4S CDA Buildere

Open Source komponenter for CDA dokumenter

medcom

LAKESIDE SYSTEMATIC

Agenda

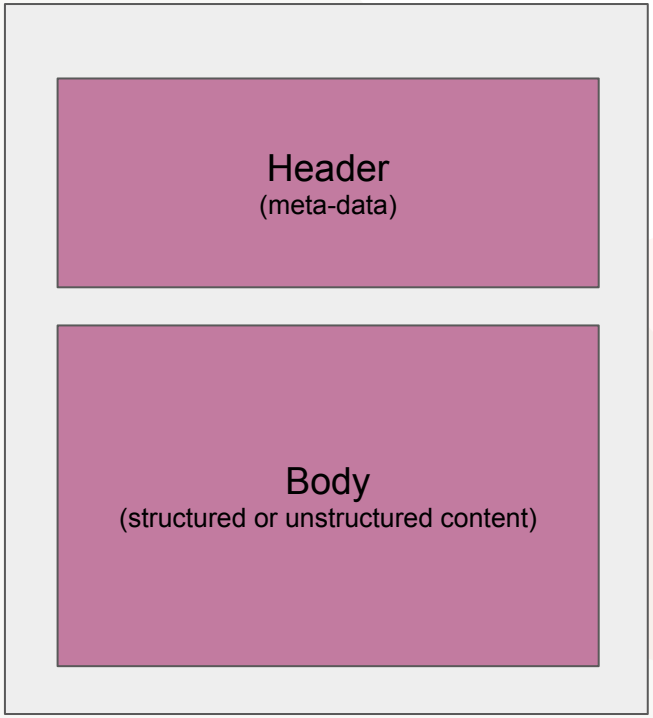
- Baggrund for nye CDA “buildere”
- Udvikling af næste generation CDA “buildere” = CDA Converters
- Hvad er der i pakken?
- Hvad er der i pipeline?
- Lidt om CDA dokumenter og XDS

Baggrund

- I forbindelse med **MaTIS** projektet skulle der etableres et decideret **IHE XDS Repository** som en del af infrastrukturen for telemedicin.
- Dette repository kalder vi nu **KIH Repository** ...
- Siden arbejdet med **KIH databasen** er der introduceret nye dokumentformater, ud over **PHMR** (Personal Health Monitoring Record), i form af **QFDD** (Questionnaire Form Definition Document) og **QRD** (Questionnaire Response Document).
- Der fandtes i forvejen en "**builder**" (objekt model => XML) for PHMR dokumenter, og lidt initielle tilløb til QFDD og QRD "buildere".
- De eksisterende "buildere" var baseret på at udviklere kunne benytte en **simplificeret objektmodel**, baseret på **green CDA** principper til at skabe PHMR dokumenter med, så man slap for mange komplicerede detaljer ved skabelsen af PHMR dokumenter.

CDA

Basically ...



ClinicalDocument templateId

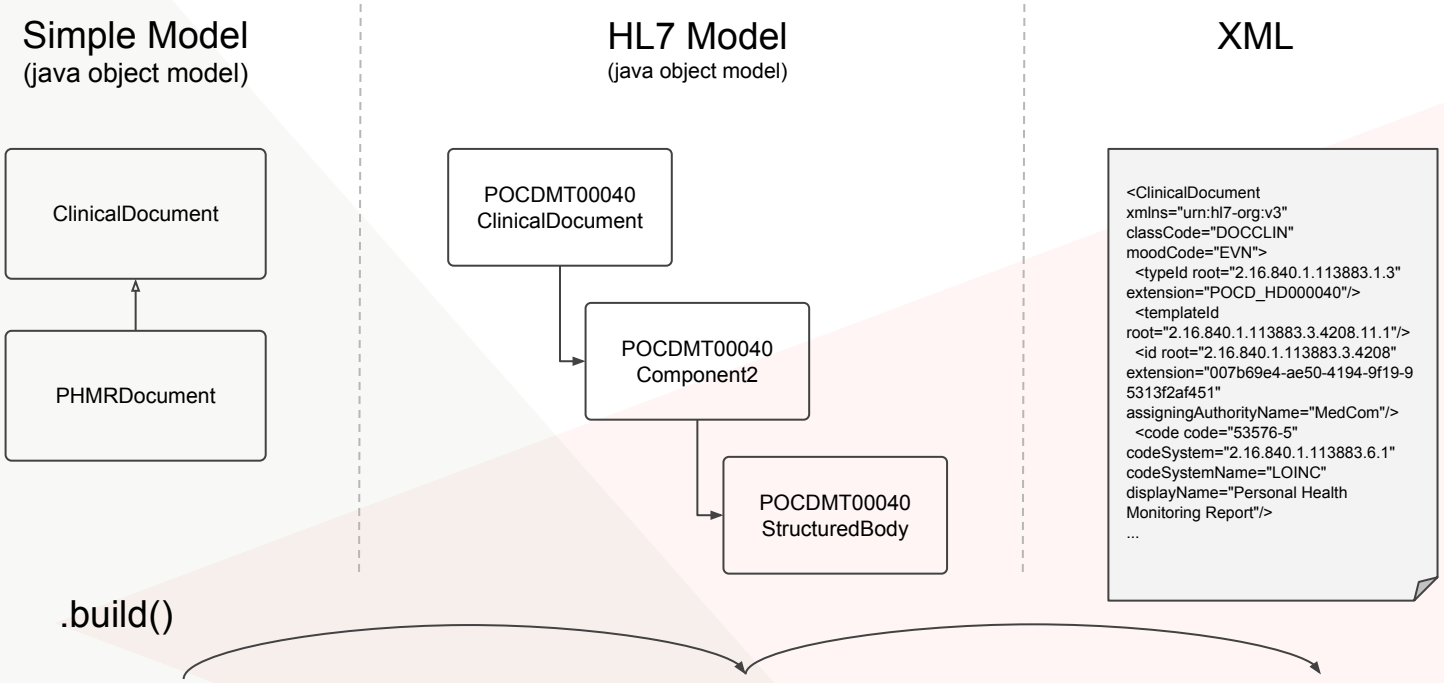
```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="../../Stylesheet/cda.xsl"?>
<!-- Questionnaire Response Document, contains the response to the Form Definition Document that contains questions. -->
<ClinicalDocument xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="urn:hl7-org:v3 ../../Schema/CDA_SDTC.xsd" xmlns="urn:hl7-org:v3"
    xmlns:voc="urn:hl7-org:v3/voc" classCode="DOCCLIN" moodCode="EVN">
    <realmCode code="DK"/>
    <typeId root="2.16.840.1.113883.1.3" extension="POCD_HD000040"/>
    <!-- MedCom Danish QRD-profile OID -->
    <templateId root="1.2.208.184.13.1"/>
    <!-- The next templateId, conforms the Questinnaere Response Document-level -->
    <templateId root="1.2.208.184.13.1.1.1"/>
    <id extension="hh2386d0-79ea-11e3-981f-0800200c9a66" root="1.2.208.184"
        assigningAuthorityName="MedCom"/>
    <!-- This code is LOINC -->
    <code codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" code="74465-6"
        displayName="Questionnaire Response Document"/>
    <title>SVAR PÅ SPØRGESKEMA 1 OM DIN EPILEPSI</title>
    <statusCode xmlns="urn:hl7-org:sdtc" code="new"/>
    <effectiveTime value="20150429123010+0100"/>
    <confidentialityCode code="N" codeSystem="2.16.840.1.113883.5.25"/>
    <languageCode code="da-DK"/>
    <versionNumber value="4711"/>
    <recordTarget typeCode="RCT" contextControlCode="OP">
        <patientRole classCode="PAT">
            <!-- This root will be changed -->
            <id extension="2512484916" root="1.2.208.176.1.2"
                assigningAuthorityName="CPR"/>
            <addr use="H">
                <streetAddressLine>Skovvejen 12</streetAddressLine>
                <streetAddressLine>Landet</streetAddressLine>
                <postalCode>5700</postalCode>
                <city>Svendborg</city>
                <country>Danmark</country>
            </addr>
            <telecom value="tel:65123456" use="H"/>
            <telecom value="mailto:nab@udkantsdanmark.dk" use="WP"/>
            <patient classCode="PSN" determinerCode="INSTANCE">
                <name>
                    <given>Nancy</given>
                    <given>Ann</given>
                    <family>Berggren</family>
                </name>
                <administrativeGenderCode code="F" codeSystem="2.16.840.1.113883.5.1" codeSystemName="HL7"/>
                <birthTime value="19481225000000+0000"/>
            </patient>
        </patientRole>
    </recordTarget>
    <author typeCode="AUT" contextControlCode="OP">
        <time value="20150129123010+0100"/>
        <assignedAuthor classCode="ASSIGNED">
            <!-- This root will be changed -->
            <id extension="2512484916" root="1.2.208.176.1.2"
                assigningAuthorityName="CPR"/>
```

Beslutning...

- Der skulle udvikles “buildere” til **QFDD** og **QRD**.
- Det blev besluttet at “bygge nyt”, men med genbrug af alt det som kunne bruges fra de eksisterende buildere.

- **Rationale:**
  - De(n) eksisterende builder fokuserede alene på at generere XML fra objekt model.
    Ønske: konvertering begge veje, dvs. model => XML og XML => model.
  - De(n) eksisterende builder benyttede en HL7 objekt model (CONNECTCommonTypesLib) som et mellemformat og JAXB til generering af XML.
    Ønske: En mere “ren” model med færre eksterne afhængigheder og en mere effektiv udnyttelse af ressourcer på runtime (memory, CPU)
  - De(n) eksisterende builder var bygget op omkring en model hvor objekt model og generering af XML er en del af metoder på modellen.
    Ønske: At separere model og konvertering således at der (potentielt) kan bygges en række forskellige konverterings komponenter.

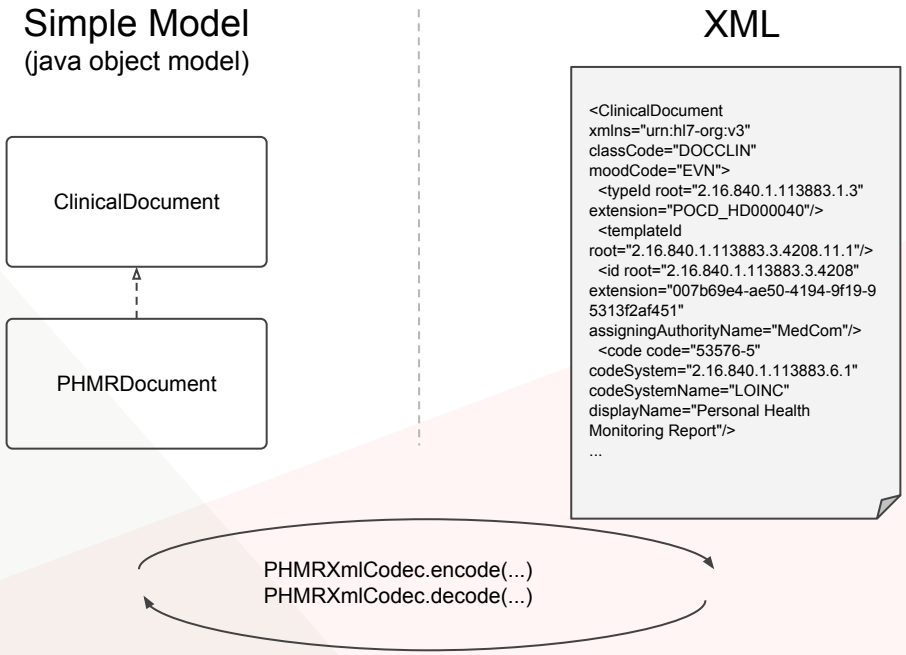
Den gamle konverteringsmodel ...



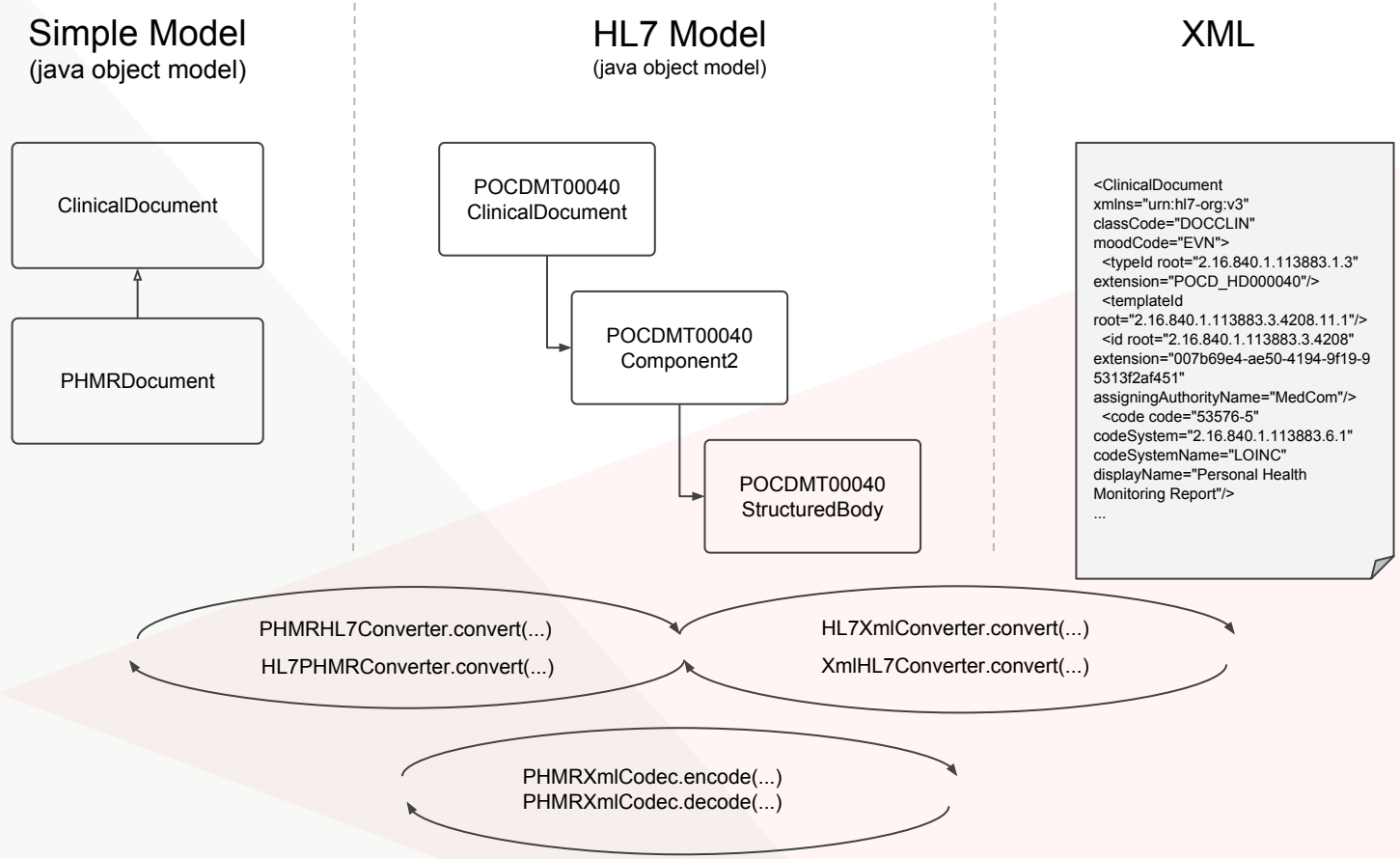
Vores tanker ved projektinitiering

- Do we actually need the HL7 component model?
  - Takes ~4 seconds to create JAXBContext for PHMR document (startup penalty)
  - Defines JAXB properties that allows XML serialization/deserialization.
  - Does not look like it is used for any particular purpose beyond XML generation.
  - As such it only adds complexity, computational overhead, as well as a considerable memory footprint.

Den nye model for konvertering ...

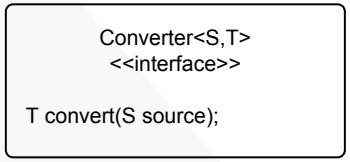


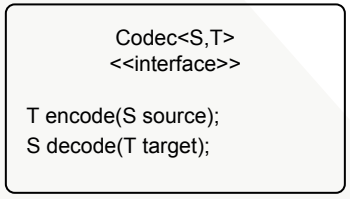
Men … den nye model kunne også understøtte ...

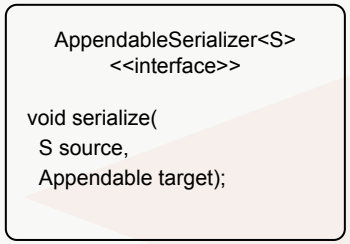


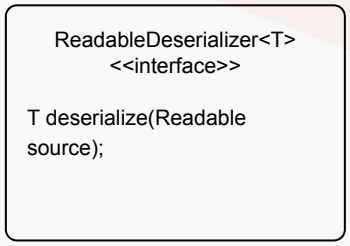
… eller andre kombinationer … model til DOM … model til StAX eller lignende ...

Converter / Codec interfaces









Converter and Codec
The Converter<S, T> interface is used for creating classes that are capable of converting from a source type (S) to a target type (T).

The Codec<S, T> interface can be seen as an interface consolidating to symmetric converters into a single class for coding and decoding. One converter will be used for the encode(...) method and one will be used for the decode(...) method.

Example:
We implement one converter capable of converting a PHMRDocument to XML (PHMRXMLConverter<PHMRDocument, String>). Likewise we implement a converter capable of converting XML to a PHMRDocument (XMLPHMRConverter<String, PHMRDocument>).

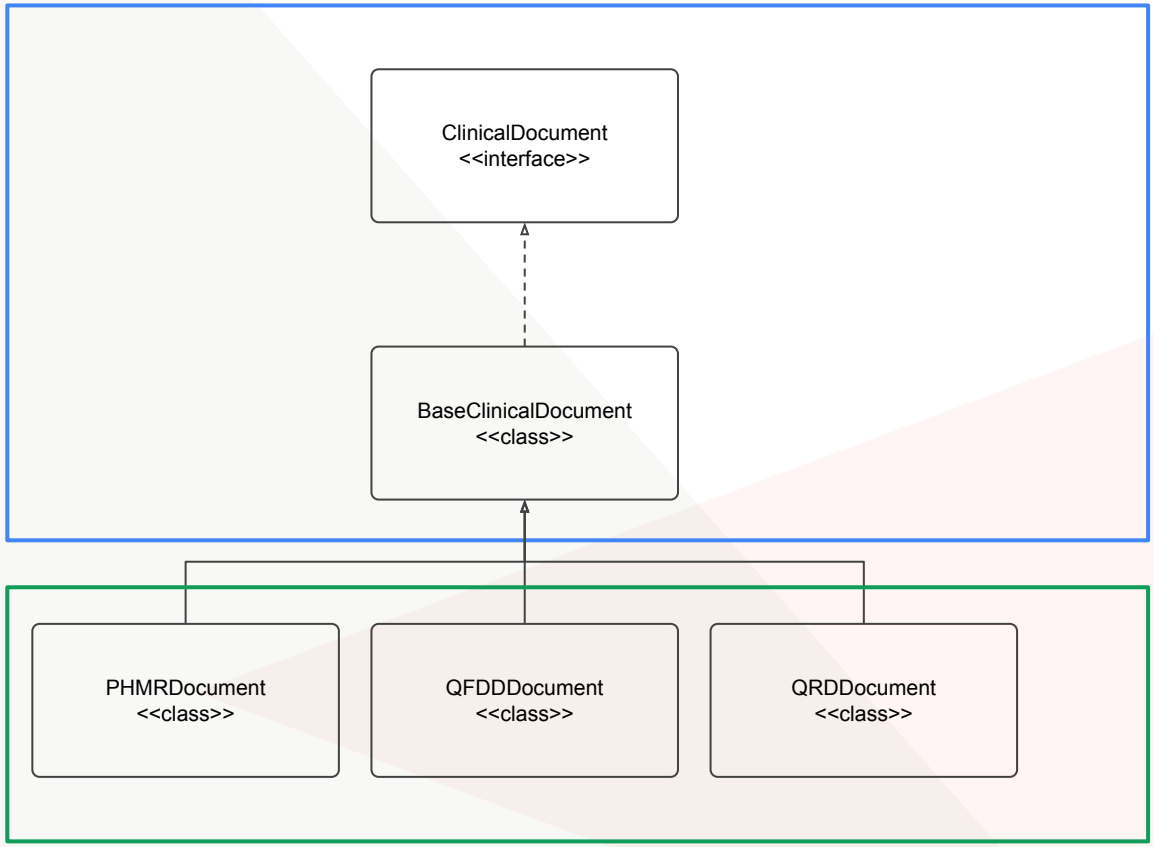
These two converters can be used to implement a PHMR/XML codec (PHMRXMLCoded<PHMRDocument, String>).

The same approach could be taken using org.w3c.dom.Document resulting in conversion between the CDA object model and a XML DOM Document.

AppendableSerializer and ReadableDeserializer
To support converters based on streams we have the AppendableSerializer<S> converting from some source type (S) delivering output as an appendable stream of characters.

The reverse conversion can be achieved by using a ReadableDeserializer processing some readable input stream and converting it into some target type (T).

Core Model Structure



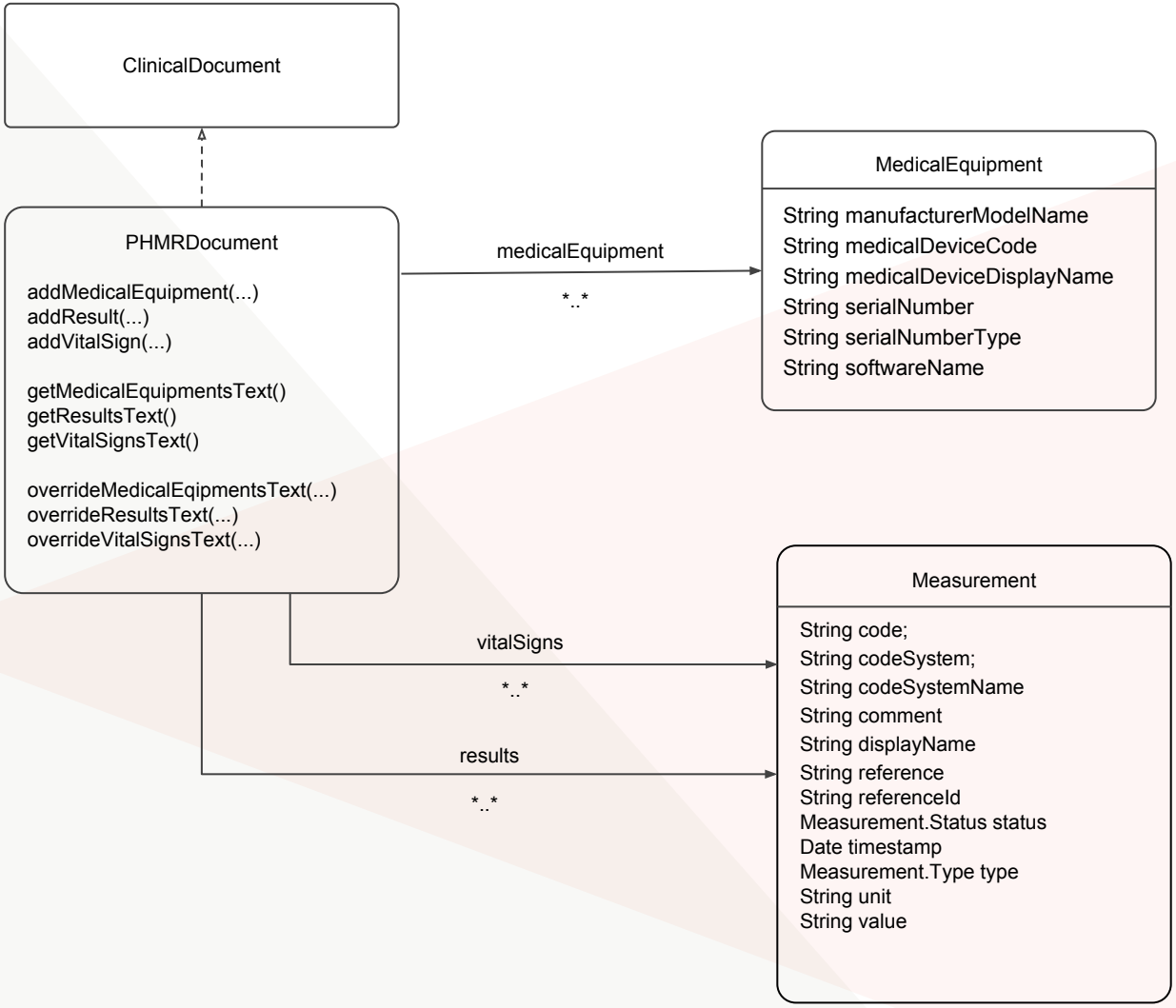
General part of the document model for CDA documents. The `ClinicalDocument` interface and the core implementation in `BaseClinicalDocument` and the associated `CDAHeader` object serves as a foundation for developing simple models for CDA documents.

Additional CDA documents can simply extend `BaseClinicalDocument` and add document specific behaviour.

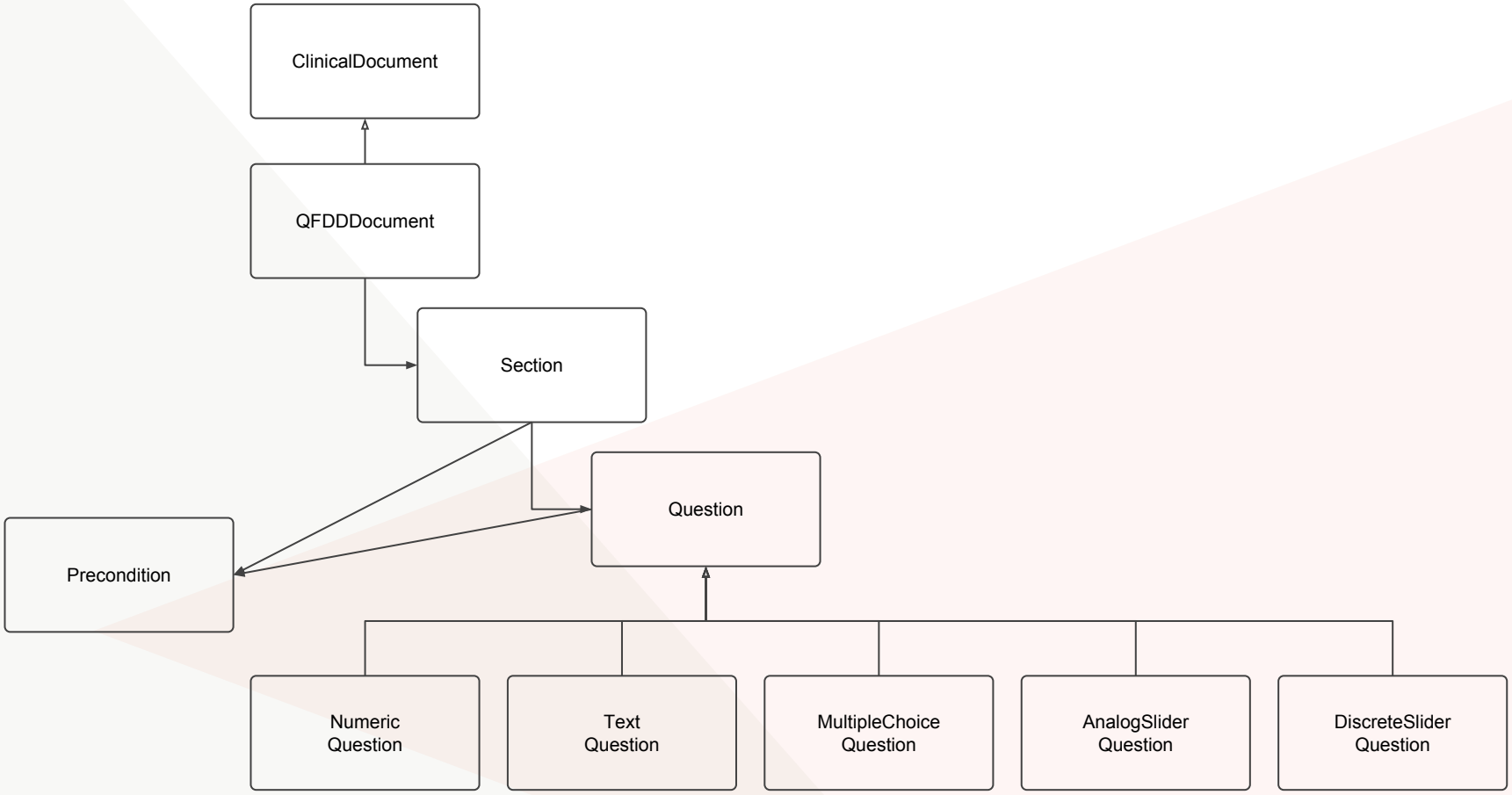
Specific CDA document model currently includes `PHMRDocument`, `QFDDDocument` and `QRDDocument`.

Each document type implements document specific attributes and relationships that are specific for each CDA document type.

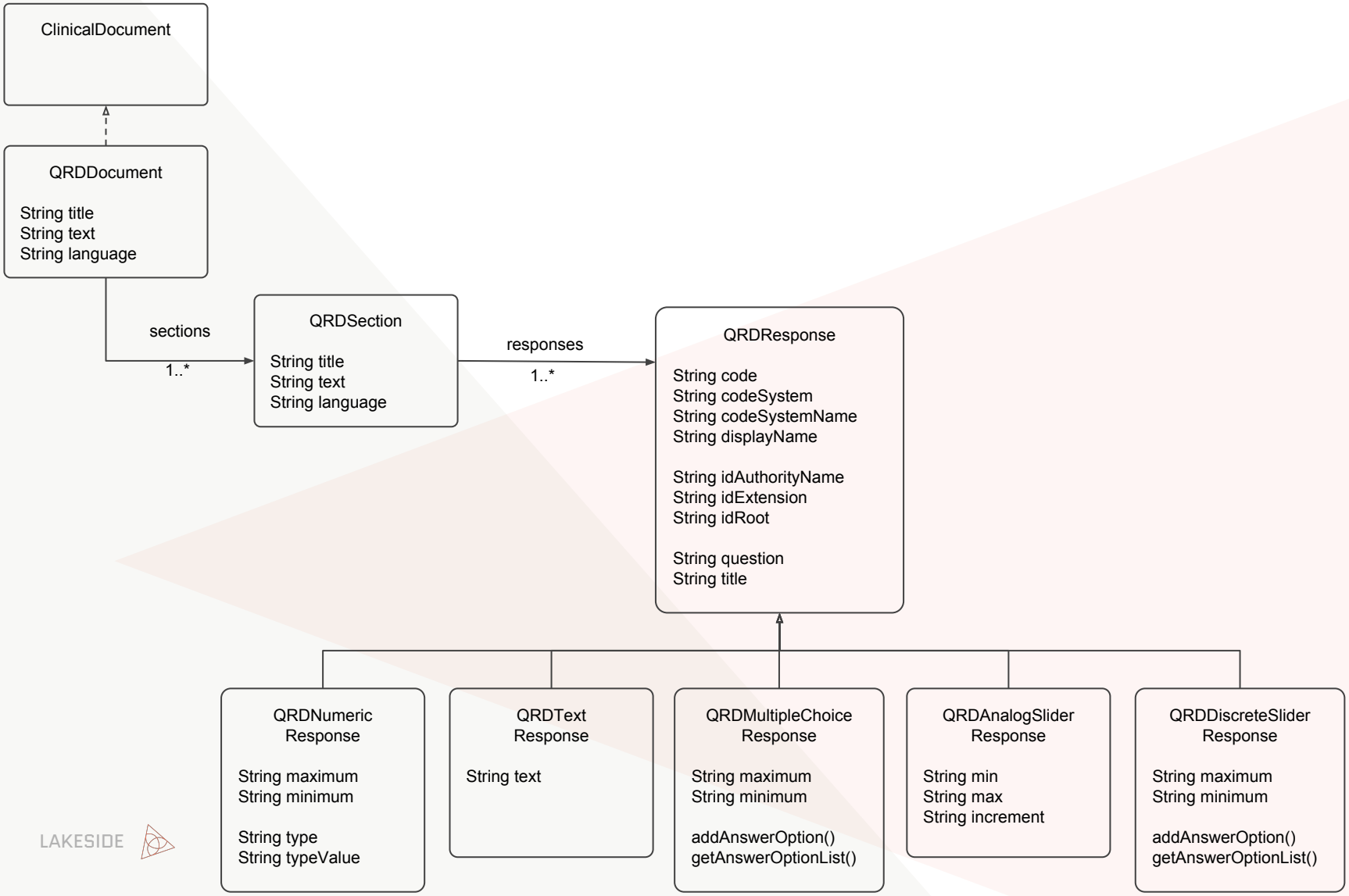
PHMR


ClinicalDocument
PHMRDocument
addMedicalEquipment(...)
addResult(...)
addVitalSign(...)
getMedicalEquipmentsText()
getResultsText()
getVitalSignsText()
overrideMedicalEqipmentsText(...)
overrideResultsText(...)
overrideVitalSignsText(...)
medicalEquipment
..
MedicalEquipment
String manufacturerModelName
String medicalDeviceCode
String medicalDeviceDisplayName
String serialNumber
String serialNumberType
String softwareName
vitalSigns
..
results
..
Measurement
String code;
String codeSystem;
String codeSystemName
String comment
String displayName
String reference
String referenceId
Measurement.Status status
Date timestamp
Measurement.Type type
String unit
String value

QFDD


ClinicalDocument
QFDDDocument
Section
Question
Precondition
Numeric Question
Text Question
MultipleChoice Question
AnalogSlider Question
DiscreteSlider Question

QRD



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Hvad er der i pakken?

- Færdiggørelse af MaTIS “release”
  - Fuld understøttelse af PHMR encode / decode (lige på trapperne - i dag?)
  - Færdiggørelse af QFDD decode og QRD decode (nærmeste fremtid)

- Andet
  - Kode til generering af testdata (PHMR, QFDD, QRD)
  - Doneret kode til kald af validator (Jens Villadsen)

Pipeline

- IHE XDS Query Tool
  - Simpel front-end til fremsøgning og upload af dokumenter
  - Mere brugervenlig udgave end XDSConnector
- XDS Header Converter
  - ClinicalDocumentXDSHeaderCodec (?)
  - Konverter et ClinicalDocument til en IHE XDS Header struktur ved at udtrække meta-data fra header
  - Valider overholdelse af den danske profil
- … forslag? ...

Lidt om IHE XDS Repositories / Registries ...

Sluttelig oplæg til diskussion ...

- Hvordan understøtter vi OSS udvikling i 4S regie?
- Libraries, frameworks, platforms …
-