



Rethinking Public Health Reporting in a SOA World

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Overview

- How we arrived at a SOA approach to a traditional, point-to-point public health reporting use case
- Practical steps required to develop the approach
- Arrive at the same business case arguments developed elsewhere (for example, Canada)

Software Partners

- Developer of San Diego Immunization Registry (SDIR) and other interoperability software
- Extensive standards work
 - Integrating the Healthcare Environment (IHE)
 - Health Level Seven (HL7)
 - Object Management Group (OMG)
 - Health IT Standards Panel (HITSP)
 - CalRHIO
- Innovative approaches to immunization IT services
 - Immunization decision support web service
 - Patient empowerment tool on Google Health, HealthVault

Background Work

- CalRHIO 2006: Service-Oriented Approach to Healthcare Interoperability Architecture
- HL7 White Paper
 - Draft presented in May in Rio de Janeiro
 - [Practical Guide for SOA in Healthcare Volume II Immunization Management Case Study.doc](#)
 - Developed with VA and DoD authors (Nancy Orvis, Steve Hufnagel)
- Convergence of HL7 and IHE work
 - [A Service-Oriented Architecture \(SOA\) View of the IHE Profiles](#)

Immunization Registry Reporting in the U.S.

- Stage 1 Meaningful Use objective
- Is it just a “nice to have”?
 - Opportunity for a new approach
 - Progress can be expanded to other domains (i.e. cardiology, etc.)

Innovation = opportunity for an early win

What are immunization registries?

- Public health initiative to manage vaccine-preventable diseases
- Databases for public health analysis
- Provide complete immunization records at point of service
- “EHRs for immunizations” for some providers

Starting Point – Registry Side

**Full Compliance –
Able to Send and
Receive HL7
Messages**

**Partial Compliance –
Able to Send or
Receive HL7
Messages**

**No Compliance –
Unable to Send or
Receive HL7
Messages**

**30 of 51 (59%)
grantees reporting**

**4 of 51 (8%) grantees
reporting**

**17 of 51 (33%)
grantees reporting**

**18 grantees were
eligible and applied to
receive HITECH-
ARRA 317 funding to
enhance EHR- IIS
interoperability**

**2 grantees were
eligible and applied to
receive HITECH-
ARRA 317 funding to
enhance EHR- IIS
interoperability**

**11 grantees were
eligible and applied to
receive HITECH-
ARRA 317 funding to
enhance EHR- IIS
interoperability**



Early Use of HL7 Version 2 (2.3.1) for reporting

- Connect with EHRs
- Receive records electronically from providers
- Provide immunization records to providers
- Provide decision support at point of service
- Health Information Exchange (HIE)-like

Ideal World



▼	V
Diphtheria/Tetanus/Pertussis (DTP) Vac	
Diphtheria/Tetanus/Pertussis (DTP) Vac	
Diphtheria/Tetanus/Pertussis (DTP) Vac	
DTaP/Hib Vaccine	
Diphtheria/Tetanus/Per	
H1N1	
Hepatitis A Vaccine, P	
Hepatitis A Vaccine, P	
Hepatitis B Vaccine, A	
Hepatitis B Vaccine, A	
Hepatitis B Vaccine, Adolescent or Pediatric	

A parent is preparing to take his child to the doctor for a Well Child visit. She views the child's current immunizations using a Personal Health Record (PHR).

Ideal World



The patient and the parent visit their doctor

- The provider's EHR queries the immunization registry and retrieves the

same immunization records the parent saw

- The provider reviews the immunizations and administers vaccines
- The provider records the new immunizations
- The EHR updates the immunization registry

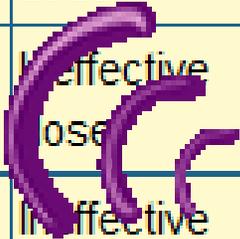
using HL7 Version 2

◆
Diphtheria/Tetanus/Pertus
Diphtheria/Tetanus/Pertus
Diphtheria/Tetanus/Pertus
DTaP/Hib Vaccine
Diphtheria/Tetanus/Pertus
H1N1
Hepatitis A Vaccine, Pedi
Hepatitis A Vaccine, Pediatric/Adolescent, 2 Dose
Hepatitis B Vaccine, Adolescent or Pediatric
Hepatitis B Vaccine, Adolescent or Pediatric
Hepatitis B Vaccine, Adolescent or Pediatric

Ideal World

- The child is now getting ready to enter school
 - The parent uses his hand-held device to make sure the child is up-to-date on required vaccines
 - One shot is missing

↕	Dose	
	Ineffective dose	T d
	Ineffective dose	T d
	Ineffective dose	Minimum age for this dose of vaccine is 6 weeks minus 4
	Ineffective dose	Minimum age for this dose of vaccine is 6 weeks minus 4
		vaccine date.
		g vaccine date.



Ideal World

In a rush, the parent gets the missing vaccine at a different clinic

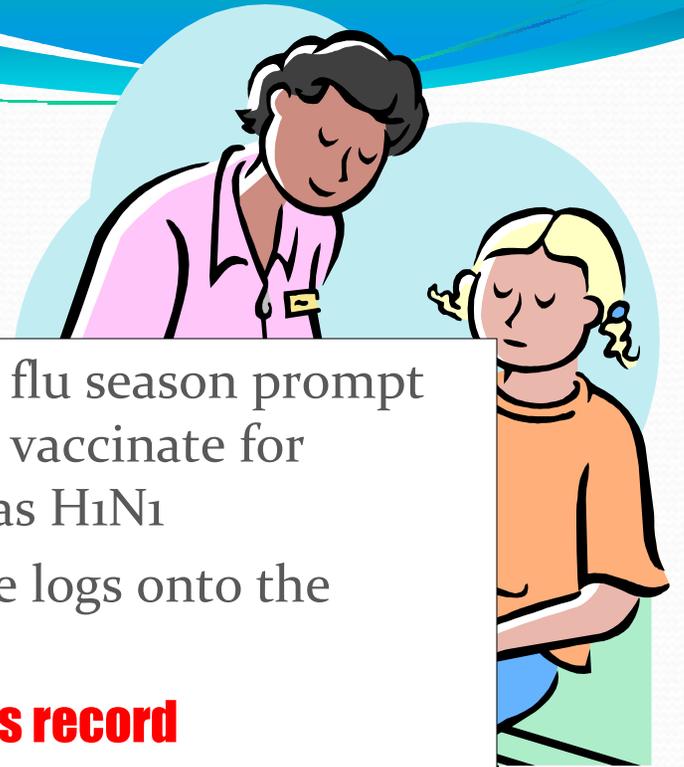
➤ The clinic EHR retrieves the child's records from the registry

- ... including the **vaccines recorded by other providers**
- ...reviews the child's records
- ...administers vaccines
- ...records the new vaccine
- The EHR updates the immunization registry using

HL7 Version 2



Ideal World



Predictions of a severe flu season prompt the child's school to vaccinate for seasonal flu as well as H1N1

- The school nurse logs onto the registry
- ...**views the child's record**
- ...administers a combination H1N1 and seasonal flu vaccine, and....
- ...records the shot in the registry

 2 vaccines recommended

 Vaccine
 Influenza
 H1N1 influenza
Tdap
MCV4
HPV, quadrivalent



Aug 07, 2012



Aug 07, 2012

1. VIS: Vaccine Information Statements are documents produced by the CDC and record provides the patient with pertinent facts about risks, side-effects and other information

Ideal World

HEPATITIS A VACCINE

WHAT YOU NEED TO KNOW

Many Vaccine Information Statements are available in Spanish and other languages. See www.immunize.org/vi.

1 What is hepatitis A?

Hepatitis A is a serious liver disease caused by the hepatitis A virus (HAV). HAV is found in the stool of persons with hepatitis A. It is usually spread by close personal contact and sometimes by eating food or drinking water containing HAV.

routine vaccination has been implemented because of high disease incidence.

- Men who have sex with men.
- Persons who use street drugs.
- Persons with chronic liver disease.
- Persons who are treated with clotting factor

ation  **Precaution [PDI]**



Thrombocytopenia,



Gelatin

More Info

allergy to gelatin (anaphylactic)



Epidemiologist views population or individual immunization data to analyze pockets of under-immunization, adverse events, etc.



All the requirements of an HIE

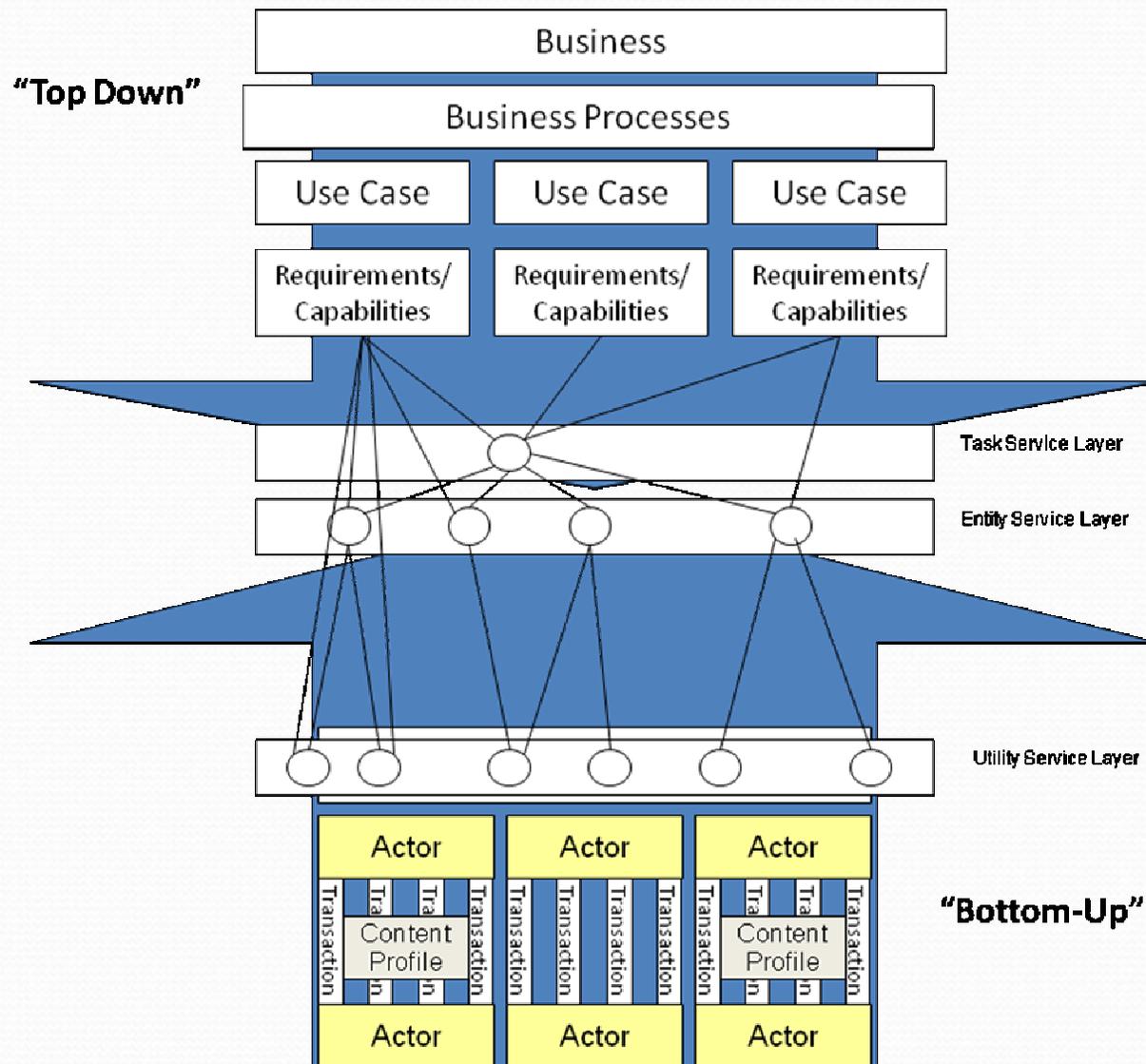
- Provider-provider health information exchange
- Improving the doctor-patient relationship
- Population health tool
- Research tool



