FHIR OCH INTEROPERABILITET I SJUKVÅRDEN

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FHIR OCH INTEROPERABILITET I SJUKVÅRDEN

- Semantisk interoperabilitet
- Bakgrund
- Dagens standarder
- FHIR och framtidens smarta plattformar för vården

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SEMANTISK INTEROPERABILITET INOM HÄLSO- OCH SJUKVÅRD

Semantisk interoperabilitet handlar om hur man bäst kodar, överför och använder… inte data utan information och kunskap
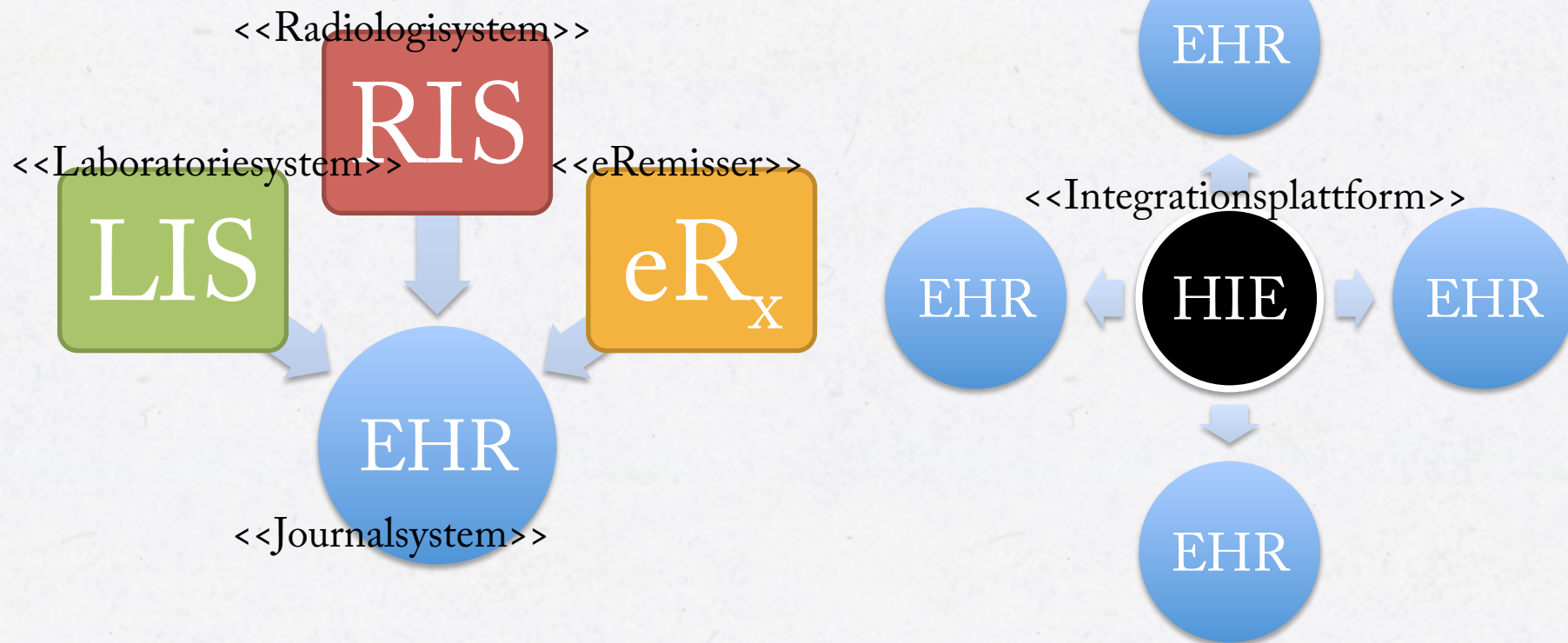
- Från medborgare/patienter, medicinsk vetenskap och andra kunskapskällor
- Mellan språkmässigt och kulturells skilda professioner, patienter, myndigheter och andra aktörer
- Över system- och organisationsgränser.

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INTEROPERABILITET I SVENSK SJUKVÅRD, SNABBVERSIONEN

- 1980-2000 sker en datorisering av vården
- 2001 använder hälften av alla läkare ett elektroniskt journalsystem och idag är siffran ca 99%
- Sedan 2004 pågår arbete med nationell infrastruktur för att få informationen att följa patienten mellan vårdgivare och över systemgränser

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FAST INFORMATIONSFÖRSÖRJNINGEN ÄR LITE MER KOMPLEX ÄN SÅ...

