SOA and Immunizations

Alean Kirnak

Software Partners LLC

akirnak@swpartners.com

Agenda

- Review the immunization registry use case
- Explain evolution of immunization registry software used by the San Diego registry into Service-Oriented Architecture
- Explain the theoretical background of Service-Oriented Architecture Return on Investment
- Show how the approach can be used by health information exchanges
- Illustrate the broader healthcare benefits that lead to sustainability

Are some things made harder than they need to be?

US Model: immunization registries

- A single public health system performing multiple functions for immunization management
  - “EHR” for immunizations
  - Reporting server
  - HL7 Version 2 server to query and update immunization information
  - “Vaccine forecast” – aka immunization decision support

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 immunizations and other healthcare information using a Personal Health Record (PHR) that queries ….

Ideal World

The patient and the parent visit their doctor

- The provider's EHR queries … and retrieves the

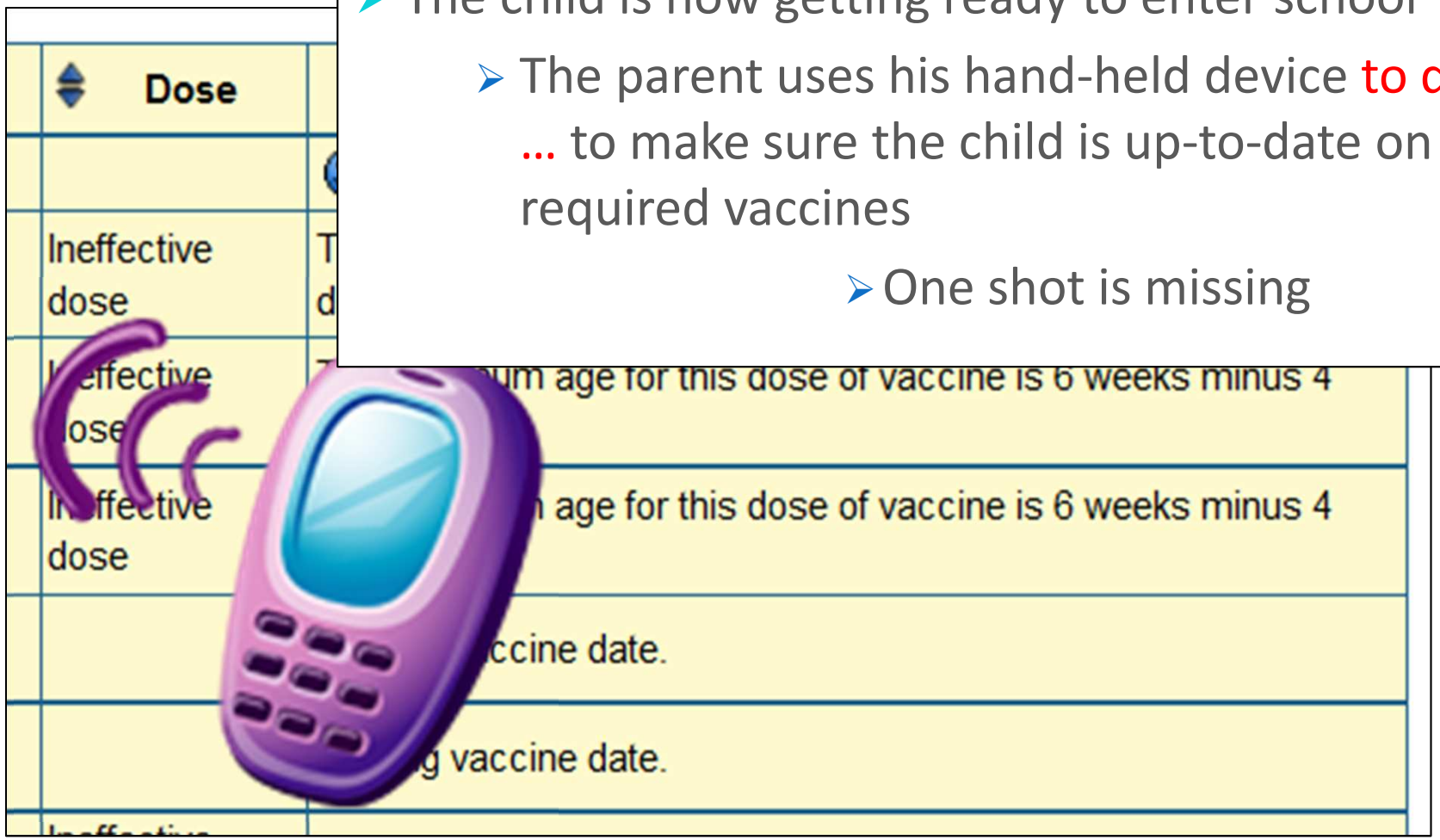
  same complete record the parent saw

- The provider reviews the immunizations and administers vaccines
- The provider records the new immunizations
- The EHR updates public health

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 query … to make sure the child is up-to-date on required vaccines
    - One shot is missing