How a SOA approach can fill the gap

- Inventory existing standards
- Resolve to a set of common base services with multiple platform-specific models
- Separate service provider and service consumer roles
- Develop a common information model
- Implement services

Meet in the Middle



Immunization Standards

#	Service	Identification		Retrieve, Locate and Update			Decision Support	
1	Standards Org	HL7						
2	Capability	Identification Service Functional Mode		Retrieve, Locate, Update SFM			Decision Support SFM	
3	Standards Org	OMG						
4	Service Definition	Identification Service Specification		Retrieve, Locate, Update Spec			Decision Support Service Spec	
5	Profile Org	IHE						
6	Interoperability Layer	PIX/PDQ				Immunization Content (IC)	Immunization Content	Request for Clinical Guidance
7	Profile Org	AIRA/CDC						
8	Interoperability Layer	2.5 Implementation Guide		2.5 Implementation Guide				
9	Interoperability Layer	2.3.1 Implementation Guide		2.3.1 Implementation Guide				
10	Standards Org	HL7						
11	Base Standard	Version 2	Version 3 Patient Admin messaging	Version 2	Version 3 Immunization (POIZ) messaging	Version 3 Care Record CDA	Version 3 Care Record CDA	Version 3 Care Record messaging

Overlap Removed – Transform into Taxonomy

Task Service	GetPatientIZStatus				
Mediating Service	Identification	Retrieve, Locate, Update			Decision Support
Utility Service	PIX/PDQ transactions	HL7 Version 2.5 Imple- mentation Guide VXU, RIH	Version 3 Immuni- zation (POIZ) messaging	XDS.b, Immuni- zation Content (IC)	Request for Clinical Guidance, Immunization Content



How a SOA approach can fill the gap

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Meaningful Use Reporting*

- §170.302(k) Submission to immunization registries. Electronically record, modify, retrieve, and submit immunization information in accordance with:
 - (1) the standard (and applicable implementation specifications) specified in §170.205(e)(1) or §170.205(e)(2); and
 - (2) At a minimum, the version of the standard specified in §170.207(e).

* Health Information Technology: Initial Set of Standards, Implementation Specifications, and Certification Criteria for Electronic Health Record Technology Final Rule issued by the Department of Health and Human Services (HHS) on July 28, 2010

Interpretation

- Use of HL7 V2
 - 2.3.1 with implementation guide
 - 2.5.1 with implementation guide
- Use of CVX Codes
 - Like CPT codes
 - CDC maintains a mapping CVX ↔ CPT
- “Menued” with other public health functions
 - Some states considering making it required

EHR Side vs. Registry Side

- “We are primarily concerned with Certified EHR Technology’s ability to transmit the immunization information in a standardized format, and do not believe that it is necessary to specify a particular recipient in the certification criterion.”
- “...we have revised the certification criterion to replace the word “transmit” with “submit” to better align this certification criterion with the meaningful use objective and measure.”

Source: Section III.D of the preamble of the Health Information Technology: Initial Set of Standards, Implementation Specifications, and Certification Criteria for Electronic Health Record Technology, Final Rule

EHR Side

- Provider must purchase/have a Complete EHR or EHR Module certified for immunization registry reporting criteria
- To be certified, the EHR or Module must demonstrate ability to generate messages in HL7 V2
- Must actually report where possible



EHR Certification Requirements*

- Record: enter CVX-encoded immunization information into the EHR
- Retrieve: display the CVX-encoded immunization information that has been entered into the EHR
- Submit: electronically submit the CVX-encoded immunization information to an immunization registry in either HL7 2.3.1 or HL7 2.5.1

*Source: NIST

Immunization Content - Windows Internet Explorer

C:\Documents and Settings\Pat\Desktop\Ctrn2009\ImmunizationContent.xml

Google

File Edit View Favorites Tools Help

Immunization Content

Immunization Content

Patient: Greenway
EHR_GREENWAY ,

MRN: 52bd9565c42c4ba^{^^}&1.3.6.1.4.1.21367.2005.3.7&ISO

Birthdate: January 1, 1977

Sex: Female

Consultant:

Created On: January 14, 2009

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

Signed by: on ,

Done

My Computer

100%

Immunization Content CCD

Susan Brown - Greenway PrimeSuite - Medical Summaries for Referral Export - Windows Internet Explorer

C:\D09B_19481.xml

Susan Brown - Greenway PrimeSuite - Medical Summa...

Susan Brown - Greenway PrimeSuite - Medical Summaries for Referral Export

Document Information

Author:	Detail:
Work:	Title: Greenway PrimeSuite - Medical Summaries for Referral Export.
System: PrimeSuite	Description: Summary Of Episode Note (24133-9 LQMC)
	Effective Date: Thursday, October 9, 2008 at 12:07:19 pm (-0400)

Patient Information

Patient Detail

Name: Susan Brown	Patient Number: 19481
Address: Unknown	Date of Birth: Saturday, January 1, 1977
Home:	Gender: Female

Reason for Referral

possible vertigo, patient has trouble with balance at times

Allergies and Adverse Reactions

Name	Reaction	Notes
Birds	hives	black birds
Codine Phosphate		
Egg		

Medication List

Name	Start Date	Estimated Completion Date
Advil	10/09/2008	01/01/2009
Allopurinol	10/09/2008	11/20/2008

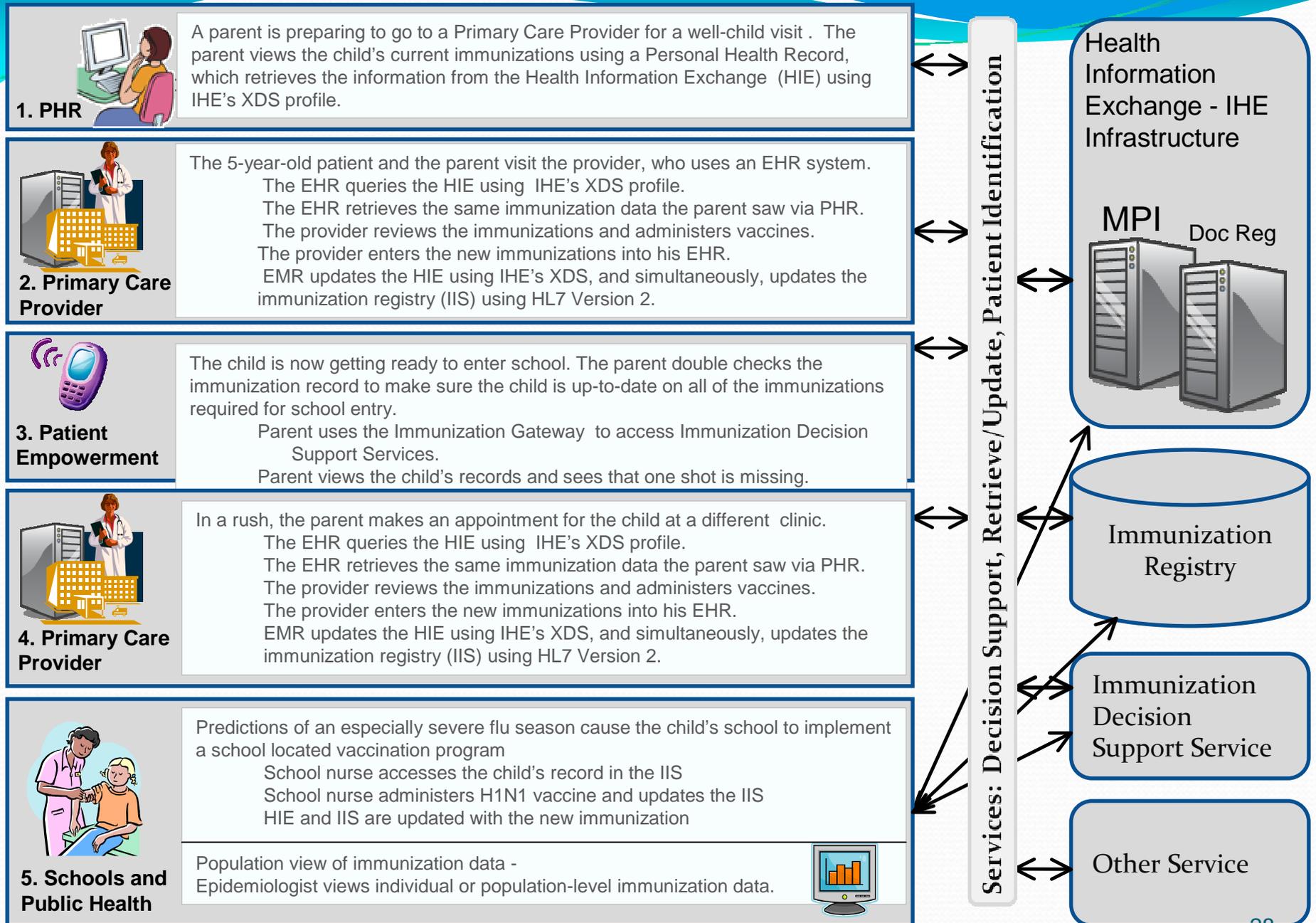
Family History

Description	Relationships	Comments
Autism, infantile	Brother's Age of Onset: 3	
Family history of appendiceal cancer	Father's Age of Onset: 56, Mother's Age of Onset: 25	

Immunizations

Name	Date Admin	Mfg Name	Mfg Code	Trade Name	Lot Number	Route	Inj	VIS Given	VIS Publication
HepB	7/20/2003	Merck & Co., Inc.	MSD	Other TradeName		IM	LA	7/20/2003	
HepB	7/21/2004	Merck & Co., Inc.	MSD	Other TradeName		IM	LA	7/21/2004	
DTaP	9/25/2003	GlaxoSmithKline	SKB	Other TradeName		IM	LA	9/25/2003	
DTaP	11/30/2003	GlaxoSmithKline	SKB	Other TradeName		IM	LA	11/30/2003	
DTaP	2/15/2004	GlaxoSmithKline	SKB	Other TradeName		IM	LA	2/15/2004	
DTaP	7/21/2004	Merck & Co., Inc.	MSD	Other TradeName		IM	LA	7/21/2004	
Hib	9/25/2003	sanofi sntabo	SKB	Other TradeName		IM	LA	9/25/2003	

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How a SOA approach can fill the gap

- Inventory existing standards
- Resolve to a set of common base services with multiple platform-specific models
- Separate service provider and service consumer roles
- **Develop a common information model**
- Proof of concept



Common Information Model

- Existing work products
 - HITSP products
 - OpenEHR
 - RIMBAA?
 - Canadian approach
- Derive something new using elements of these



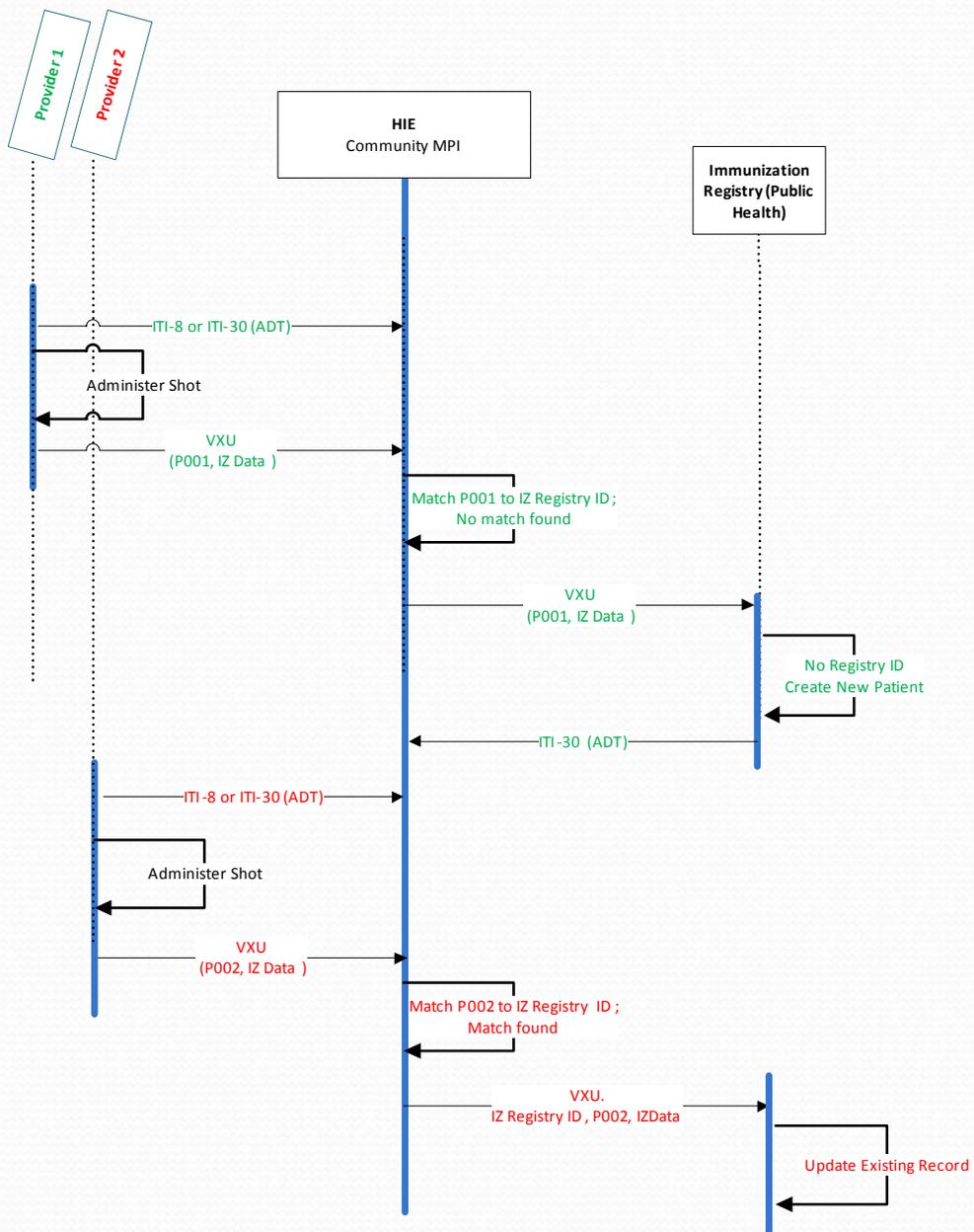
How a SOA approach can fill the gap

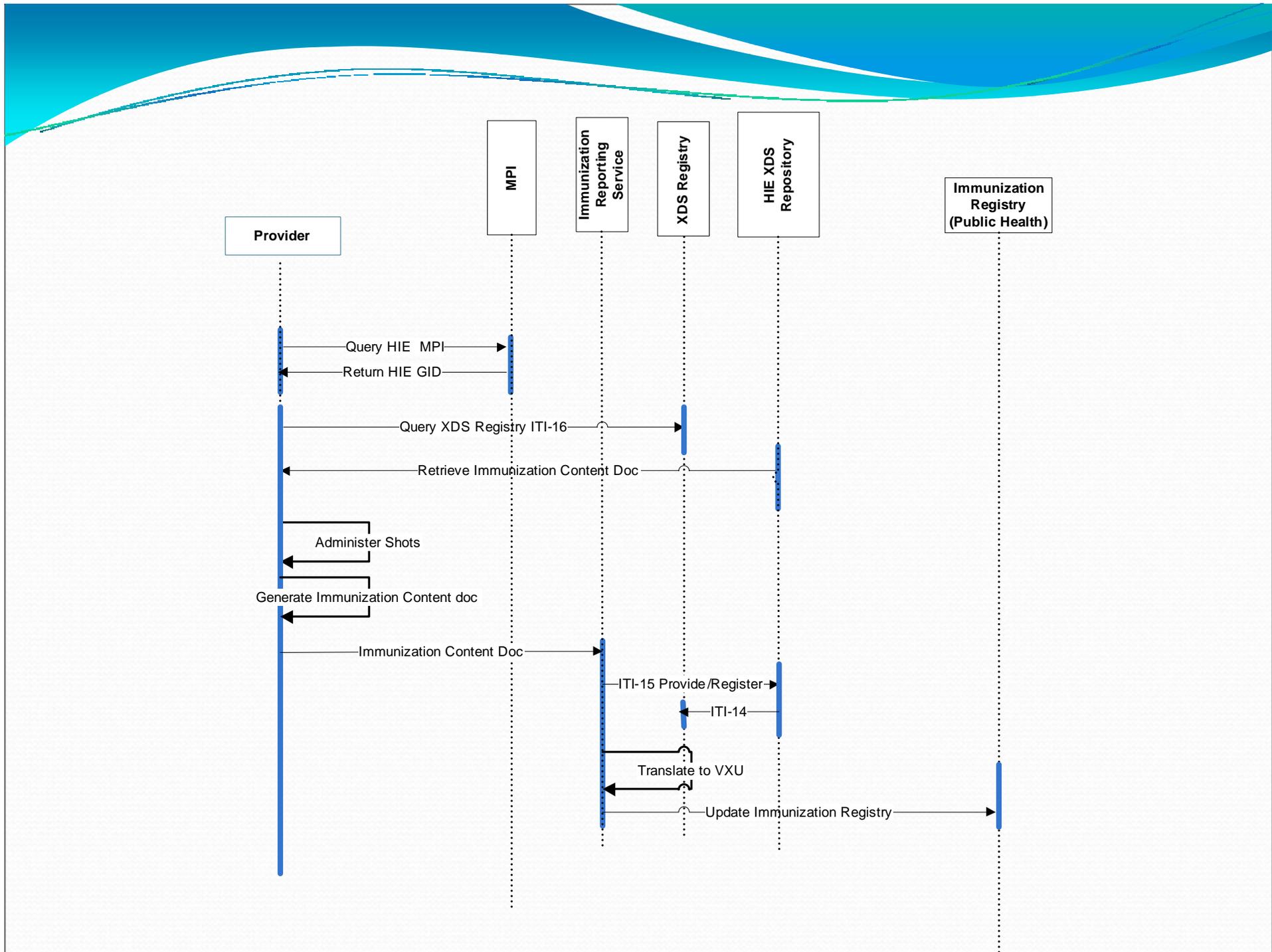
- Inventory existing standards
- Resolve to a set of common base services with multiple platform-specific models
- Separate service provider and service consumer roles
- Develop a common information model
- **Develop and analyze workflows**

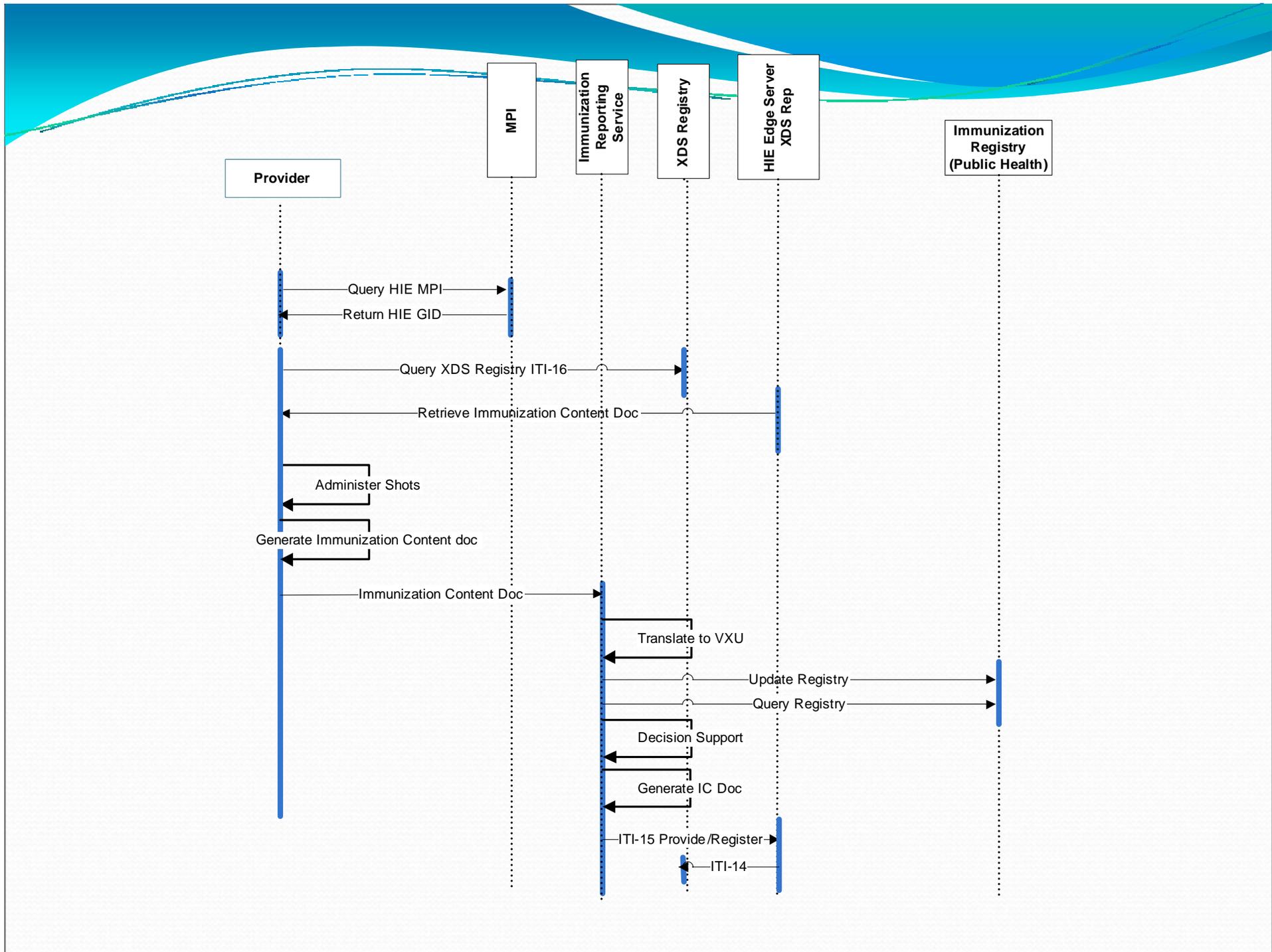
Two scenarios:

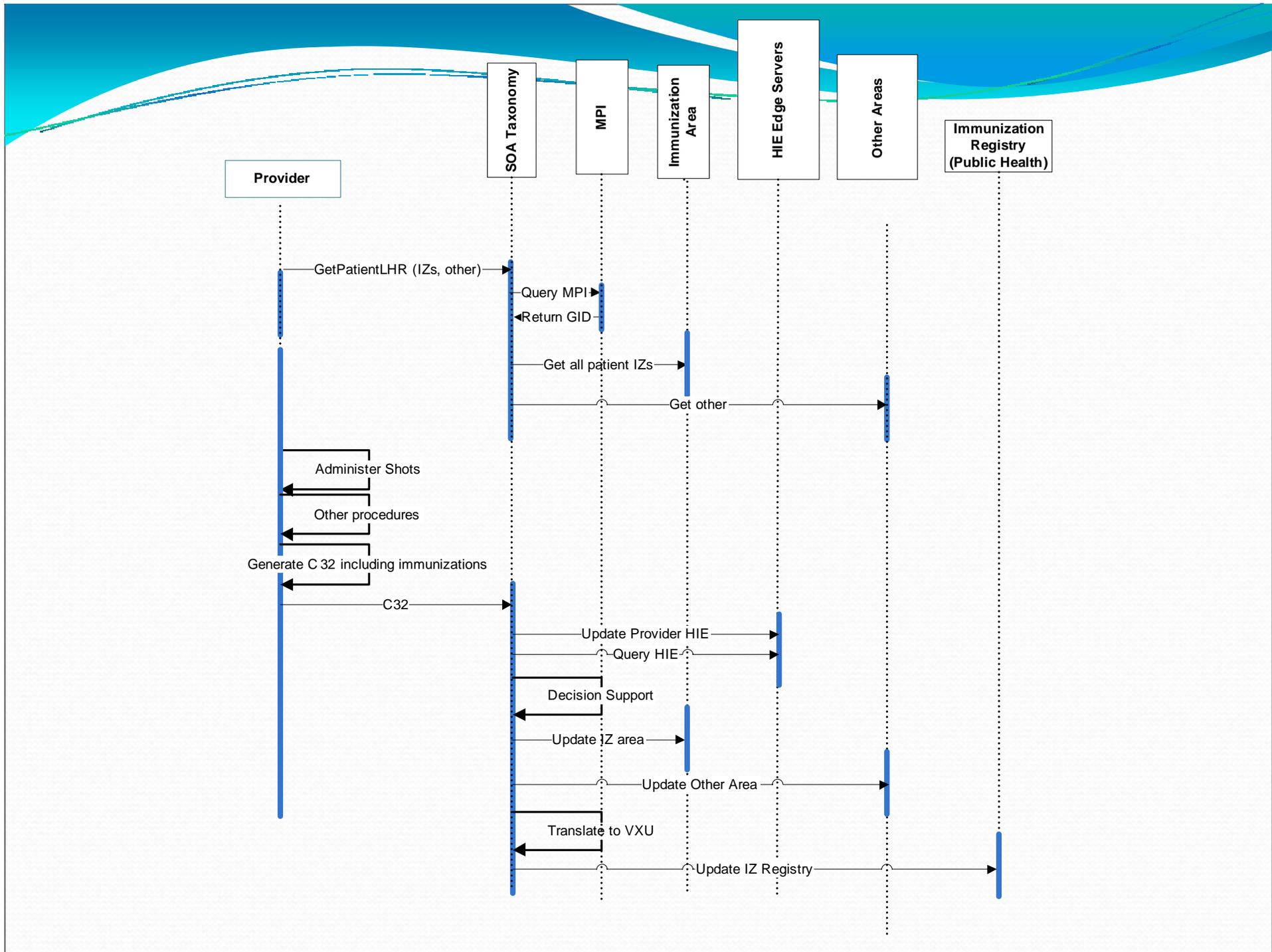
- This patient is new to Immunization Registry
- Known to Immunization Registry

- John visits provider 1 and has id P001
- John also visits provider 2 at a later time and has id P002 for that one

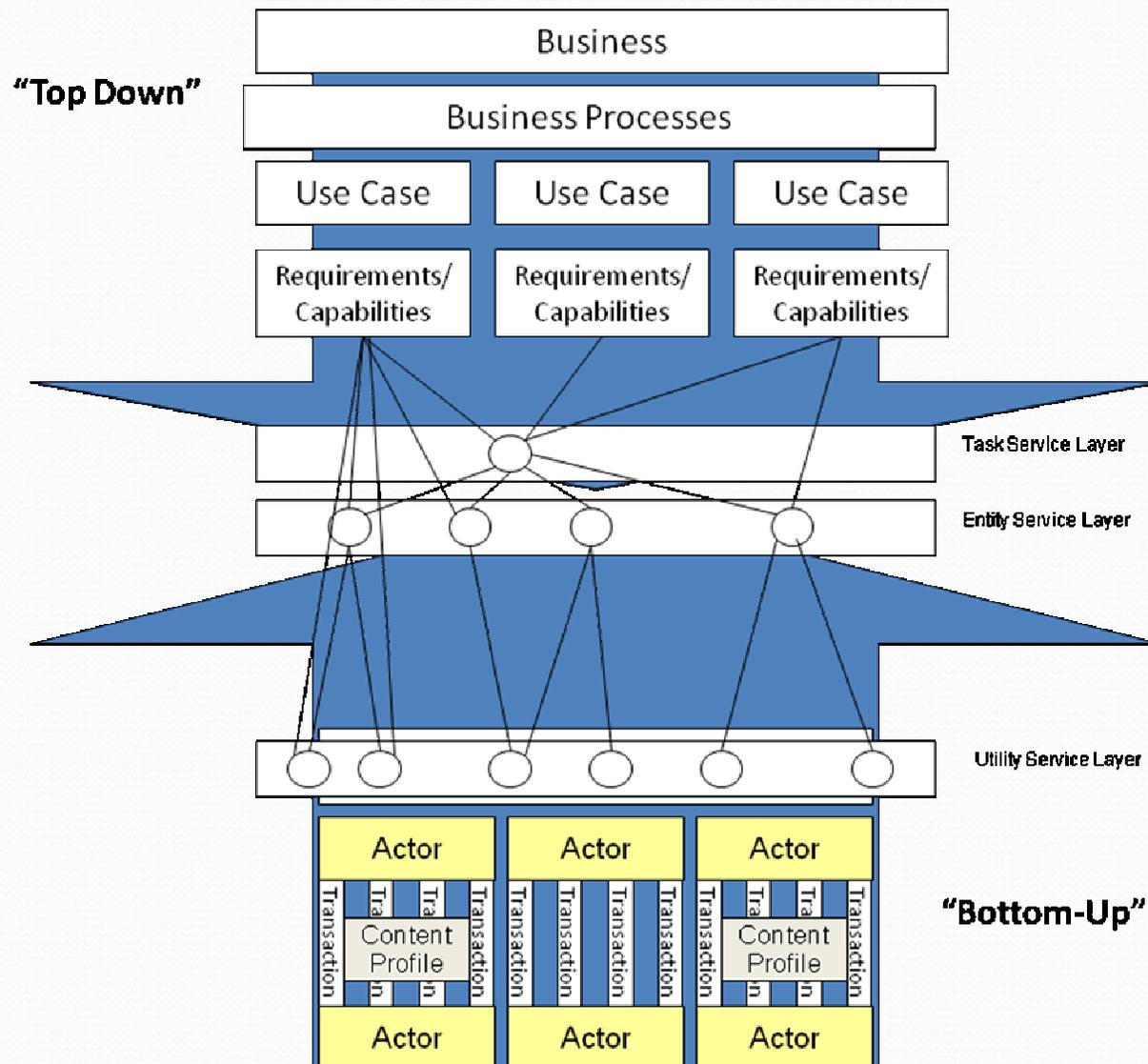








Meet in the Middle



Conclusion

- Everyone has a single connection to the information exchange
- Cost is a function of # connections * # services