CH EPR FHIR and
Cross Community Access with FHIR API

Workshop

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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

1996 - Dipl. Inf. ETH
ETH Zürich

HL7 FHIR® Proficient, 2023
Certified Professional - IHE Foundations, 2022
Certified HL7 CDA Specialist, 2015
NDK eHealthcare, Nottwil, 2009
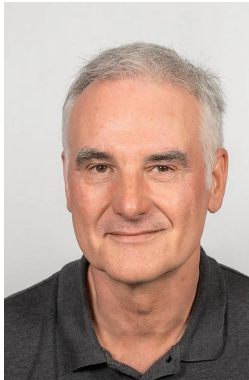
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now - FOPH

Working for eHealth Suisse and the FOPH in various areas of technical architecture and solutions

2020 - Health Solutions

Positions at Swisscom and Post Health

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Startups in the area of planning and scheduling for logistics and manufacturing

1999 - Universität GHS Essen

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Member of the board

IHE International

ITI Technical Committee

Agenda Workshop

- Introduction/ Welcome

- CH EPR FHIR

- Federating over communities

- Discussion

CH EPR FHIR
FHIR API for the EPR

- Contemporary alternative for primary systems and portals to connect to the EPR

- FHIR API for Web and mobile applications based on IHE mobile Profiles (MHD, PIXm) als alternative for the IHE XDS / HL7v3 based interfaces

- Addition to the EPR ordonnances scheduled to 2025

- Usual 1 year time frame for communities to implement the specifications

- *Note:*
  - *OpenID Connect will be mandatory in Annex 8*
  - *Direct integration of native mobile apps will be legally allowed no earlier than 2028*

https://fhir.ch/ig/ch-epr-fhir/index.html

CH EPR FHIR
FHIR Implementation Guide

https://fhir.ch/ig/ch-epr-fhir/index.html

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CH EPR FHIR (R4)
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This page is part of the CH EPR FHIR (R4) (v4.0.1-ballot: DSTU 4 Ballot 2) based on FHIR (HL7® FHIR® Standard) R4. This is the current published version. For a full list of available versions, see the Directory of published versions

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Official URL: **http://fhir.ch/ig/ch-epr-fhir/ImplementationGuide/ch.fhir.ig.ch-epr-fhir**	Version: **4.0.1-ballot**
Active as of 2024-05-16	Computable Name: CHEprFhir
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1.1 Introduction

The national extensions documented in this implementation guide shall be used in conjunction with the definitions of integration profiles, actors and transactions provided in Volumes 1 through 3 of the IHE IT Infrastructure Technical Framework.

This implementation guide with national extensions of IHE integration profiles was authored in order to fulfil the Swiss regulations of the Ordinance on the Electronic Patient Record (EPRO, SR 816.11). The EPRO and the EPRO-DFI are published in Official Compilation of Federal Legislation (AS) (available in German, French and Italian).

- Introduction
- Conformance Expectations
- Overview
- IP Statements
- Cross Version Analysis
- Dependency Table
- Globals Table

STU Note
This implementation guide is under an informative ballot by HL7 Switzerland until September 30th, 2024 midnight.
Please add your feedback via the 'Propose a change'-link in the footer on the page where you have comments.

The following items are under current development:

- Cross community access #92
- mCSD additional transaction for Feed #158
- Audit Examples together with IUA and adapted to EPR requirements #186

Significant changes, open and closed issues.

Download: You can download this implementation guide in NPM format from here.

1.2 Conformance Expectations

The key words MUST, MUST NOT, REQUIRED, SHALL, SHALL NOT, SHOULD, SHOULD NOT, RECOMMENDED, MAY, and OPTIONAL in this document are to be interpreted as described in [RFC2119].

This implementation guide uses **Must Support** in StructureDefinitions with the definition found in Appendix Z. This is equivalent to the IHE use of **R2** as defined in Appendix Z.