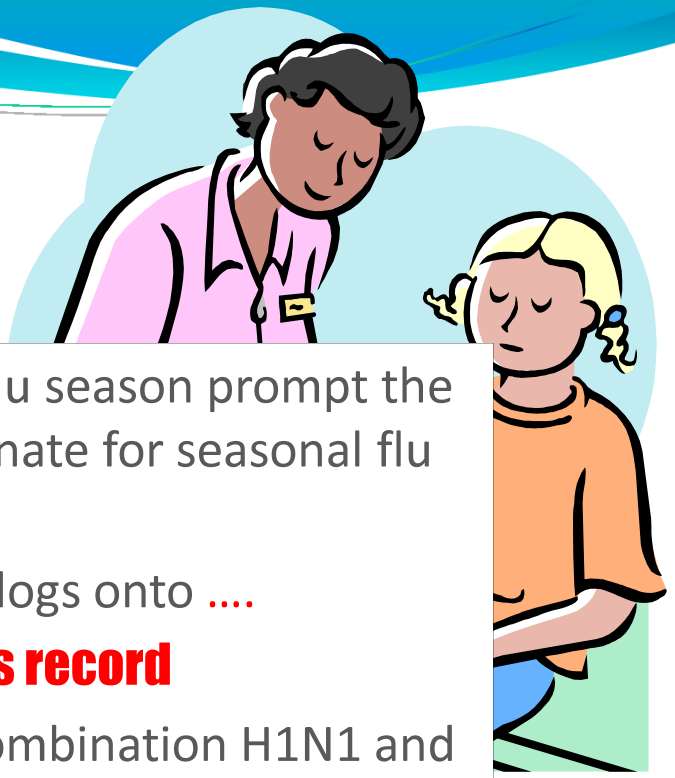


Ideal World

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

- The clinic EHR retrieves the child's records
  - … including the **vaccines recorded by other providers as well as his complete medical history, including any vaccine contraindications or precautions**
  - …reviews the child's records
  - …administers vaccines
  - …records the new vaccine
  - The EHR updates public health

Ideal World



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

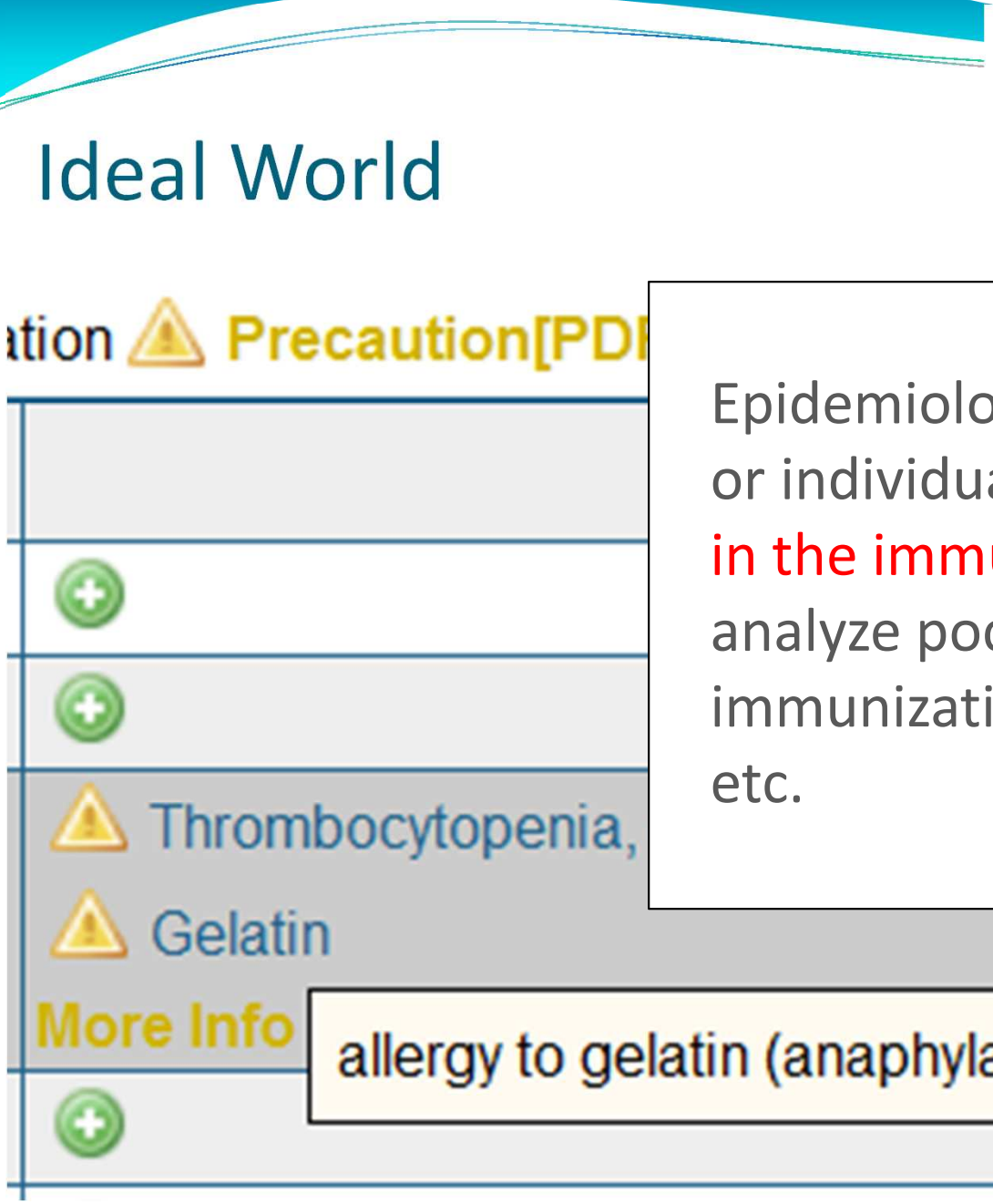
- The school nurse logs onto ….
- …**views the child's record**
- …administers a combination H1N1 and seasonal flu vaccine, and….
- …records the shot in ….

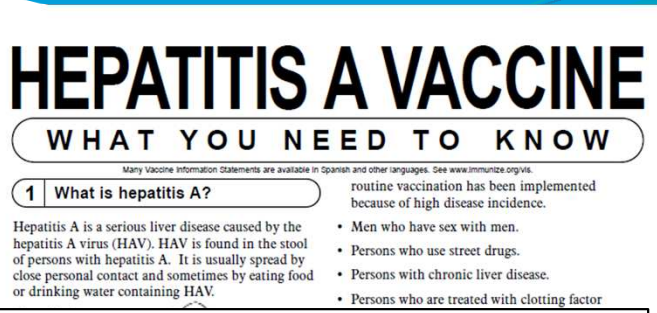
2 vaccines recomme

Vaccine		
Influenza		
H1N1 influenza		
Tdap		
MCV4		Aug 07, 2012
HPV, quadrivalent		Aug 07, 2012

1. **VIS**: Vaccine Information Statements are documents produced by the CDC and req
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/vis.

1 What is hepatitis A?

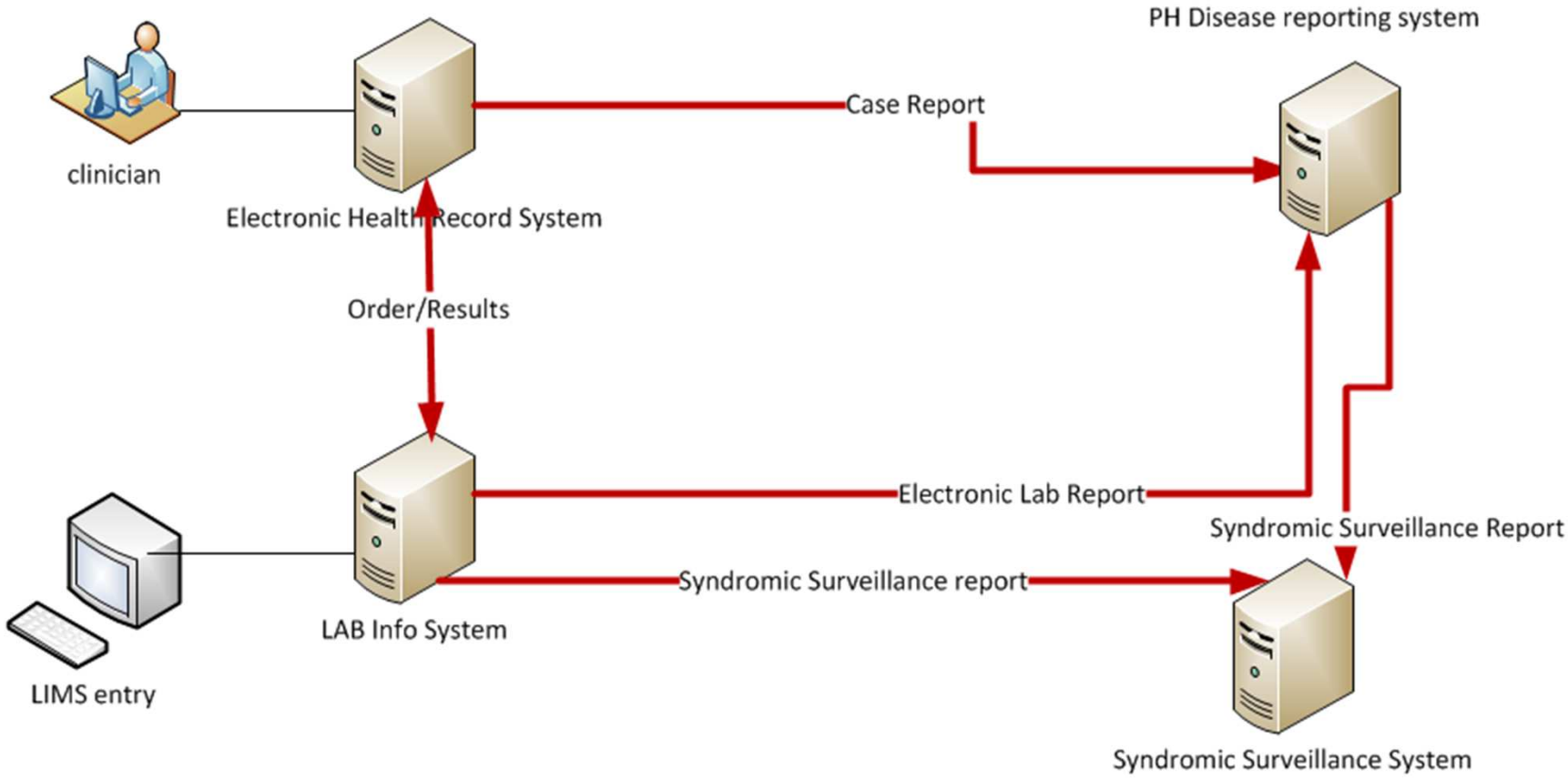
Hepatitis A is a serious liver disease caused by the hepatitis A virus (HAV). HAV is found in the stool of persons with hepatitis A. It is usually spread by close personal contact and sometimes by eating food or drinking water containing HAV.

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

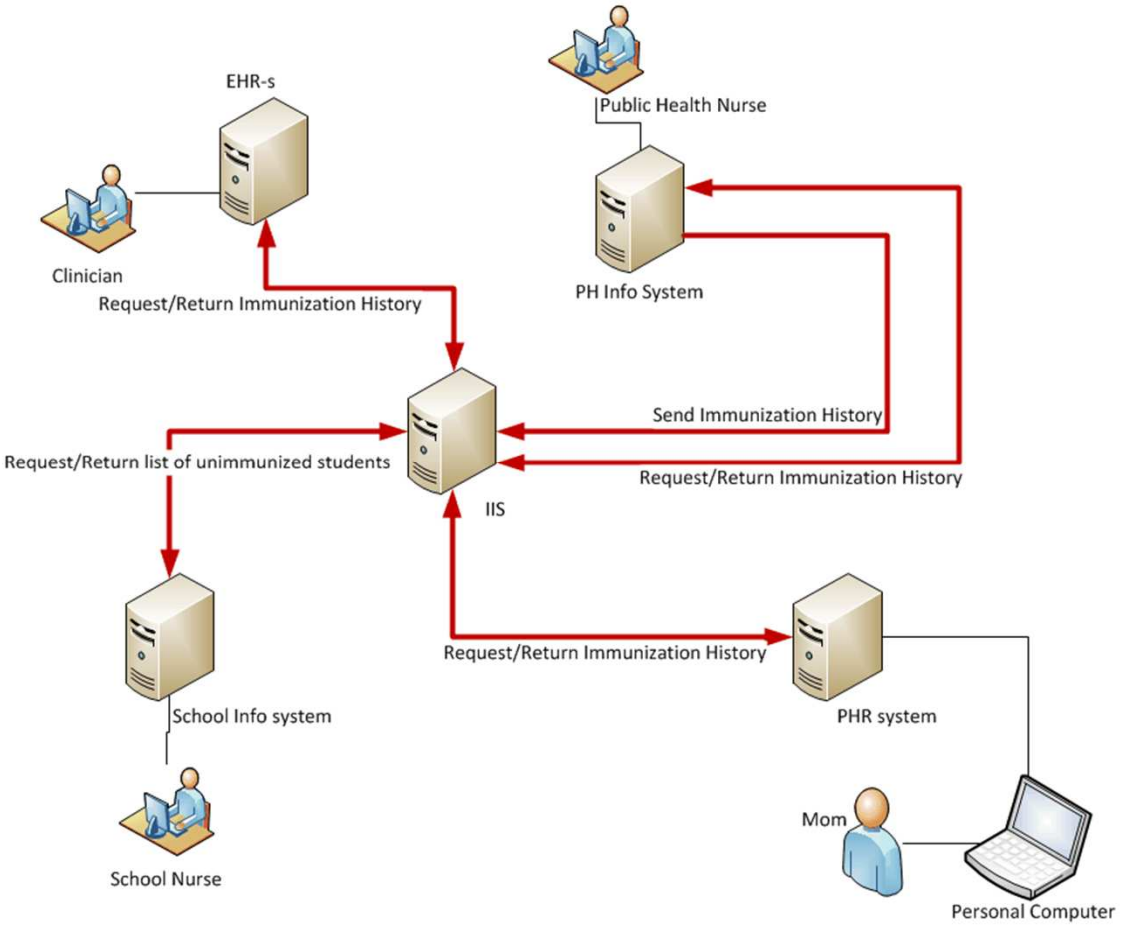
Epidemiologist views population or individual immunization data in the immunization registry to analyze pockets of under-immunization, adverse events, etc.

Reporting a Case of Measles*



*source: HL7 Public Health and Emergency Response ambassador presentation

Case Follow-up Interactions*



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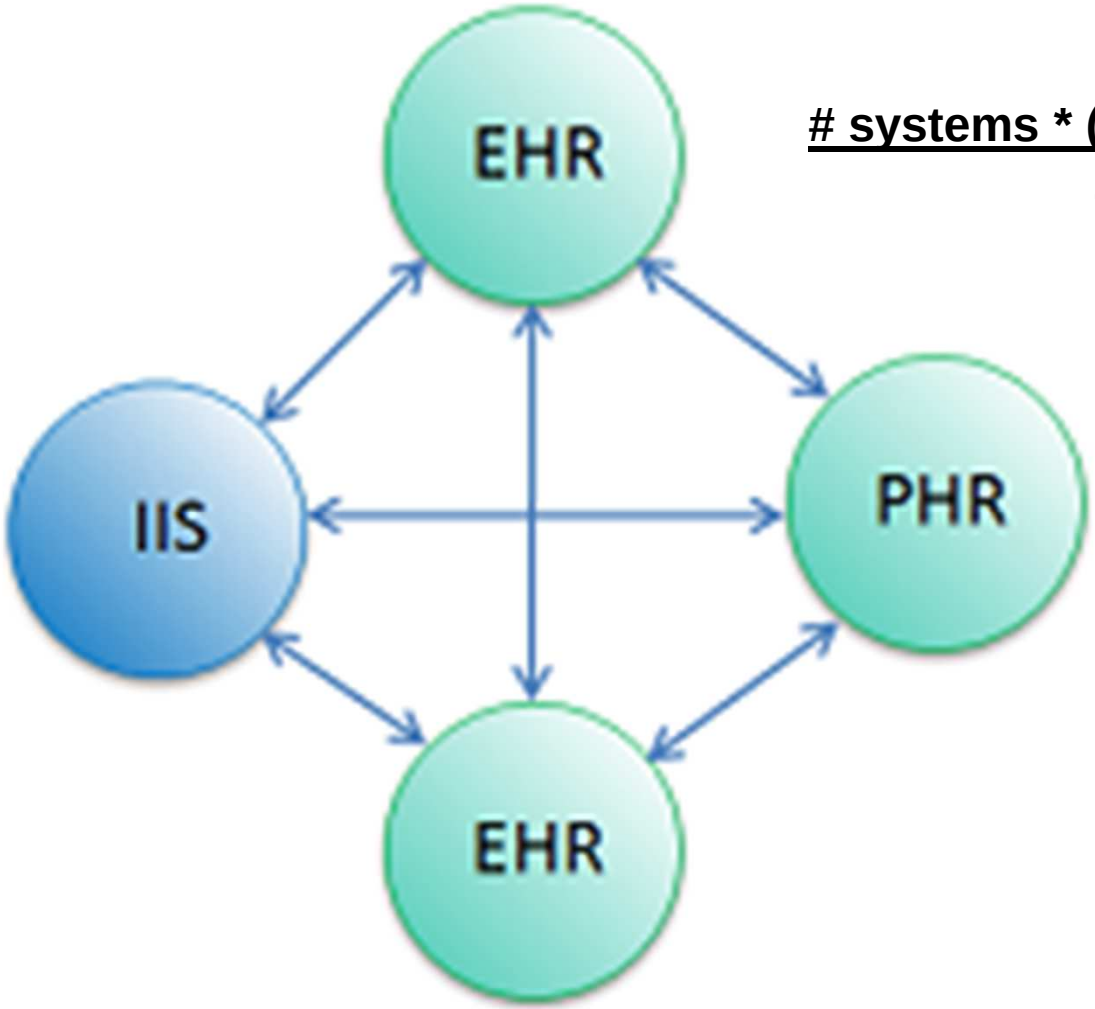
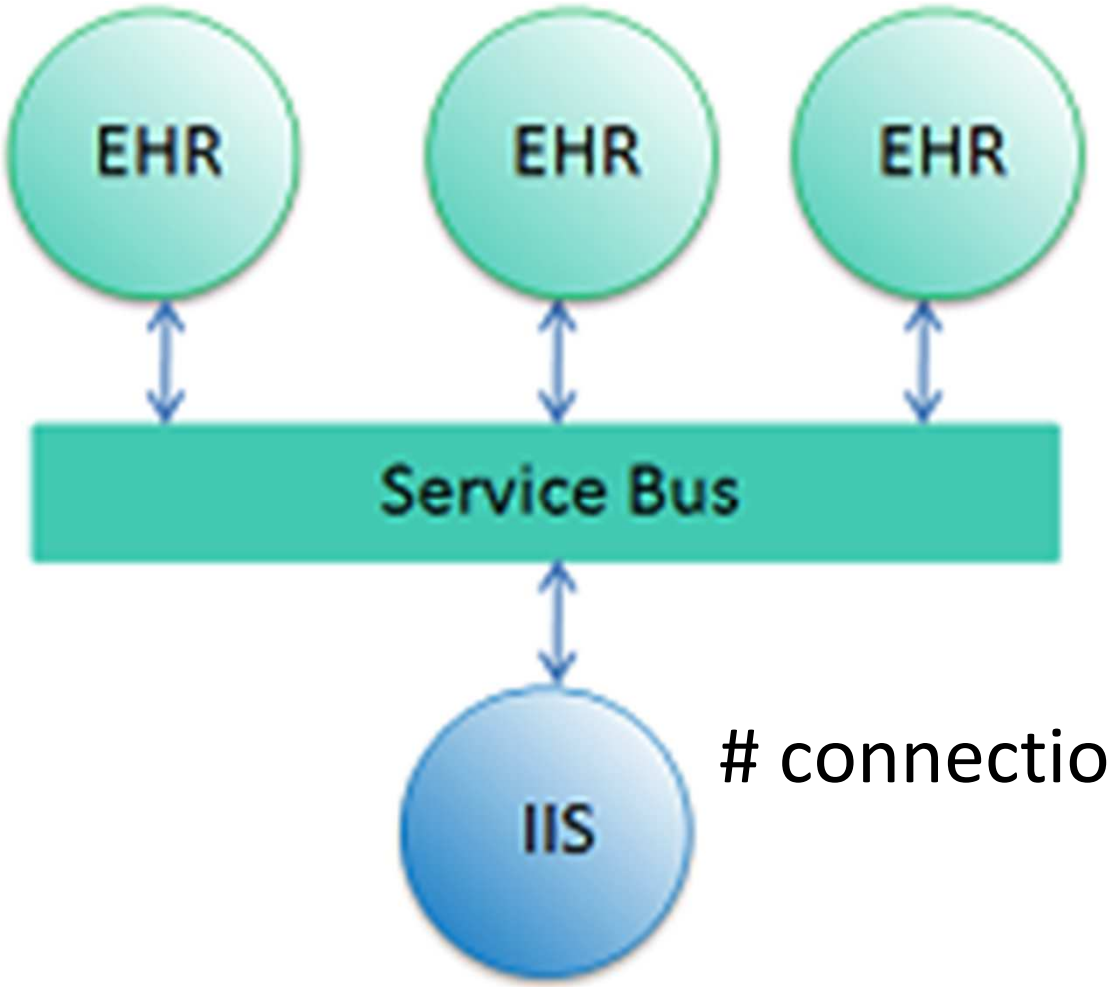
Point-to-point model



$$\frac{\#\text{ systems} * (\#\text{ systems} - 1)}{2}$$

Sustainability: Promise of SOA



connections * # services

Sustainability: Canada Health Infoway

- Estimated point-to-point cost of connecting 40,000 systems to be 184 T $CDN

Sustainability: Canada Health Infoway

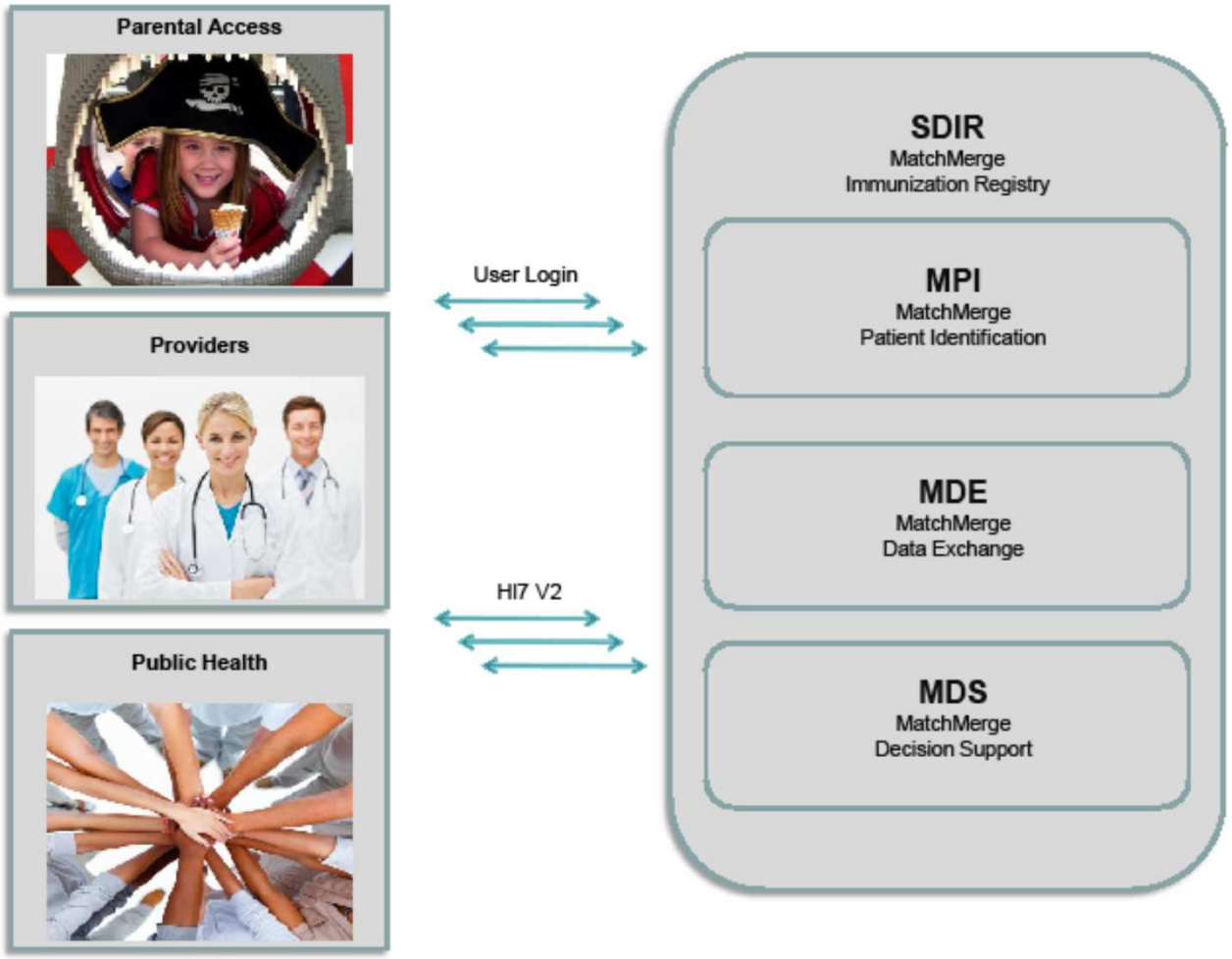
- Estimated SOA cost of connecting 20,000 integration points to be 2.2 B $CDN

Point-Point Messaging Will Never Work

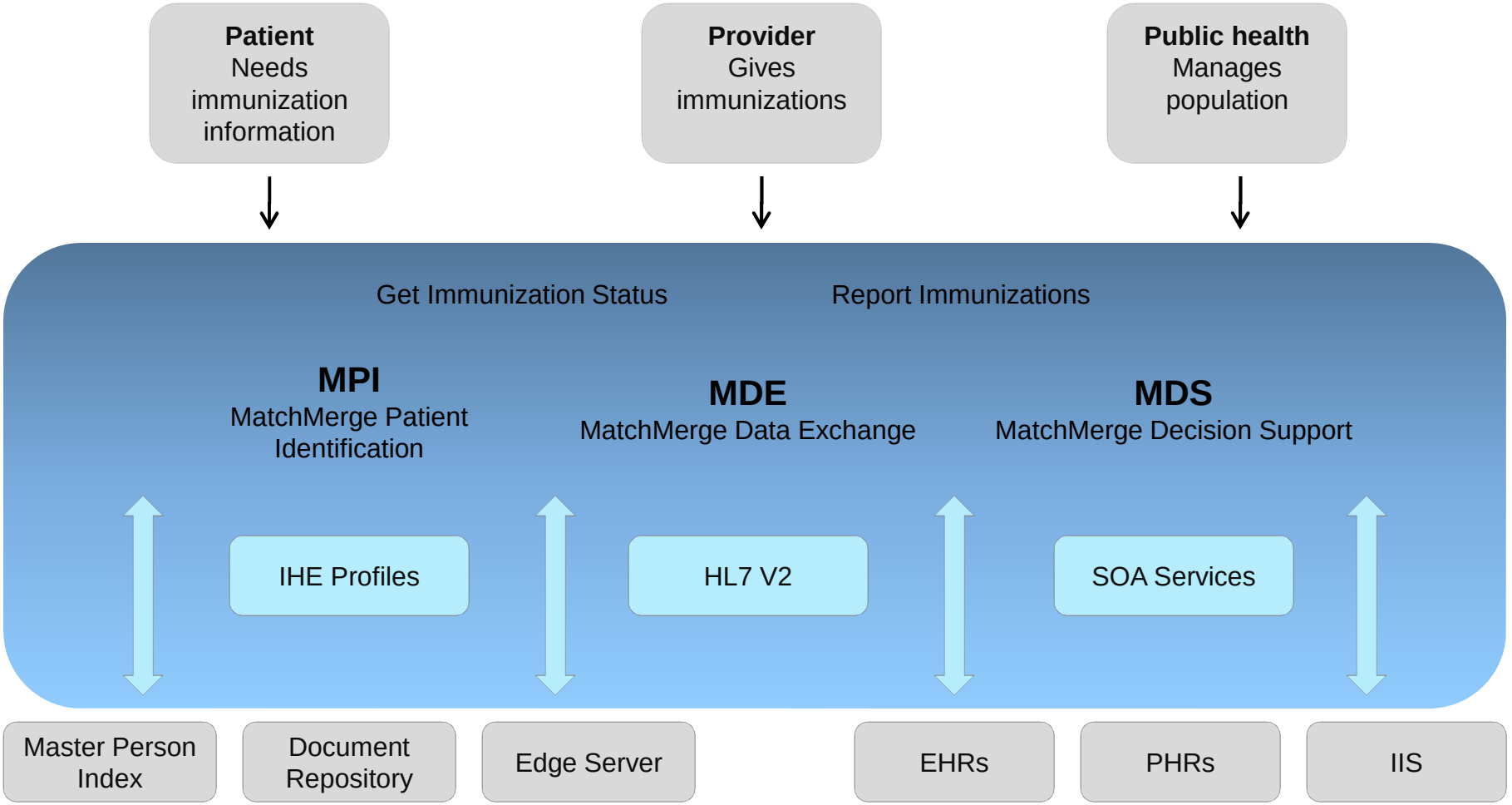
- Approximately 75 U.S. Immunization Information Systems (IISs)
- Completely connected point-to-point IIS network: 74 * 75 / 2 = 2775 connections
- Assume 200 regional provider EHRs per IIS:

  200 * 75 = 15,000 connections
- Each connection costs $10K-$30K per side
- $40K each * 17,775 =$711,000,000

San Diego model



Immunization Registry Services Reconfigured as HIE Gateway



Health Information Exchange

Immunization Standards & MU

#	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 Implemen-tation Guide		2.5 Implemen-tation Guide				
9	**Interoperability Layer**	2.3.1 Implemen-tation Guide		2.3.1 Implemen-tation 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

HIMSS 2011-IHE Interoperability Showcase

Public Health-Immunization Registry Updating and Utilization Scenario

The 4-year-old patient and the parent visit the provider, who uses an EHR system.

The EHR queries the HIE using IHE's PIX and XDS profiles.

The provider reviews the immunizations and the vaccine recommendation.

The provider administers vaccines and enters the records into his EHR.

1. Patient and Primary Care Provider

EHR sends a CDA document to the HIE Immunization Gateway

The Immunization Gateway creates a comprehensive Immunization Content Document.

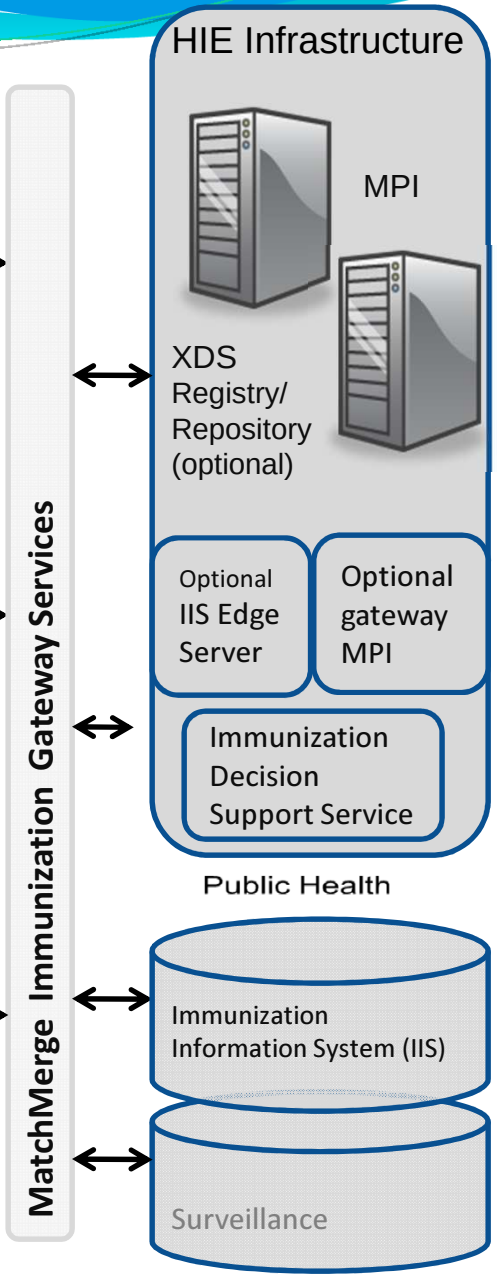
The Gateway simultaneously updates the immunization registry (IIS) using HL7 Version 2, and the surveillance system using XDR.

2. Public Health and HIE

In getting the child ready for school, the parent uses notices from his PHR that one vaccine is missing. In a rush, the parent makes an appointment at a different clinic.

The provider's EHR repeats the process of Step 1 above, getting the up-to-date vaccines from the previous provider, and the up-to-date recommendation.

3. Patient and Primary Care Provider



Handout provided by: ***Software Partners LLC http://www.swpartners.com***

For more information please contact Alean Kirnak (akirnak@swpartners.com)

Immunization Content CCD

Software Partners LLC Immunization Registry

MARK MAROSTICA - Immunization Content

Document Information

Detail:

Title: Immunization Content

Description: History of immunization *(11369-6 LOINC)*

Effective Date: Tuesday, February 22, 2011 at 10:22 :23 am

Patient Information

Patient Detail

Name: MARK MAROSTICA

Address: 216 Woodland Ave
Atlanta, GA 31146
USA

Home :

Patient Number: 12342234

Date of Birth: Tuesday, February 21, 2006 at 12:00 :00 am

Gender: Male

Language:

Immunizations

Name	CVX Code	Date Admin	Dose #	Mfg Code	Lot Number	Route	Site
			POLIO				
IPV	10	04/04/2006	1	PMC	abc10PMCswp	SC	LA
IPV	10	06/04/2006	2	PMC	abc10PMCswp	SC	LA
IPV	10	08/04/2006	3	PMC	abc10PMCswp	SC	LA
IPV	10	02/22/2010	4	NE	1231232	IM	LG
			DTP				
DTaP	20	04/04/2006	1	SKB	abc20SKBswp	IM	LD
DTaP	20	06/04/2006	2	SKB	abc20SKBswp	IM	LD
DTaP	20	08/04/2006	3	SKB	abc20SKBswp	IM	LD
DTaP	20	02/21/2007	4	SKB	abc20SKBswp	IM	LD
DTaP	20	02/22/2010	5	NE	12938172	IM	LA
			MMR				
MMR	3	02/21/2007	1	MSD	abc3MSDswp	SC	RA
MMR	3	02/21/2010	2	NE	128198	IM	RA

Software Partners LLC Immunization Registry

			HIB				
Hib	17	04/04/2006	1	PMC	abc17PMCswp	IM	RVL
Hib	17	06/04/2006	2	PMC	abc17PMCswp	IM	RVL
Hib	17	08/04/2006	3	PMC	abc17PMCswp	IM	RVL
Hib	17	02/21/2007	4	PMC	abc17PMCswp	IM	RVL
			HEP B				
Hep B-adol or ped	8	02/21/2006	1	SKB	abc8SKBswp	IM	LD
Hep B-adol or ped	8	03/21/2006	2	SKB	abc8SKBswp	IM	LD
Hep B-adol or ped	8	08/08/2006	3	SKB	abc8SKBswp	IM	LD
			VARIC				
Varicella	21	02/21/2007	1	MSD	abc21MSDswp	SC	LA
			HEP A				
Hep A-child	31	02/21/2007	1	MSD	abc31MSDswp	IM	LD
Hep A-child	31	08/21/2007	2	MSD	abc31MSDswp	IM	LD
			PNEUMO				
PCV 7	100	04/04/2006	1	WAL	abc37WALswp	IM	RVL
PCV 7	100	06/04/2006	2	WAL	abc37WALswp	IM	RVL
PCV 7	100	08/04/2006	3	WAL	abc37WALswp	IM	RVL
PCV 7	100	02/21/2007	4	WAL	abc37WALswp	IM	RVL

Care Plan

Name	CVX Code	Min Date	Max Date	Dose #
Varicella	21	03/21/2010	02/20/2066	2
Tdap	115	02/21/2017	02/20/2071	1
MCV4	114	02/21/2017	02/20/2025	1
Zoster (shingles)	121	02/21/2066	02/21/2106	1

Benefits

- Decision support
- Integrated healthcare information
- Better outcomes
- Sustainability

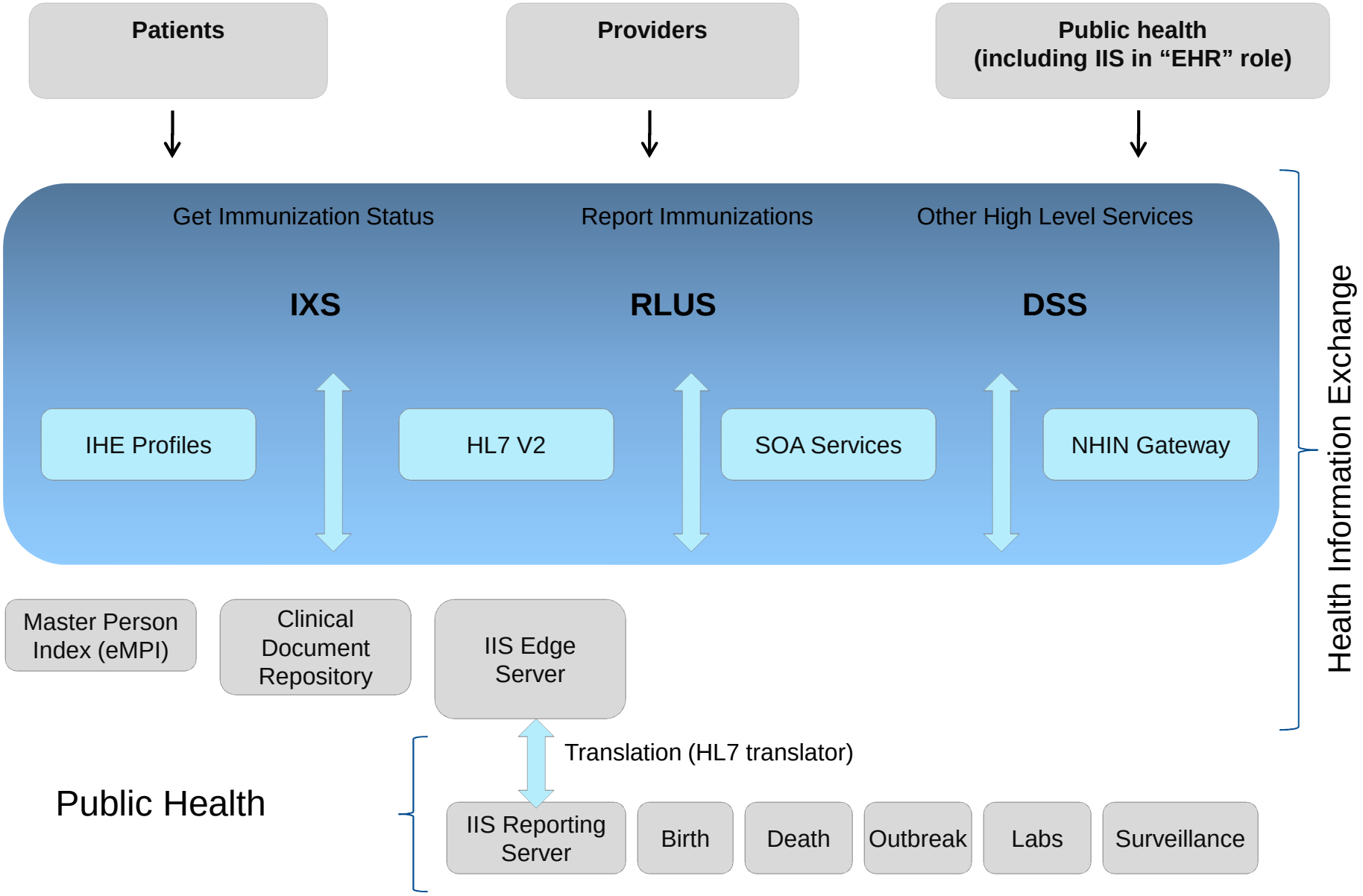
Leveraging Meaningful Use

- Options for stakeholders:
  - Submit “VXU” – HL7 V2 messages
  - Pull data out of CDA (“C32” or Immunization Content) document
  - Any other method of submission that can be translated into a VXU for reporting to immunization registries

Leveraging Meaningful Use

- More provider options
- