



# Online Public Health @ Health Level Seven

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# Health Level Seven (HL7)

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- American National Standards Institute-accredited Standards Development Organization (SDO)
- Highly successful in healthcare
- International organization
- Other SDOs adopt and build upon HL7 standards
- Public Health and Emergency Response (PHER) Workgroup works to address the requirements of public health

[www.hl7.org](http://www.hl7.org)



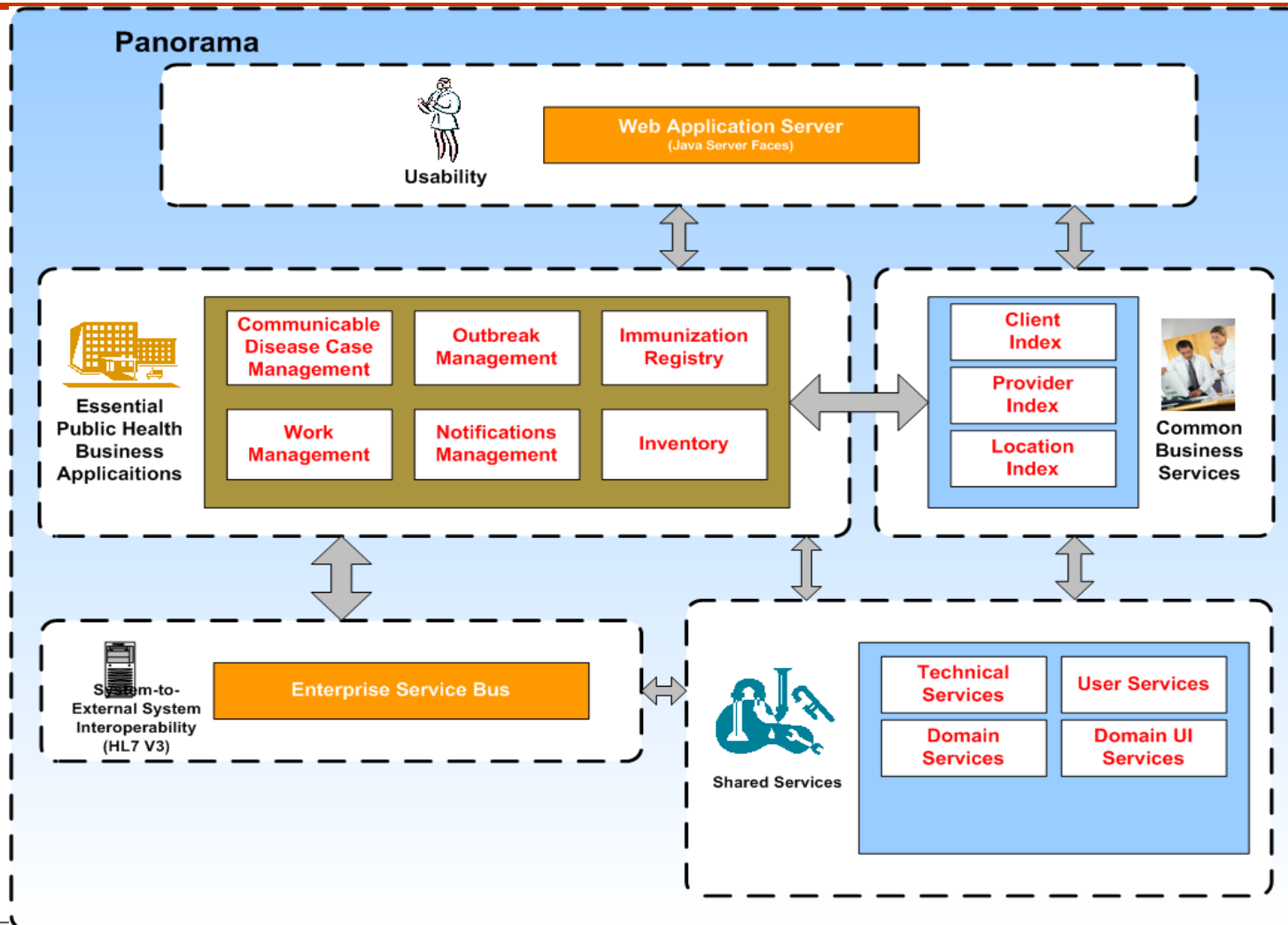
# PHER Areas of Interest

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- Public health registries
  - Immunizations
  - Cancer ...
- Tuberculosis
- Vital records
- Public health reporting
- Public health case management
- Outbreak management
- ...and more!



# Example: Canada Health Infoway



# National Person Id in Sweden

## Example checksum

812228-987x gives

$$\left[ \begin{array}{l} 8 \cdot 2 = 16 \\ 1 + 6 \rightarrow 7 \end{array} \right] + 1 + [2 \cdot 2 = 4] + 2 + [2 \cdot 2 = 4] + 8 + \left[ \begin{array}{l} 9 \cdot 2 = 18 \\ 1 + 8 \rightarrow 9 \end{array} \right] + 8 + \left[ \begin{array}{l} 7 \cdot 2 = 14 \\ 1 + 4 \rightarrow 5 \end{array} \right] = 48$$

The sum 48 has the last digit of 8. That is then subtracted from ten to give the value:  $x = 10 - 8 = 2$ ; the checksum is the last digit (in this example, the only digit) of this: 2. If the sum had been 50, then subtraction of the last digit 0 from 10 would give the value  $x = 10 - 0 = 10$ . The last digit of this is 0 which would be the resulting checksum.


Sök Person Avancerad
Sök Företag Avancerad
Taxeringskatalog
Självbevakning™
Alla tjänster

Förnamn: Fredrik  
 Efternamn: Strom  
 Födelsedatum: [ ]  
 Adress: [ ]  
 Postnummer: [ ]  
 Postort: [ ]  
 Fonetisk sökning: (x)

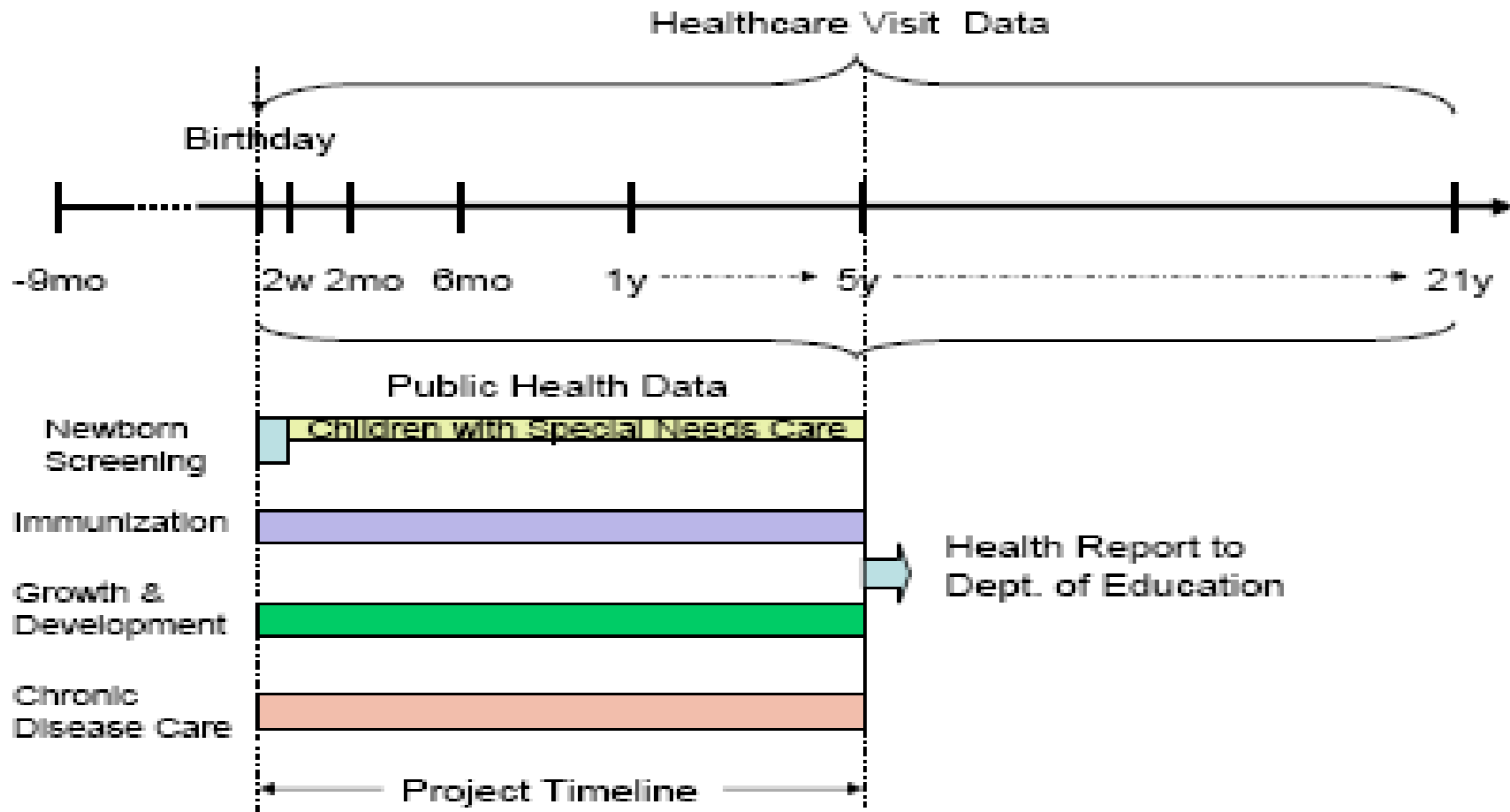
**Vet du vem du gör affärer med?**

**Träfflista** Sök Antal träffar: 0

Ansvarig utgivare



# Pediatric EHR-PH Timeline



Source: Public Health Data Standards Consortium (PHDSC). Pediatric Electronic Health Record Public Health Perspectives. Report to Health Resources and Services Administration (HRSA), 2004, Baltimore, MD



# Domain Analysis Model

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- Describes use cases in domain expert terms
- Immunization DAM
- Vital Records DAM
- TB DAM
  - Moved to Clinical Interoperability Council
- Public Health Reporting DAM
  - Patient Safety



# EHR-S Functional Activities

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- Vital Records Functional Profiles
- Add public health functional profile to EHR Functional Model?
- Public health functional profile or functional model?



# HL7 Paradigms

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- HL7 Version 2 (V2)
  - Large installed base especially in the U.S.
- HL7 Version 3 (V3)
  - Messages, documents, services
  - National commitment internationally
- Structured Documents
  - V3-based
  - Clinical Document Architecture
    - Continuity of Care Document
  - Fast growing
- Service-Oriented Architecture (SOA)
  - Fast emerging



# Version 2

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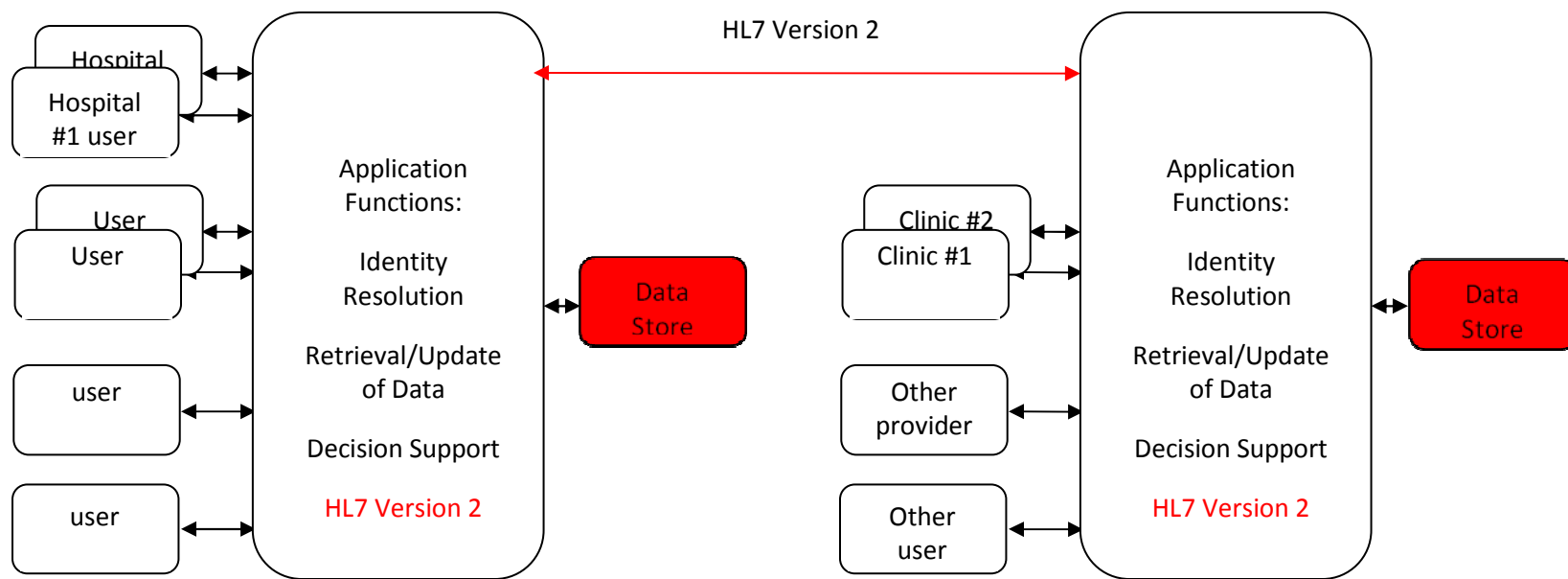
- Point-to-point communication
- Delimited text strings
- Field semantics is implied by its position in the string

Msg|value1|value2|value3....



# V2 Application Architecture

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# PHER V2 Projects

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- No actual Version 2 standards development
- “Implementation Guides”
  - Immunizations V2.5 Guide
  - Electronic Lab Reporting (ELR) V2.5 Guide
  - Cancer Registries V2.5 Guide
    - “housed” in Anatomical Pathology Workgroup
  - Newborn Screening 2.3 Implementation Guide
    - Outside organization



# Version 3

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- Uses Internet family of protocols
- XML: Semantics of strings is given by “tags”
  - <Tag1> value1
  - <Tag2> value2...
- Object-Oriented technology
  - Reference Information Model (RIM)
  - Universal Modeling Language (UML)
  - “Common information model”
- Syntax described by XML “schema”



# Version 3 Paradigms

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## ■ Messages

- Point-to-point orientation
- Not architecturally different from V2

## ■ Documents

- Meant to persist
- Similar data payloads but different wrappers
- Architecturally different from messages (V2/V3)

## ■ Services

- Bus orientation – like Internet
- Service provider - like web site
- Service consumer - like browser
- Wrapper is subsumed into “service description”



# PHER V3 Messaging Projects

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- Version 3 Immunization Standard
  - Canada Health Infoway
- Outbreak Management
- Common Product Model
  - With Pharmacy Workgroup
- Clinical Decision Support (CDS)
  - With CDS Workgroup
  - Care Provision standard (Patient Safety)



# Structured Documents

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- Human-readable part
  - .xslt
- Structured data part
- Clinical authentication
- Wholeness
- Persistence



# Document Examples

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- Continuity of Care Document (CCD)
  - Particular type of medical summary doc
  - CDA and Continuity of Care Record
  - Based upon V3 Care Provision standard
  - Increasing adoption of CCD and other Care Record variants
- IHE Cross-Document Sharing (XDS)
- CDA for Public Health Reporting



# Document Fragment

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```
<templateId root="2.16.840.1.113883.10.20.1.53" />
<manufacturedMaterial classCode="MMAT">
  <code code="110" codeSystem="2.16.840.1.113883.6.59" codeSystemName="CVX"
displayName="DTaP-Hep B-IPV">
  <originalText>
    <reference value="#ImmCode-1" />
  </originalText>
  <originalText>
    <reference value="#ImmName-1" />
  </originalText>
</code>
  <lotNumberText>ABC12345M
  <originalText>
    <reference value="#ImmLotNumber-1" />
  </originalText>
</lotNumberText>
  <expirationTime value='20080305'/>
  <!-- Manufacturer of Vaccine -->
  <manufacturerOrganization classCode='MANU'>
    <manufacturer classCode='ORG'>
      <code code="SKB" codeSystem="2.16.840.1.113883.6.60" codeSystemName="MVX"
displayName="Glaxo Smith Kline Beacham">
```



Greenway EHR\_GREENWAY - Immunization Content - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Copy Paste

Address C:\Documents and Settings\dshields\Desktop\Connectathon 2009\EHR\_GREENWAY\_40172\_Mod4MvxEtc.xml

## Greenway EHR\_GREENWAY - Immunization Content

### Document Information

<b>Authored By:</b>	<b>Detail:</b>
<b>Work :</b>	<b>Title:</b> Immunization Content
<b>System:</b> PrimeSuite	<b>Description:</b> HISTORY OF IMMUNIZATIONS (11369-6 LOINC)
	<b>Effective Date:</b> Wednesday, January 14, 2009 at 11:35:11 pm (-0600)

### Patient Information

#### Patient Detail

<b>Name:</b> Greenway EHR_GREENWAY	<b>Patient Number:</b> 52bd9565c42c4ba^^^&1.3.6.1.4.1.21367.2005.3.7&ISO
<b>Address:</b>	<b>Date of Birth:</b> Saturday, January 1, 1977
<b>Home :</b>	<b>Gender:</b> Female
	<b>Language:</b>

### Immunizations

CVX	Name	Date Admin	Mfg Name	Mfg Code	Trade Name	Lot Number	Route	Inj	VIS Given	VIS Publication
110	DTaP-Hep B-IPV	3/1/1977	Not Entered	NE	Not Entered	ABC12345M	NE	NE		
10	IPV	3/1/1977	Not Entered	NE	Not Entered		NE	NE		
10	IPV	1/15/2009	Abbott Laboratories	AB	Adeno T7	655	IV	NE	1/15/2009	1/13/2009
110	DTaP-Hep B-IPV	1/15/2009	Adams Laboratories	AD	BayGam	3233	IV	LD	1/15/2009	1/15/2009
08	HepB	1/15/2009	Unknown manufacturer	UNK	ActHib		ID	LG	1/15/2009	1/15/2009

Done My Computer

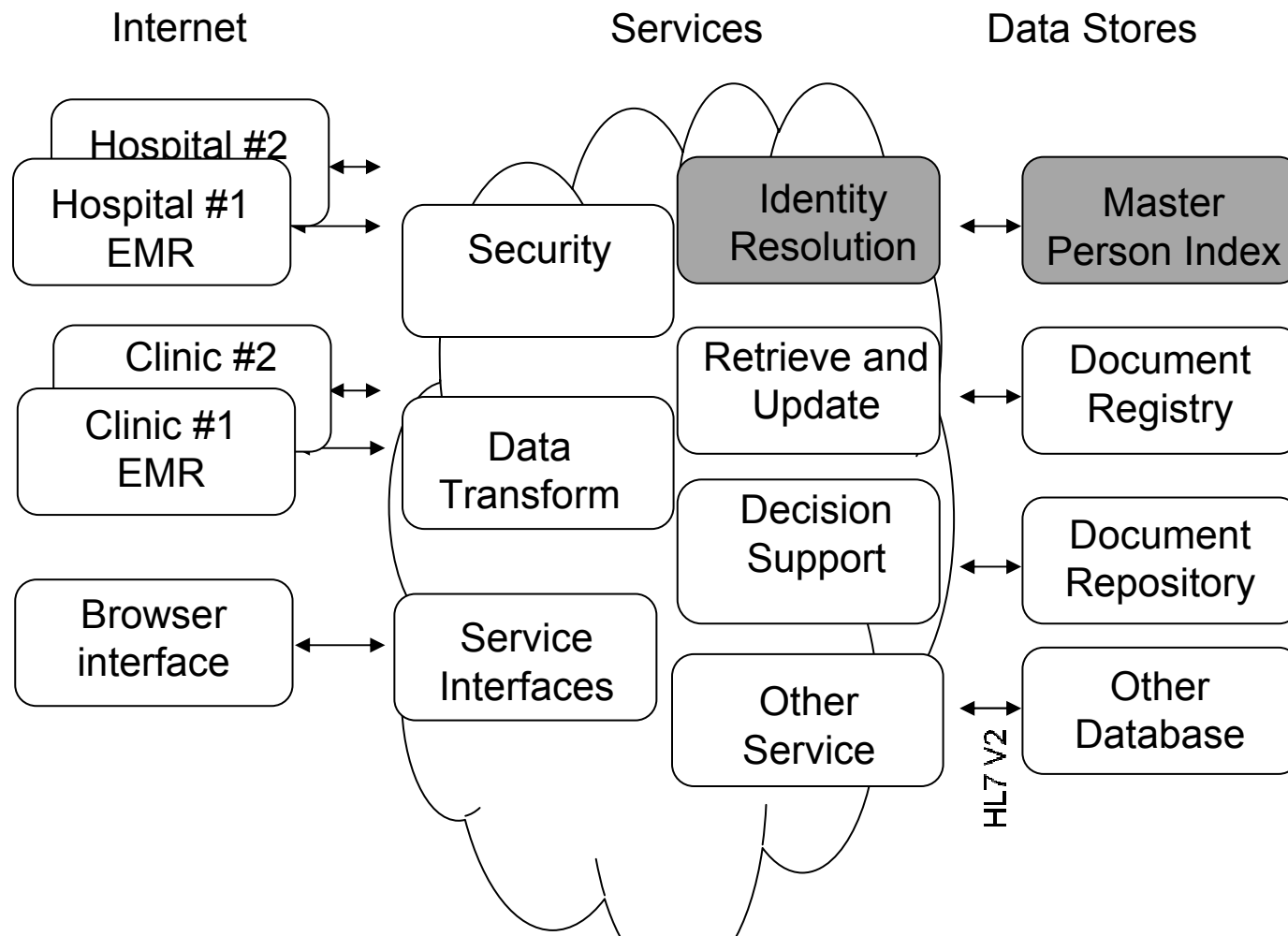
# Services

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- Can pass or subsume messages and documents



# Computing in the Cloud (Service-Oriented Architecture)



# Economies of SOA

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- Unifying
  - Common abstract service definition
  - Multiple concrete renditions
  - V2, V3, Messages and documents as payloads
- Workflow optimization (“agility”)
- Economies of bus architecture
- Reuse of components
- Ability to create security layers
- Standardization of services makes them interoperable



# Bus Architecture Economies

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- Approximately 75 U.S. Immunization Registries (Immunization Information Systems - IIS)
- Completely connected point-to-point message network:  $74 * 75 / 2 = 2775$  connections
- Each connection costs \$10K-\$30K per side
- Approx \$40K each \* \$111,000,000 total

*Just to put connections in place*

- Bus Architecture: each site connects once
- $\$40K * 75 = \$3,000,000$



# SOA, HL7, PHER

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- HL7 Service-Aware Enterprise Architecture Framework
- SOA-PHER-EHR Reference Architecture
  - Public health use case
- Healthcare Service Specification Project
  - Service Functional Models (HL7)
  - Technical Specifications (OMG)
  - Collaboration with IHE
  - Public health (immunization) examples



# Interoperability Showcase

Users / Stakeholders



Services



Data Stores

Provider #1  
EMR  
GE Healthcare  
SAIC

Provider #2  
EMR  
Greenway

Public Health Nurse  
Portal  
Browser Interface

Identity Resolution

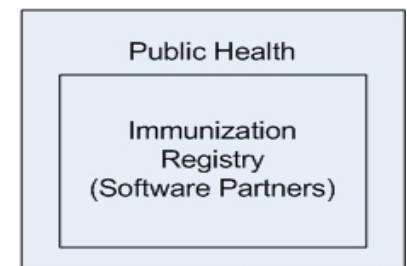
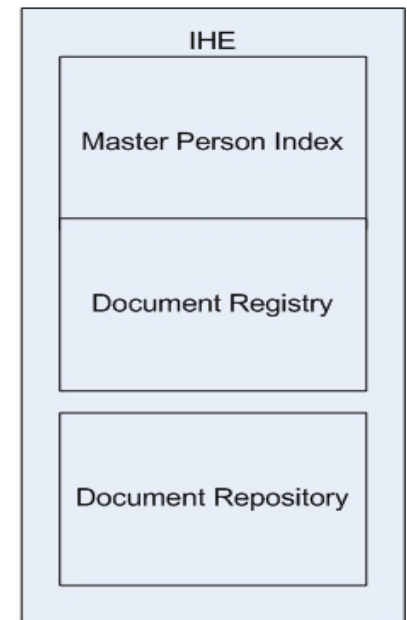
Retrieve & Update

Decision Support  
(Vaccine Forecast Module)

Other Services  
(Yellow Card)

Data Transform  
(Software Partners)

Security



# Contacts for PHER

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