

Collaborative Health Platform

An mHealth Interoperability project for PEPFAR/USAID



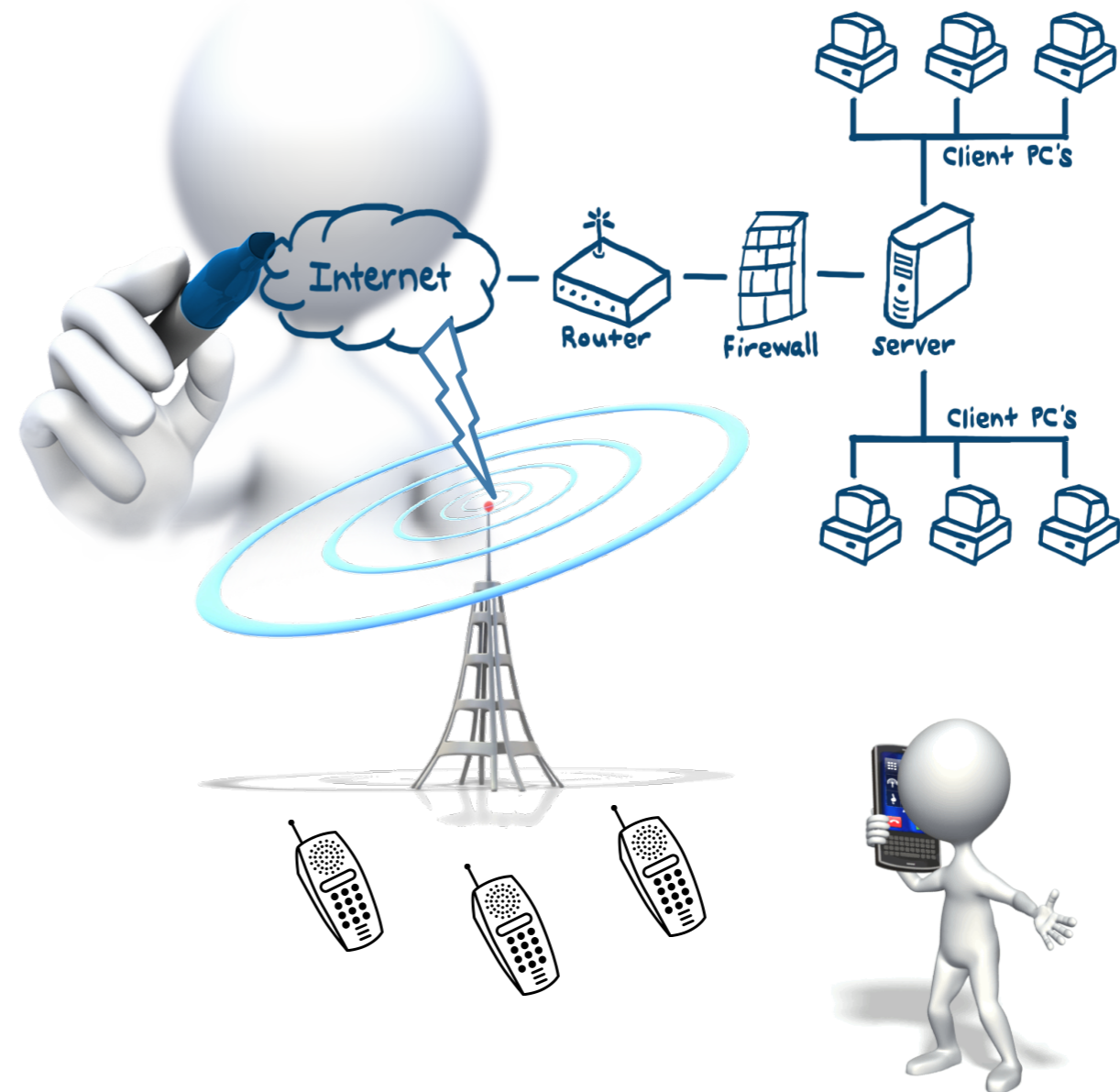
2011 mHealth Summit
Washington, DC



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The Key Deliverable

a design specification on how selected interoperability standard(s) may be adopted and adapted for use in mobile (healthcare) application designs

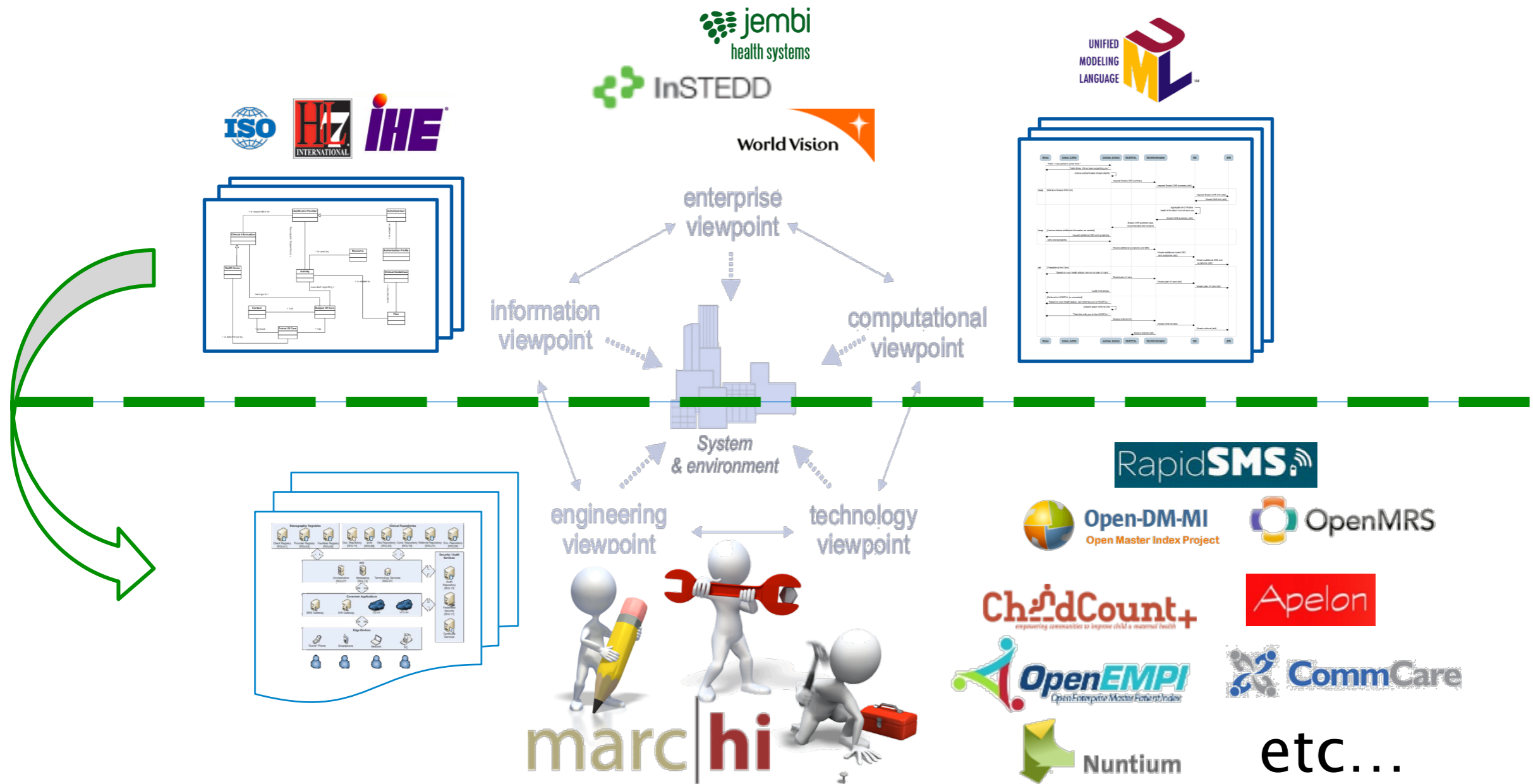


HOW STANDARDS PROLIFERATE:
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC.)



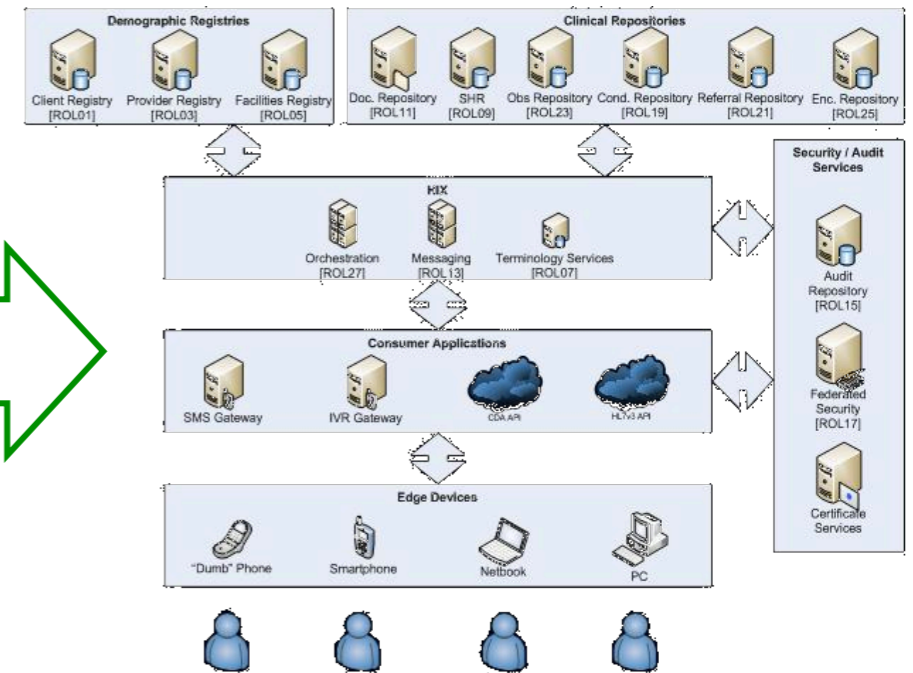
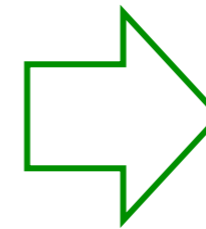
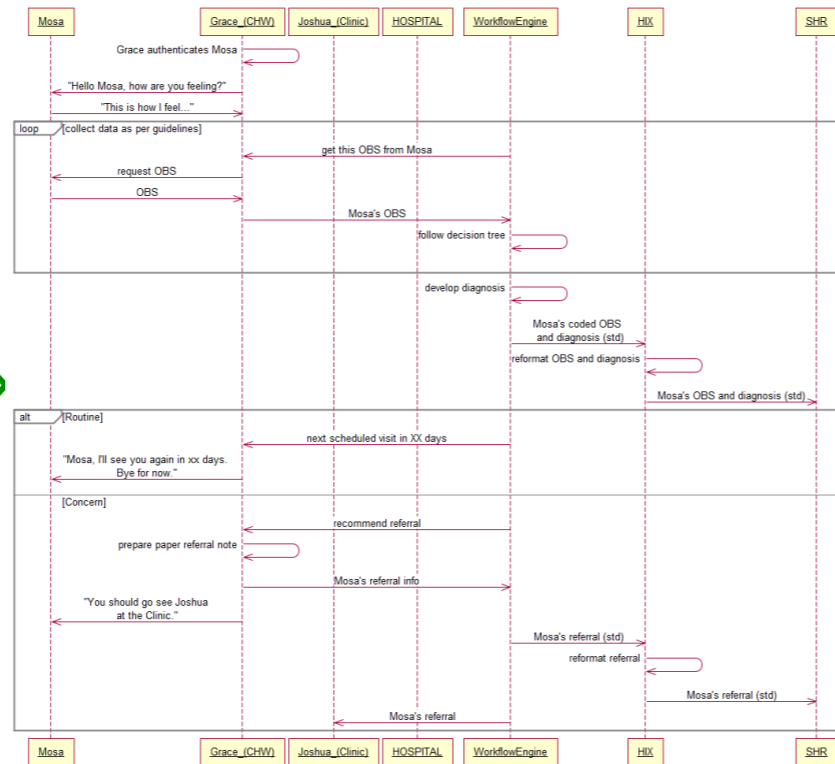
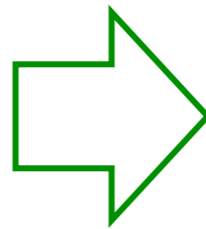
<http://xkcd.com/927/>

Leverage & extend artefacts from MNCH Framework & active projects



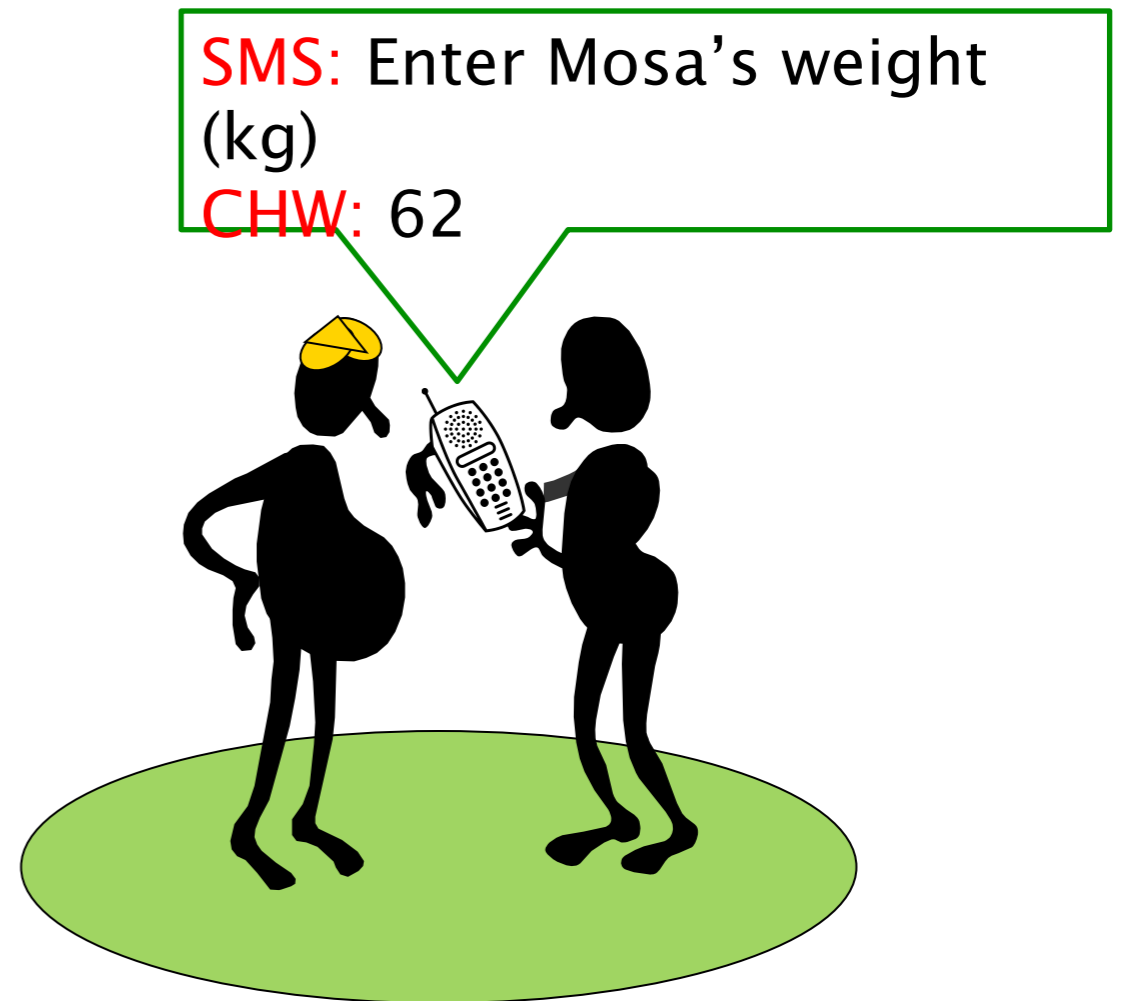
An example...

Use case story



Community-based Care Event

- Grace (CHW) and Mosa (client) begin a visit. Mosa's identity is authenticated.
- Grace follows care guidelines; she gathers information from Mosa
- Based on the readings, an evidence-based course of action is determined.
 - IF Mosa's condition requires it, she is referred to a clinic for follow-up
 - IF Mosa's condition is within care guidelines, Grace indicates when the "next scheduled appointment" will occur



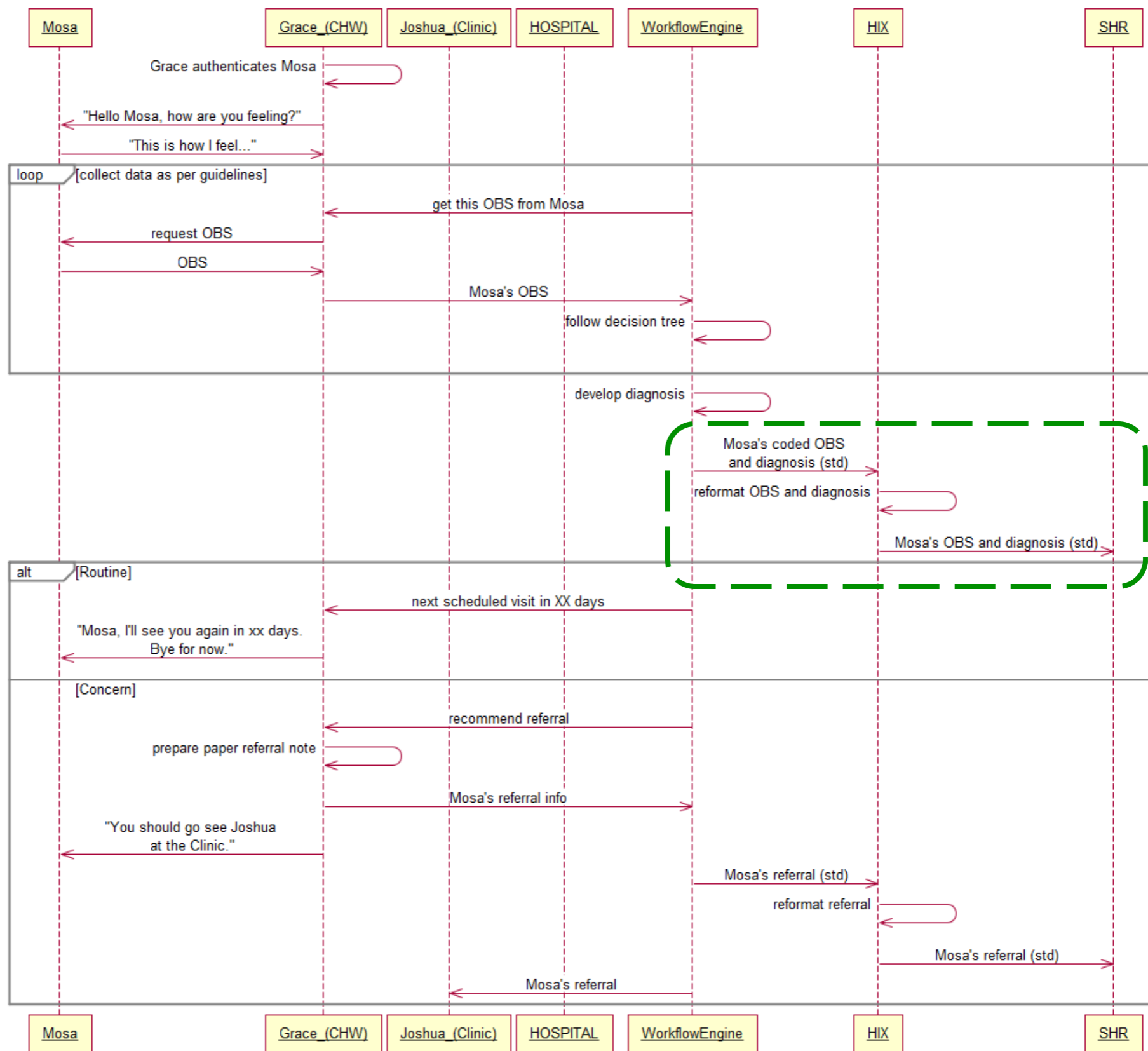
Begin visit

Gather info

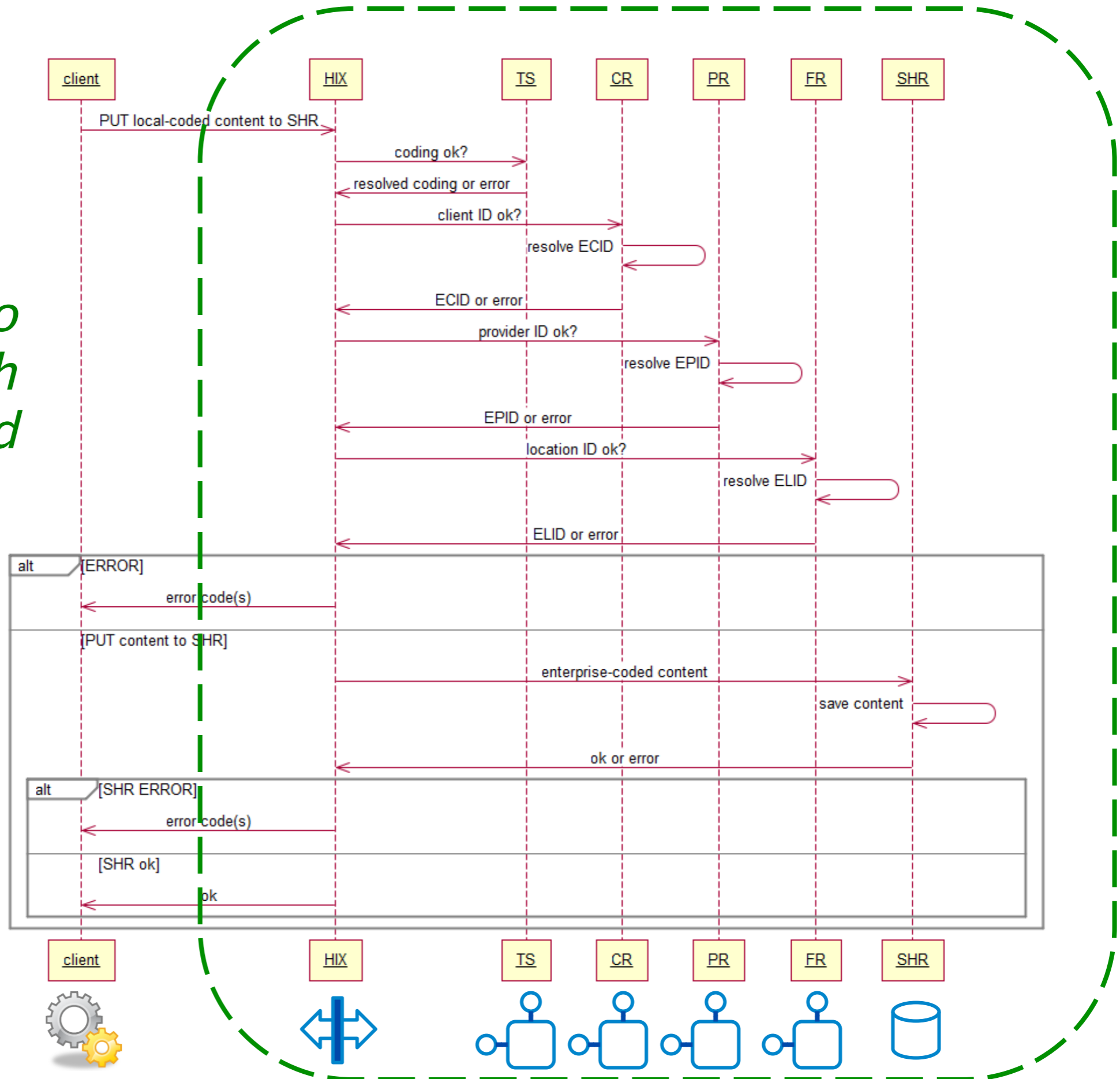
Evidence-based decision

Routine care

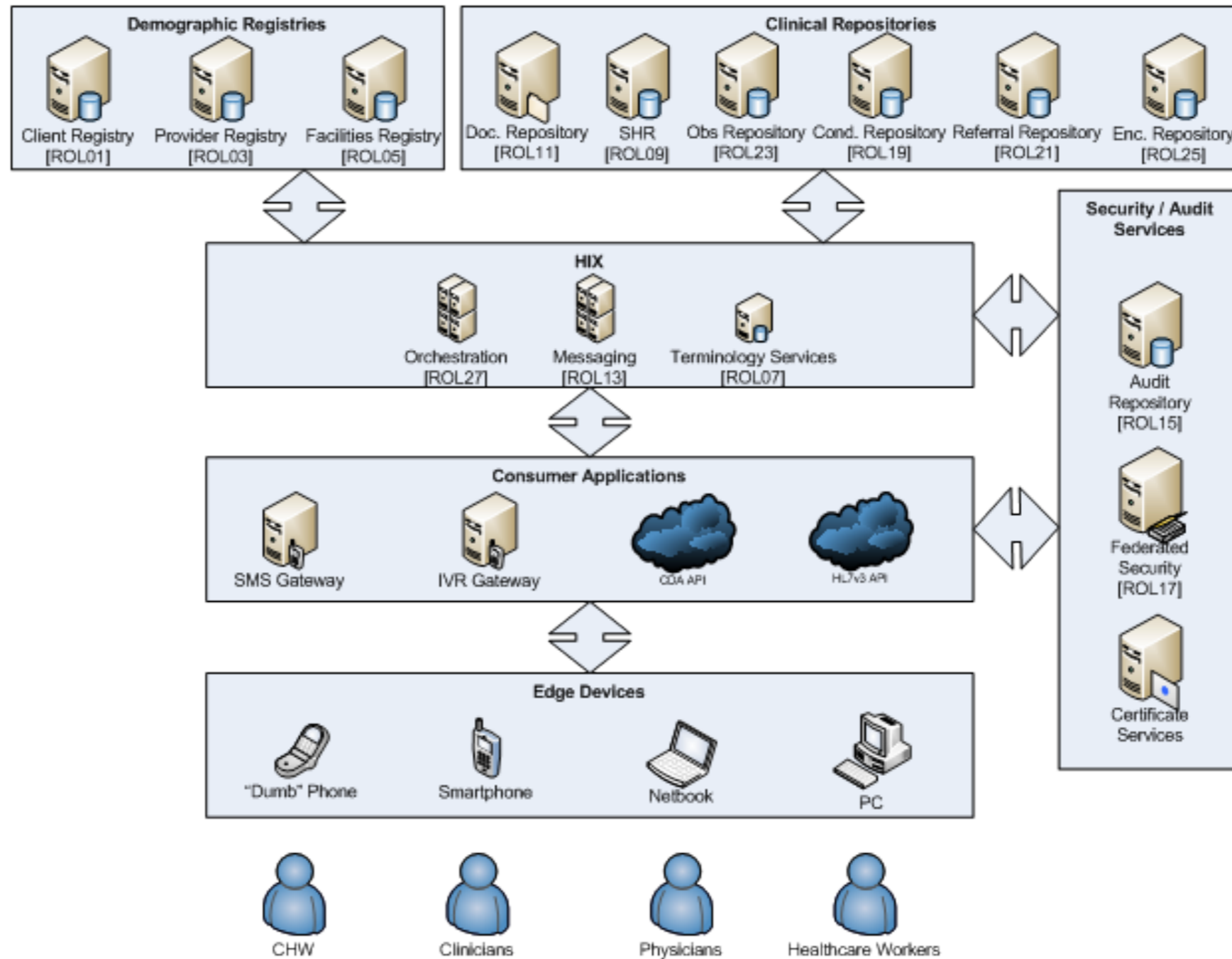
Referral



Save content to a shared health record



Engineering the architecture



Engineering the architecture



- Service roles are defined which are needed in order to realize the eHealth infrastructure
- Each role participates in one or more interactions
- The interactions are identified, analysed, and described



Roles

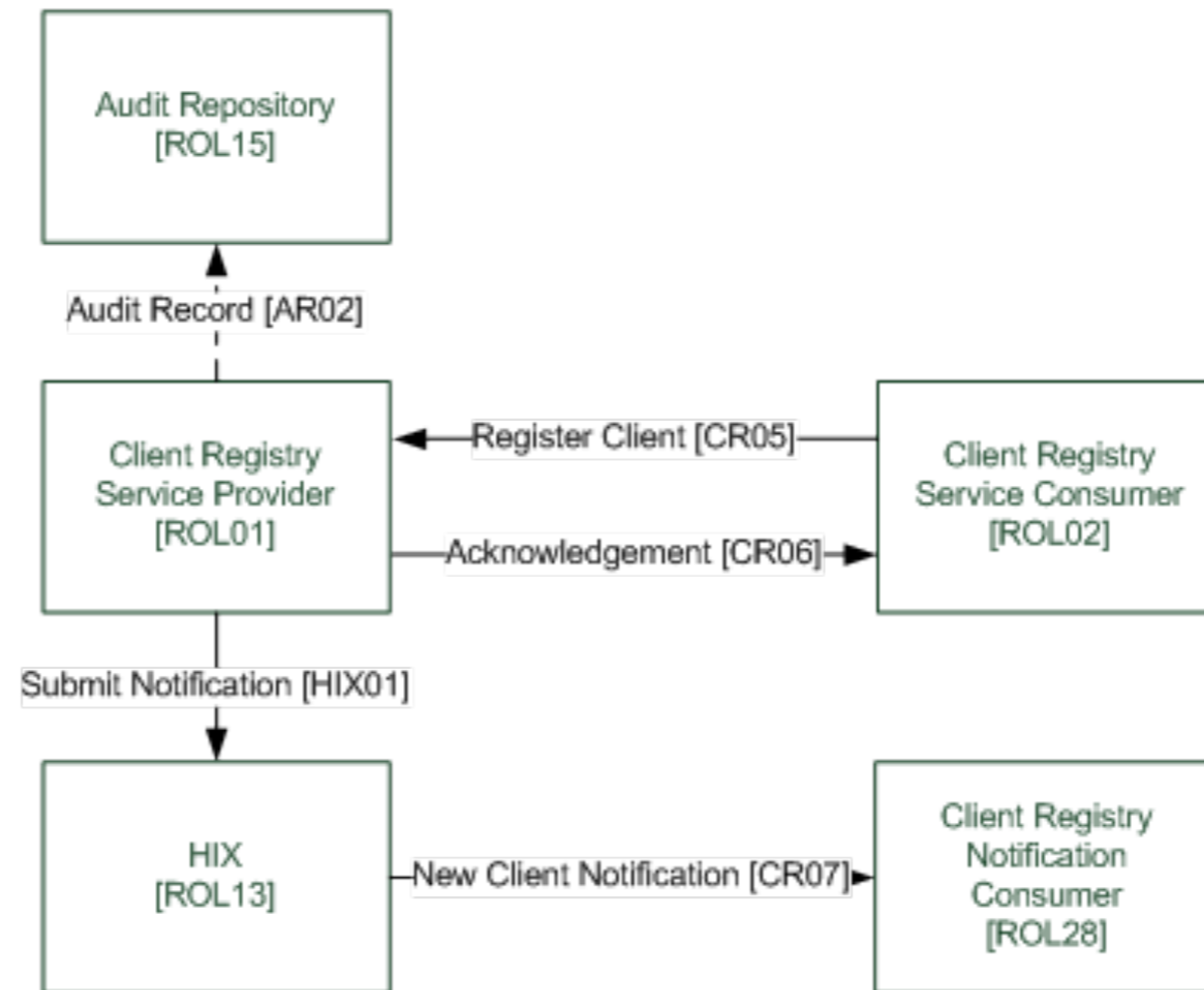


| Component Group | Contained Services | Description |
|---------------------------|---|--|
| Demographic Registries | Client Registry Provider Registry Facilities/Location Registry | The primary role of a demographic registry is the storage and matching of demographic information related to various entities that participate in healthcare events. |
| Clinical Repositories | Document Repository Shared Health Record Lab Repositories Imaging Repositories | Clinical repositories are responsible for the storage of data related to healthcare events. These repositories can be general purpose (such as a document repository) or targeted repositories for a specific purpose (HIV or TB programme repositories) |
| HIX | Orchestration | The HIX is responsible for the orchestrating and of integrating the jurisdictional registries and clinical repositories. It is recommended that all HIX functions be written against a canonical form. |
| Security / Audit Services | Audit Repository Federated Security System Certificate Services | The security and audit services are a set of federated services that are used by the HIX, Repositories and Registries, and Clients to facilitate enterprise authentication, and auditing. |
| Consumer Applications | SMS Gateways IVR Gateways Integration APIs / Toolkits | The term consumer application is used to refer to gateways, frameworks and APIs that will be used to integrate edge devices into the system. |
| Edge Devices | | Edge devices are the physical hardware devices that will be used by users to access consumer applications. |



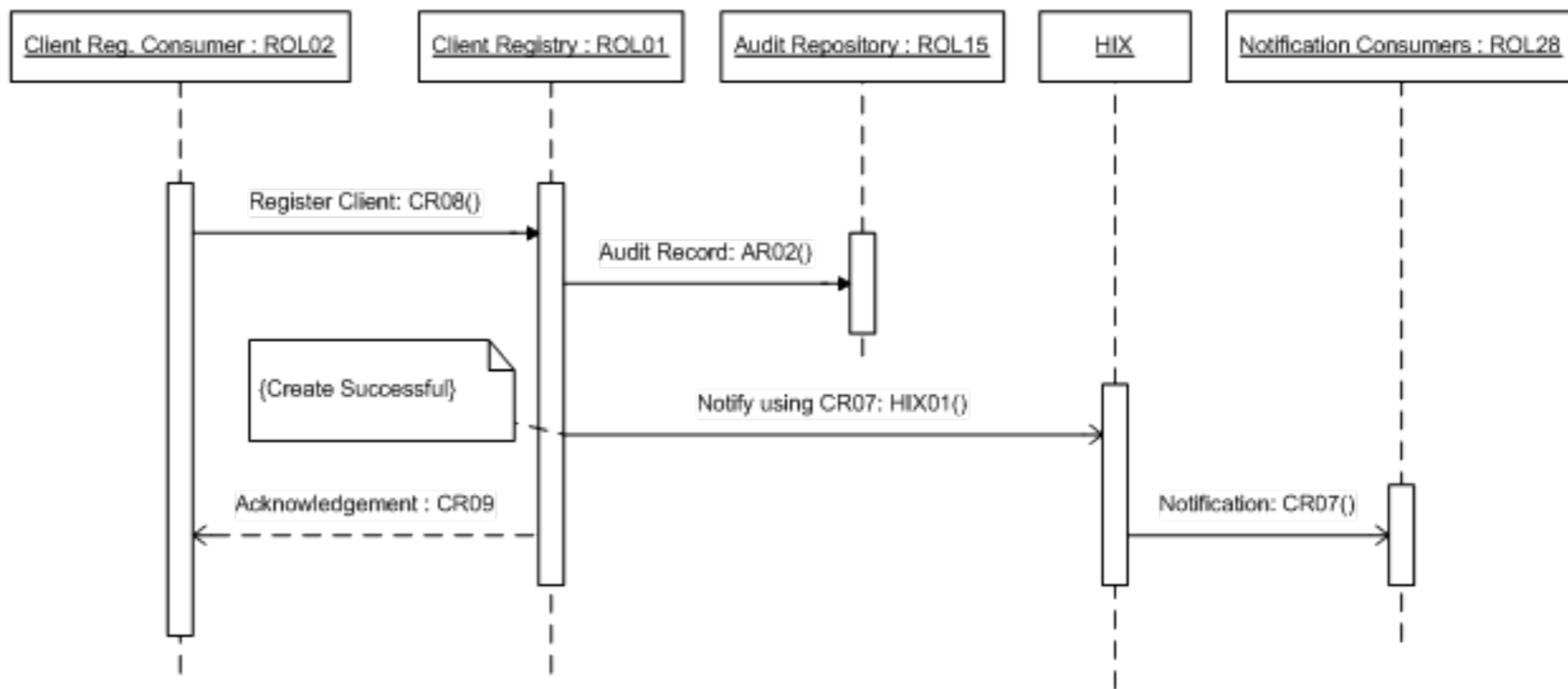
Invocation patterns

E.g. Register client [CR05] invocation pattern



Sequences

E.g. Register client [CR05] sequence



Candidate technology stacks were evaluated for each role

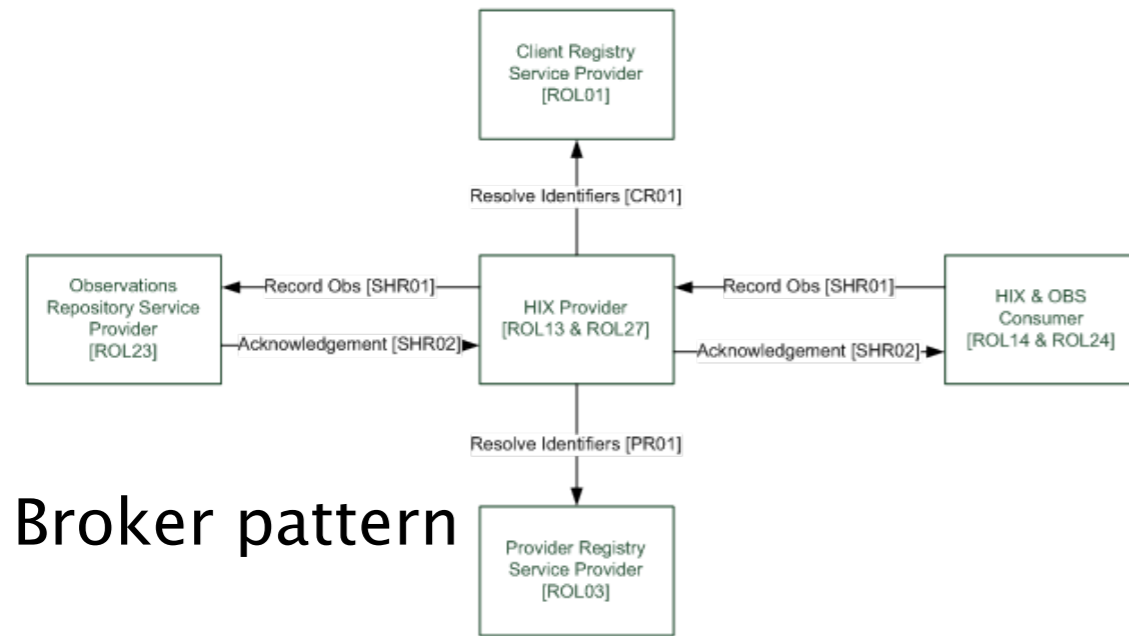


E.g. Client Registry Functional Support

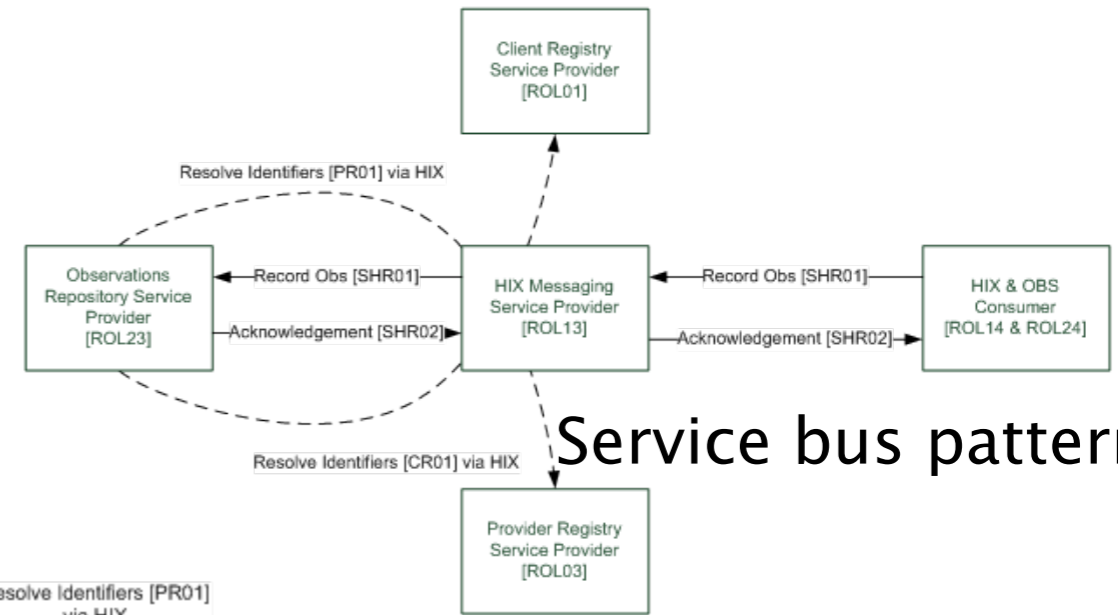
| | Mirth | OpenMRS | DM-MI | OpenEMPI | Mohawk CR |
|---|-------|---------|-------|----------|-----------|
| CR01 – Resolve Identifier | * | * | * | X | X |
| CR03 – Demographics Query | * | X | * | X | X |
| CR05 – Register Client | * | X | * | X | X |
| CR08 – Update Client | * | X | * | X | X |
| CR07 – New Client Notification | | | | X | |
| CR10 – Update Client Notification | | | | X | |
| AR01† – Audit Disclosure | X | X | ? | X | X |
| AR02† – Audit Record | ? | X | ? | X | X |
| † - The software package is able to invoke this functionality * - Only partial functionality could be identified ? – Functionality is not identified in documentation and could not be found in reference deployments | | | | | |



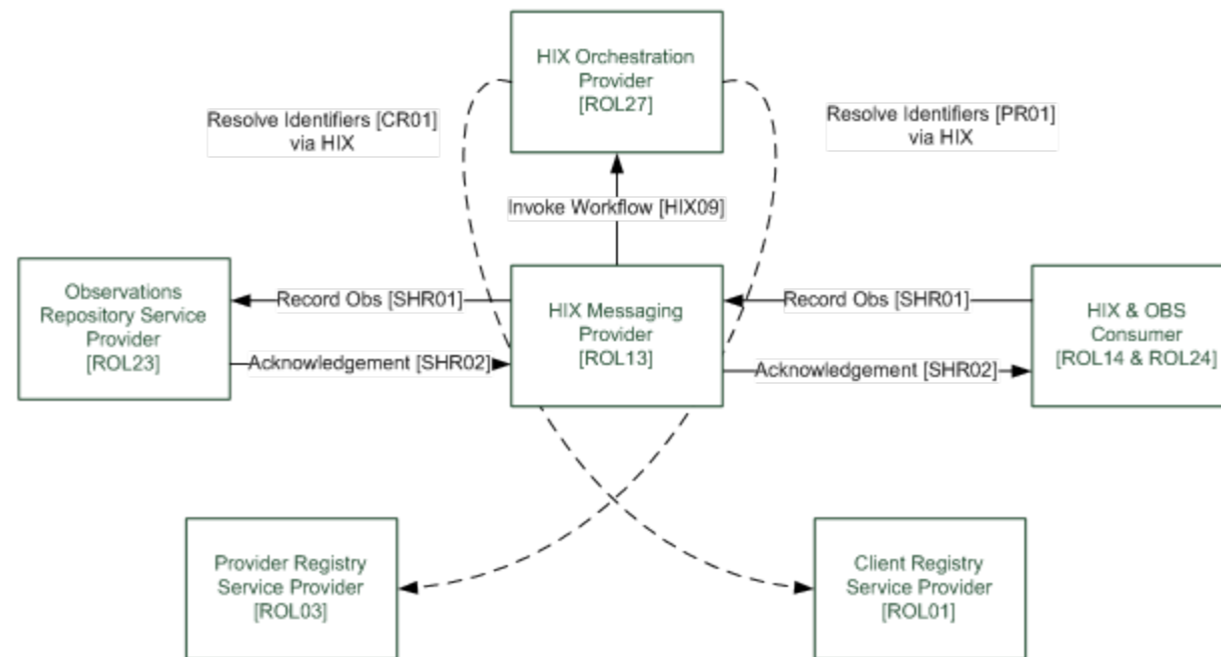
Alternate architectural patterns were modeled



Broker pattern



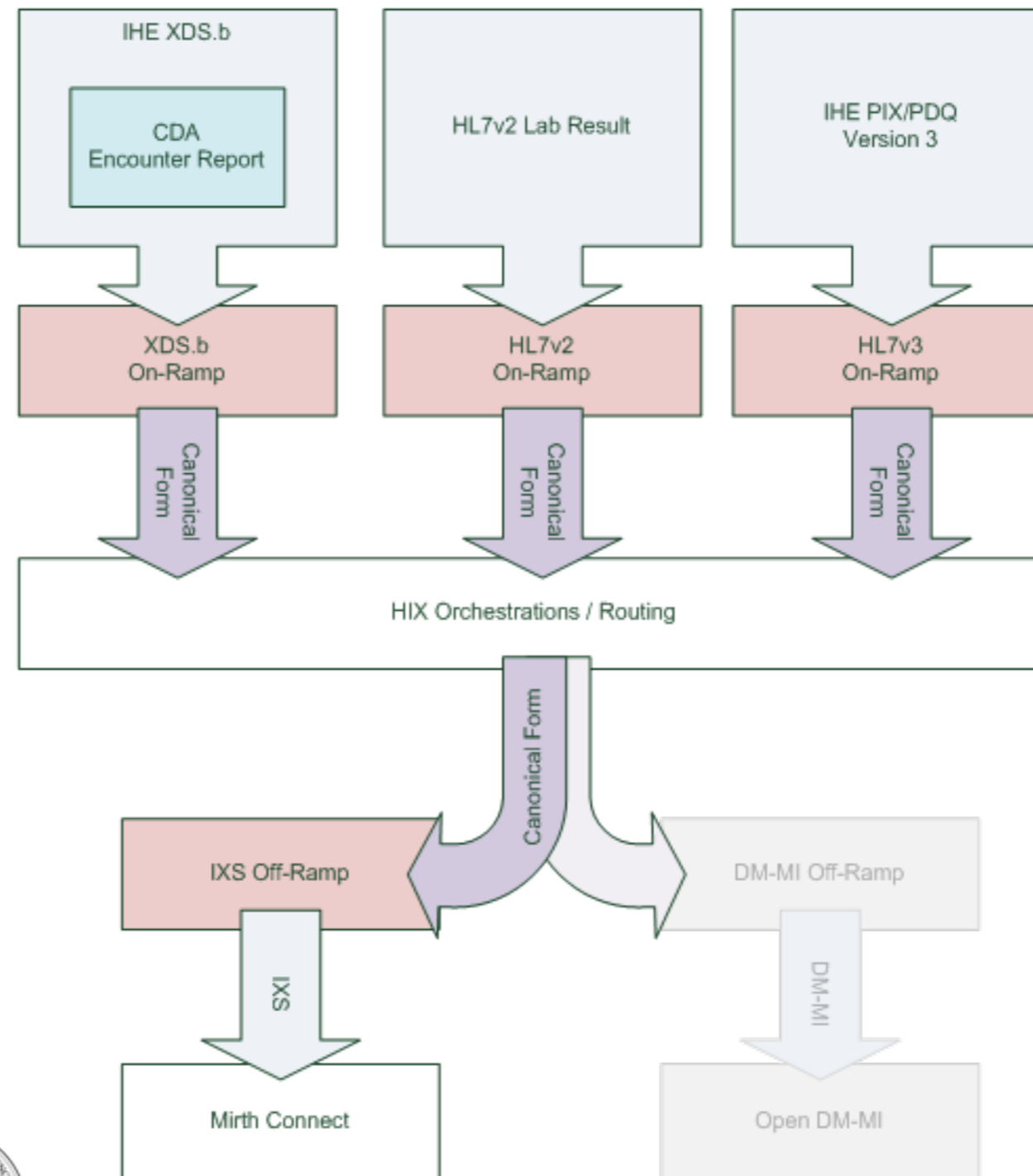
Service bus pattern



Hybrid pattern

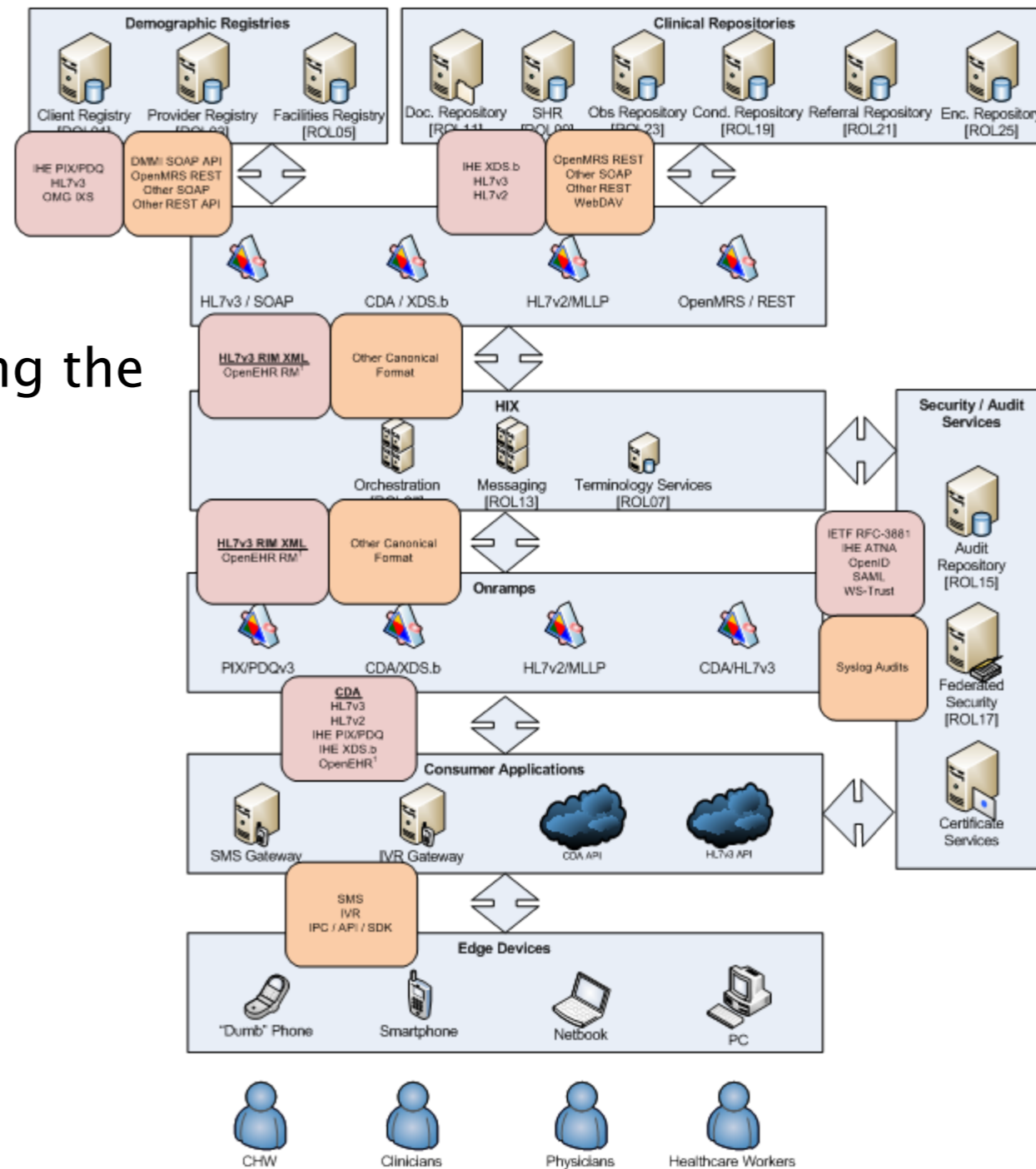
Communications patterns were explored

On/off ramp pattern using HL7 clinical document architecture (CDA)



Enterprise architectures were modeled

Service roles modeled using the on/off ramp pattern



Message sets were prototyped



PDQ request HL7v2

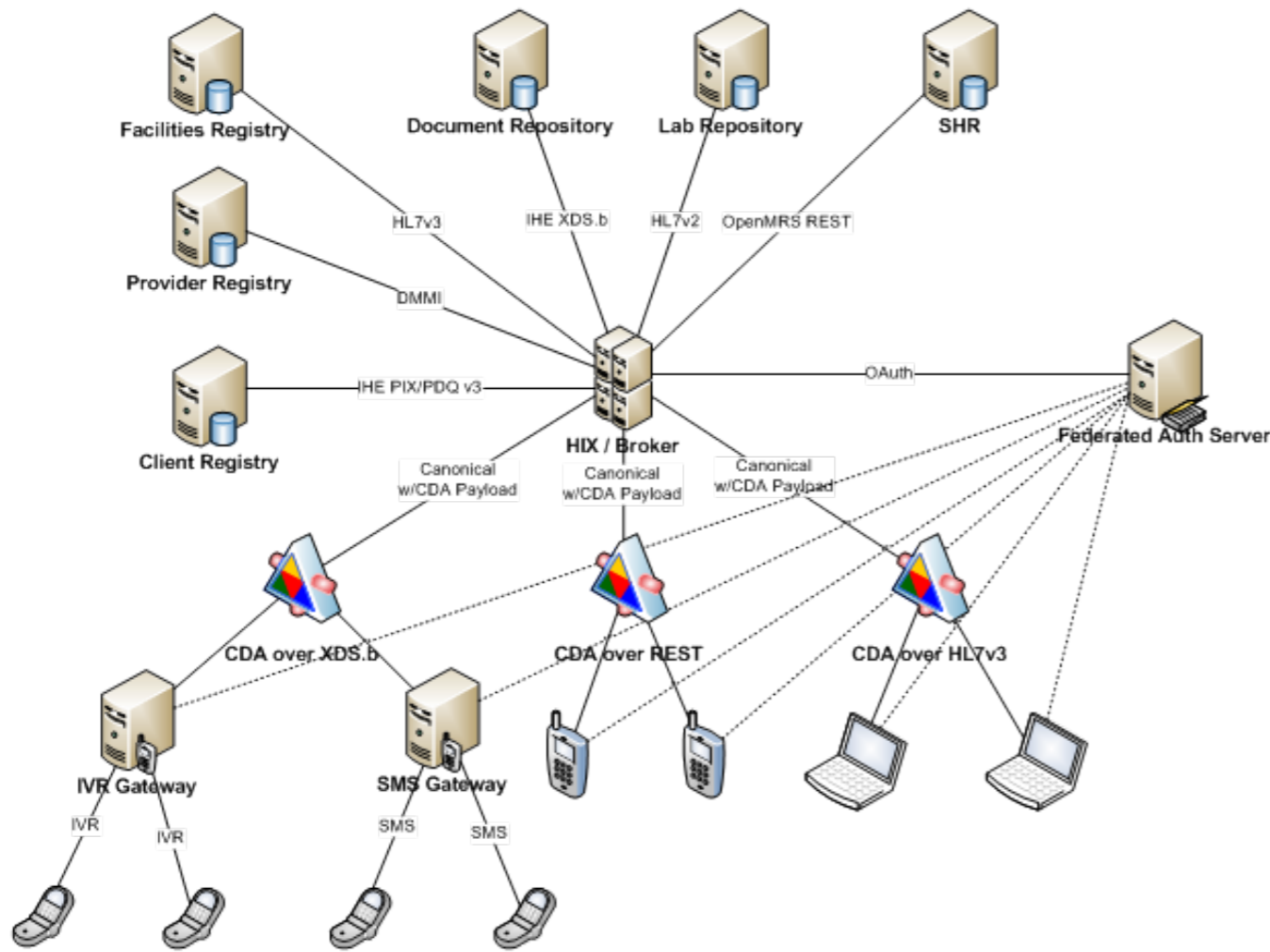
```
MSH|^~\&|OPENMRS_DEPLOYMENT|OPENMRS|PAT_IDENTITY_X_REF_MGR_MISYS|ALLSCRIPTS|2  
0111111144546||QBP^Q23^QBP_Q21|658598754|P|2.5|||||  
QPD|Q22^Find Candidates  
Example^HL7|Q2128|@PID.5.1.1^MUNTABE~@PID.5.1.2^MOSA~@PID.8.1^F  
RCP|I|10^RD
```

PDQ request HL7v3

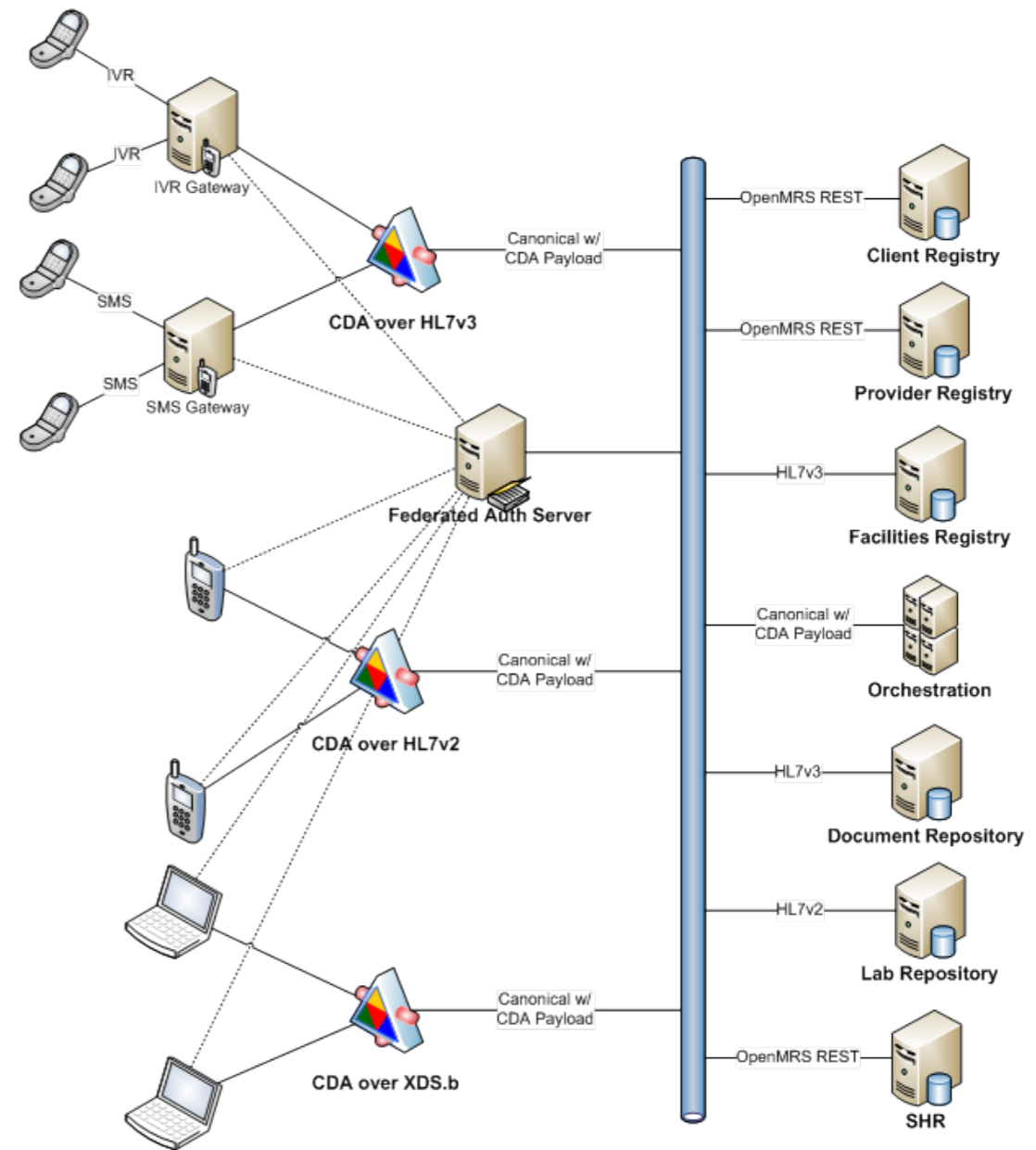
```
<PRPA_IN201305UV02 ITSVersion="XML_1.0" xmlns="urn:hl7-org:v3">  
  <id root="1.2.840.114350.1.13.0.1.7.1.1" extension="44506" />  
  . . .  
  <controlActProcess classCode="CACT">  
    <code code="PRPA_TE201305UV02" />  
    <queryByParameter>  
      <queryId root="1.2.840.114350.1.13.28.1.18.5.999" extension="18204" />  
      <statusCode code="new" />  
      <initialQuantity value="1" />  
      <matchCriterionList>  
        <minimumDegreeMatch>  
          <value xsi:type="INT" value="100" />  
          <semanticsText>Degree of match requested</semanticsText>  
        </minimumDegreeMatch>  
      </matchCriterionList>  
      <parameterList>  
        <livingSubjectAdministrativeGender>  
          <value code="F" codeSystem="2.16.840.1.113883.5.1" />  
          <semanticsText>LivingSubject.administrativeGender</semanticsText>  
        </livingSubjectAdministrativeGender>  
        <livingSubjectName>  
          <value use="L">  
            <given partType="GIV">Mosa</given>  
            <family partType="FAM">Muntabe</family>  
          </value>  
          <semanticsText>LivingSubject.name</semanticsText>  
        </livingSubjectName>  
      </parameterList>  
    </queryByParameter>  
  </controlActProcess>  
</PRPA_IN201305UV02>
```



Sample deployments were modeled



EAI Broker Design



Bus Design

Use case scenarios were modeled using the messages

```

<?xml version="1.0" encoding="UTF-8"?>
<ClinicalDocument xmlns="urn:h17-org:v3">
  . . .
  <id root="1.3.6.1.4.1.33349.3.1.2.2.3.2" extension="32587"
    assigningAuthorityName="Jurisdiction X Identifiers"/>
  <code code="34133-9" displayName="Summarizat
    codeSystem="2.16.840.1.113883.6.1" cod
  <title>CHW Encounter 2011-11-11</title>
  <effectiveTime value="20111110"/>
  <confidentialityCode/>
  <languageCode code="en-CA"/>
  <recordTarget>
    <patientRole>
      <id root="1.3.6.1.4.1.33349.3.1.2.1.0" extension="494825-231102-2022M"/>
      <addr nullFlavor="NI"/>
      </addr>
      <telecom value="+1 203 4958473"/>
      <patient>
        <name>
          <given>Mosa</given>
          <family>Muntabe</family>
        </name>
        <administrativeGenderCode code="F" codeSystem="2.16.840.1.113883.5.1"/>
        <time value="20111111"
      <assignedAuthor>
        <id root="1.3.6.1.4.1.33349.3.1.2.1.1" extension="0009"
          assigningAuthorityName="A Regional CHW Authority"/>
        <telecom value="+1 209 39485675"/>
        <assignedPerson>
          <name>
            <given>Grace</given>
            <family>Gillmont</family>
          </name>
        </assignedPerson>
        <representedOrganization>
          <name>A Regional CHW Authority</name>
        </representedOrganization>
      </assignedAuthor>
    </author>
    <custodian>
      <assignedCustodian>
        <representedCustodianOrganization>
          <id root="1.3.6.1.4.1.33349.3.1.2.1.2" extension="109345"/>
          <name>ChildCount+ Gateway</name>
        </representedCustodianOrganization>
      </assignedCustodian>
    </custodian>
    <component>
      <structuredBody>
        <component>
          <section>
            <code code="8716-3" codeSystemName="LOINC"
              codeSystem="2.16.840.1.113883.6.1" displayName="Vital signs"/>
            <title>Vital Signs</title>
            . . .
            <entry typeCode="DRIV">
              <organizer classCode="CLUSTER" moodCode="EVN">
                <id root="d11275e0-67ae-11db-bd13-0800200c9a66"/>
  
```

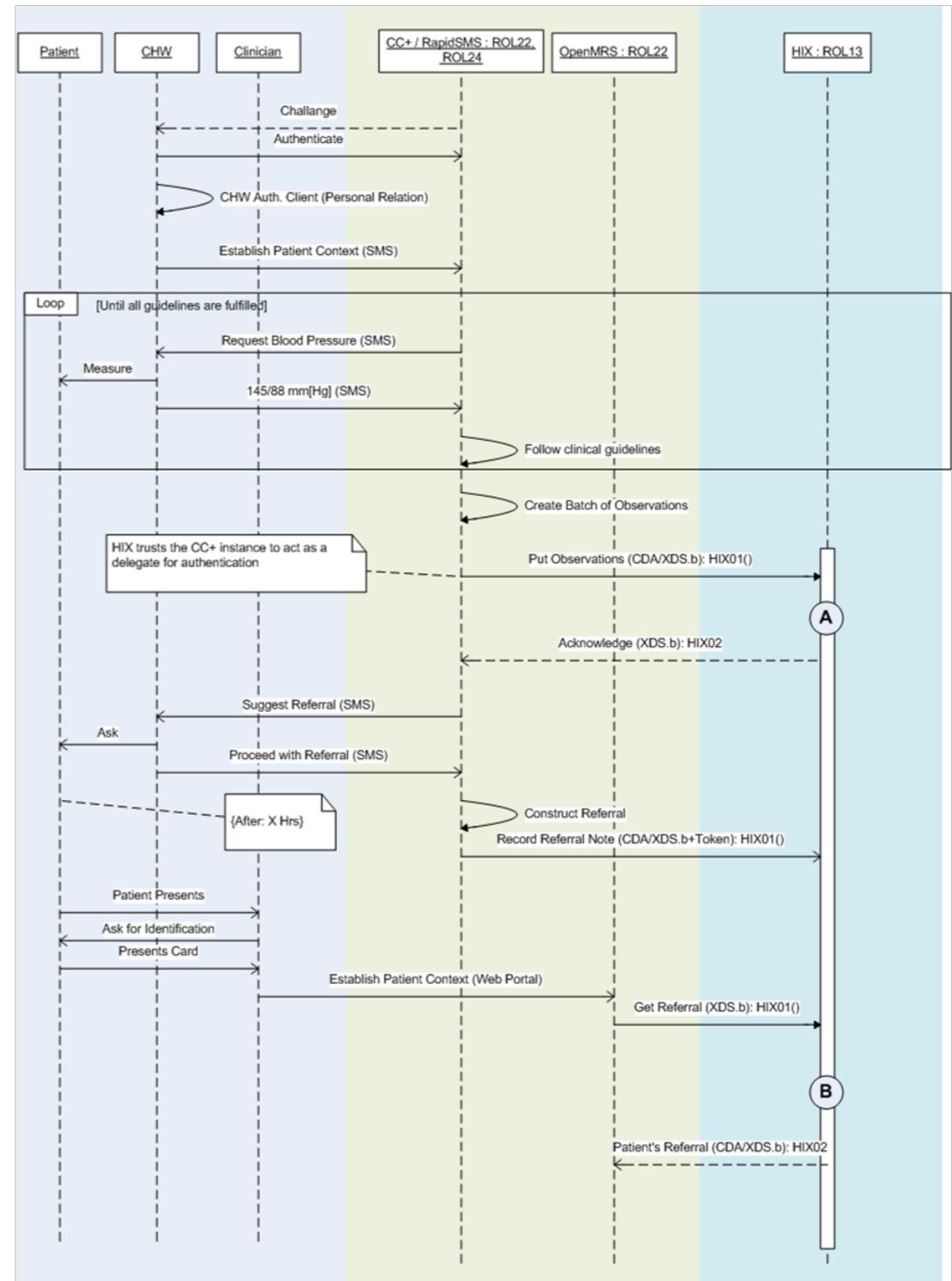
Client's National Health ID Card (root) Number (extension)

Demographic data is included for validation (Are we talking about the same person?)

CHW's Local (ChildCount+) and National CHW Registration ID

Demographic data included to validate we're talking about the same person.

The type of observation being made



A recommended spec was arrived at...



- The engineering analysis looked at a number of scenarios and weighed pros and cons of each
- Depending on the implementation constraints, certain options will be favoured
- A flexible candidate message structure (HL7 CDA) was found which meets the criteria set for it
- A number of open source software tools and applications are able to be leveraged to deploy a working infrastructure consistent with the recommended specifications



Next...

- Transparently engage with stakeholders and peer reviewers on HUB
- Evolve the design
 - Improve and extend the specification
 - Prototype working versions
 - Field test
 - Feedback lessons we learn



Thank you!



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