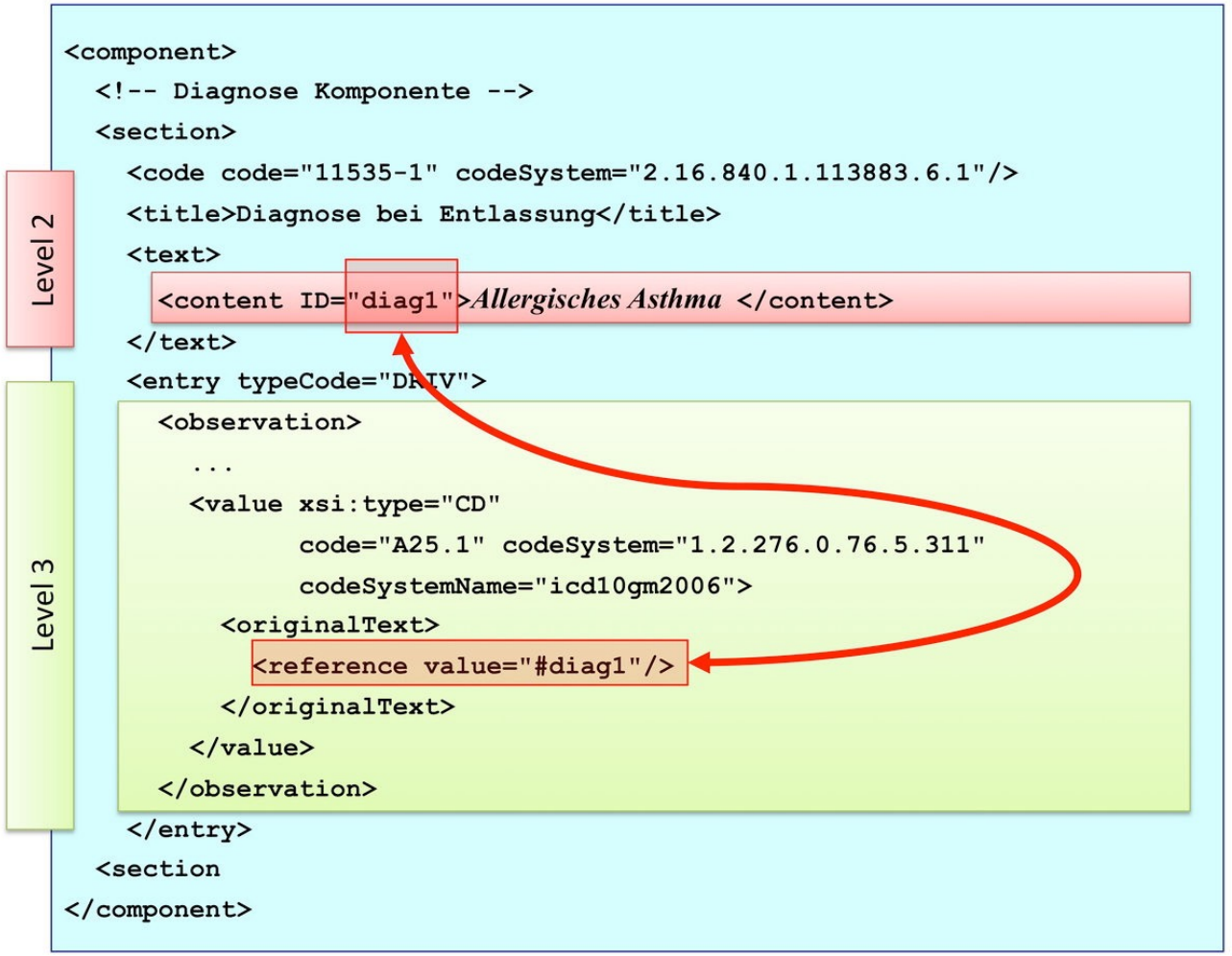
http://wiki.hl7.de/index.php?title=IG:Arztbrief_2014

CDA Documents XML View



http://wiki.hl7.de/index.php?title=IG:Arztbrief_2014

CDA section components, entry and reference to narrative



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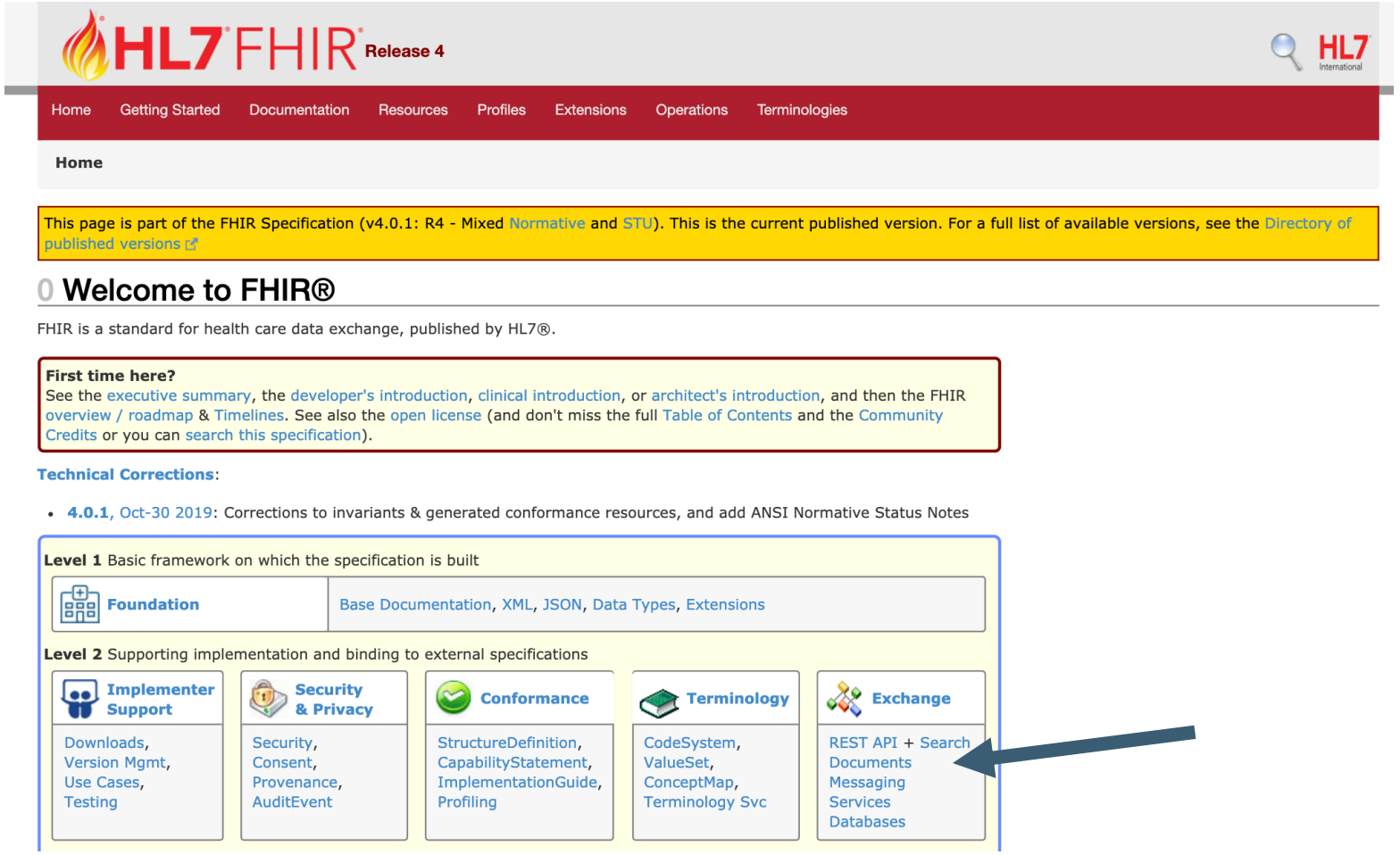
FHIR documents

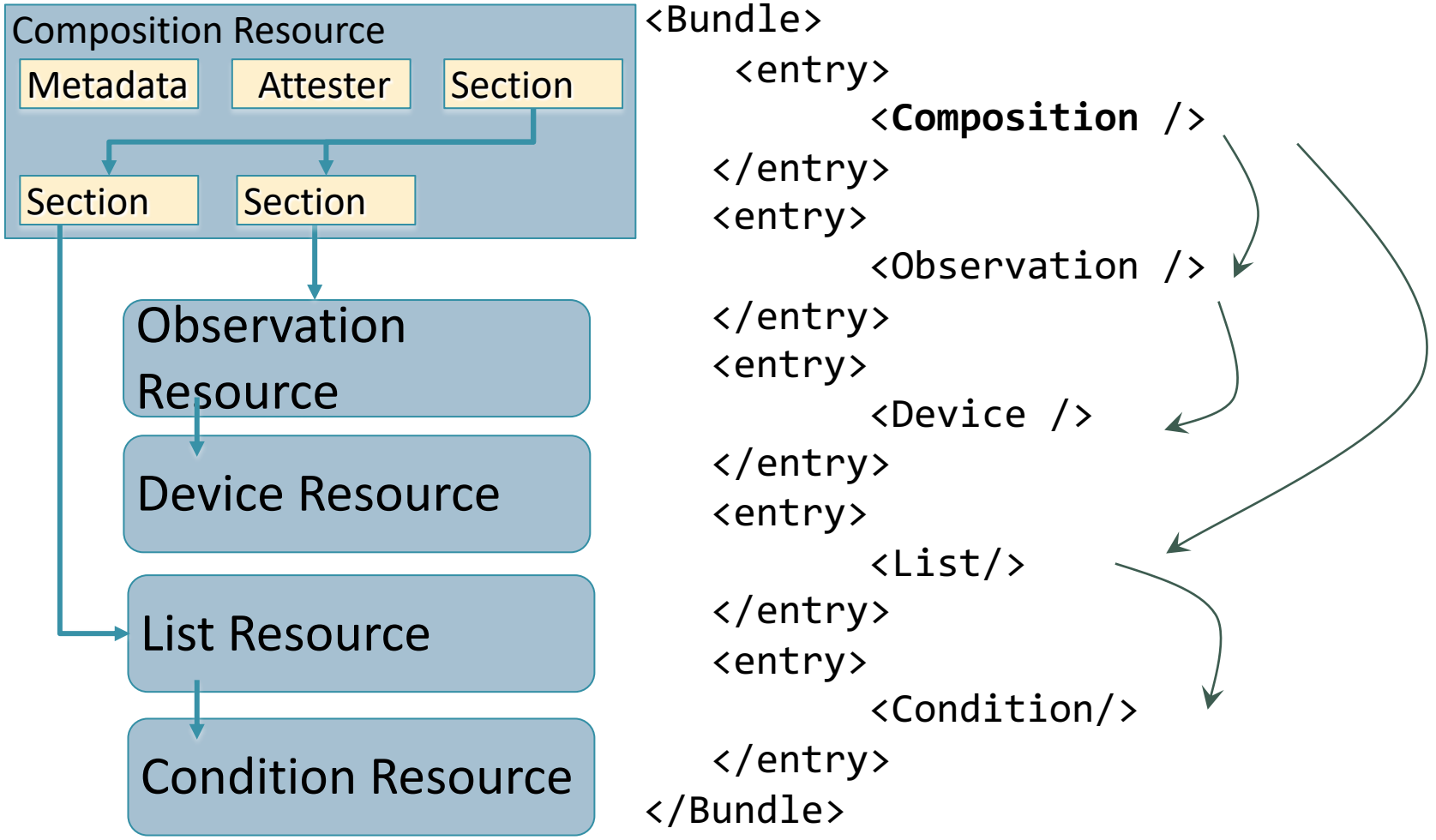


http://www.hl7.org/fhir/

FHIR documents

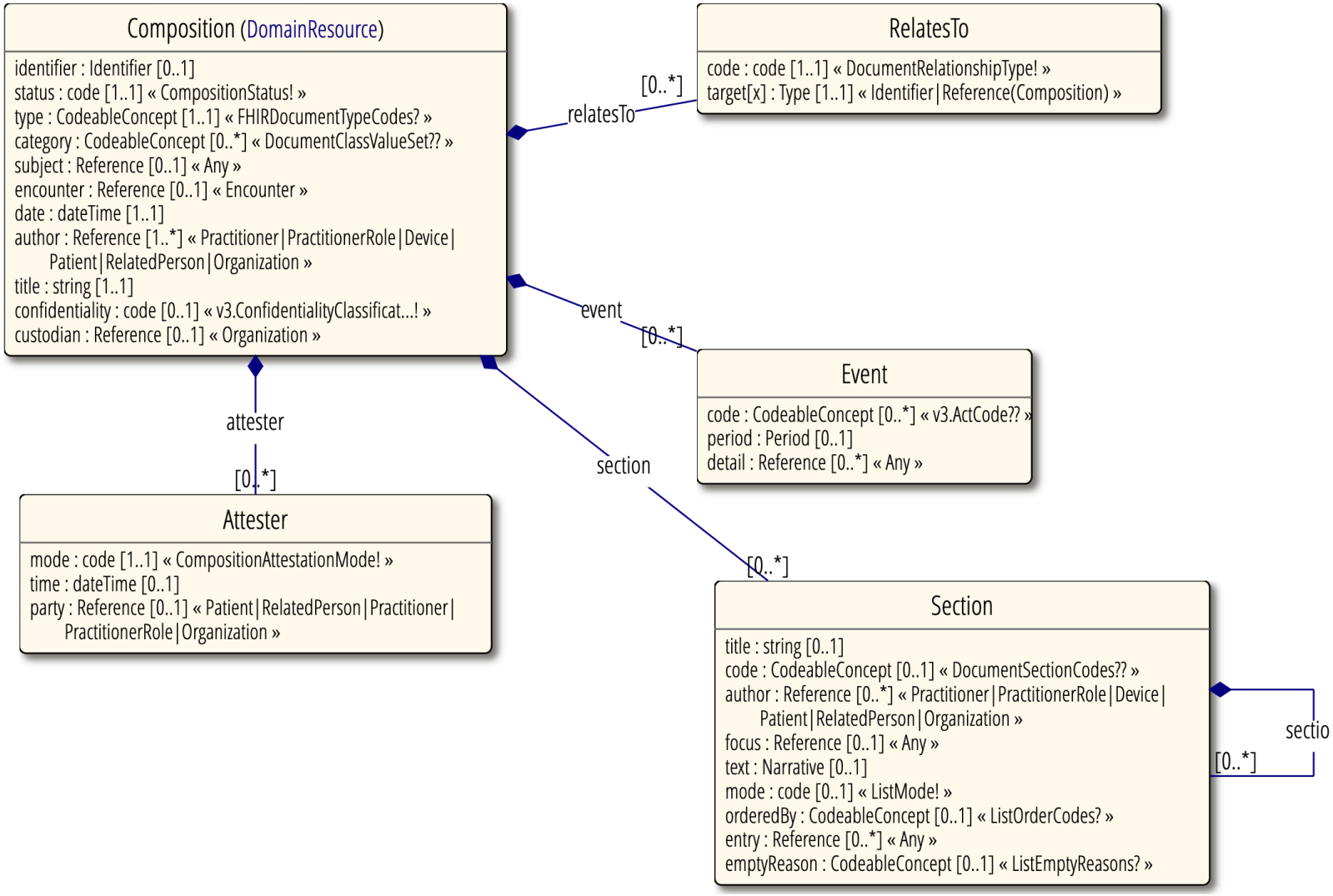
- FHIR resources can be used to build documents that represent a composition: a coherent set of information that is a statement of healthcare information.
- First entry is a Composition Resource
  - Equivalent to CDA header and narrative
- Can be signed, authenticated, etc.
- A FHIR document has the same basic principles as a CDA document

Documents are Bundles

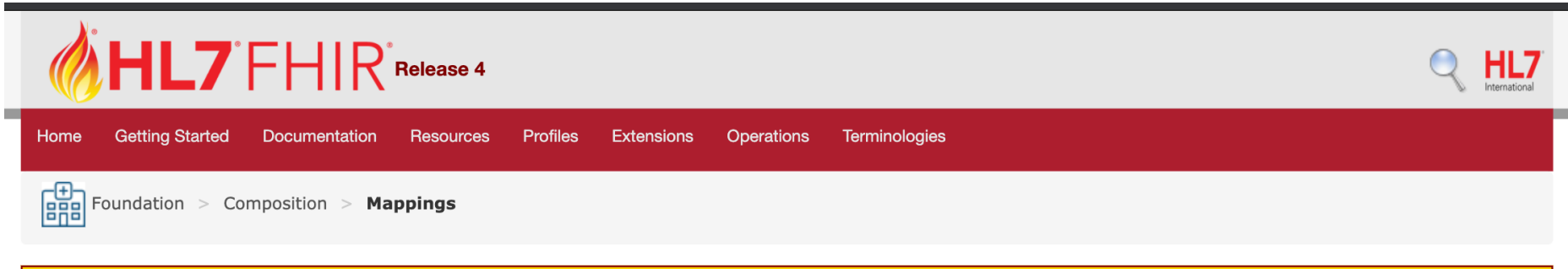


Source: https://github.com/FHIR/documents/tree/master/presentations/2019-01%20Webinars

Composition Resource



Composition CDA Mapping



2.41.10 Resource Composition - Mappings

Structured Documents Work Group	Maturity Level: N/A	Standards Status: Informative	Security Category: Not Classified	Compartments: Device, Encounter, Patient, Practitioner, RelatedPerson