CH EPR FHIR
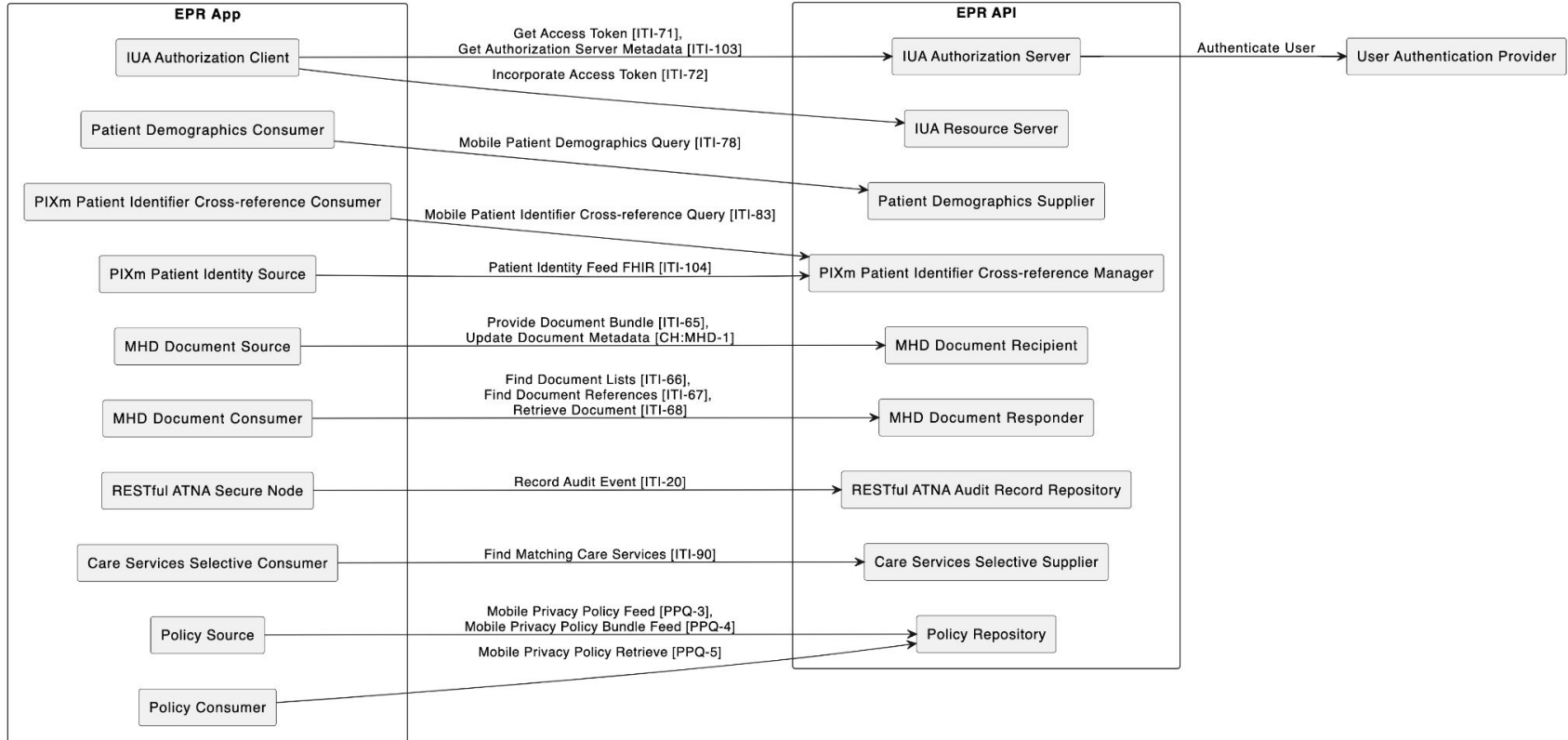## Use Cases

The scope of this extension covers all document management use cases:

1. Client authentication and authorization
2. User authentication and authorization
3. Read data and documents from the EPR
4. Write data and documents to the EPR
5. Manage patient privacy policies
6. Read and write health provider data
7. Read and write ATNA Audit Trails

https://fhir.ch/ig/ch-epr-fhir/index.html

CH EPR FHIR - IHE Actors and Transactions

Profiles, actors and transactions covered in this national extension

EPR App	EPR API	
IUA Authorization Client	Get Access Token [ITI-71], Get Authorization Server Metadata [ITI-103]	IUA Authorization Server → Authenticate User → User Authentication Provider
	Incorporate Access Token [ITI-72]	IUA Resource Server
Patient Demographics Consumer	Mobile Patient Demographics Query [ITI-78]	Patient Demographics Supplier
PIXm Patient Identifier Cross-reference Consumer	Mobile Patient Identifier Cross-reference Query [ITI-83]	PIXm Patient Identifier Cross-reference Manager
PIXm Patient Identity Source	Patient Identity Feed FHIR [ITI-104]	
MHD Document Source	Provide Document Bundle [ITI-65], Update Document Metadata [CH:MHD-1]	MHD Document Recipient
MHD Document Consumer	Find Document Lists [ITI-66], Find Document References [ITI-67], Retrieve Document [ITI-68]	MHD Document Responder
RESTful ATNA Secure Node	Record Audit Event [ITI-20]	RESTful ATNA Audit Record Repository
Care Services Selective Consumer	Find Matching Care Services [ITI-90]	Care Services Selective Supplier
Policy Source	Mobile Privacy Policy Feed [PPQ-3], Mobile Privacy Policy Bundle Feed [PPQ-4]	Policy Repository
Policy Consumer	Mobile Privacy Policy Retrieve [PPQ-5]	

CH EPR FHIR
Use Cases

4.6.3 User Access from an integrated Primary System to publish documents

Healthcare Professional Portal or Primary System

Community Components

IdP

Healthcare Professional

App GUI | Document Source (MHD) | Patient Identifier Cross-reference Consumer | Authorization Client (IUA) | Patient Identifier Cross-reference Manger | Authorization Server (IUA) | Document Recipient (MHD) | User Authentication Provider

[01] write doc

[02] GET /.well-known/smart-configuration

[03] Conformance statement incl. OAuth 2.1 endpoints

[04] Get Access Token

[05] [ITI-71] Get Access Token Request [Basic access token]

[06] Authenticate User

[07]

[08] Authorize App Access

[09] [ITI-71] Get Access Token Response [Basic access token]

[10]

[11] query MPI-PID and EPR-SPID from MPI using local ID and access token

[12] [ITI-83] Mobile Patient Identifier Cross-reference Query [local ID] together with access token

[13] [ITI-83] Mobile Patient Identifier Cross-reference Query Response [MPI-PID, EPR-SPID]

[14]

[15] Get Access Token

[16] [ITI-71] Get Access Token [Extended access token]

[17] [ITI-71] Get Access Token Response [Extended access token]

[18]

[19] publish document

loop [For the access decision enforcement, the EPR relies on the Confidentiality Code within the document metadata to be stored in the patient's Health Record. A patient can set the default Confidentiality Codeand a document source needs to iterate over the different confidentiality code until successful]

[20] publish document [ITI-65]

[21]

[22]

[23]

https://build.fhir.org/ig/ehealthsuisse/ch-epr-fhir/sequencediagrams.html

IUA

IUA covers the following use cases in the EPR:

- OAuth based client identification, authentication and authorization for web and mobile apps
- Identification, authentication and authorization of SMART on FHIR components
- Conveying user identity attributes in the access token required for policy enforcement
- Conveying attributes of technical user required for policy enforcement (added in 2024)

https://fhir.ch/ig/ch-epr-fhir/iti-iua.html

IUA

https://fhir.ch/ig/ch-epr-fhir/iti-iua.html
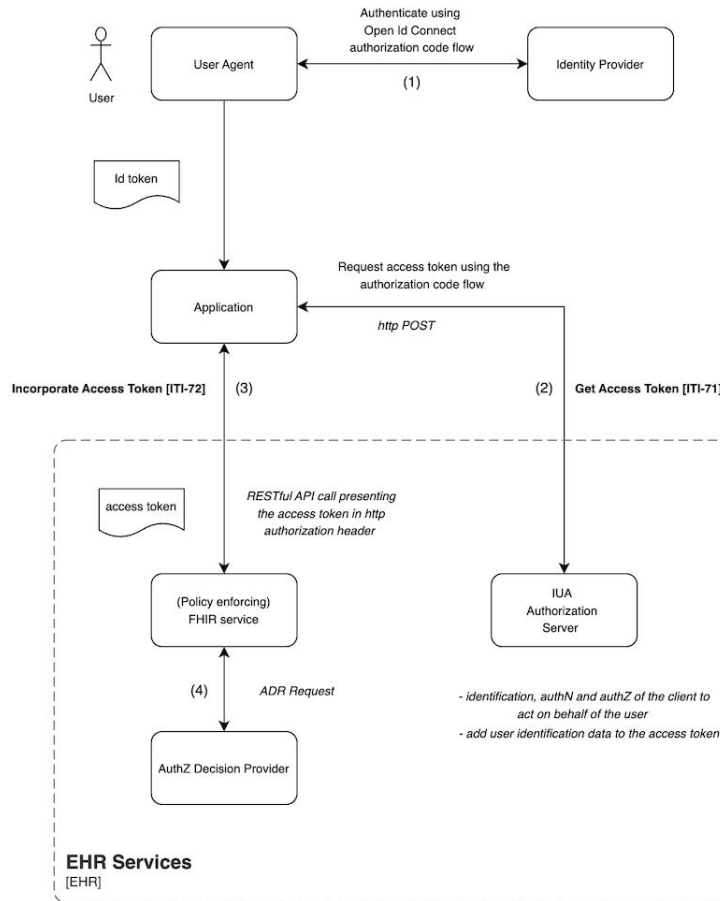
IUA

Analogy to XDS and XUA:

- The IUA authorization server covers several roles formerly splitted in XDS with XUA
    - Identify and authenticate the client, which in XDS is done via mTLS node authentication
    - Provide an access token enriched with the user identification data required for AuthZ, which in XUA is done by the User Assertion Provider actor
- The IUA authorization server adds the possibility for the user to restrict client authorization to specific scopes

https://fhir.ch/ig/ch-epr-fhir/iti-iua.html

PDQm
Mobile Patient Demographics Query [ITI-78]

https://fhir.ch/ig/ch-epr-fhir/iti-78.html

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3.3 Mobile Patient Demographics Query [ITI-78]

This section describes the national extension for the Swiss EPR to the Mobile Patient Demographics Query [ITI-78] ⧉ transaction defined in the IUA profile published in the IHE IT Infrastructure Technical Framework Trial Implementation "Patient Demographics Query for mobile".

- Scope
- Actor Roles
- Referenced Standards
- Messages
- Security Consideration

3.3.1 Scope

The Mobile Patient Demographics Query is used by an app in the Swiss EPR to query with demographics parameters for a patient participating in the Swiss EPR.

3.3.2 Actor Roles

Actor: Patient Demographics Consumer
Role: Requests a list of patients matching the supplied set of demographics criteria (example: ID or Name) from the Patient Demographics Supplier. The Patient Demographics Consumer populates its attributes with demographic information received from the Patient Demographics Supplier.
Actor: Patient Demographics Supplier
Role: Returns demographic information for all patients matching the demographics criteria provided by the Patient Demographics Consumer

3.3.3 Referenced Standards

1. Patient Demographics Query for mobile (PDQm) Rev. 2.4.0 ⧉
2. This PDQm Profile is based on Release 4 of the emerging HL7® FHIR® ⧉ standard.

3.3.4 Messages

Interaction Diagram for [ITI-78]

Patient Demographics Consumer   Patient Demographics Supplier

Query
Query Patient Resource →
← Query Patient Resource Response

Retrieve
Retrieve Patient Resource →
← Retrieve Patient Resource Response
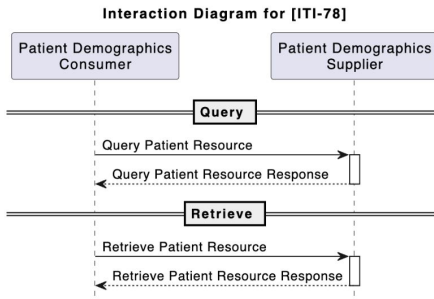
- needs IUA basic access token
- max 5 query results

3.3.4.1.3 Message Example

Query for a patient with name Muster and

```
GET [base]/Patient?name=Muster&bi
Accept: application/fhir+json
traceparent: 00-0af7651916cd43dd8
```

Example response to above query

Tracecontext for all transactions

https://fhir.ch/ig/ch-epr-fhir/iti-78.html

```
{
  "resourceType" : "Bundle",
  "id" : "PDQm-QueryResponse",
  "meta" : {
    "profile" : [
       "http://fhir.ch/ig/ch-epr-fhir/StructureDefinition/ch-pdqm-querypatientresourceresponsem
    ]
  },
  "type" : "searchset",
  "total" : 1,
  "link" : [
    {
      "relation" : "self",
      "url" : "http://example.com/fhir/Patient?birthdate=1995-01-27&name=Muster"
    }
  ],
  "entry" : [
    {
      "fullUrl" : "http://example.com/fhir/Patient/FranzMuster",
      "resource" : {
        "resourceType" : "Patient",
        "id" : "FranzMuster",
        "text" : {
          "status" : "generated",
          "div" : "<div xmlns=\"http://www.w3.org/1999/xhtml\"><a name=\"Patient_FranzMuster\">
        },
        "identifier" : [
          {
            "system" : "urn:oid:2.999.5.6.7",
            "value" : "value of MPI-PID"
          },
          {
            "type" : {
              "coding" : [
                {
                  "system" : "http://terminology.hl7.org/CodeSystem/v2-0203",
                  "code" : "MR"
                }
              ]
            },
            "system" : "urn:oid:2.16.756.888888.3.1",
            "value" : "8734"
```

PIXm
[ITI-83] Mobile Patient
[ITI-104] Patient Identity
Feed FHIR

https://fhir.ch/ig/ch-epr-fhir/iti-83.html

https://fhir.ch/ig/ch-epr-fhir/iti-104.html

MHD
Mobile Health Documents

Document Source

Document Consumer

ITI-65 Provide Document Bundle
CH:MHD-1 Update Document Metadata

ITI-67 Find Document References
ITI-68 Retrieve Document

Document Recipient

Document Responder
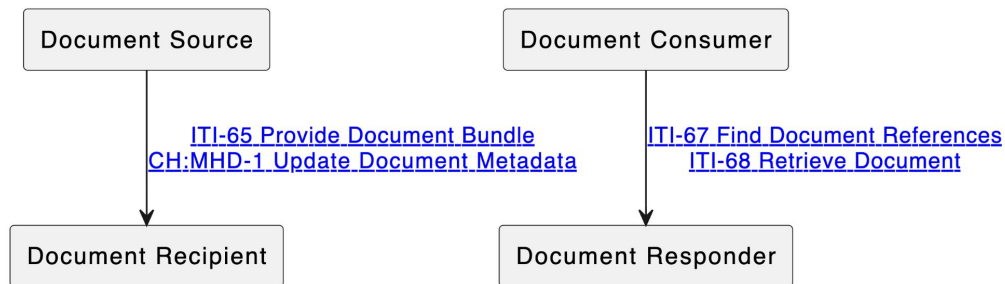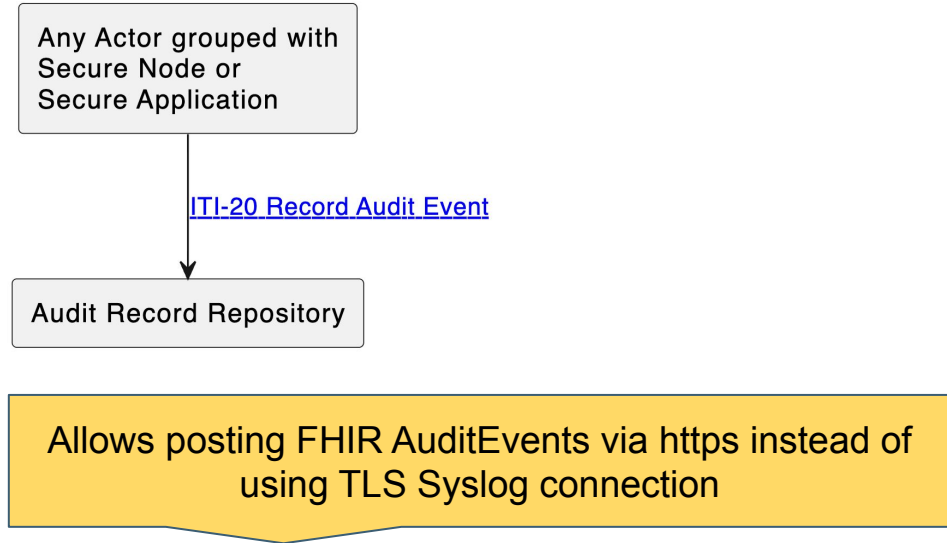
- No more grouping with XDS on FHIR, but requires comprehensive metadata
- National Extension: Update Document Metadata

https://build.fhir.org/ig/ehealthsuisse/ch-epr-fhir/iti-mhd.html

RESTFul ATNA
Query and Feed supplement

Any Actor grouped with
Secure Node or
Secure Application

ITI-20 Record Audit Event

Audit Record Repository

Allows posting FHIR AuditEvents via https instead of
using TLS Syslog connection

https://build.fhir.org/ig/ehealthsuisse/ch-epr-fhir/iti-restful-atna.html

mCSD
Mobile Care Services Discovery

mCSD Actor Diagram

Care Services Selective Consumer	Care Services Source

ITI-90 Find Matching Care Services   CH:mCSD-1 Care Services Feed

Care Services Selective Supplier	Care Services Directory

- FHIR API for HPD
- National Extension to feed the HPD

https://build.fhir.org/ig/ehealthsuisse/ch-epr-fhir/iti-mcsd.html
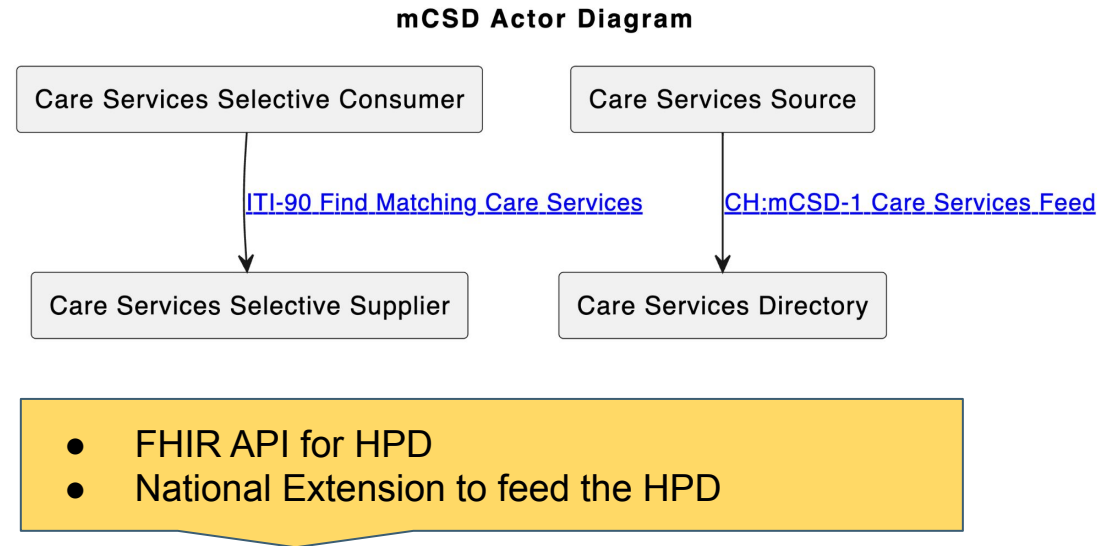
CH:PPQm
Privacy Policy Query for Mobile

| Policy Source | PPQ-3: Mobile Privacy Policy Feed → | Policy Repository | ← PPQ-5: Mobile Privacy Policy Retrieve | Policy Consumer |

PPQ-3: Mobile Privacy Policy Feed

PPQ-4: Mobile Privacy Policy Bundle Feed

PPQ-5: Mobile Privacy Policy Retrieve
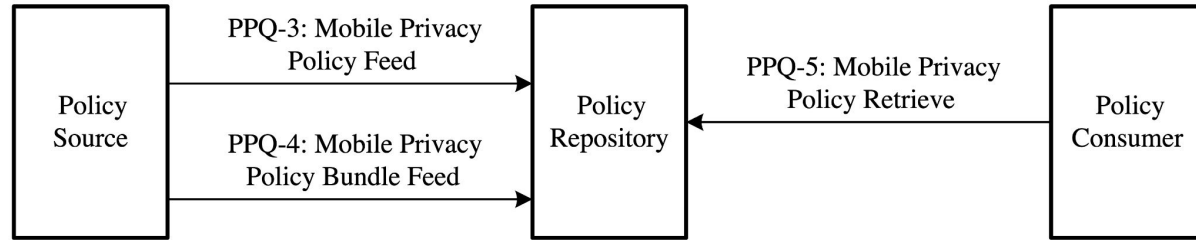
PPQm integrated into CH EPR FHIR

https://build.fhir.org/ig/ehealthsuisse/ch-epr-fhir/iti-mcsd.html

CH EPR FHIR
Out of scope

- IUA and MHD: Image Sources as technical user #177

CH EPR FHIR
Open issues

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https://fhir.ch/ig/ch-epr-fhir/index.html

Agenda Workshop

- Federating over communities

Federation

- FHIR core framework does not explicitly address the challenge of cross community communication
- Thus there are several possible solutions how to manage access to documents in a cross community environment like the EPR

https://fhir.ch/ig/ch-epr-fhir/iti-iua.html

Federation

- In a cross community scenario the challenge is to make the documents available for requesting clients connected to a single community only!
- Since remote Document Responder actors respond the remote URL of the document, which is typically not accessible by the clients Document Consumer actor, since this would require the client to be registered in all remote communities.

http://fhir.ch/ig/ch-epr-fhir/iti-67.html

Cross Community Access with FHIR API
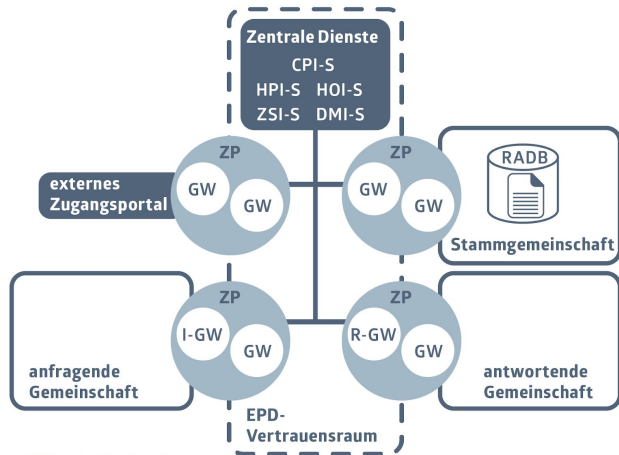
A) Every community offers a FHIR API and a client queries all communities

> … too complicated, EPR App or primary system should not need to handle multiple communities
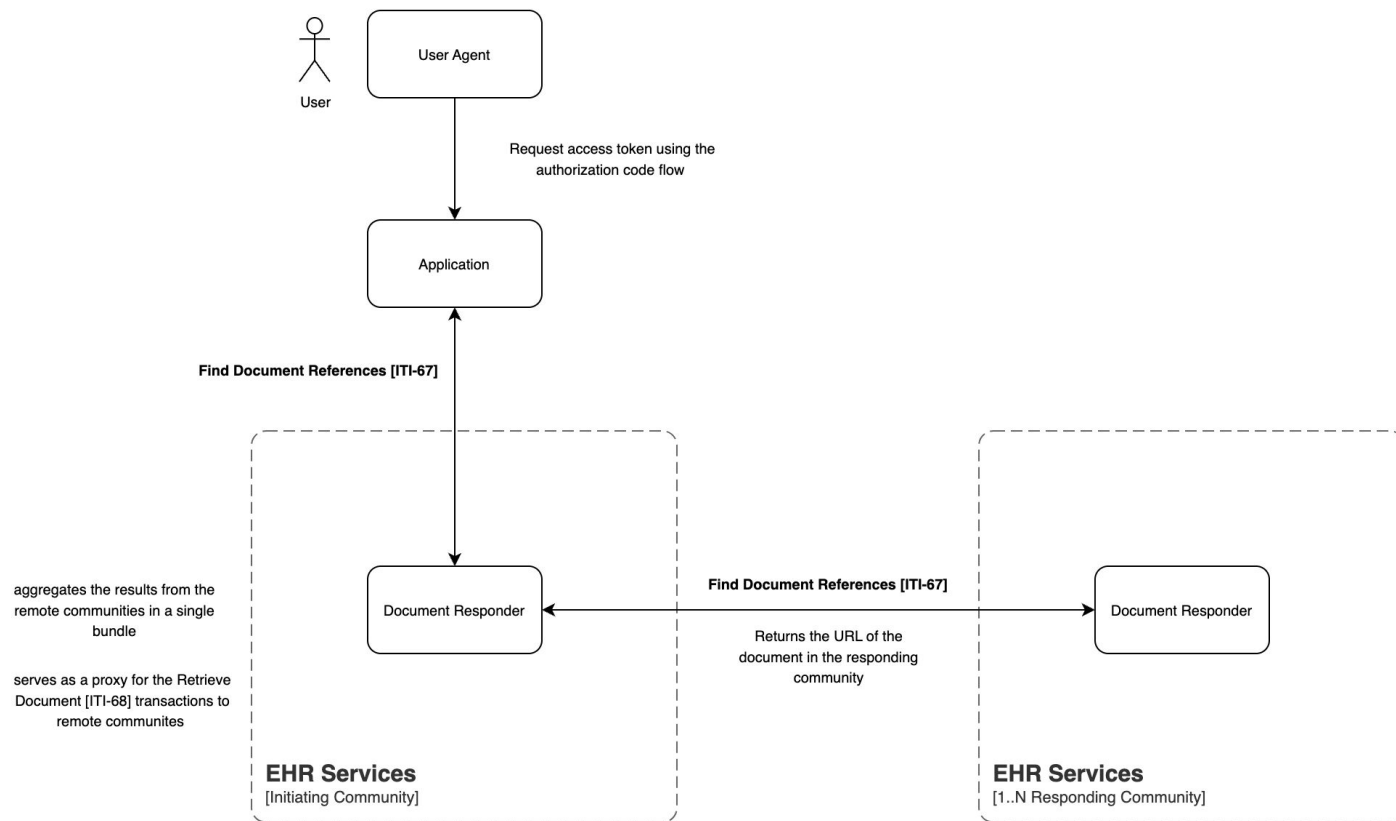
B) Community aggregates query using IHE XC (Cross Community) Profiles as of today

> … first attempt in earlier CH EPR mHealth version, challenge IUA (OAuth) / XUA (SAML2) and limited to documents

C) Community aggregates, needs FHIR API endpoints from other communities

> FHIR API for Client the same for all FHIR Resources
> => FHIR Multidomain

Federation

User

User Agent

Request access token using the
authorization code flow

Application

Find Document References [ITI-67]

aggregates the results from the
remote communities in a single
bundle

serves as a proxy for the Retrieve
Document [ITI-68] transactions to
remote communites

Document Responder

Find Document References [ITI-67]

Returns the URL of the
document in the responding
community

Document Responder

EHR Services
[Initiating Community]
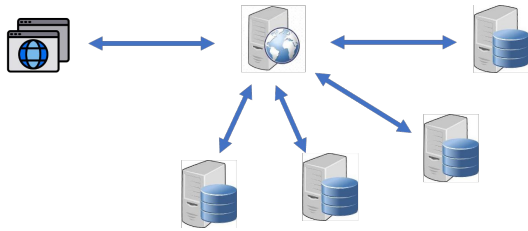
EHR Services
[1..N Responding Community]

HL7 FHIR Multi-domain HIE Architecture

- Gemini-Project (Joint IHE und HL7 International Initiative)

- Project Kickoff: Monday May 8, 2023 at WGM+

- Konsistente Usage of the FHIR-API in a scenario with multiple domains
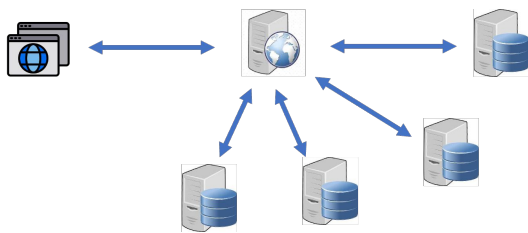
- Zulip Stream:

  https://chat.fhir.org/#narrow/stream/428828-Multi-domain-environments

https://confluence.hl7.org/display/GP/HL7+FHIR+Multi-domain+HIE+Architecture

Intermediary Pattern

- Authenticating the user

- Combining the search results

- Managing Search Synchronisation

- Routing the follow up queries to the correct server

Intermediary Pattern

- How to implement intermediary?
  - FHIR Gateway
- or
  - Reverse Proxy with HTTP Forward Header?

    (limitation for resource access, no aggregation support)

https://confluence.hl7.org/display/FHIR/Intermediaries+White+Paper

Workshop

Open Discussion about experiences with FHIR API over multiple domains.

Q & A

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