Andra vårdgivare

Forskning

Vårdgivare

Myndigheter

Kvalitets-uppföljning

Patienter/medborgare

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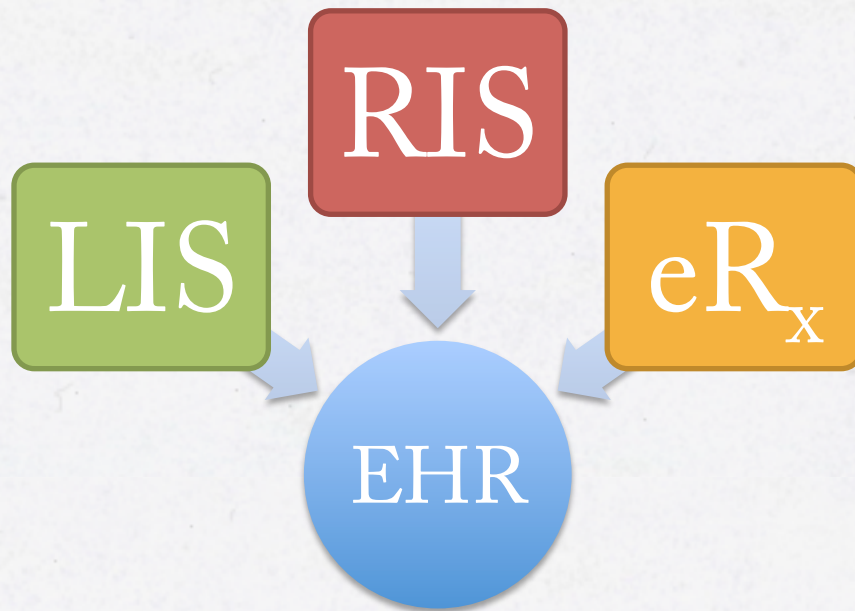— ENTERPRISE —

HL7

- Står för Health Level Seven
- Amerikansk icke-vinstdrivande standardiseringsorganisation
- HL7 v2 – standardiserade meddelanden för specifika användningsfall, datatyper
- HL7 v3 – xml, referensmodell, domänmodeller
- CDA – Clinical Document Architecture, del av v3, standard för dokument, header och strukturerad eller ostrukturerad data

STANDARDER I HÄLSO- OCH SJUKVÅRD

1987 → HL7 v2.x

HL7 v 3

CDA

meddelandeformat

FHIR →2016

transport/
infrastruktur

ebXML

IHE iti → årlig uppdatering

openEHR

13606

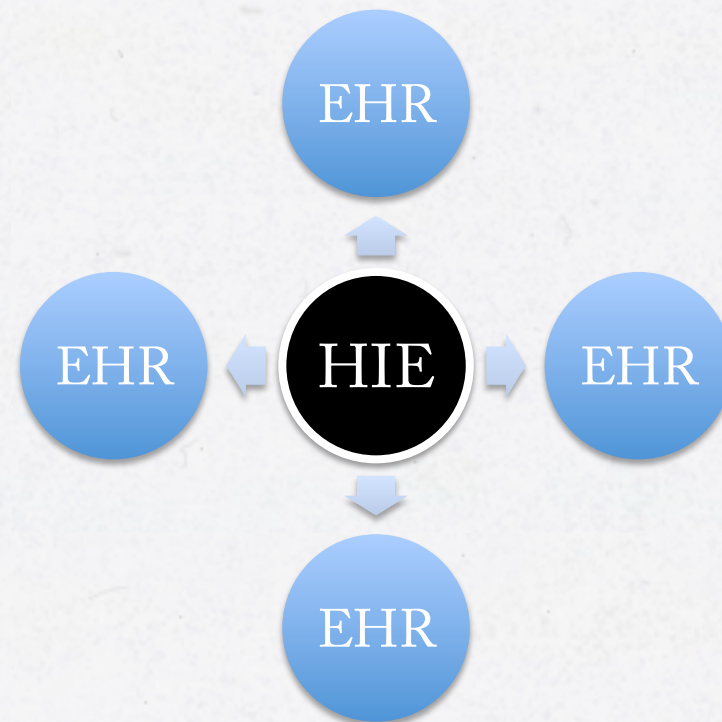1996   19982000   20022004   2006   20082010   2012

RIS

LIS

eR$_x$

EHR
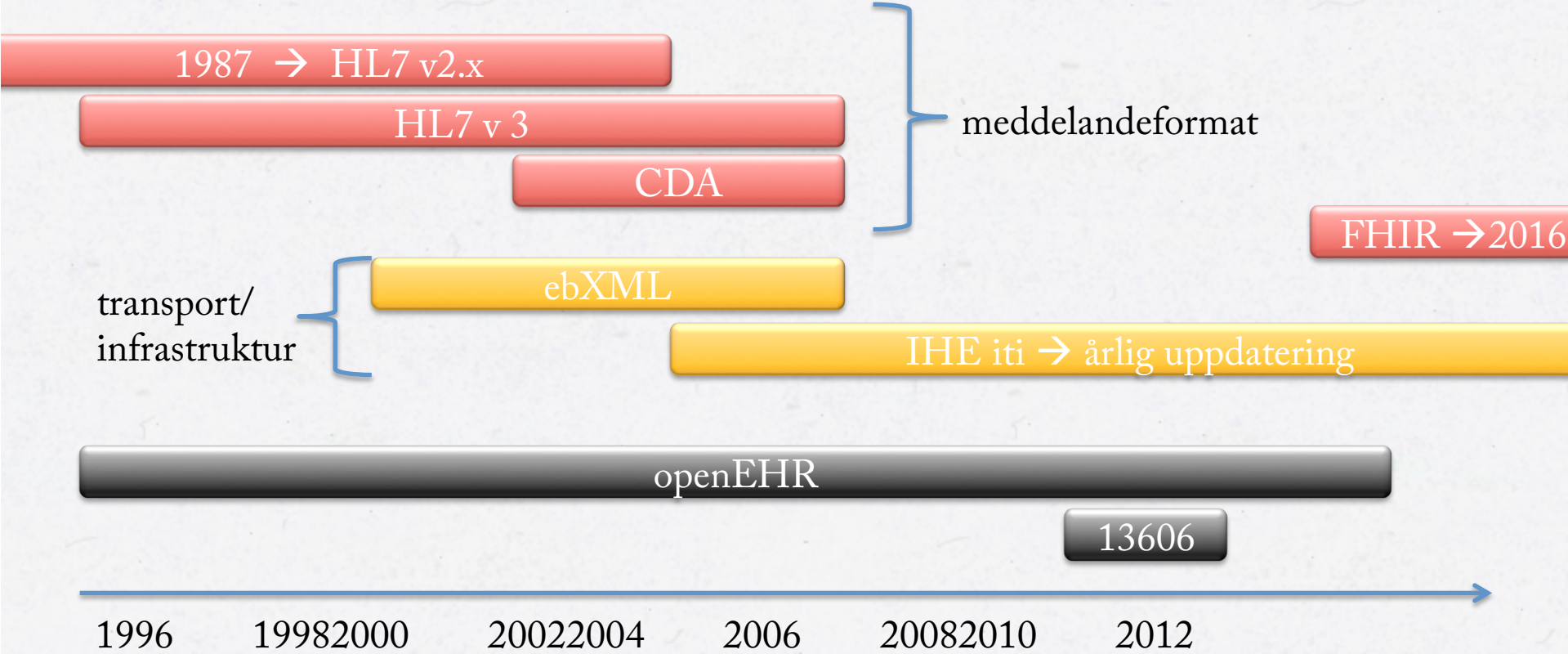
- Bra inom en organisation
- Ett hundratal användningsfall stödjs
- Skalar ej för interorganisatoriskt utbyte
- (För) stor valfrihet
- Saknar gemensam modell/ terminologi

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EXEMPEL HL7 V2

```
MSH|^~\&|MyHospital|MyHospital^543876^CMS|LocalPharmacy|||ORM^O01^RDO_O01|00015|P|2.3.1
PID|||1234321^^^MyHospital^MR||Able^Michael^D^^^^LAL1|1|DA|^Penicillin
ORC|NW|0889475^MyHospital|||||20011001084135|A99887^Gilbert^Mary^^^^^MyHospital||1234567^Welby^M^J^Jr^Dr^^MyHospital|ER
RXO|1^Once|0026-8562^CiprofloxicinInj^NDC|200||mg^milligram^ISO+|^Injection …
RXR|IV^Intravenous^HL70162
```

HL7 V3, CDA

- Pappersanalogi – dokumentbaserat, mänskligt läsbart, titel och rubriker
- Passar metodiken för många till många-kontrakt, stor valfrihet.
- Stor overhead, ej fingranulärt
- All verksamhetslogik i specen
- Implicit SOAP
  - Version 1 tar tid
  - Svårt att versionera
  - Krångligt bygga workflow

```xml
<substanceAdministration classCode='SBADM' moodCode='INT|EVN'>
  <templateId root='2.16.840.1.113883.10.20.1.24'/>
  <templateId root='1.3.6.1.4.1.19376.1.5.3.1.4.7'/>
  <templateId root=''/>
  <id root='' extension=''/>
  <code code='' codeSystem='' displayName='' codeSystemName=''/>
  <text><reference value='#med-1'/></text>
  <statusCode code='completed'/>
  <effectiveTime xsi:type='IVL_TS'>
      <low value=''/>
      <high value=''/>
  </effectiveTime>
  <effectiveTime operator='A' xsi:type='TS|PIVL_TS|EIVL_TS|PIVL_PPD_TS|SXPR_TS'>
      :
  </effectiveTime>
  <routeCode code='' codeSystem='' displayName='' codeSystemName=''/>
  <doseQuantity value='' unit=''/>
  <approachSiteCode code='' codeSystem='' displayName='' codeSystemName=''/>
  <rateQuantity value='' unit=''/>
  <consumable>
      :
      .
  </consumable>
  <!-- 0..* entries describing the components -->
  <entryRelationship typeCode='COMP' >
      <sequenceNumber value=''/>
  </entryRelationship>
  <!-- An optional entry relationship that indicates the the reason for use -->
  <entryRelationship typeCode='RSON'>
    <act classCode='ACT' moodCode='EVN'>
      <templateId root='1.3.6.1.4.1.19376.1.5.3.1.4.4.1'/>
      <id root='' extension=''/>
    </act>
  </entryRelationship>
  <!-- An optional entry relationship that provides prescription activity -->
  <entryRelationship typeCode='REFR'>
    <templateId root='1.3.6.1.4.1.19376.1.5.3.1.4.7.3'/>
      :
      .
  </entryRelationship>
  <precondition>
    <criterion>
      <text><reference value=''></text>
    </criterion>
  </precondition>
</substanceAdministation>
```
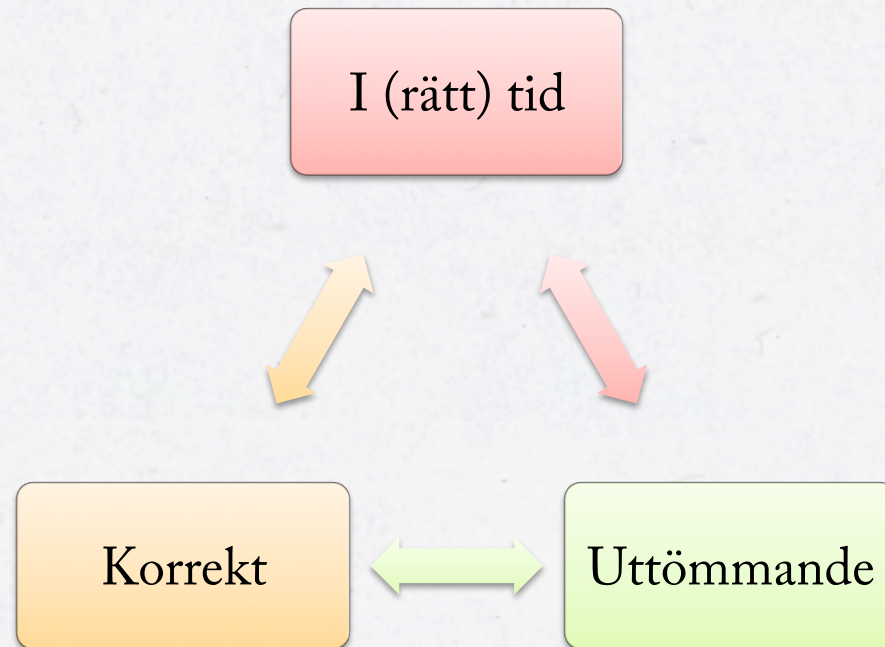
```xml
teId root='2.16.840.1.113883.10.20.1.8'/>
teId root='1.3.6.1.4.1.19376.1.5.3.1.3.19'/>
t=' ' extension=' '/>
ode='10160-0' displayName='HISTORY OF MEDICATION USE'
ystem='2.16.840.1.113883.6.1' codeSystemName='LOINC'/>

as described above


Required Medications element -->
mplateId root='1.3.6.1.4.1.19376.1.5.3.1.4.7'/>
>


>
>
```

STANDARDISERINGENS DILEMMA

- En standard kan bara vara två av tre:

I (rätt) tid

Korrekt

Uttömmande

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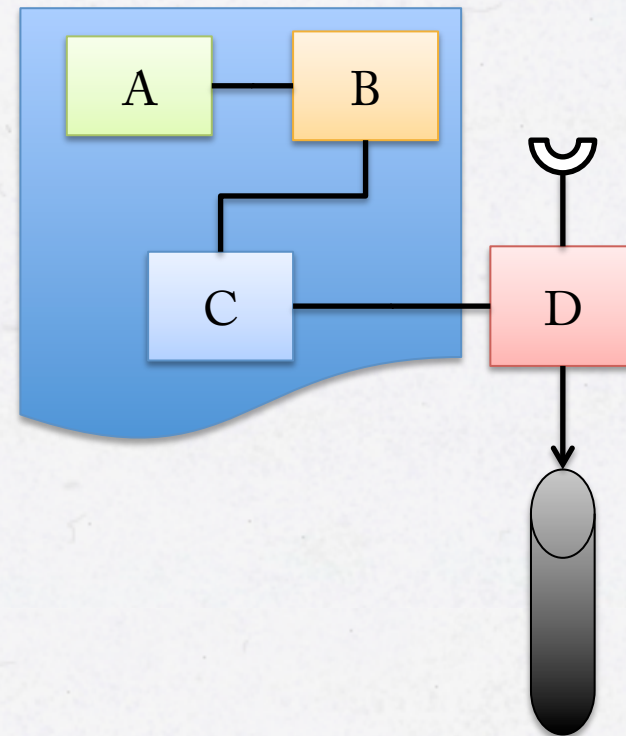
FHIR

Fast Healthcare Interoperability Resources
- "Recept" på API:er att tillhandahålla istället för specar på dokument att producera.
- Första HL7 standard under öppen licens
- REST
  - XML och JSON
  - Oauth
  - Atom-liknande stöd för prenumeration
- Både infrastruktur och kliniska data
- Förenar det intraorganisatoriska med det interorganisatoriska
- Mobilvänligt, utvecklarvänligt

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EXEMPEL FHIR

```xml
<?xml version="1.0" encoding="UTF-8"?>
<MedicationAdministration xmlns="http://hl7.org/fhir">
    <identifier> http://myapplication.com/medicationAdministration/1 </identifier>
    <status value="inProgress"/>
    <patient> http://myapplication.com/patient/7 </patient>
    <practitioner> http://myapplication.com/practitioner/1234 </practitioner>
    <encounter> http://myapplication.com/encounter/4734982359 </encounter>
    <prescription> http://myapplication.com/prescription/23092509725 </prescription>
    <whenGiven>201401010</whenGiven>
    <medication> http://myapplication.com/medication/24095092 </medication>
    <device> http://myapplication.com/device/2 </device>
    <dosage>  <!-- 0..* Medicine administration instructions to the patient/carer -->
        <timing[x]><!-- 0..1 dateTime|Period When dose(s) were given --></timing[x]>
          <asNeeded[x]><!-- 0..1 boolean|CodeableConcept Take "as needed" f(or x) --></asNeeded[x]>
            <site><!-- 0..1 CodeableConcept Body site administered to --></site>
            <route><!-- 0..1 CodeableConcept Path of substance into body --></route>
            <method><!-- 0..1 CodeableConcept How drug was administered --></method>
            <quantity><!-- 0..1 Quantity Amount administered in one dose --></quantity>
            <rate><!-- 0..1 Ratio Dose quantity per unit of time --></rate>
            <maxDosePerPeriod><!-- 0..1 Ratio Total dose that was consumed per unit of time --></maxDosePerPeriod>
    </dosage>
</MedicationAdministration>
```
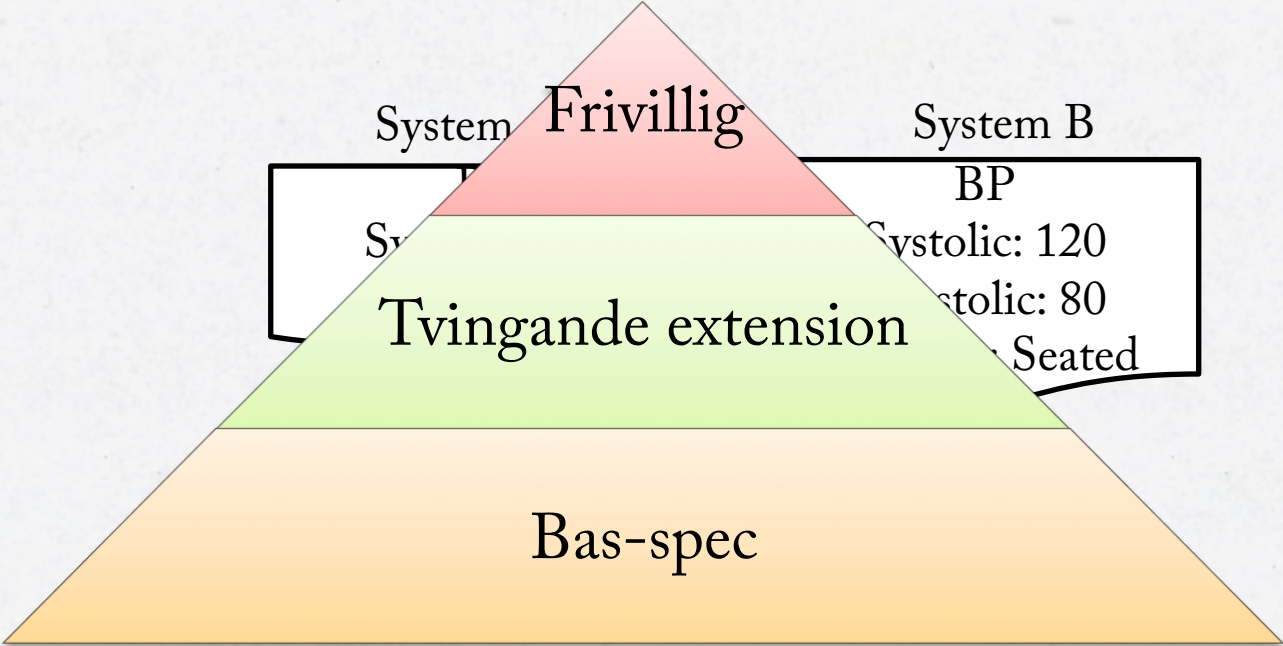
STÖDJER FLERA ARKITEKTORIELLA STILAR

- REST

- Document

- Message

- Service

FHIR SPECAS MED EN 80/20 REGEL

Frivillig

System A
System B
BP
Systolic: 120
Diastolic: 80
Seated

Tvingande extension

Bas-spec

EXTENSIONS

Exempel: Norska mellannamn

```xml
<name>
  <use value="official" />
  <family value="Fiskars" />
  <given value="Minna" />
  <given value="Prästkulla">
    <extension url="http://hl7.org/fhir/Profile/
iso-21090#name-qualifier" >
      <valueCode value="MID" />
    </extension>
  </given>
</name>

<name>
<templateId root='1.3.6.1.4.1.19376.1.5.3.1.4.7.3'/>
…
```

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OAUTH

- OAuth + OpenID
- Autenticera användare
- Sätta användar- och patientkontext

DEMO

https://apps.fhir.me/#/ui/select-patient

http://sandbox.smartplatforms.org/

Tack!

Frågor?

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SMART FHIR Starter

SMART on FHIR (fhir.me)
Health Intersections Server (Grahame)
✓ Furore Server (Ewout)
Local FHIR dev server
Local FHIR Tomcat server

```
 "name": "Furore Server (Ewout)",
 "serviceUrl": "http://spark.furore.com/fhir",
 "auth": {
  "type": "none"
 }
}
```

Save settings   Cancel

Connect to api.fhir.me via OAuth2

<feed xmlns="http://www.w3.org/2005/Atom"><title type="text">Search on resources in collection 'Patient'</title><id>urn:uuid:c5e57cff-d35a-45cf-9405-5c14a77d8e7c</id><updated>2015-01-14T11:34:27.6446311Z</updated><author><name>Furore Spark FHIR server</name><uri>http://fhir.furore.com</uri></author><totalResults xmlns="http://a9.com/-/spec/opensearch/1.1/">502</totalResults><link rel="self" href="http://spark.furore.com/fhir/_snapshot?id=7e66cec4-5ef2-41b6-90a6-d93765d257e3&start=0&_count=20" /><link rel="first" href="http://spark.furore.com/fhir/_snapshot?id=7e66cec4-5ef2-41b6-90a6-d93765d257e3&start=0" /><link rel="last" href="http://spark.furore.com/fhir/_snapshot?id=7e66cec4-5ef2-41b6-90a6-d93765d257e3&start=500" /><link rel="next" href="http://spark.furore.com/fhir/_snapshot?id=7e66cec4-5ef2-41b6-90a6-d93765d257e3&start=20" /><link rel="fhir-base" href="http://spark.furore.com/fhir" /><entry><title type="text">Patient with id xds</title><id>http://spark.furore.com/fhir/Patient/xds</id><updated>2014-12-24T08:15:17.771Z</updated><published>1601-01-01T00:00:00Z</published><author><name>(imported from file)</name></author><link rel="alternate" href="http://hl7.org/fhir/Patient/xds" /><link rel="self" href="http://spark.furore.com/fhir/Patient/xds/_history/spark12" /><content type="text/xml"><Patient xmlns="http://hl7.org/fhir"><text><status value="generated" /><div xmlns="http://www.w3.org/1999/xhtml"><p>Patient John Doe, M, 27-May 1956. ID: 89765a87b</p></div></text><identifier><use value="usual" /><label value="MRN" /><system value="urn:oid:1.2.3.4.5" /><value value="89765a87b" /></identifier><name><family value="Doe" /><given value="John" /></name><gender><coding><system value="v3/AdministrativeGender" /><code value="M" /></coding></gender><birthDate value="1956-05-27" /><address><line value="100 Main St" /><city value="Metropolis" /><state value="Il" /><zip value="44130" /><country value="USA" /></address><managingOrganization><reference value="Organization/2" /></managingOrganization><active value="true" /></Patient></content><summary type="xhtml"><div xmlns="http://www.w3.org/1999/xhtml"><p>Patient John Doe, M, 27-May 1956. ID: 89765a87b</p></div></summary></entry><entry><title type="text">Patient with id ihe-pcd</title><id>http://spark.furore.com/fhir/Patient/ihe-pcd</id><updated>2014-12-24T08:15:17.77Z</updated><published>1601-01-01T00:00:00Z</published><author><name>(imported from file)</name></author><link rel="alternate" href="http://hl7.org/fhir/Patient/ihe-pcd" /><link rel="self" href="http://spark.furore.com/fhir/Patient/ihe-pcd/_history/spark9" /><content type="text/xml"><Patient xmlns="http://hl7.org/fhir"><text><status value="generated" /><div xmlns="http://www.w3.org/1999/xhtml">Albert Brooks, Id: AB60001</div></text><identifier><label value="Internal Identifier" /><value value="AB60001" /></identifier><name><family value="BROOKS" /><given value="ALBERT" /></name><active value="true" /></Patient></content><summary type="xhtml"><div xmlns="http://www.w3.org/1999/xhtml">Albert Brooks, Id: AB60001</div></summary></entry><entry><title type="text">Patient with id us01</title><id>http://spark.furore.com/fhir/Patient/us01</id><updated>2014-12-24T08:15:17.77Z</updated><published>1601-01-01T00:00:00Z</published><author><name>(imported from file)</name></author><link rel="alternate" href="http://hl7.org/fhir/Patient/us01" /><link rel="self" href="http://spark.furore.com/fhir/Patient/us01/_history/spark10" /><content type="text/xml"><Patient xmlns="http://hl7.org/fhir"><extension url="http://hl7.org/fhir/Profile/us-core#race"><valueCodeableConcept><coding><system value="v3/Race" /><code value="1096-7" /></coding></valueCodeableConcept></extension><extension url="http://hl7.org/fhir/Profile/us-core#ethnicity"><valueCodeableConcept><coding><system value="v3/Ethnicity" /><code value="2162-6" /></coding></valueCodeableConcept></extension><text><status value="generated" /><div xmlns="http://www.w3.org/1999/xhtml"><table><tbody><tr><td>Name</td><td>Peter James Chalmers ("Jim")</td></tr><tr><td>Address</td><td>534 Erewhon, Pleasantville, Orange County, 3999</td></tr><tr><td>Contacts</td><td>Home: unknown. Work: (03) 5555 6473</td></tr><tr><td>Id</td><td>MRN: 12345 (Acme Healthcare)</td></tr></tbody></table></div></text><name><use value="official" /><family value="Chalmers" /><given value="Peter" /><given value="James" /></name><address><extension url="http://hl7.org/fhir/Profile/us-core#county"><valueString value="Orange County" /></extension><use value="home" /><line value="534 Erewhon St" /><city value="PleasantVille" /><state value="Vic" /><zip value="3999" /></address><active value="true" /></Patient></content><summary type="xhtml"><div xmlns="http://www.w3.org/1999/xhtml"><table><tbody><tr><td>Name</td><td>Peter James Chalmers ("Jim")</td></tr><tr><td>Address</td><td>534 Erewhon, Pleasantville, Orange County, 3999</td></tr><tr><td>Contacts</td><td>Home: unknown. Work: (03) 5555 6473</td></tr><tr><td>Id</td><td>MRN: 12345 (Acme Healthcare)</td></tr></tbody></table></div></summary></entry><entry><title type="text">Patient with id xcda</title><id>http://spark.furore.com/fhir/Patient/xcda</id><updated>2014-12-24T08:15:17.77Z</updated><published>1601-01-01T00:00:00Z</published><author><name>(imported from file)</name></author><link rel="alternate" href="http://hl7.org/fhir/Patient/xcda" /><link rel="self" href="http://spark.furore.com/fhir/Patient/xcda/_history/spark11" /><content type="text/xml"><Patient xmlns="http://hl7.org/fhir"><text><status value="generated" /><div xmlns="http://www.w3.org/1999/xhtml"><p>Henry Levin the 7th</p></div></text><identifier><use value="usual" /><label value="MRN" /><system value="urn:oid:2.16.840.1.113883.19.5" /><value value="12345" /></identifier><name><family value="Levin" /><given value="Henry" /></name><gender><coding><system value="v3/AdministrativeGender" /><code value="M" /></coding></gender><birthDate value="1932-09-24" /><managingOrganization><reference value="Organization/2.16.840.1.113883.19.5" /><display value="Good Health Clinic" /></managingOrganization></Patient></content><summary type="xhtml"><div xmlns="http://www.w3.org/1999/xhtml"><p>Henry Levin the 7th</p></div></summary></entry><entry><title type="text">Patient with id f001</title><id>http://spark.furore.com/fhir/Patient/f001</id><updated>2014-12-24T08:15:17.768Z</updated><published>1601-01-01T00:00:00Z</published><author><name>(imported from file)</name></author><link rel="alternate" href="http://hl7.org/fhir/Patient/f001" /><link rel="self" href="http://spark.furore.com/fhir/Patient/f001/_history/spark7" /><content type="text/xml"><Patient xmlns="http://hl7.org/fhir"><text><status value="generated" /><div xmlns="http://www.w3.org/1999/xhtml"><p>Generated Narrative</p><p>identifier: 738472983 (usual), ?? (usual)
        </p><p>name: Pieter van de Heuvel

< Allen Vitalis >

Showcase User · Logout

SMART
version 0.6.2

Patient List

API Playground

API Verifier

BMJ Content Discovery

BP Centiles

Cardiac Risk

Diabetes Monograph

Disease Monograph

EMR View

Frame UI Example

Genomics Advisor

Got Statins?

Manage Apps

CHIP · HMS · © 2013

Patient Selected: Allen Vitalis

Now **choose an app** on the left, or click "Manage Apps" to add a new app.

Available records

Aaron Alexis	male	1989-10-26	Zip Code: 02155
Allen Vitalis	male	2007-02-07	Zip Code: 02478
Amy Clark	female	1964-01-21	Zip Code: 74008
Amy Lee	female	1999-12-08	Zip Code: 74117
Amy Morgan	female	1991-06-07	Zip Code: 74047
Amy Shaw	female	2007-03-20	Zip Code: 74047
Angela Montgomery	female	2012-08-24	Zip Code: None
Anthony Coleman	male	1950-07-31	Zip Code: 74008
Anthony Shaw	male	1960-03-11	Zip Code: 74014
Betty Davis	female	1940-12-14	Zip Code: 74066
Brian Brooks	male	1956-03-23	Zip Code: 74008
Brian Gracia	male	1965-06-22	Zip Code: 74008
Carl Lee	male	1939-08-30	Zip Code: 74047
Carol Allen	female	1963-12-26	Zip Code: 74066
Carol Hughes	female	1949-11-04	Zip Code: 74108
Carol Young	female	1932-02-26	Zip Code: 74116
Charles Williams	male	1981-08-10	Zip Code: 74066
Daniel Adams	male	1925-12-23	Zip Code: 74117
Daniel Johnson	male	1995-02-22	Zip Code: 74014
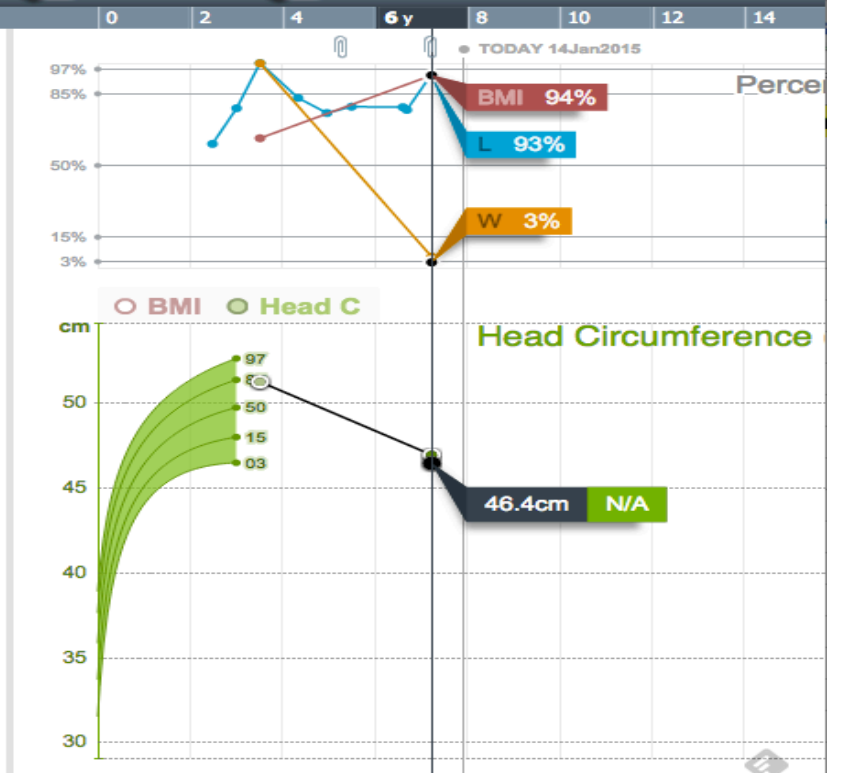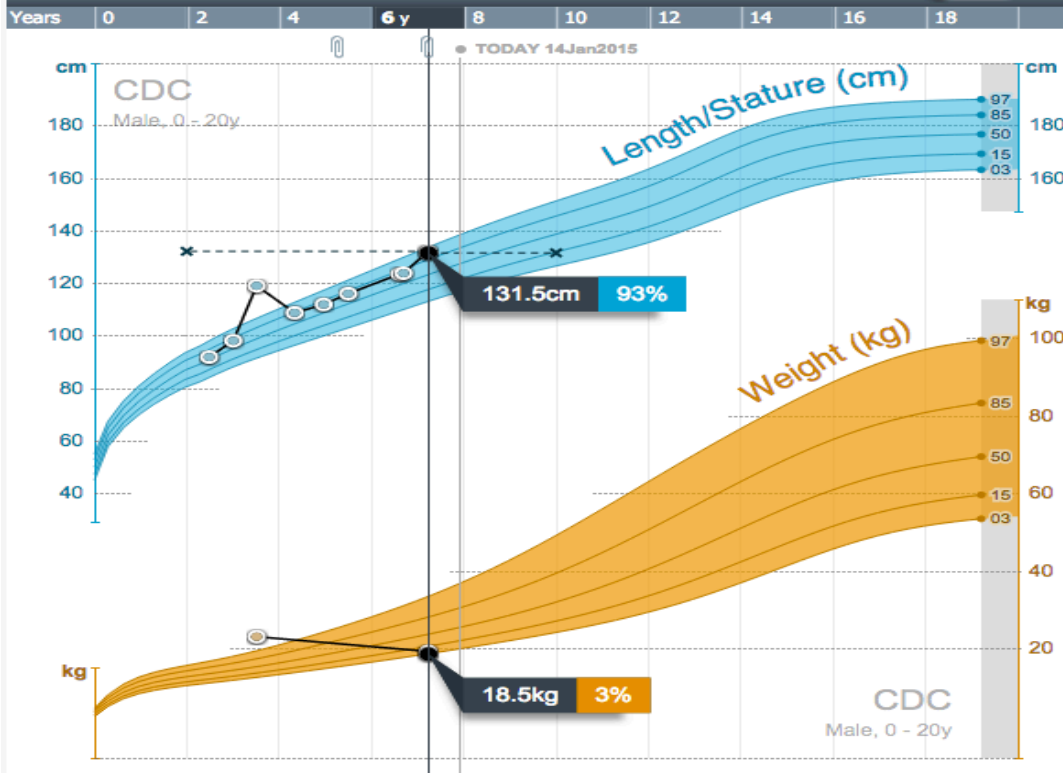
Koder

CDA

```
<code code="409586006”
codeSystem="2.16.840.1.113883.6.96”
displayName="Complaint"/>
<value xsi:type="CD” code="233604007”
codeSystem="2.16.840.1.113883.6.96”
displayName="Pneumonia"/>
```

FHIR

```
<problem>
 <system value="http://snomed.info/sct” />
 <code value="233604007" />
 <display value="Pneumonia" />
</problem>
```

Web-service "standarder"