2.41.10.3 CDA (R2) (http://hl7.org/v3/cda)

Composition	ClinicalDocument
(meta.profile)	ClinicalDocument.templateId
(language)	ClinicalDocument.languageCode
identifier	.setId
status	n/a
type	.code
category	n/a
subject	.recordTarget
encounter	.componentOf.encompassingEncounter

http://hl7.org/fhir/composition-mappings.html

Mapping from CDA to FHIR

- CDA Level 1: (Just metadata and text), map to Bundle/Composition
- CDA Level 2: Coded sections, map to Bundle/Composition
- CDA Level 3: Structured entries, map to entries in Bundle

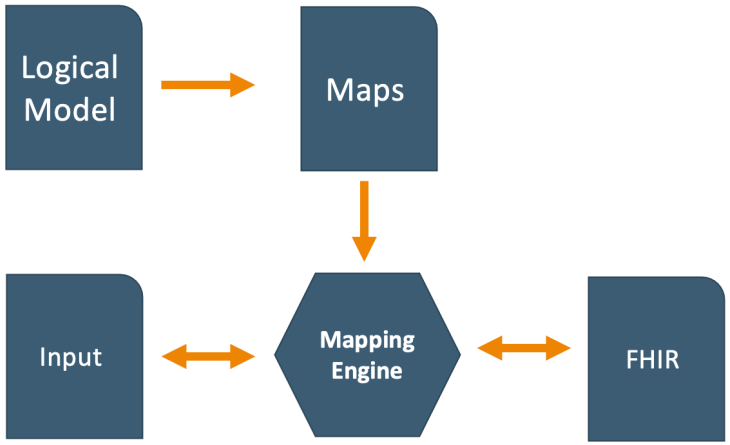
Level 1, Level 2 can be done maybe 70% generic, there are some different or missing concepts or too general to map

Level 3 general mapping hardly possible, can only be done on a profiled CDA (template), like C-CDA or a specific exchange format

Mappings should be done at the CDA template level rather than at the CDA specification

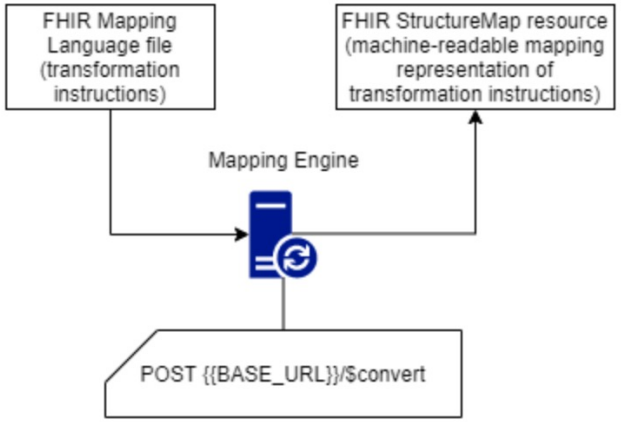
FHIR Mapping Language

https://www.hl7.org/fhir/mapping-language.html



The mapping language describes how one set of Directed Acyclic Graphs (an instance) is transformed to another set of directed acyclic graphs. It is not necessary for the instances to have formal declarations and/or be strongly typed - just that they have named children that themselves have properties.

Mapping Authoring

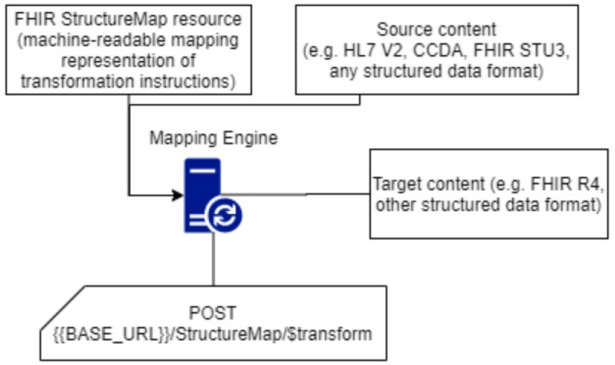


- Define mapping instructions to transform the source content to the target content.
- Use the mapping engine to create a machine-readable representation of the mapping instructions in the form of a FHIR StructureMap resource.

```
// source: https://art-decor.org/art-decor/decor-templates--ch-pharm-?section=templates&id=2.16.756.5.30.1.1.10.4.45
// target: http://build.fhir.org/ig/hl7ch/ch-emed/branches/master/StructureDefinition-ch-emed-ext-treatmentplan.html
group MTPReferenceEntryContentModule(source entryrelationship, target ext: Extension) {
  entryrelationship -> ext.url = 'http://fhir.ch/ig/ch-emed/StructureDefinition/ch-emed-ext-treatmentplan' "url";
  entryrelationship.substanceAdministration as substanceAdministration then {
    substanceAdministration.id as id -> ext.extension as ext then InnerExtensionId(id, ext) "innerExtensionId";
    substanceAdministration.reference as reference then {
      reference.externalDocument as externalDocument then {
        externalDocument.id as id -> ext.extension as ext then InnerExtensionExternalDocumentId(id, ext) "innerExtensionExternalDocument
      } "externalDocument";
    } "substanceAdministration";
  } "id";
}
```

https://confluence.hl7.org/display/FHIR/Using+the+FHIR+Mapping+Language

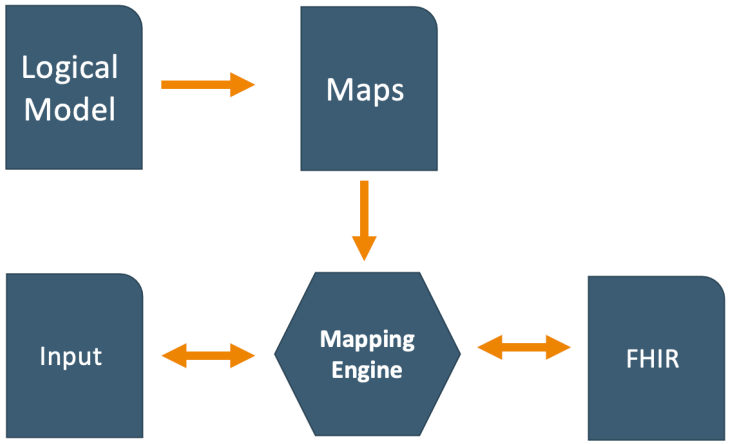
Mapping Execution



- Store the source FHIR StructureMap resource on the FHIR Server.
- Execute transformations - $transform - The mapping engine requires:
  - The source content to transform.
  - The machine-readable representation of the mapping instructions previously created.
- Store the generated target content (optional)

https://confluence.hl7.org/display/FHIR/Using+the+FHIR+Mapping+Language

Logical model

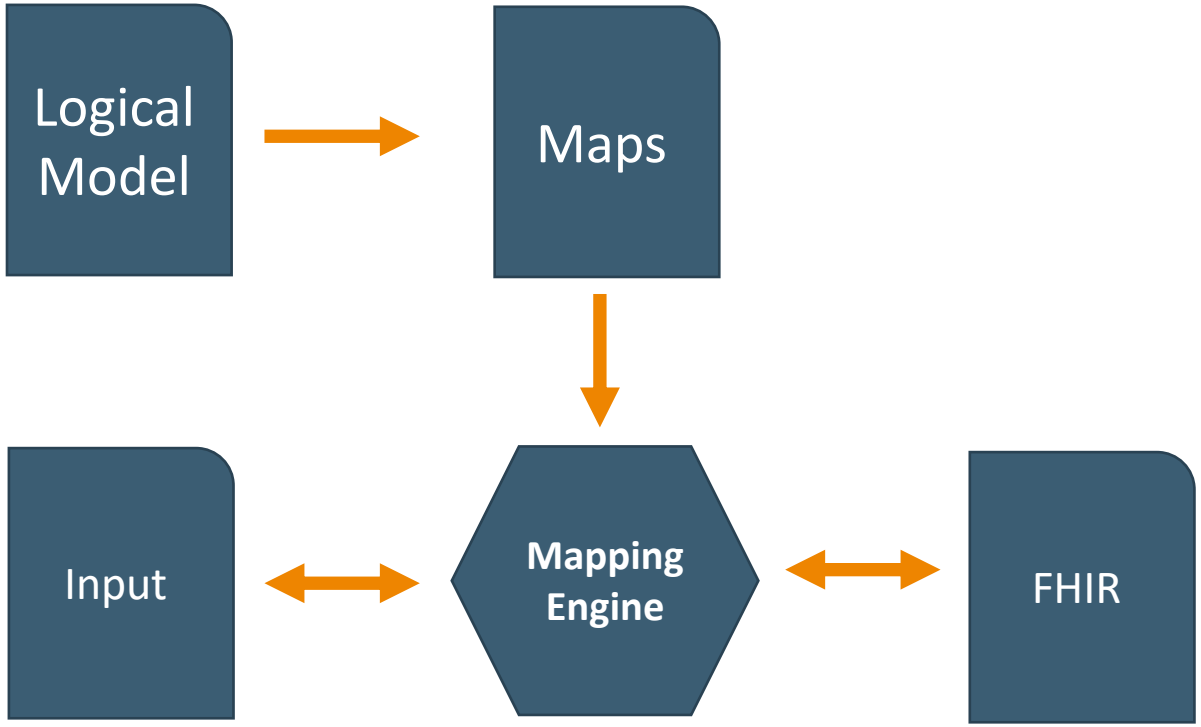


- Defining a content model to support the mapping language
- e.g. CDA Logical Model

https://www.hl7.org/fhir/structuredefinition.html#logical

FHIR Mapping Language

- Custom data to FHIR
- CDA to FHIR and back
- Structured Data Capture: Questionnaire Response to Resources



✓ Mappings have a textual representation

✓ Aligned to FHIR: ConceptMap, FHIRPath

✓ Maps can be integrated and distributed with IG's

- Need to describe Logical Model (rarely Parser)
- Steep Learning Curve for the Language
- API of the FHIR Mapping Language
- https://www.hl7.org/fhir/mapping-language.html

Feedback, Questions?

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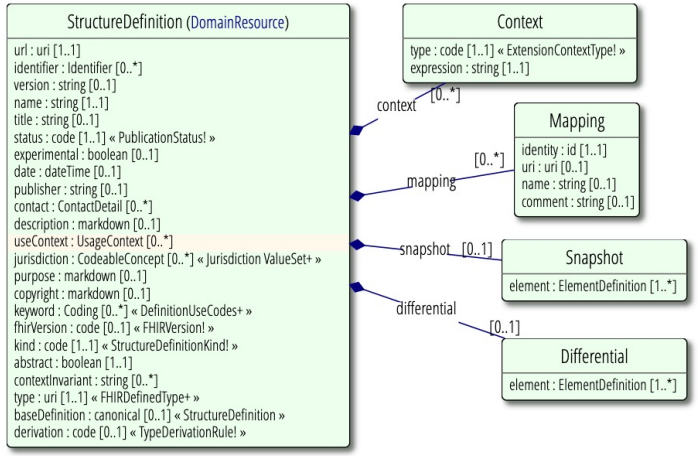
FHIR Logical model for CDA

FHIR Logical model CDA

- Introduction FHIR Logical Model
- CDA logical Model – Implementation Guide
- FHIRPath
- Conversion CDA Narrative to xhtml

StructureDefinition



- The StructureDefinition resource describes a structure - a set of data element definitions, and their associated rules of usage. These structure definitions are used to describe both the content defined in the FHIR specification itself - Resources, data types, the underlying infrastructural types, and also are used to describe how these structures are used in implementations.
- Note that as part of the specification itself, a full set of structure definitions for all resources and data types is published.

http://hl7.org/fhir/structuredefinition.html

StructureDefinition

Patient

Name	Flags	Card.	Type
Patient	N		DomainResource
identifier	Σ	0..*	Identifier

See the Profiles & Extensions and the alternate definitions: Master Definition XML + JSON,

http://hl7.org/fhir/R4/patient.html

```
<StructureDefinition xmlns="http://hl7.org/fhir">
  <id value="Patient"/>
  <url value="http://hl7.org/fhir/StructureDefinition/Patient"/>
  <version value="4.0.1"/>
  <name value="Patient"/>
  <status value="active"/>
  <date value="2019-11-01T09:29:23+11:00"/>
  <publisher value="Health Level Seven International (Patient Administration)"/>
  <kind value="resource"/>
  <abstract value="false"/>
  <type value="Patient"/>
  <baseDefinition value="http://hl7.org/fhir/StructureDefinition/DomainResource"/>
  <derivation value="specialization"/>
  <differential>
    <element id="Patient">
      <path value="Patient"/>
      <min value="0"/>
      <max value="*"/>
    </element>
    <element id="Patient.identifier">
      <path value="Patient.identifier"/>
      <short value="An identifier for this patient"/>
      <definition value="An identifier for this patient."/>
      <requirements value="Patients are almost always assigned specific numerical identifiers."/>
      <min value="0"/>
      <max value="*"/>
      <type>
        <code value="Identifier"/>
      </type>
```

StructureDefinition

Profile on Patient, CH-Core

Name	Flags	Card.	Type
Patient	I	0..*	Patient
identifier		*0..**	*(Slice Definition)*
identifier:LocalPid		0..*	Identifier
type		1..1	CodeableConcept
coding		1..*	Coding
system		1..1	uri
code		1..1	code
system		1..1	uri
value		1..1	string

```
<StructureDefinition xmlns="http://hl7.org/fhir">
  <id value="ch-core-patient"/>
  <url value="http://fhir.ch/ig/ch-core/StructureDefinition/ch-core-patient"/>
  <version value="1.0.0"/>
  <name value="CHCorePatient"/>
  <title value="CH Core Patient Profile"/>
  <status value="draft"/>
  <date value="2018-10-14T16:00:00+02:00"/>
  <publisher value="HL7 Switzerland"/>
  <kind value="resource"/>
  <abstract value="false"/>
  <type value="Patient"/>
  <baseDefinition value="http://hl7.org/fhir/StructureDefinition/Patient"/>
  <derivation value="constraint"/>
  <differential>
    <element id="Patient">
      <path value="Patient"/>
      <short value="CH Core Patient"/>
    </element>
    <element id="Patient.identifier">
      <path value="Patient.identifier"/>
      <slicing>
        <discriminator>
          <type value="pattern"/>
          <path value="$this"/>
        </discriminator>
        <rules value="open"/>
      </slicing>
```

http://fhir.ch/ig/ch-core/StructureDefinition-ch-core-patient.profile.xml.html

Logical models based on StructureDefinitions

- StructureDefinitions can also be used to define any arbitrary structures that are a directed acyclic graph with typed nodes, where the primitive types are those defined by the FHIR specification.
- This technique has many uses
  - Describing any arbitrary content model
  - Describing existing HL7 content models (e.g. v2, CDA) using FHIR
  - Describing common design patterns used in FHIR
  - Defining a content model to support the mapping language

http://hl7.org/fhir/structuredefinition.html#logical

StructureDefinition

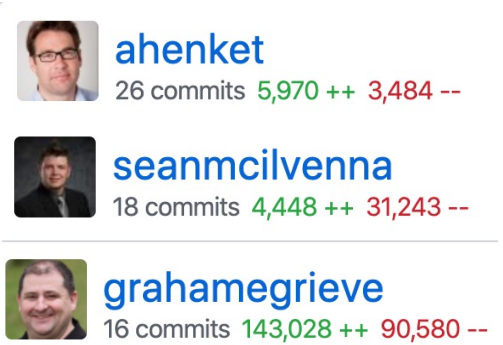
recordTarget

```
<recordTarget>
    <patientRole>
        <id extension="12345" root="2.16.840.1.113883.19.5"/>
        <patient>
            <name>
                <given>Henry</given>
                <family>Levin</family>
                <suffix>the 7th</suffix>
            </name>
            <administrativeGenderCode code="M" codeSystem="2.16.840.1.11388
            <birthTime value="19320924"/>
        </patient>
        <providerOrganization>
            <id root="2.16.840.1.113883.19.5"/>
        </providerOrganization>
    </patientRole>
</recordTarget>
```

http://hl7.org/fhir/R4/patient.html

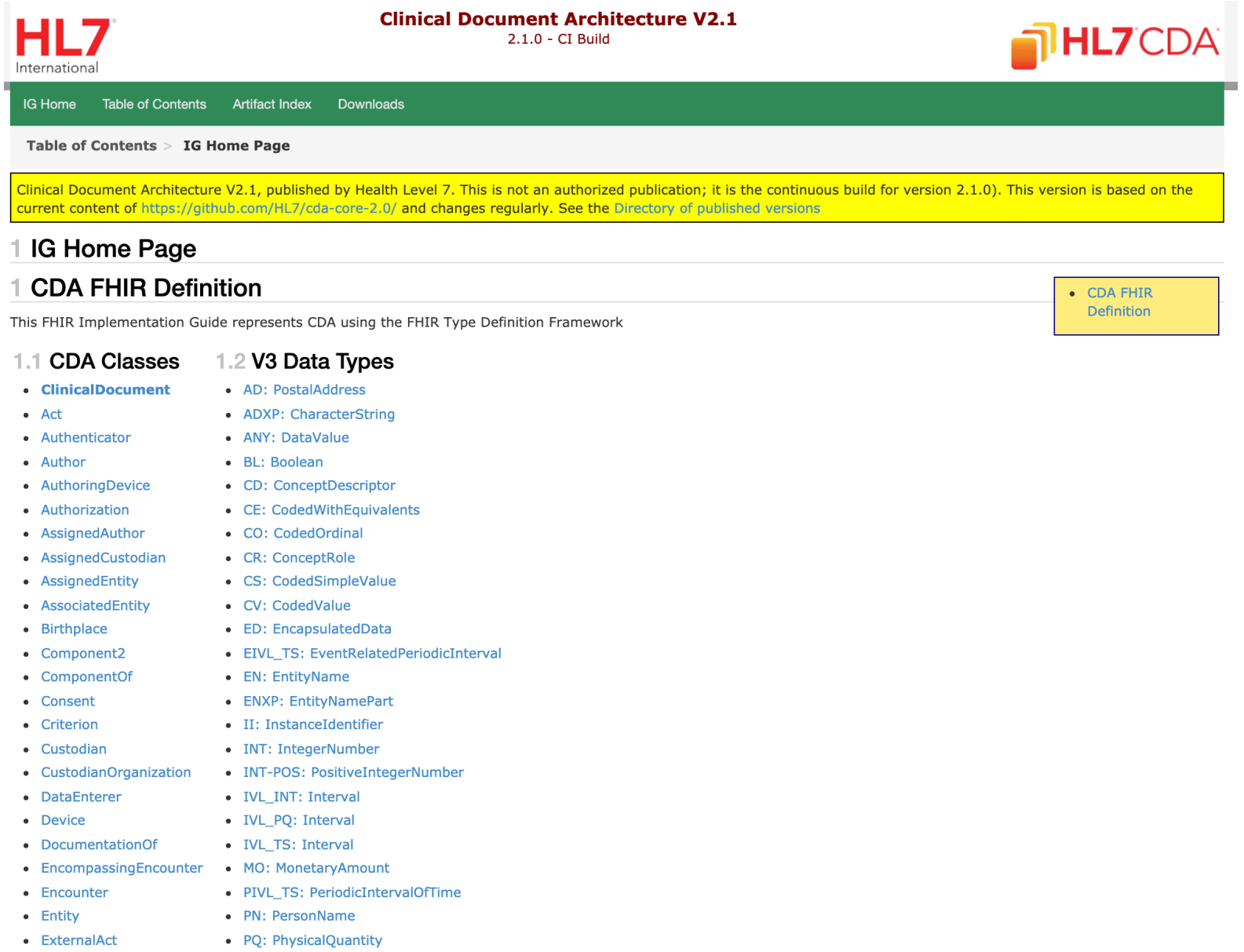
```
<StructureDefinition xmlns="http://hl7.org/fhir">
  <id value="RecordTarget"/>
  <url value="http://hl7.org/fhir/cda/StructureDefinition/RecordTarget"/>
  <version value="2.1.0"/>
  <name value="CDAR2.RecordTarget"/>
  <title value="RecordTarget (CDA Class)"/>
  <status value="active"/>
  <fhirVersion value="4.0.1"/>
  <kind value="logical"/>
  <abstract value="false"/>
  <type value="RecordTarget"/>
  <baseDefinition value="http://hl7.org/fhir/StructureDefinition/Base"/>
  <derivation value="specialization"/>
  <differential>
    <element id="RecordTarget">
      <path value="RecordTarget"/>
      <min value="1"/>
      <max value="1"/>
    </element>
    <element id="RecordTarget.patientRole">
      <path value="RecordTarget.patientRole"/>
      <min value="1"/>
      <max value="1"/>
      <type>
        <code value="http://hl7.org/fhir/cda/StructureDefinition/PatientRole"/>
      </type>
    </element>
  </differential>
```

FHIR Logical model for CDA



- supports the CCDA on FHIR guide, and other CDA/FHIR mapping projects
- Presented by Grahame at FHIR DevDays in 2016
- https://github.com/HL7/cda-core-2.0
- IG Publisher generates then the model:
- http://build.fhir.org/ig/HL7/cda-core-2.0/branches/master/index.html
- **Note:** no official release yet

FHIR Logical model CDA



http://build.fhir.org/ig/HL7/cda-core-2.0/branches/master/index.html

V3 Datatypes

AD: PostalAddress

ANY: DataValue

BL: Boolean

CD: ConceptDescriptor

CE: CodedWithEquivalents

CO: CodedOrdinal

CR: ConceptRole

CS: CodedSimpleValue

CV: CodedValue

ED: EncapsulatedData

EIVL_TS: EventRelatedPeriodicInterval

EN: EntityName

EN: EntityName

II: InstanceIdentifier

INT: IntegerNumber

IVL_INT: Interval

IVL_PQ: Interval

IVL_TS: Interval

MO: MonetaryAmount

PIVL_TS: PeriodicIntervalOfTime

PQ: PhysicalQuantity

PQR: PhysicalQuantityRepresentation

QTY: Quantity

REAL: RealNumber

RTO_PQ_PQ: Ratio

SC: CharacterStringWithCode

ST: CharacterString

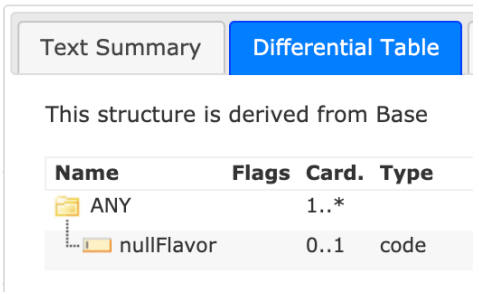
SXCM_TS: GeneralTimingSpecification

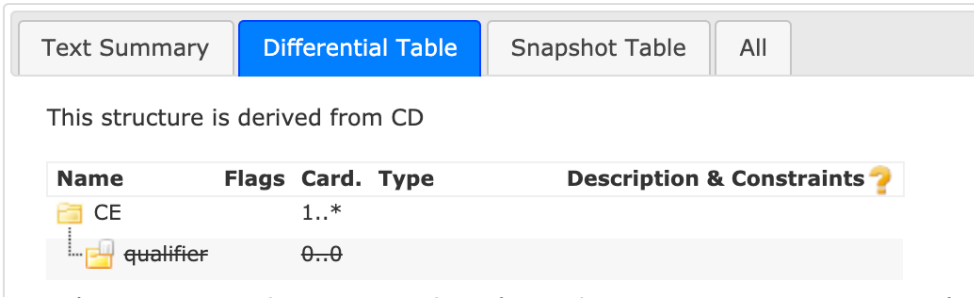
SXPR_TS: Component part of GTS

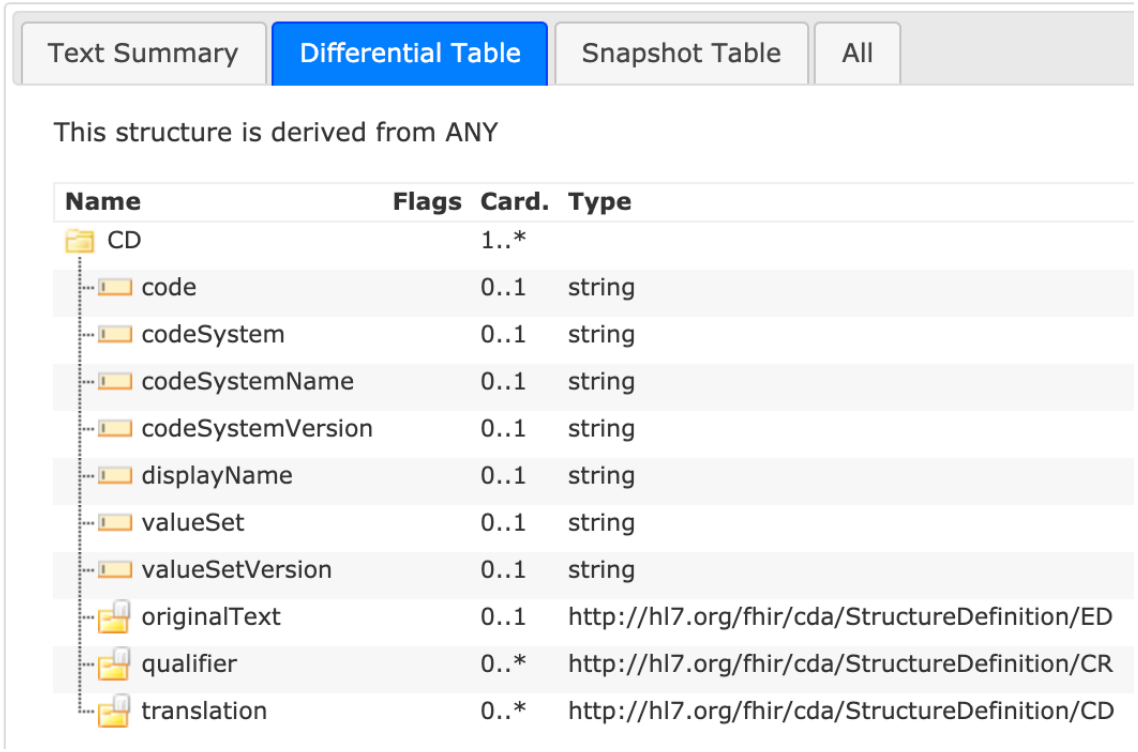
TEL: TelecommunicationAddress

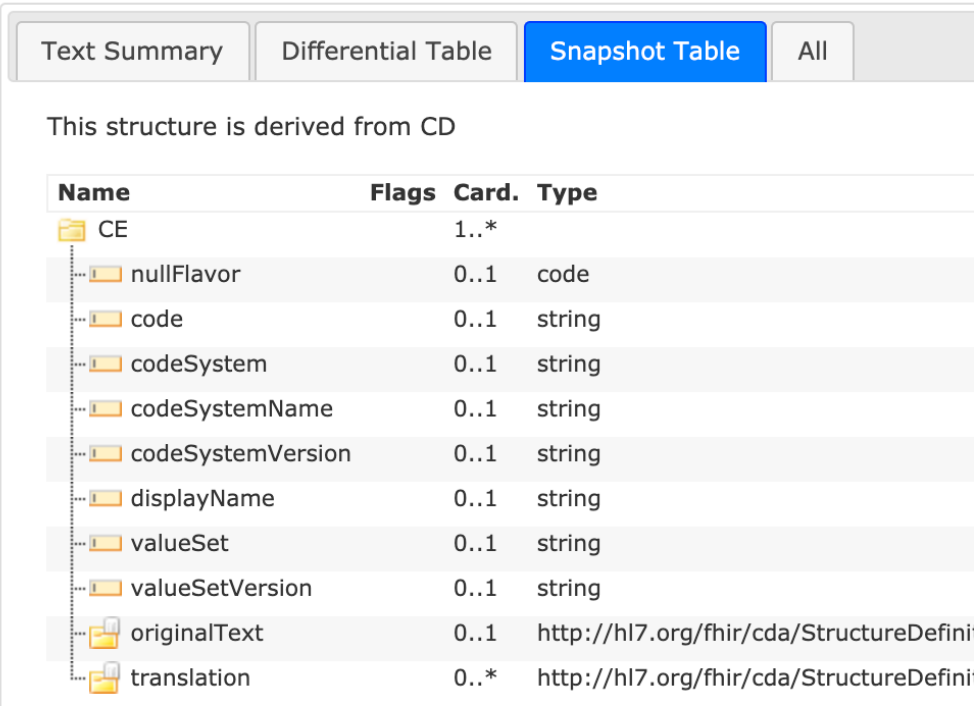
TS: PointInTime

Datatypes: ANY – CD - CE









CDA classes

ClinicalDocument

Act

Authenticator

Author

AuthoringDevice

Authorization

AssignedAuthor

AssignedCustodian

AssignedEntity

AssociatedEntity

Birthplace

Component2

ComponentOf

Consent

Criterion

Custodian

CustodianOrganization

DataEnterer

Device

DocumentationOf

EncompassingEncounter

Encounter

Entity

ExternalAct

ExternalDocument

ExternalObservation

ExternalProcedure

Guardian

HealthCareFacility

Informant

InformationRecipient

InfrastructureRoot

InFulfillmentOf

IntendedRecipient

LabeledDrug

…

CDA classes

Text Summary | **Differential Table** | Snapshot Table | All

This structure is derived from Base

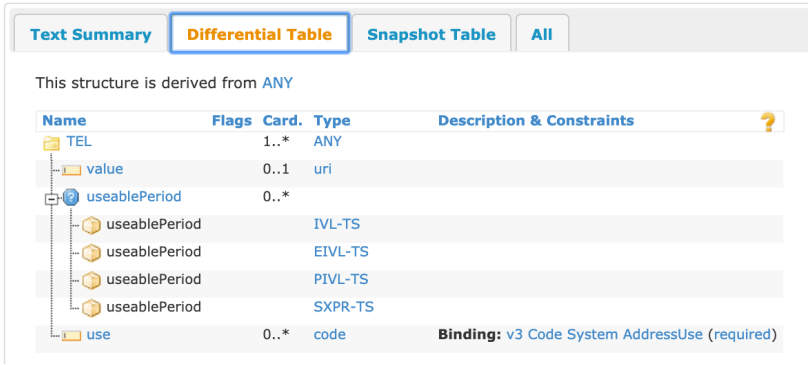
Name	Flags	Card.	Type	Description & Constraints
ClinicalDocument		1..1		
classCode		1..1	code	**Binding:** v3 Code System ActClass (extensible) **Fixed Value:** DOCCLIN
moodCode		1..1	code	**Binding:** v3 Code System ActMood (required) **Fixed Value:** EVN
realmCode		0..*	http://hl7.org/fhir/cda/StructureDefinition/CS	
typeId		0..1	http://hl7.org/fhir/cda/StructureDefinition/II	
templateId		0..*	http://hl7.org/fhir/cda/StructureDefinition/II	
code		1..1	http://hl7.org/fhir/cda/StructureDefinition/CE	**Binding:** http://terminology.hl7.org/ValueSet/v3-DocumentType (extensible)
title		0..1	http://hl7.org/fhir/cda/StructureDefinition/ST	
effectiveTime		1..1	http://hl7.org/fhir/cda/StructureDefinition/TS	
confidentialityCode		1..1	http://hl7.org/fhir/cda/StructureDefinition/CE	
languageCode		0..1	http://hl7.org/fhir/cda/StructureDefinition/CS	**Binding:** V3 Value SetHumanLanguage (required)
setId		0..1	http://hl7.org/fhir/cda/StructureDefinition/II	
versionNumber		0..1	http://hl7.org/fhir/cda/StructureDefinition/INT	
copyTime		0..1	http://hl7.org/fhir/cda/StructureDefinition/TS	
recordTarget		1..*	http://hl7.org/fhir/cda/StructureDefinition/RecordTarget	
author		1..*	http://hl7.org/fhir/cda/StructureDefinition/Author	
dataEnterer		0..1	http://hl7.org/fhir/cda/StructureDefinition/DataEnterer	

CDA & FHIR Logical Model

- attributes
- type attributes in xml
- text in xml elements
- CDA narrative vs xhtml
- V3 classes with id element and extension attribute
- foreign namespaces
- choice elements from CDA schema
- granularity of model (e.g. EntryRelationship as Element and not as only type)

cda xml attributes

```
<telecom use="HP"
    value="tel:+41.32.685.12.34"/>
```




```
    <element id="TEL.use">
      <path value="TEL.use"/>
      <representation value="xmlAttr"/>
      <label value="Use Code"/>
      <definition
                  value="One or more codes advising a system or user which tele
elecommunication need."/>
      <min value="0"/>
      <max value="*"/>
      <type>
        <code value="code"/>
      </type>
      <binding>
        <strength value="required"/>
        <valueSet value="http://terminology.hl7.org/ValueSet/v3-AddressUse"/>
      </binding>
    </element>
```

```
<element id="TEL.value">
  <path value="TEL.value"/>
  <representation value="xmlAttr"/>
  <min value="0"/>
  <max value="1"/>
  <type>
    <code value="uri"/>
  </type>
</element>
```

http://build.fhir.org/ig/HL7/cda-core-2.0/branches/master/StructureDefinition-TEL.html

type attribute xsi:type

```
<effectiveTime value="20180604"/>
```

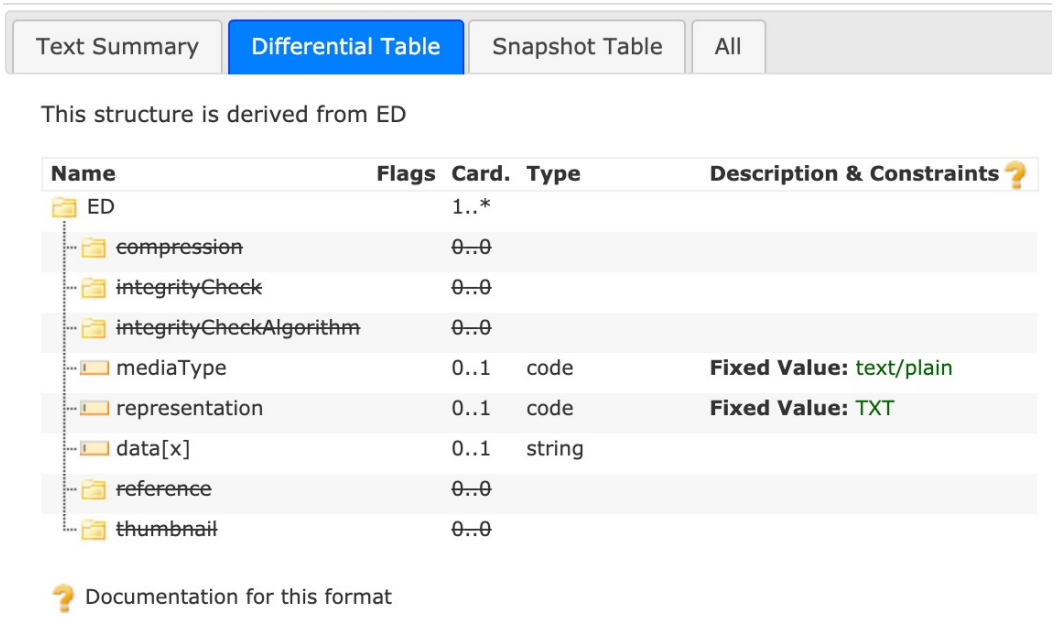
```
<effectiveTime xsi:type="IVL_TS">
    <low value="20111129" />
</effectiveTime>
<effectiveTime operator='A' xsi:type='EIVL_TS'>
    <event code='ACM' />
</effectiveTime>
```

```
<element id="SubstanceAdministration.effectiveTime">
  <extension
            url="http://hl7.org/fhir/StructureDefinition/elementdefinition-defaulttype">
    <valueString value="http://hl7.org/fhir/cda/StructureDefinition/SXCM_TS"/>
  </extension>
  <path value="SubstanceAdministration.effectiveTime"/>
  <representation value="typeAttr"/>
  <min value="0"/>
  <max value="*"/>
  <type>
    <code value="http://hl7.org/fhir/cda/StructureDefinition/SXCM_TS"/>
  </type>
  <type>
    <code value="http://hl7.org/fhir/cda/StructureDefinition/IVL_TS"/>
  </type>
  <type>
    <code value="http://hl7.org/fhir/cda/StructureDefinition/EIVL_TS"/>
  </type>
  <type>
    <code value="http://hl7.org/fhir/cda/StructureDefinition/PIVL_TS"/>
  </type>
  <type>
    <code value="http://hl7.org/fhir/cda/StructureDefinition/SXPR_TS"/>
  </type>
</element>
```

Warning: *Open discussion about type representation (IVL-TS vs IVL_TS), see https://chat.fhir.org/#narrow/stream/179273-CCDA-.2F.20FHIR.20mapping.20stream/topic/v3.20datatypes.20_.20instead.20of.20-*

text in xml elements: ST datatype

```
<title>DCI Continuity of Care Document</title>
```



Text Summary | Differential Table | Snapshot Table | All

This structure is derived from ED

Name	Flags	Card.	Type	Description & Constraints
ED		1..*		
~~compression~~		~~0..0~~		
~~integrityCheck~~		~~0..0~~		
~~integrityCheckAlgorithm~~		~~0..0~~		
mediaType		0..1	code	**Fixed Value:** text/plain
representation		0..1	code	**Fixed Value:** TXT
data[x]		0..1	string	
~~reference~~		~~0..0~~		
~~thumbnail~~		~~0..0~~		

Documentation for this format

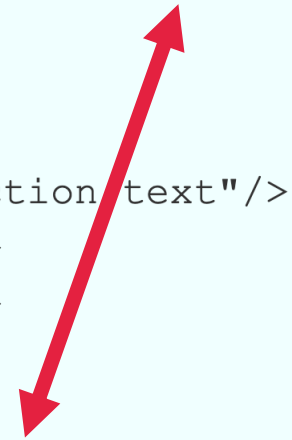
```
<element id="ED.data[x]">
  <path value="ED.data[x]"/>
  <representation value="xmlText"/>
  <definition value="The string value"/>
  <min value="0"/>
  <max value="1"/>
  <base>
    <path value="ED.data[x]"/>
    <min value="0"/>
    <max value="1"/>
  </base>
  <type>
    <code value="string"/>
  </type>
</element>
```

title.dataString

CDA narrative vs xhtml

```
<section>
    <templateId root="2.16.840.1.113883.10.20.22.2.17"/>
    <!--  ********  Social history section template   ******** -->
    <code code="29762-2" codeSystem="2.16.840.1.113883.6.1" displayName="Social History"/>
    <title>Social History</title>
    <text>
        <table border="1" width="100%">
            <thead>
                <tr>
                    <th>Social History Element</th>
                    <th>Description</th>
                    <th>Effective Date</th>
                </tr>
            </thead>
            <tbody>
                <tr>
                    <td>
                        <content>Smoking</content>
                    </td>
                    <td>Never as of 06/18/2015</td>
                    <td>20150618000000</td>
                </tr>
            </tbody>
        </table>
    </text>
```

```
<element id="Section.text">
  <path value="Section.text"/>
  <representation value="cdaText"/>
  <min value="0"/>
  <max value="1"/>
  <base>
    <path value="Section.text"/>
    <min value="0"/>
    <max value="1"/>
  </base>
  <type>
    <code value="xhtml"/>
  </type>
  <mustSupport value="true"/>
</element>
```



validator: internal conversion

V3 classes with id element and extension attribute

```
<id root="31397B31-BE60-47E1-BEC6-F37816D42B0C"/>

<id extension="7601000201041" root="2.51.1.3"/>
```

```
<element id="ClinicalDocument.id">
  <path value="ClinicalDocument.id"/>
  <min value="1"/>
  <max value="1"/>
  <type>
    <code value="http://hl7.org/fhir/cda/StructureDefinition/II"/>
  </type>
</element>
```

```
<element id="II.extension">
  <path value="II.extension"/>
  <representation value="xmlAttr"/>
  <label value="Extension"/>
  <definition
              value="A character string as a unique identifier wi
  <min value="0"/>
  <max value="1"/>
  <type>
    <code value="string"/>
  </type>
</element>
```

Name	Flags	Card.	Type	Description & Constraints
Element	I		n/a	Base for all elements *All FHIR elements must have a @value or children*
id		0..1	string	Unique id for inter-element referencing
extension		0..*	Extension	Additional content defined by implementations

V3 classes are now derived from Base (not Element anymore), but Base is a R5 type http://build.fhir.org/types.html#Base

CDA & FHIR Logical Model Demonstration

- For this demonstration the FHIR Logical model for CDA has been forked. The generated IG can be found here: https://github.com/ahdis/cda-core-2.0/releases and is provided in https://github.com/hl7ch/cda-fhir-maps/cda-core-2.0-pr.tgz

CDA and FHIR Validator

The HL7 FHIR Validator can validate also models, you need to provide the packagename (cda-core-2.0-pr.tgz instead of hl7.fhir.cda#current)

```
java -jar /Users/oliveregger/.vscode/extensions/yannick-lagger.vscode-fhir-tools-1.5.0/validator_cli.jar ./input/cda-it/CDA2_Referto_di_Medicina_di_Laboratorio.xml -version 4.0.1 -ig cda-core-2.0-pr.tgz

Internal error in location for message: 'Error @1, 1: Found / expecting a token name', loc = '/v3:ClinicalDocument/v3:participant/v3:associatedEntity', err = 'Undefined attribute '@nullFlavor' on associatedEntity for type http://hl7.org/fhir/cda/StructureDefinition/AssociatedEntity (properties = [AssociatedEntity.classCode, AssociatedEntity.templateId, AssociatedEntity.id, AssociatedEntity.code, AssociatedEntity.addr, AssociatedEntity.telecom, AssociatedEntity.associatedPerson, AssociatedEntity.scopingOrganization])'

Internal error in location for message: 'Error @1, 1: Found / expecting a token name', loc = '/v3:ClinicalDocument/v3:documentationOf/v3:serviceEvent', err = 'Undefined element 'statusCode''

 00:02.0293

Done. Times: Loading: 00:10.0139, validation: 00:02.0294. Memory = 294Mb

*FAILURE*: 9 errors, 0 warnings, 0 notes
```

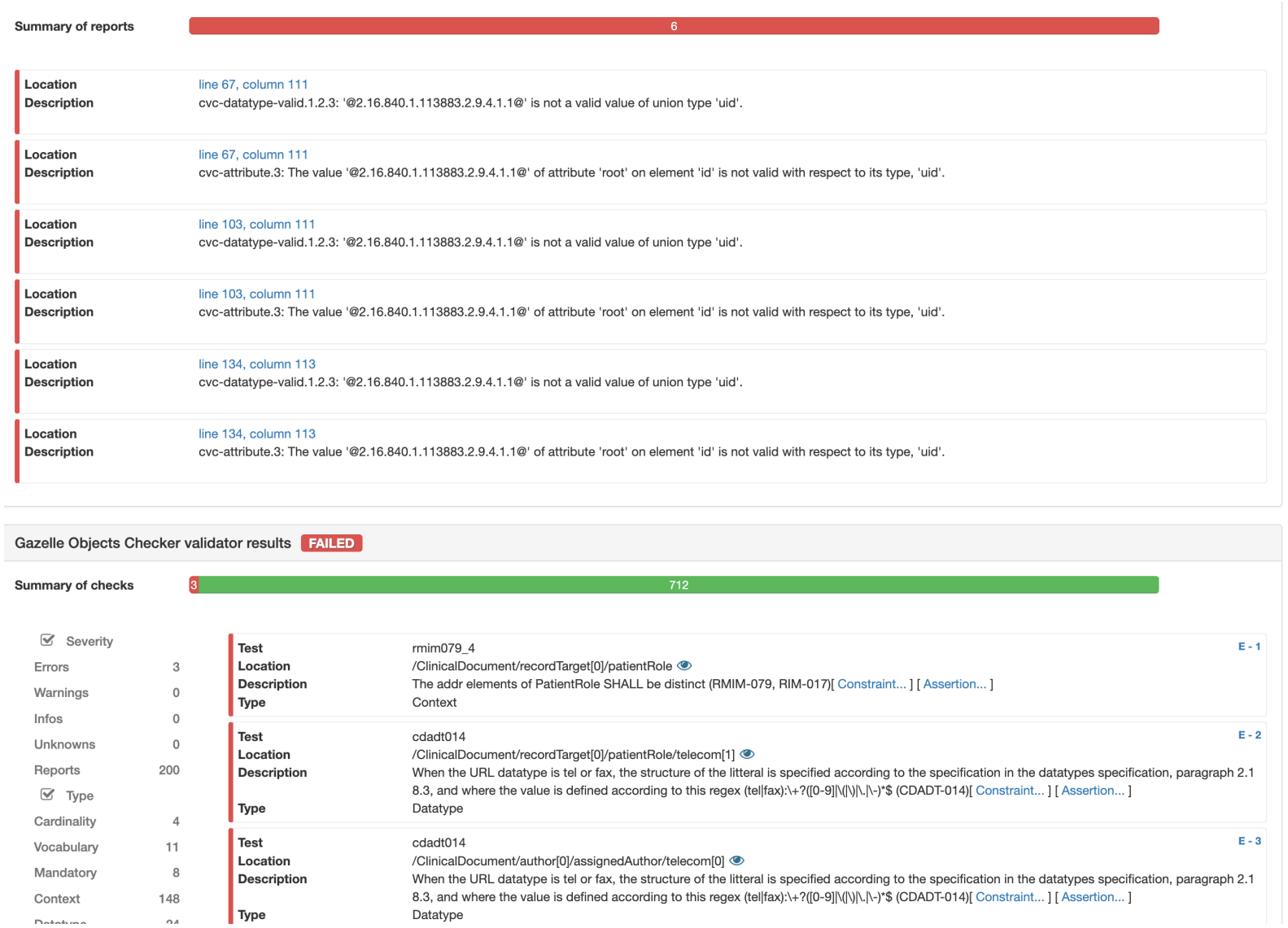
https://confluence.hl7.org/display/FHIR/Using+the+FHIR+Validator

CDA and FHIR Validator

- CDA V3 Code validation is not supported with the validator
- Last Error seems a CDA Logical Model Problem

```
Error @ ClinicalDocument.author[0].assignedAuthor.classCode (line 55, col40): The value provided ('ASSIGNED') is not in the value set 'RoleClassAssignedEntity'
(http://terminology.hl7.org/ValueSet/v3-RoleClassAssignedEntity), and a code is required from this value set) (error message = The code system '' is not known (encountered
paired with code = 'ASSIGNED'); The code provided (#ASSIGNED) is not valid in the value set 'RoleClassAssignedEntity' (from http://tx.fhir.org/r4))

  Error @ ClinicalDocument.inFulfillmentOf[0].typeCode (line 114, col35): The value provided ('FLFS') is not in the value set 'ParticipationType'
(http://terminology.hl7.org/ValueSet/v3-ParticipationType), and a code is required from this value set) (error message = Unknown Code
http://terminology.hl7.org/CodeSystem/v3-ParticipationType#FLFS in http://terminology.hl7.org/CodeSystem/v3-ParticipationType)

  Error @ ClinicalDocument.documentationOf[0].typeCode (line 120, col34): The value provided ('DOC') is not in the value set 'ParticipationType'
(http://terminology.hl7.org/ValueSet/v3-ParticipationType), and a code is required from this value set) (error message = Unknown Code
http://terminology.hl7.org/CodeSystem/v3-ParticipationType#DOC in http://terminology.hl7.org/CodeSystem/v3-ParticipationType)

  Error @ ClinicalDocument.recordTarget[0].patientRole.telecom[1].value (line 32, col50): URI values cannot have whitespace('tel:+39 3445812567')

  Error @ ClinicalDocument.author[0].assignedAuthor.telecom[0].value (line 57, col50): URI values cannot have whitespace('tel:+39 3441834678')

  Error @
ClinicalDocument.component.structuredBody.component[0].section.component[0].section.entry[0].act.entryRelationship[0].observation.referenceRange[0].observationRange.va.ofTy
pe(lue).low.value (line 219, col47): The value ' 0.00' is not a valid decimal

  Error @
ClinicalDocument.component.structuredBody.component[0].section.component[0].section.entry[0].act.entryRelationship[0].observation.referenceRange[0].observationRange.va.ofTy
pe(lue).high.value (line 220, col49): The value ' 20.00' is not a valid decimal

  Error @ /v3:ClinicalDocument/v3:participant/v3:associatedEntity (line 112, col56): Undefined attribute '@nullFlavor' on associatedEntity for type
http://hl7.org/fhir/cda/StructureDefinition/AssociatedEntity (properties = [AssociatedEntity.classCode, AssociatedEntity.templateId, AssociatedEntity.id,
AssociatedEntity.code, AssociatedEntity.addr, AssociatedEntity.telecom, AssociatedEntity.associatedPerson, AssociatedEntity.scopingOrganization])

  Error @ /v3:ClinicalDocument/v3:documentationOf/v3:serviceEvent (line 122, col38): Undefined element 'statusCode'
```

Gazelle CDA validation



Summary of reports: 6

Location	line 67, column 111
Description	cvc-datatype-valid.1.2.3: '@2.16.840.1.113883.2.9.4.1.1@' is not a valid value of union type 'uid'.
Location	line 67, column 111
Description	cvc-attribute.3: The value '@2.16.840.1.113883.2.9.4.1.1@' of attribute 'root' on element 'id' is not valid with respect to its type, 'uid'.
Location	line 103, column 111
Description	cvc-datatype-valid.1.2.3: '@2.16.840.1.113883.2.9.4.1.1@' is not a valid value of union type 'uid'.
Location	line 103, column 111
Description	cvc-attribute.3: The value '@2.16.840.1.113883.2.9.4.1.1@' of attribute 'root' on element 'id' is not valid with respect to its type, 'uid'.
Location	line 134, column 113
Description	cvc-datatype-valid.1.2.3: '@2.16.840.1.113883.2.9.4.1.1@' is not a valid value of union type 'uid'.
Location	line 134, column 113
Description	cvc-attribute.3: The value '@2.16.840.1.113883.2.9.4.1.1@' of attribute 'root' on element 'id' is not valid with respect to its type, 'uid'.

Gazelle Objects Checker validator results FAILED

Summary of checks: 3 / 712

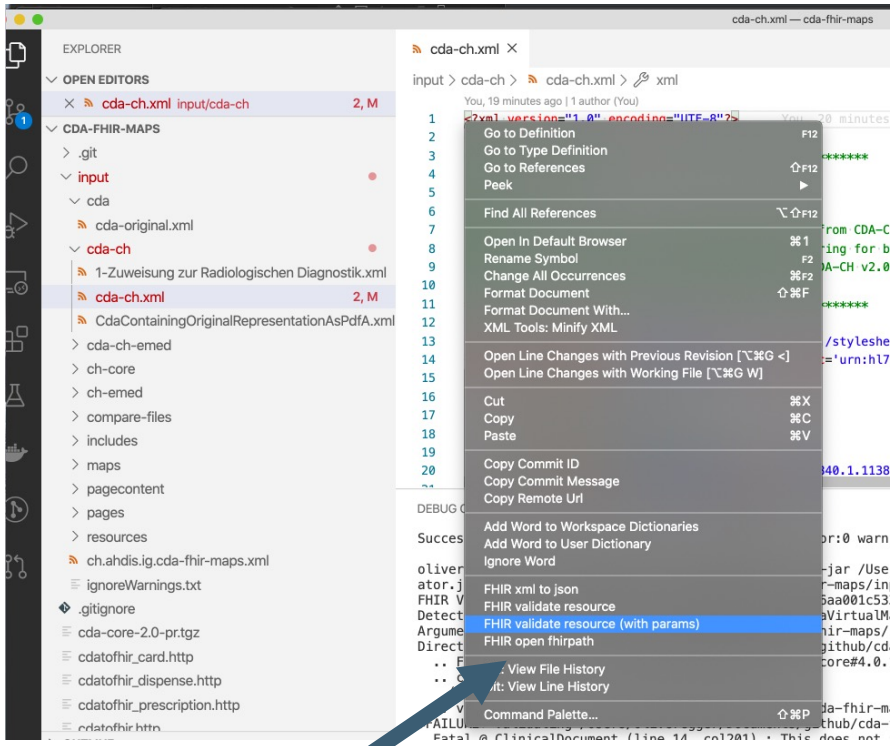
Severity	
Errors	3
Warnings	0
Infos	0
Unknowns	0
Reports	200
Type	
Cardinality	4
Vocabulary	11
Mandatory	8
Context	148

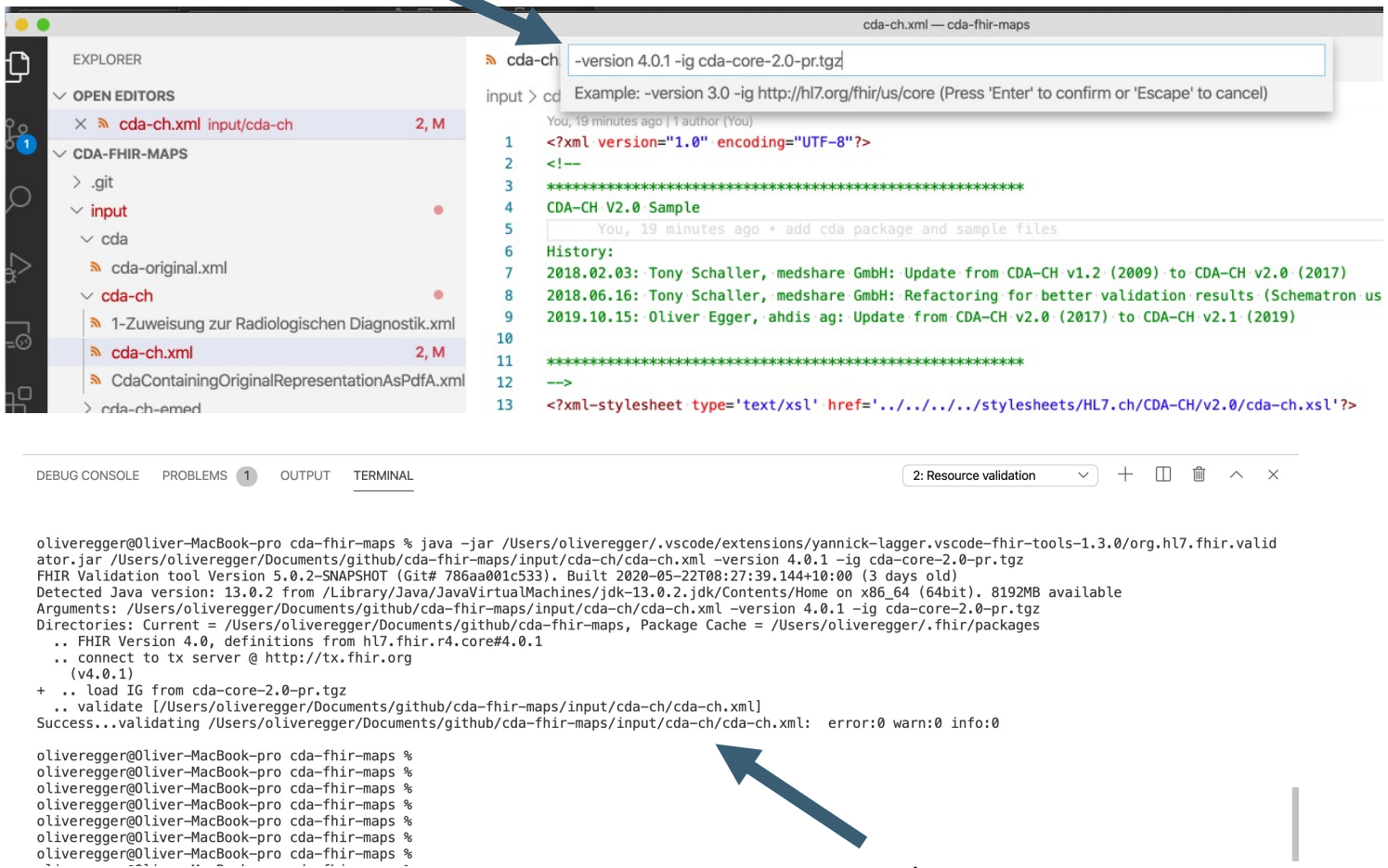
Test	rmim079_4	E - 1
Location	/ClinicalDocument/recordTarget[0]/patientRole	
Description	The addr elements of PatientRole SHALL be distinct (RMIM-079, RIM-017)[Constraint...] [Assertion...]	
Type	Context	
Test	cdadt014	E - 2
Location	/ClinicalDocument/recordTarget[0]/patientRole/telecom[1]	
Description	When the URL datatype is tel or fax, the structure of the litteral is specified according to the specification in the datatypes specification, paragraph 2.1 8.3, and where the value is defined according to this regex (tel|fax):\+?([0-9]|(|)|\.|\-)*$ (CDADT-014)[Constraint...] [Assertion...]	
Type	Datatype	
Test	cdadt014	E - 3
Location	/ClinicalDocument/author[0]/assignedAuthor/telecom[0]	
Description	When the URL datatype is tel or fax, the structure of the litteral is specified according to the specification in the datatypes specification, paragraph 2.1 8.3, and where the value is defined according to this regex (tel|fax):\+?([0-9]|(|)|\.|\-)*$ (CDADT-014)[Constraint...] [Assertion...]	
Type	Datatype	

https://gazelle.ihe.net/EVSClient/cda/validator.seam?standard=CDA-IHE&extension=IHE

CDA and FHIR Validator

2) Add params –version 4.0.1 cda-core-2.0-pr.tgz





3) Output

1) Right click on file to validate and select validate with params

Applying FHIRPath expressions to CDA documents

- FHIRPath is a path based navigation and extraction language, somewhat like XPath.
- Operations are expressed in terms of the logical content of hierarchical data models, and support traversal, selection and filtering of data.
- Its design was influenced by the needs for path navigation, selection and formulation of invariants in both HL7 Fast Healthcare Interoperability Resources (FHIR) and HL7 Clinical Quality Language (CQL).

FHIRPath examples

- Patient.name.given
- Patient.telecom.where(use = 'official')
- Patient.name[0]

http://hl7.org/fhirpath/
https://www.hl7.org/fhir/fhirpath.html

Applying FHIRPath expressions to CDA documents

```
<recordTarget>
    <patientRole>
        <id extension="12345" root="2.16.840.1.113883.19.5"/>
        <patient>
            <name>
                <given>Henry</given>
                <family>Levin</family>
                <suffix>the 7th</suffix>
            </name>
            <administrativeGenderCode code="M" codeSystem="2.16.840.1.1
            <birthTime value="19320924"/>
```

```
java -jar org.hl7.fhir.validator.jar
          -version 4.0.1 -ig cda-core-2.0-pr.tgz
-fhirpath
recordTarget.patientRole.patient.name.given.dataString
input/cda/cda-original.xml

.. definitions from hl7.fhir.r4.core#4.0.1 (v4.0.1)

...evaluating
recordTarget.patientRole.patient.name.given.dataString

Henry
```

Summary CDA Logical Model

- Logical Model is a description of CDA
  - no API
  - datatypes are equivalent to FHIR
  - no FHIR resources
  - no query possibilities
- Logical Model can be used with the FHIR Mapping Language

Exercise

- Use the Java Validator to
  - validate the CDA File in ./input/cda-it/CDA2_Referto_Radiologia.xml
  - develop a FHIRPath expression to get the family name of the recordTarget

Feedback, Questions?

Agenda

10.00 – 10.30	High Level Introduction CDA and FHIR Mapping (Differences between Standards, FHIR Mapping Language as independent Mapping Exchange format)
10.30 – 11.00	FHIR Logical Model of CDA - Exercise
11.15 – 12.15	FHIR Mapping Language Introduction with conversion to StructureMap - Exercise
14.00 – 15.00	CDA to FHIR mapping hands-on with matchbox - Exercise (based on provided Italian example)
15.00 – 15.30	Summary, Questions and answers - Exercise

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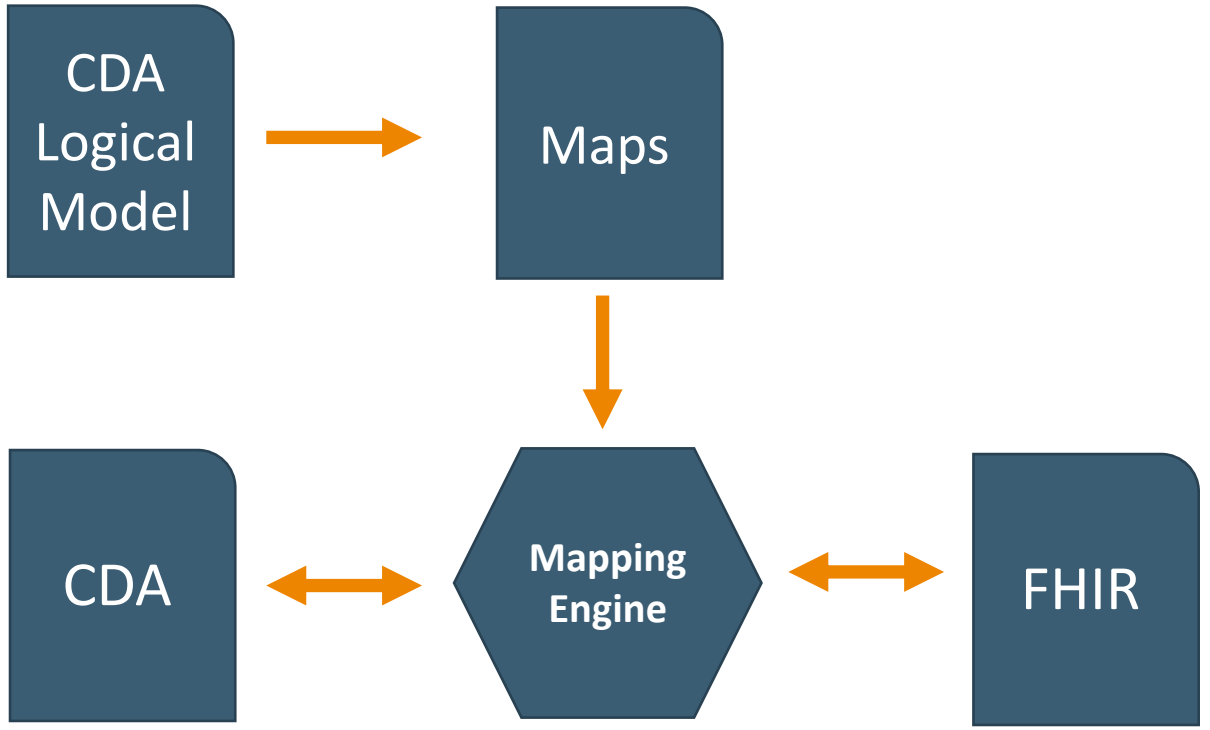
FHIR Mapping Language

FHIR Mapping Language

The mapping language describes how one set of Directed Acyclic Graphs (an instance) is transformed to another set of directed acyclic graphs. It is not necessary for the instances to have formal declarations and/or be strongly typed - just that they have named children that themselves have properties.

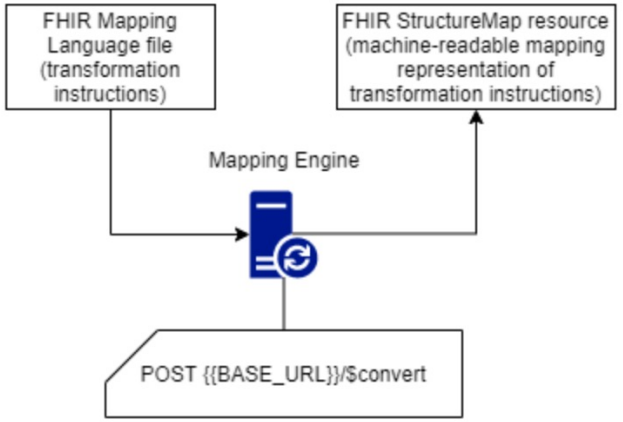
https://www.hl7.org/fhir/mapping-language.html

FHIR Mapping Language



https://www.hl7.org/fhir/mapping-language.html

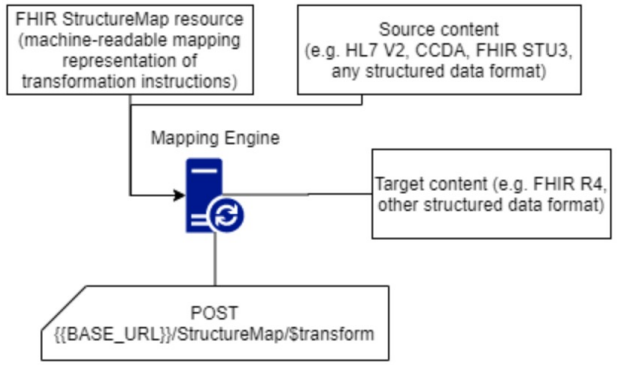
Mapping Authoring



- Define mapping instructions to transform the source content to the target content.
- Use the mapping engine to create a machine-readable representation of the mapping instructions in the form of a FHIR StructureMap resource.

https://confluence.hl7.org/display/FHIR/Using+the+FHIR+Mapping+Language

Mapping Execution



- Store the source FHIR StructureMap resource on the FHIR Server.
- Execute transformations - $transform - The mapping engine requires:
  - The source content to transform.
  - The machine-readable representation of the mapping instructions previously created.
- Store the generated target content (optional)

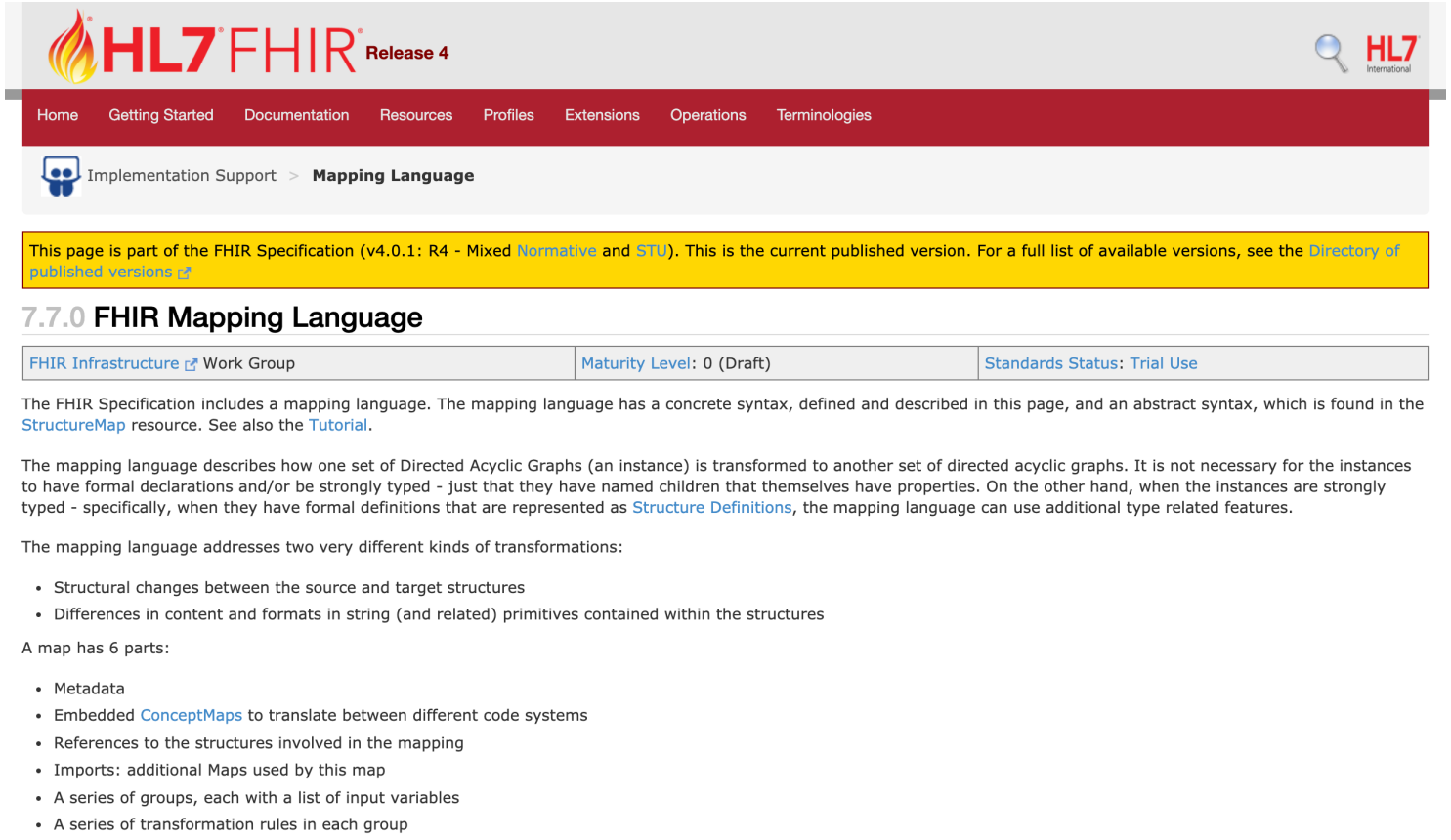
https://confluence.hl7.org/display/FHIR/Using+the+FHIR+Mapping+Language

Mapping Engines

- Java FHIR Mapping
  - Java Validator
  - matchbox (hapi-fhir, java, test.ahdis.ch/matchbox)

https://confluence.hl7.org/display/FHIR/Using+the+FHIR+Mapping+Language

FHIR Mapping Language



HL7 FHIR Release 4

HL7 International

Home | Getting Started | Documentation | Resources | Profiles | Extensions | Operations | Terminologies

Implementation Support > **Mapping Language**

This page is part of the FHIR Specification (v4.0.1: R4 - Mixed Normative and STU). This is the current published version. For a full list of available versions, see the Directory of published versions

7.7.0 FHIR Mapping Language

FHIR Infrastructure Work Group	Maturity Level: 0 (Draft)	Standards Status: Trial Use

The FHIR Specification includes a mapping language. The mapping language has a concrete syntax, defined and described in this page, and an abstract syntax, which is found in the StructureMap resource. See also the Tutorial.

The mapping language describes how one set of Directed Acyclic Graphs (an instance) is transformed to another set of directed acyclic graphs. It is not necessary for the instances to have formal declarations and/or be strongly typed - just that they have named children that themselves have properties. On the other hand, when the instances are strongly typed - specifically, when they have formal definitions that are represented as Structure Definitions, the mapping language can use additional type related features.

The mapping language addresses two very different kinds of transformations:

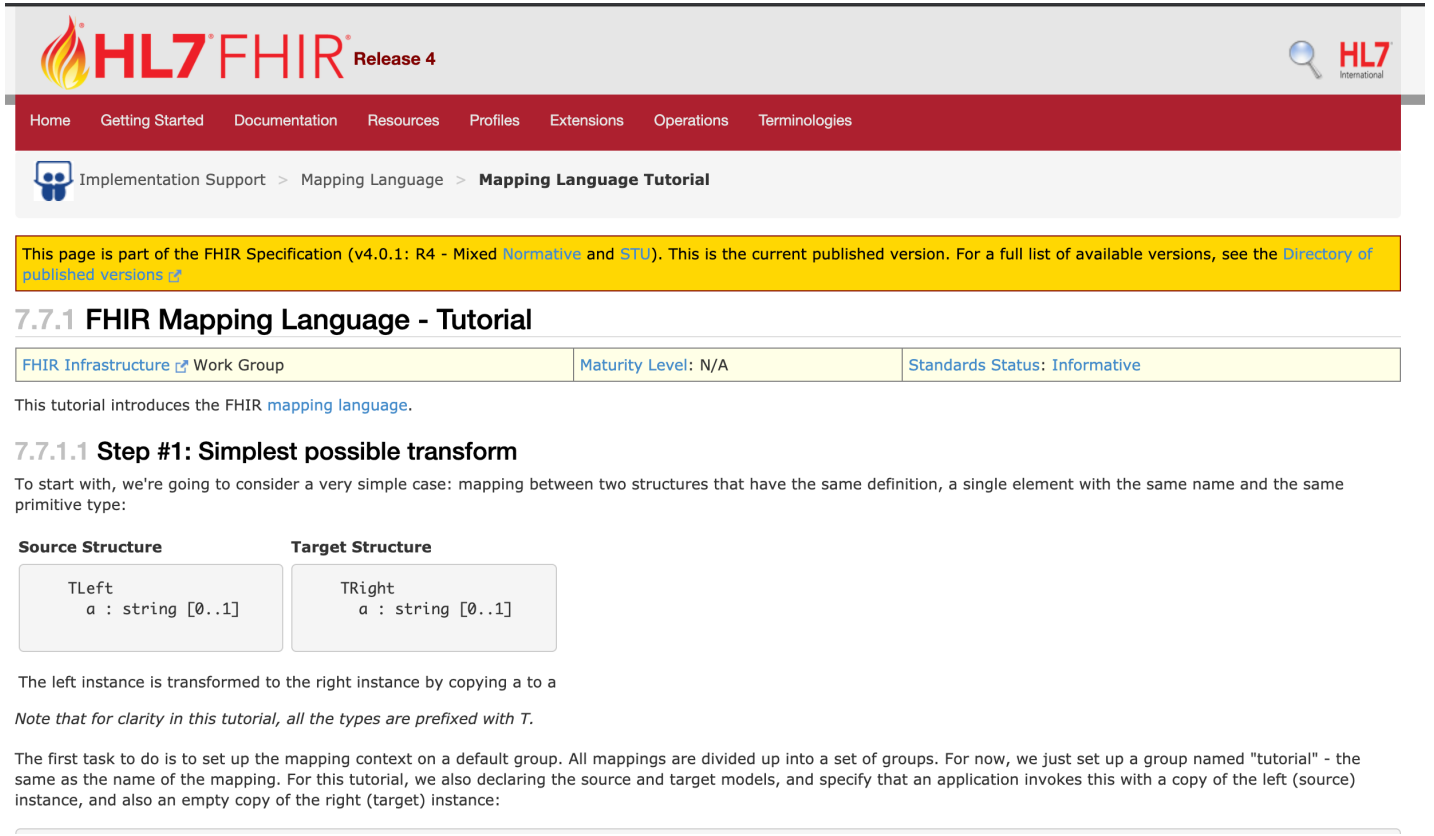
- Structural changes between the source and target structures
- Differences in content and formats in string (and related) primitives contained within the structures

A map has 6 parts:

- Metadata
- Embedded ConceptMaps to translate between different code systems
- References to the structures involved in the mapping
- Imports: additional Maps used by this map
- A series of groups, each with a list of input variables
- A series of transformation rules in each group

https://www.hl7.org/fhir/mapping-language.html

FHIR Mapping Language tutorial



https://www.hl7.org/fhir/mapping-tutorial.html

Step #1: Simplest possible transform

Source Structure

```
TLeft
  a : string [0..1]
```

Target Structure

```
TRight
  a : string [0..1]
```

The left instance is transformed to the right instance by copying a to a

```
1   /// title = "tutorial-step1"
2   /// status = draft
3
4   map "http://hl7.org/fhir/StructureMap/tutorial-step1" = "tutorial-step1"
5
6   uses "http://hl7.org/fhir/StructureDefinition/tutorial-left" alias TLeft as source
7   uses "http://hl7.org/fhir/StructureDefinition/tutorial-right" alias TRight as target
8
9   group tutorial(source src : TLeft, target tgt : TRight) {
10      src.a as a -> tgt.a = a "rule_a";
11  }
```

https://www.hl7.org/fhir/mapping-tutorial.html

HL7 FHIR Java Validator

Copy validator to step1 directory or adjust path

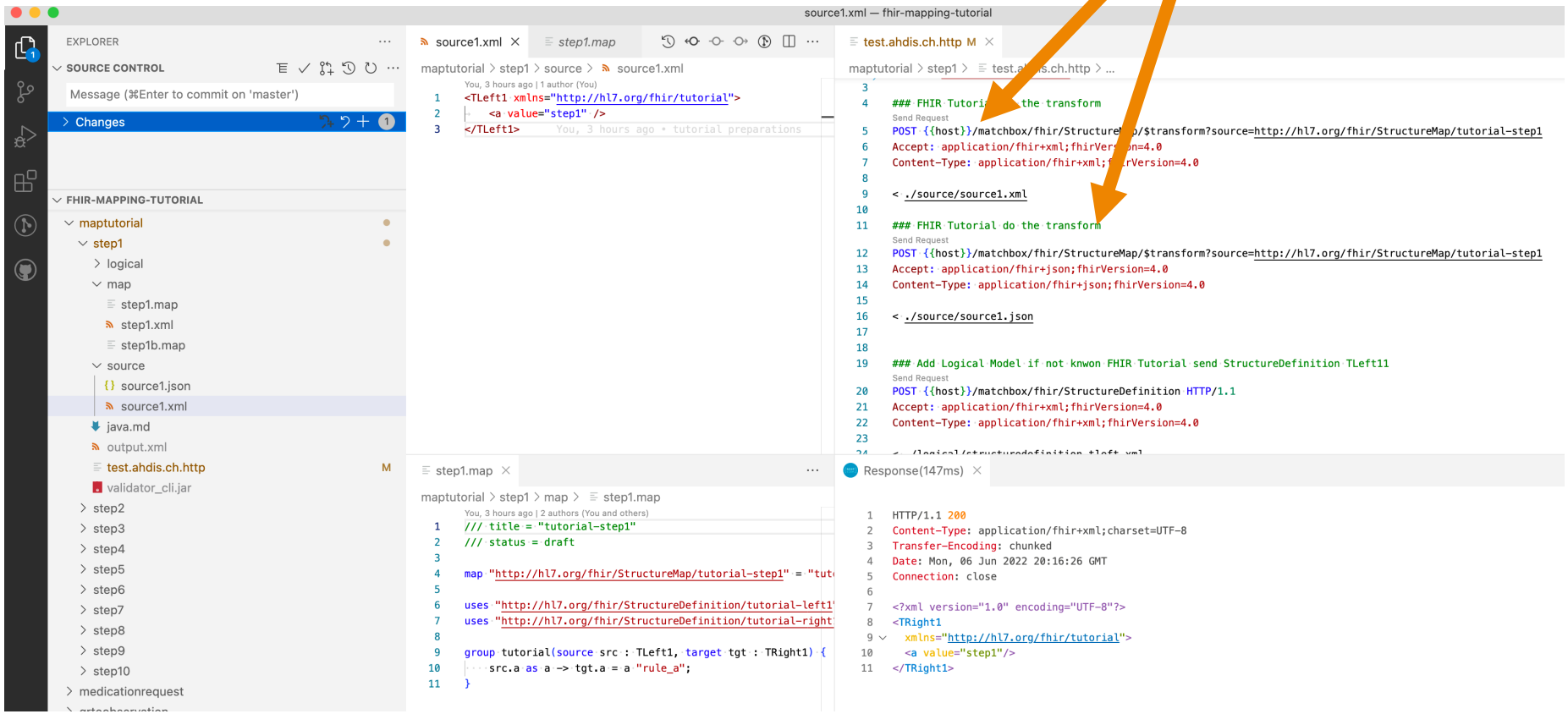
```
% java -jar validator_cli.jar ./source/source1.xml -transform http://hl7.org/fhir/StructureMap/tutorial -
version 4.0.1 -ig ./logical -ig ./map -output ./output.xml
FHIR Validation tool Version 5.6.43 (Git# 3fffad10e36f). Built 2022-04-28T02:39:57.434Z (39 days old)
Loading
  Load FHIR v4.0 from hl7.fhir.r4.core#4.0.1 - 4575 resources (00:06.0175)
  Load hl7.terminology#3.1.0 - 4117 resources (00:02.0370)
  Terminology server http://tx.fhir.org - Version 2.0.14 (00:01.0406)
  Load ./logical
  Load ./map
Start Transform http://hl7.org/fhir/StructureMap/tutorial
Group : tutorial; vars = source variables [src: (TLeft1)], target variables [tgt: (TRight1)], shared variables []
  rule : rule_a; vars = source variables [src: (TLeft1)], target variables [tgt: (TRight1)], shared variables []
 ...success
Done. Times: Loading: 00:10.0506. Max Memory = 4Gb

% cat output.xml
<?xml version="1.0" encoding="UTF-8"?>

<TRight1 xmlns="http://hl7.org/fhir/tutorial">
  <a value="step1"/>
</TRight1>
```

https://github.com/ahdis/fhir-mapping-tutorial/blob/master/step1/java.md

Step #1: Demo mit VS Code REST Client



clone https://github.com/ahdis/fhir-mapping-tutorial

https://github.com/ahdis/fhir-mapping-tutorial/blob/master/maptutorial/step2/test.ahdis.ch.http

Step #2: Fields with different names

Source Structure

```
TLeft
  a1 : string [0..1]
```

Target Structure

```
TRight
  a2 : string [0..1]
```

The left instance is transformed to the right instance by copying a1 to a2

```
/// title = "tutorial-step2"
/// status = draft

map "http://hl7.org/fhir/StructureMap/tutorial-step2" = "tutorial-step2"

uses "http://hl7.org/fhir/StructureDefinition/tutorial-left" alias TLeft as source
uses "http://hl7.org/fhir/StructureDefinition/tutorial-right" alias TRight as target

group tutorial(source src : TLeft, target tgt : TRight) {
  src.a1 as a -> tgt.a2 = a "rule_a";
}
```

https://www.hl7.org/fhir/mapping-tutorial.html

Step #5: Managing lists, part 1

Source Structure

```
TLeft
  a22 : string [0..*]
```

Target Structure

```
TRight
  a22 : string [0..*]
```

The left instance is transformed to the right instance by copying a22 to a22, once for each copy of a22

```
1   /// title = "tutorial-step5"
2   /// status = draft
3
4   map "http://hl7.org/fhir/StructureMap/tutorial-step5" = "tutorial-step5"
5
6   uses "http://hl7.org/fhir/StructureDefinition/tutorial-left-5" as source
7   uses "http://hl7.org/fhir/StructureDefinition/tutorial-right-5" as target
8
9   group tutorial(source src : TLeft, target tgt : TRight) {
10    src.a22 as a -> tgt.a22 = a "rule_a22";
11  }
12
```

https://www.hl7.org/fhir/mapping-tutorial.html

Step #6: Managing lists, part 2

Source Structure

```
TLeft
  a23 : string [0..*]
```

Target Structure

```
TRight
  a23 : integer [0..1]
```

The left instance is transformed to the right instance by copying a23 to a23, but there can only be one copy of a23

```
src.a23 as a -> tgt.a23 = a;  // leave it to the transform engine
src.a23 only_one as a -> tgt.a23 = a;  // transform engine throws an error if there is more than one
src.a23 first as a -> tgt.a23 = a;  // Only use the first one
src.a23 last as a -> tgt.a23 = a;  // Only use the last one
```

https://www.hl7.org/fhir/mapping-tutorial.html

Step #7: Simple Nesting

Source Structure

```
TLeft
  aa : [0..*]
    ab : string [1..1]
```

Target Structure

```
TRight
  aa : [0..*]
    ab : string [1..1]
```

```
src.aa as s_aa -> tgt.aa as t_aa then { // make aa exist
  s_aa.ab as ab -> t_aa.ab = ab; // copy ab inside aa
};
```

```
src.aa as s_aa -> tgt.aa as t_aa then ab_content(s_aa, t_aa); // make aa e

group ab_content(source src, target tgt) {
  src.ab as ab -> tgt.ab = ab; // copy ab inside aa
}
```

https://www.hl7.org/fhir/mapping-tutorial.html

Transform Rules

```
src_context.field as new_variable where condition
   -> tgt_context.field = create([type]) as new_variable
        then [details] "name";
```

```
src.value : code as vs0
   -> tgt.value = create("code") as vt0
        then code(vs0, vt0) "valueCode";
```

https://www.hl7.org/fhir/mapping-language.html#rules

FHIR Mapping Example 1

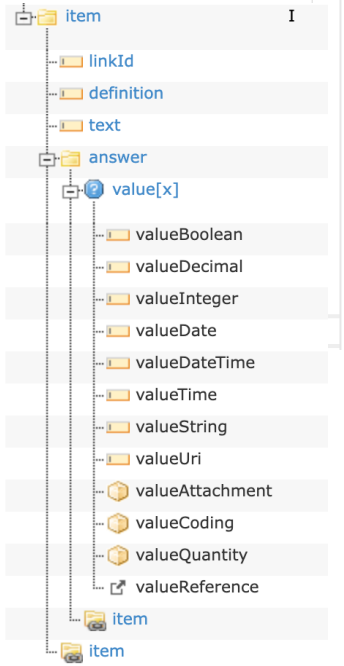
QuestResp.item.item.answer.valueString to Patient.gender

qr.json M

qrtopat > qr.json > [ ] item > { } 0 > [ ] item

You, 24 seconds ago | 1 author (You)

```
{
    "resourceType": "QuestionnaireResponse",
    "id": "qrpatientsexeresponse",
    "questionnaire": "http://ahdis.ch/matchbox/fml/qrpatientsex",
    "status": "in-progress",
    "item": [
        {
            "linkId": "patient",
            "text": "Patient",
            "item": [
                {
                    "linkId": "patient.sex",
                    "text": "Geschlecht",
                    "answer": [
                        {
                            "valueString": "male"
                        }
                    ]
                },
```



qr2patgender.map M

qrtopat > map > qr2patgender.map

You, 57 seconds ago | 1 author (You)

```
map "http://ahdis.ch/matchbox/fml/qr2patgender" = "qr2patgender"

uses "http://hl7.org/fhir/StructureDefinition/QuestionnaireResponse" alias QuestionnaireResponse as source
uses "http://hl7.org/fhir/StructureDefinition/Patient" alias Patient as target

group QuestionnaireResponse(source src : QuestionnaireResponse, target tgt : Patient) {
  src.item as item -> tgt as patient then item(item, patient);
}

group item(source src, target tgt: Patient) {
  src.item as item where linkId.value in ('patient.sex') -> tgt.gender = (item.answer.valueString);
}
```

Name	Flags	Card.	Type
Patient	N		DomainResource
identifier	Σ	0..*	Identifier
active	?! Σ	0..1	boolean
name	Σ	0..*	HumanName
telecom	Σ	0..*	ContactPoint
gender	Σ	0..1	code

https://confluence.hl7.org/display/FHIR/Using+the+FHIR+Mapping+Language

FHIR Mapping Example 2

QR.item.item.answer.valueString to ExplanationOfBenefit.type

Name	Flags	Card.	Type
ExplanationOfBenefit	TU		DomainResource
identifier		0..*	Identifier
status	?! Σ	1..1	code
type	Σ	1..1	CodeableConcept

stringtocoding.map M

tests > stringtocoding.map

You, now | 1 author (You)

```
1  map "http://ahdis.ch/matchbox/fml/stringtocoding" = "stringtocoding"
2
3  uses "http://hl7.org/fhir/StructureDefinition/QuestionnaireResponse" alias QuestionnaireResponse as source
4  uses "http://hl7.org/fhir/StructureDefinition/ExplanationOfBenefit" alias ExplanationOfBenefit as target
5
6  group stringtocoding(source src : QuestionnaireResponse, target tgt : ExplanationOfBenefit) {
7      src.item as item -> tgt as eob then item(item, eob);
8  }
9
10 group item(source src, target tgt: ExplanationOfBenefit) {
11     src.item as item where linkId.value in ('patient.claim-type') ->
12     tgt.type as code, code.coding as coding, coding.system='http://terminology.hl7.org/CodeSystem/claim-type',
13                                                 coding.code=(item.answer.valueString) "code2coding";
14 }
15
```

Name	Flags	Card.	Type
CodeableConcept	Σ N		Element
coding	Σ	0..*	Coding
text	Σ	0..1	string

Name	Flags	Card.	Type
Coding	Σ N		Element
system	Σ	0..1	uri
version	Σ	0..1	string
code	Σ	0..1	code
display	Σ	0..1	string

https://confluence.hl7.org/display/FHIR/Using+the+FHIR+Mapping+Language

Exercise questionnaire response to FHIR resource

Use https://github.com/ahdis/fhir-mapping-tutorial/tree/master/qrtopat

Apply the map map/qr2patgender.map to input qr.json

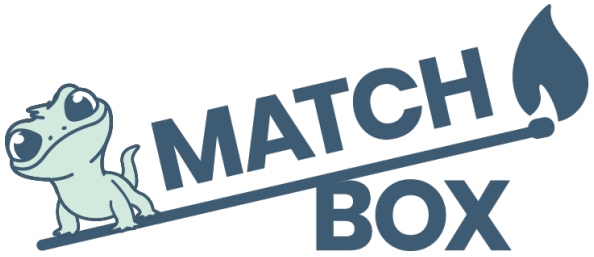
1. Apply the transformation with either FHIR Java validator or VSCode/RESTClient/matchbox
2. Change the mapping that the family name is mapped also from the questionnaire response (item.linkId = 'patient.family') to the Patient resource into the name.family element

   Please change the url of the map if you use VSCode/RESTClient that you have your own map to work on.

https://github.com/ahdis/fhir-mapping-tutorial/tree/master/qrtopat

Solutions

- see branch https://github.com/ahdis/fhir-mapping-tutorial/tree/devdaysletsbuild
- diff https://github.com/ahdis/fhir-mapping-tutorial/compare/devdaysletsbuild?expand=1



you can run also matchbox locally in a docker container instead of the test server, see https://github.com/ahdis/matchbox or https://www.matchbox.health/

Feedback, Questions?

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CDA to FHIR

Map CDA to FHIR for HL7 Italy workshop

- Based on Swiss mapping project of HL7
- Includes example files provided by HL7 Italy
- Branch hl7italy (maybe fork at a later stage?)

https://github.com/hl7ch/cda-fhir-maps/tree/hl7italy

Maps
CDA to FHIR

- Datatypes: CDAtoFHIRTypes.map
- CDA: CDAtoBundle.map
- CDA-IT: CDAIttoBundle.map
- CdaItRefertoMedicinaLaboratorio.map
- CdaItRefertoRadilogiaToBundle.map

https://github.com/ahdis/cda-fhir-maps

Referto Radilogia - Document

```
1   map "http://fhir.ch/ig/cda-fhir-maps/StructureMap/CdaItRefertoRadilogiaToBundle" = "CdaItRefertoRadilogiaToBundle"
2

33
34  group CdaItRefertoRadilogiaToBundle(source cda : ClinicalDocument, target bundle : Bundle) {
35      cda -> bundle.entry as e,
36          e.resource = create('Composition') as composition,
37          composition.id = uuid() as uuid,
38          e.fullUrl = append('urn:uuid:',uuid),
39          bundle.entry as e2,
40          e2.resource = create('Patient') as patient,patient share patient,
41          patient.id = uuid() as uuid2,
42          e2.fullUrl = append('urn:uuid:',uuid2)
43          then CdaItRefertoRadilogiaDocumentToBundle(cda, patient, composition, bundle) "ClinicalDocumentToBody";
44  }
45
```

https://github.com/hl7ch/cda-fhir-maps/blob/hl7italy/input/maps/CdaItRefertoRadilogiaToBundle.map

ATTENTION:
Sections need to be completed
Entries not done yet

Referto Radilogia – Section to Entry

```
group CdaItRefertoRadilogiaDocumentToBundle(source cda : ClinicalDocument, target patient : Patient, target composition : Composition, target bundle : Bundle)
  extends ClinicalDocumentToBundle {
  cda then ClinicalDocumentCompositionIt(cda, composition, patient, bundle) "composition";
  cda.component as component then {
    component.structuredBody as body then {
      body.component as component then {
        component.section as srcSection where (code.code='121181' and code.codeSystem='1.2.840.10008.2.16.4') -> composition.section as tgtSection
                then SectionDICOMObjectCatalog(cda, srcSection, patient, tgtSection, bundle);
        component.section as srcSection where (code.code='18785-6' and code.codeSystem='2.16.840.1.113883.6.1') -> composition.section as tgtSection
                then SectionQuesitoDiagnostico(cda, srcSection, patient, tgtSection, bundle);
        component.section as srcSection where (code.code='11329-0' and code.codeSystem='2.16.840.1.113883.6.1') -> composition.section as tgtSection
                then SectionStoriaClinica(cda, srcSection, patient, tgtSection, bundle);
      } "component";
    } "body";
  } "component";
}
```

https://github.com/hl7ch/cda-fhir-maps/blob/hl7italy/input/maps/CdaItRefertoRadilogiaToBundle.map

ATTENTION:
Copy of Swiss CDA Header,
Needs to be adapted for Italy

Clinical Document Composition It

```
// target: http://build.fhir.org/ig/hl7ch/ch-core/branches/master/StructureDefinition-ch-core-composition-epr.html
group ClinicalDocumentCompositionIt(source src : ClinicalDocument, target tgt : Composition, target patientResource: Patient, target bundle : Bundle) {
  src.confidentialityCode as confidentialityCode then {
    confidentialityCode.code as v where ('http://fhir.ch/ig/ch-epr-term/ValueSet/DocumentEntry.confidentialityCode'.resolve().compose.include.concept.where($t
      tgt.confidentiality = translate(v, 'http://fhir.ch/ig/ch-core/ConceptMap/documententry-confidentialitycode-to-fhir', 'code') as fhirconf,
        fhirconf.extension as ext then ChExtEprConfidentialityCode(confidentialityCode, ext) "confCode";
  } "confidentialityCode";
  src.versionNumber as versionNumber where (versionNumber>1)-> tgt.extension as ext2 then ChExtEprVersionNumber(versionNumber, ext2) "versionNumber";
  src.informationRecipient as informationRecipient -> bundle.entry as e then {
    informationRecipient.intendedRecipient as intendedRecipient where $this.receivedOrganization.exists()=false
      -> e.resource = create('Patient') as recipient,
        recipient.id = uuid() as uuid,
        e.fullUrl = append('urn:uuid:',uuid),
        tgt.extension as ext then ChExtEprInformationRecipient(intendedRecipient, recipient, ext) "informationRecipient";
    informationRecipient.intendedRecipient as intendedRecipient then {
      intendedRecipient.receivedOrganization -> e.resource = create('Organization') as recipient,
        recipient.id = uuid() as uuid2,
        e.fullUrl = append('urn:uuid:',uuid2),
        tgt.extension as ext
        then ChExtEprInformationRecipientOrganization(intendedRecipient, recipient, ext) "informationRecipientOrganization";
    } "intendedRecipientAsOrganization";
  } "entry";
  src.dataEnterer as dataEnterer -> bundle.entry as e,
    e.resource = create('PractitionerRole') as practitionerRole,
    practitionerRole.id = uuid() as uuid,
    e.fullUrl = append('urn:uuid:',uuid),
    tgt.extension as ext then ChExtEprDataEnterer(dataEnterer, bundle, practitionerRole, ext) "dataEnterer";
}
```

https://github.com/hl7ch/cda-fhir-maps/blob/hl7italy/input/maps/CdaItToBundle.map

ATTENTION:
Sections need to be completed
Entries not done yet

Referto Radilogia – Section to Entry

```
group CdaItRefertoRadilogiaDocumentToBundle(source cda : ClinicalDocument, target patient : Patient, target composition : Composition, target bundle : Bundle)
    extends ClinicalDocumentToBundle {
    cda then ClinicalDocumentCompositionIt(cda, composition, patient, bundle) "composition";
    cda.component as component then {
        component.structuredBody as body then {
            body.component as component then {
                component.section as srcSection where (code.code='121181' and code.codeSystem='1.2.840.10008.2.16.4') -> composition.section as tgtSection
                    then SectionDICOMObjectCatalog(cda, srcSection, patient, tgtSection, bundle);
                component.section as srcSection where (code.code='18785-6' and code.codeSystem='2.16.840.1.113883.6.1') -> composition.section as tgtSection
                    then SectionQuesitoDiagnostico(cda, srcSection, patient, tgtSection, bundle);
                component.section as srcSection where (code.code='11329-0' and code.codeSystem='2.16.840.1.113883.6.1') -> composition.section as tgtSection
                    then SectionStoriaClinica(cda, srcSection, patient, tgtSection, bundle);
            } "component";
        } "body";
    } "component";
}
```

```
group SectionDICOMObjectCatalog(source cda : ClinicalDocument, source src : Section, source patient : Patient, target tgt, target bundle: Bundle)
    extends ClinicalDocumentSection {
//  src.entry as cdaEntry where (substanceAdministration.templateId.where(root='2.16.756.5.30.1.1.10.4.34')) -> bundle.entry as e, e.resource = create('Medicati
//      medicationstatement.id = uuid() as uuid,
//      e.fullUrl = append('urn:uuid:',uuid),
//      tgt.entry = create('Reference') as reference, reference.reference = append('urn:uuid:',uuid) then {
//      cdaEntry.substanceAdministration as substanceAdministration then MedicationTreatmentPlanItemEntryContentModule(src, substanceAdministration, patient, medica
//  } "cdaEntry";
    }
```

https://github.com/hl7ch/cda-fhir-maps/blob/hl7italy/input/maps/CdaItRefertoRadilogiaToBundle.map

CDAtoFHIR Types

```
155
156 group ADAddress(source src : AD, target tgt : Address) extends Any <<types>> {
157   src.country as v -> tgt.country = (v.dataString);
158   src.state as v -> tgt.state = (v.dataString);
159   src.county as v -> tgt.district = (v.dataString);
160   src.city as v -> tgt.city = (v.dataString);
161   src.postalCode as v -> tgt.postalCode = (v.dataString);
162   src.streetAddressLine as v -> tgt.line = (v.dataString) "streetAddress";
163   src.streetName as v -> tgt.line = (v.dataString);
164   src.houseNumber as v -> tgt.line = (v.dataString);
165   src.use as c -> tgt.use = translate(c, '#addressUse', 'code') "addressUse";
166   src.useablePeriod -> tgt.period;
167 }
```

https://github.com/ahdis/cda-fhir-maps/blob/master/input/maps/CDAtoFHIRTypes.map

CDAtoFHIR Types

```
155
156 group ADAddress(source src : AD, target tgt : Address) extends Any <<types>> {
157   src.country as v -> tgt.country = (v.dataString);
158   src.state as v -> tgt.state = (v.dataString);
159   src.county as v -> tgt.district = (v.dataString);
160   src.city as v -> tgt.city = (v.dataString);
161   src.postalCode as v -> tgt.postalCode = (v.dataString);
162   src.streetAddressLine as v -> tgt.line = (v.dataString) "streetAddress";
163   src.streetName as v -> tgt.line = (v.dataString);
164   src.houseNumber as v -> tgt.line = (v.dataString);
165   src.use as c -> tgt.use = translate(c, '#addressUse', 'code') "addressUse";
166   src.useablePeriod -> tgt.period;
167 }
```

https://github.com/ahdis/cda-fhir-maps/blob/master/input/maps/CDAtoFHIRTypes.map

Response(2851ms) — cda-fhir-maps

EXPLORER

SOURCE CONTROL

Message (⌘Enter to commit on '...

Changes 0

CDA-FHIR-MAPS

- cda-core-2.0-pr.tgz
- cdatofhir_card.http
- cdatofhir_dispense.http
- cdatofhir_list.http
- cdatofhir_padv.http
- cdatofhir_prescription.http
- cdatofhir_refertomedicinalaborato...
- cdatofhir_refertoradiologia.http
- cdatofhir_treatmentplan.http
- cdatofhir.http
- fhirtocda_card.http
- fhirtocda_dispense.http
- fhirtocda_padv.http
- fhirtocda_prescription.http
- fhirtocda_treatmentplan.http

SEARCH

OPEN EDITORS

TIMELINE

OUTLINE

The active editor cannot provide outline information.

cdatofhir_refertoradiologia.http

cdatofhir_refertoradiologia.http > ...

```
Accept: application/fhir+xml;fhirVersion=4.0
Content-Type: text/fhir-mapping

< ./input/maps/CdaItToBundle.map


### 3b. POST CdaItRefertoRadilogiaToBundle.map
Send Request
POST {{host}}/StructureMap HTTP/1.1
Accept: application/fhir+xml;fhirVersion=4.0
Content-Type: text/fhir-mapping

< ./input/maps/CdaItRefertoRadilogiaToBundle.map


###
Send Request
POST {{host}}/StructureMap/$transform?source=http://fhir.ch/ig/cda-fhir-maps/StructureMap/CdaItRefertoRadilogia
Accept: application/fhir+xml;fhirVersion=4.0
Content-Type: application/fhir+xml;fhirVersion=4.0

< ./input/cda-it/CDA2_Referto_Radiologia.xml

```

Response(2851ms)

```
HTTP/1.1 200
Content-Type: application/fhir+xml;charset=UTF-8
Transfer-Encoding: chunked
Date: Sat, 18 Jun 2022 10:48:00 GMT
Connection: close

<?xml version="1.0" encoding="UTF-8"?>
<Bundle
  xmlns="http://hl7.org/fhir">
  <identifier>
    <system value="urn:oid:2.16.840.1.113883.2.9.2.120.4.4"/>
    <value value="030702.LCNLVC95L47H501Q.20220325112426.OQlvTq1J"/>
  </identifier>
  <type value="document"/>
  <timestamp value="2022-03-30T11:24:26+01:00"/>
  <entry>
    <fullUrl value="urn:uuid:d3b71fb9-9ac0-46ee-b030-79f0dd5056c9"/>
    <resource>
      <Composition>
        <language value="it-IT"/>
        <extension url="http://fhir.ch/ig/ch-core/StructureDefinition/ch-ext-epr-informationrecipient">
          <valueReference>
            <reference value="urn:uuid:596a55c0-6d8a-4d13-861c-7b1a11dfd220"/>
          </valueReference>
        </extension>
        <extension url="http://fhir.ch/ig/ch-core/StructureDefinition/ch-ext-epr-dataenterer">
          <extension url="enterer">
            <valueReference>
              <reference value="urn:uuid:01ea8d9c-db82-4667-a2f9-c4f5090732d6"/>
            </valueReference>
          </extension>
          <extension url="http://fhir.ch/ig/ch-core/StructureDefinition/ch-ext-epr-time">
```

CDA2_Referto_Radiologia.xml

input > cda-it > CDA2_Referto_Radiologia.xml

You, 45 minutes ago | 1 author (You)

```
<!--NEW_REFERTO_RADIOLOGIA-->
<!-- Header Referto Radiologia-->
<ClinicalDocument xmlns="urn:hl7-org:v3" xmlns:mif="urn:hl7-org:v3/mif" xmlns:xsi="http://www.w3.org/2001/XM
    <realmCode code="IT"/>
    <typeId root="2.16.840.1.113883.1.3" extension="POCD_MT000040UV02"/>
    <templateId root="2.16.840.1.113883.2.9.10.1.7.1" extension="1.1" assigningAuthorityName="HL7 Italia"/>
    <id root="2.16.840.1.113883.2.9.2.120.4.4" extension="030702.LCNLVC95L47H501Q.20220325112426.OQlvTq1J"/>
    <code code="68604-8" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" displayName="Referto Radi
        <translation code="002" codeSystem="2.16.840.1.113883.2.9.2.120.4.4" codeSystemName="SystemCode-Regi
    </code>
    <title> REFERTO RADIOLOGICO</title>
    <sdtc:statusCode code="active"/>
    <effectiveTime value="20220330112426+0100"/>
    <confidentialityCode code="N" codeSystem="2.16.840.1.113883.5.25" codeSystemName="HL7/ Confidentiality"
    <languageCode code="it-IT"/>
    <setId root="2.16.840.1.113883.2.9.2.120.4.4" extension="030702.LCNLVC95L47H501Q.20220325112426.OQlvTq1J
    <versionNumber value="1"/>
    <recordTarget typeCode="RCT" contextControlCode="OP">
        <patientRole classCode="PAT">
            <id root="2.16.840.1.113883.2.9.2.4.3.2" extension="TSTSMN63A01F205H" assigningAuthorityName="ME
            <id root="2.16.840.1.113883.9.9.9.9.9.9" extension="11111htttt" assigningAuthorityName="SAN RAFF
            <addr use="H">
                <country>100</country>
                <state>120</state>
                <county>RM</county>
                <city>Roma</city>
                <censusTract>058091</censusTract>
```

CdaItRefertoRadilogiaToBundle.map

input > maps > CdaItRefertoRadilogiaToBundle.map

You, 46 minutes ago | 1 author (You)

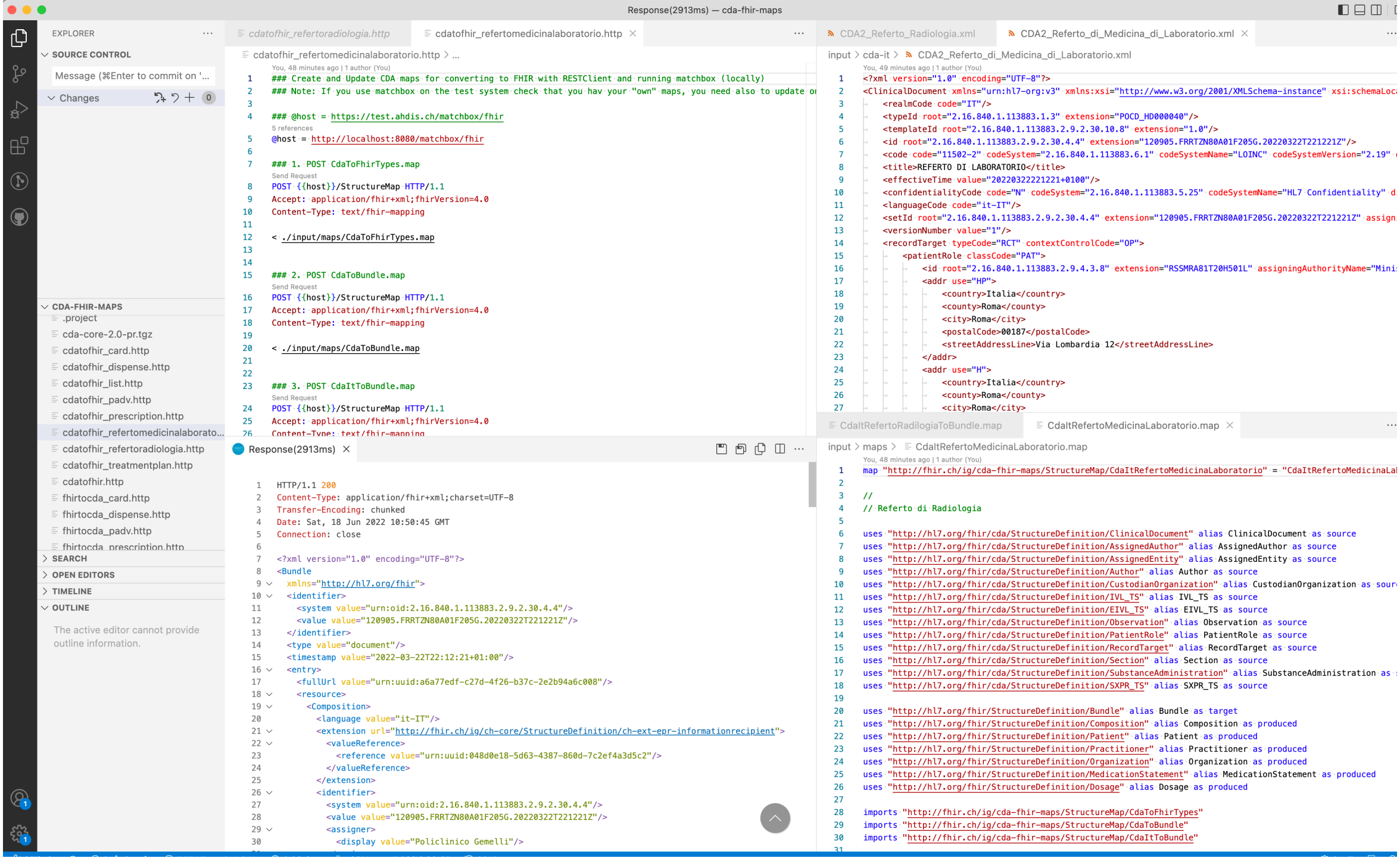
```
map "http://fhir.ch/ig/cda-fhir-maps/StructureMap/CdaItRefertoRadilogiaToBundle" = "CdaItRefertoRadilogiaToB

//
// Referto di Radiologia

uses "http://hl7.org/fhir/cda/StructureDefinition/ClinicalDocument" alias ClinicalDocument as source
uses "http://hl7.org/fhir/cda/StructureDefinition/AssignedAuthor" alias AssignedAuthor as source
uses "http://hl7.org/fhir/cda/StructureDefinition/AssignedEntity" alias AssignedEntity as source
uses "http://hl7.org/fhir/cda/StructureDefinition/Author" alias Author as source
uses "http://hl7.org/fhir/cda/StructureDefinition/CustodianOrganization" alias CustodianOrganization as sour
uses "http://hl7.org/fhir/cda/StructureDefinition/IVL_TS" alias IVL_TS as source
uses "http://hl7.org/fhir/cda/StructureDefinition/EIVL_TS" alias EIVL_TS as source
uses "http://hl7.org/fhir/cda/StructureDefinition/Observation" alias Observation as source
uses "http://hl7.org/fhir/cda/StructureDefinition/PatientRole" alias PatientRole as source
uses "http://hl7.org/fhir/cda/StructureDefinition/RecordTarget" alias RecordTarget as source
uses "http://hl7.org/fhir/cda/StructureDefinition/Section" alias Section as source
uses "http://hl7.org/fhir/cda/StructureDefinition/SubstanceAdministration" alias SubstanceAdministration as
uses "http://hl7.org/fhir/cda/StructureDefinition/SXPR_TS" alias SXPR_TS as source

uses "http://hl7.org/fhir/StructureDefinition/Bundle" alias Bundle as target
uses "http://hl7.org/fhir/StructureDefinition/Composition" alias Composition as produced
uses "http://hl7.org/fhir/StructureDefinition/Patient" alias Patient as produced
uses "http://hl7.org/fhir/StructureDefinition/Practitioner" alias Practitioner as produced
uses "http://hl7.org/fhir/StructureDefinition/Organization" alias Organization as produced
uses "http://hl7.org/fhir/StructureDefinition/MedicationStatement" alias MedicationStatement as produced
uses "http://hl7.org/fhir/StructureDefinition/Dosage" alias Dosage as produced

imports "http://fhir.ch/ig/cda-fhir-maps/StructureMap/CdaToFhirTypes"
imports "http://fhir.ch/ig/cda-fhir-maps/StructureMap/CdaToBundle"
imports "http://fhir.ch/ig/cda-fhir-maps/StructureMap/CdaItToBundle"
```


Response(2913ms) — cda-fhir-maps
EXPLORER
SOURCE CONTROL
Message (⌘Enter to commit on '...
Changes
CDA-FHIR-MAPS
.project
cda-core-2.0-pr.tgz
cdatofhir_card.http
cdatofhir_dispense.http
cdatofhir_list.http
cdatofhir_padv.http
cdatofhir_prescription.http
cdatofhir_refertomedicinalaborato...
cdatofhir_refertoradiologia.http
cdatofhir_treatmentplan.http
cdatofhir.http
fhirtocda_card.http
fhirtocda_dispense.http
fhirtocda_padv.http
fhirtocda_prescription.http
SEARCH
OPEN EDITORS
TIMELINE
OUTLINE
The active editor cannot provide outline information.
cdatofhir_refertoradiologia.http
cdatofhir_refertomedicinalaboratorio.http
cdatofhir_refertomedicinalaboratorio.http > ...
You, 48 minutes ago | 1 author (You)
Create and Update CDA maps for converting to FHIR with RESTClient and running matchbox (locally)
Note: If you use matchbox on the test system check that you hav your "own" maps, you need also to update or
@host = https://test.ahdis.ch/matchbox/fhir
5 references
@host = http://localhost:8080/matchbox/fhir
1. POST CdaToFhirTypes.map
Send Request
POST {{host}}/StructureMap HTTP/1.1
Accept: application/fhir+xml;fhirVersion=4.0
Content-Type: text/fhir-mapping
< ./input/maps/CdaToFhirTypes.map
2. POST CdaToBundle.map
Send Request
POST {{host}}/StructureMap HTTP/1.1
Accept: application/fhir+xml;fhirVersion=4.0
Content-Type: text/fhir-mapping
< ./input/maps/CdaToBundle.map
3. POST CdaItToBundle.map
Send Request
POST {{host}}/StructureMap HTTP/1.1
Accept: application/fhir+xml;fhirVersion=4.0
Content-Type: text/fhir-mapping
Response(2913ms)
HTTP/1.1 200
Content-Type: application/fhir+xml;charset=UTF-8
Transfer-Encoding: chunked
Date: Sat, 18 Jun 2022 10:50:45 GMT
Connection: close
<?xml version="1.0" encoding="UTF-8"?>
<Bundle
xmlns="http://hl7.org/fhir">
<identifier>
<system value="urn:oid:2.16.840.1.113883.2.9.2.30.4.4"/>
<value value="120905.FRRTZN80A01F205G.20220322T221221Z"/>
</identifier>
<type value="document"/>
<timestamp value="2022-03-22T22:12:21+01:00"/>
<entry>
<fullUrl value="urn:uuid:a6a77edf-c27d-4f26-b37c-2e2b94a6c008"/>
<resource>
<Composition>
<language value="it-IT"/>
<extension url="http://fhir.ch/ig/ch-core/StructureDefinition/ch-ext-epr-informationrecipient">
<valueReference>
<reference value="urn:uuid:048d0e18-5d63-4387-860d-7c2ef4a3d5c2"/>
</valueReference>
</extension>
<identifier>
<system value="urn:oid:2.16.840.1.113883.2.9.2.30.4.4"/>
<value value="120905.FRRTZN80A01F205G.20220322T221221Z"/>
<assigner>
<display value="Policlinico Gemelli"/>
CDA2_Referto_Radiologia.xml
CDA2_Referto_di_Medicina_di_Laboratorio.xml
input > cda-it > CDA2_Referto_di_Medicina_di_Laboratorio.xml
You, 49 minutes ago | 1 author (You)
<?xml version="1.0" encoding="UTF-8"?>
<ClinicalDocument xmlns="urn:hl7-org:v3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLoc
<realmCode code="IT"/>
<typeId root="2.16.840.1.113883.1.3" extension="POCD_HD000040"/>
<templateId root="2.16.840.1.113883.2.9.2.30.10.8" extension="1.0"/>
<id root="2.16.840.1.113883.2.9.2.30.4.4" extension="120905.FRRTZN80A01F205G.20220322T221221Z"/>
<code code="11502-2" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" codeSystemVersion="2.19"
<title>REFERTO DI LABORATORIO</title>
<effectiveTime value="20220322221221+0100"/>
<confidentialityCode code="N" codeSystem="2.16.840.1.113883.5.25" codeSystemName="HL7 Confidentiality" d
<languageCode code="it-IT"/>
<setId root="2.16.840.1.113883.2.9.2.30.4.4" extension="120905.FRRTZN80A01F205G.20220322T221221Z" assign
<versionNumber value="1"/>
<recordTarget typeCode="RCT" contextControlCode="OP">
<patientRole classCode="PAT">
<id root="2.16.840.1.113883.2.9.4.3.8" extension="RSSMRA81T20H501L" assigningAuthorityName="Mini
<addr use="HP">
<country>Italia</country>
<county>Roma</county>
<city>Roma</city>
<postalCode>00187</postalCode>
<streetAddressLine>Via Lombardia 12</streetAddressLine>
</addr>
<addr use="H">
<country>Italia</country>
<county>Roma</county>
<city>Roma</city>
CdaItRefertoRadiologiaToBundle.map
CdaItRefertoMedicinaLaboratorio.map
input > maps > CdaItRefertoMedicinaLaboratorio.map
You, 48 minutes ago | 1 author (You)
map "http://fhir.ch/ig/cda-fhir-maps/StructureMap/CdaItRefertoMedicinaLaboratorio" = "CdaItRefertoMedicinaLa
//
// Referto di Radiologia
uses "http://hl7.org/fhir/cda/StructureDefinition/ClinicalDocument" alias ClinicalDocument as source
uses "http://hl7.org/fhir/cda/StructureDefinition/AssignedAuthor" alias AssignedAuthor as source
uses "http://hl7.org/fhir/cda/StructureDefinition/AssignedEntity" alias AssignedEntity as source
uses "http://hl7.org/fhir/cda/StructureDefinition/Author" alias Author as source
uses "http://hl7.org/fhir/cda/StructureDefinition/CustodianOrganization" alias CustodianOrganization as sour
uses "http://hl7.org/fhir/cda/StructureDefinition/IVL_TS" alias IVL_TS as source
uses "http://hl7.org/fhir/cda/StructureDefinition/EIVL_TS" alias EIVL_TS as source
uses "http://hl7.org/fhir/cda/StructureDefinition/Observation" alias Observation as source
uses "http://hl7.org/fhir/cda/StructureDefinition/PatientRole" alias PatientRole as source
uses "http://hl7.org/fhir/cda/StructureDefinition/RecordTarget" alias RecordTarget as source
uses "http://hl7.org/fhir/cda/StructureDefinition/Section" alias Section as source
uses "http://hl7.org/fhir/cda/StructureDefinition/SubstanceAdministration" alias SubstanceAdministration as
uses "http://hl7.org/fhir/cda/StructureDefinition/SXPR_TS" alias SXPR_TS as source
uses "http://hl7.org/fhir/StructureDefinition/Bundle" alias Bundle as target
uses "http://hl7.org/fhir/StructureDefinition/Composition" alias Composition as produced
uses "http://hl7.org/fhir/StructureDefinition/Patient" alias Patient as produced
uses "http://hl7.org/fhir/StructureDefinition/Practitioner" alias Practitioner as produced
uses "http://hl7.org/fhir/StructureDefinition/Organization" alias Organization as produced
uses "http://hl7.org/fhir/StructureDefinition/MedicationStatement" alias MedicationStatement as produced
uses "http://hl7.org/fhir/StructureDefinition/Dosage" alias Dosage as produced
imports "http://fhir.ch/ig/cda-fhir-maps/StructureMap/CdaToFhirTypes"
imports "http://fhir.ch/ig/cda-fhir-maps/StructureMap/CdaToBundle"
imports "http://fhir.ch/ig/cda-fhir-maps/StructureMap/CdaItToBundle"

Exercise 1

- Perform the transformation in VSCode with RESTClient yourself for CDA2_Referto_di_Medicina_di_Laboratorio.xml and CDA2_Referto_Radiologia.xml
- If you want to do changes, please change the map urls or run matchbox locally in docker and change the host to localhost:8080/matchbox and post the Italy maps to it before the transform:

```
docker run --rm -i -t --name matchbox -p 8080:8080 -v
/PATH/TO/DIR:/config eu.gcr.io/fhir-ch/matchbox:v220
```

https://github.com/hl7ch/cda-fhir-maps/tree/hl7italy

Exercise 2

setup matchbox running on own docker instance

- Configure PATH/TO/DIR where cda-fhir-maps is checked out (will use application.yaml)
- change the @host in the .http files to http://localhost:8080/matchbox
- post the Italy maps to it before invoking the operation

```
docker run --rm -i -t --name matchbox -p
8080:8080 -v /PATH/TO/DIR:/config
eu.gcr.io/fhir-ch/matchbox:v220
```

https://github.com/hl7ch/cda-fhir-maps/tree/hl7italy

Exercise 3

- map additional sections
- map level3 cda entries

https://github.com/hl7ch/cda-fhir-maps/tree/hl7italy

Agenda

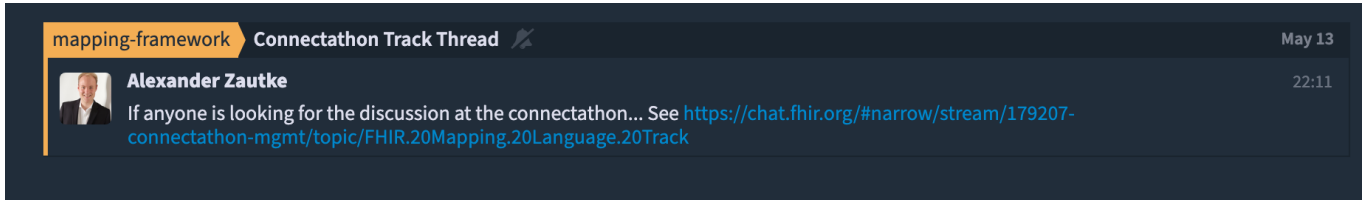
10.00 – 10.30	High Level Introduction CDA and FHIR Mapping (Differences between Standards, FHIR Mapping Language as independent Mapping Exchange format)
10.30 – 11.00	FHIR Logical Model of CDA - Exercise
11.15 – 12.15	FHIR Mapping Language Introduction with conversion to StructureMap - Exercise
14.00 – 15.00	CDA to FHIR mapping hands-on with matchbox - Exercise (based on provided Italian example)
15.00 – 15.30	Summary, Questions and answers - Exercise

Wrapup / Summary

- CDA and FHIR documents
- FHIR Logical model for CDA
- Validate and convert CDA documents with the FHIR Validator
- Applying FHIRPath expressions to CDA documents
- FHIR Mapping Language: Mapping from CDA to FHIR

Zulip Streams

- CDA
- CCDA / FHIR mapping stream
- cda to fhir
- cda/publish
- mapping-framework



Feedback, Questions

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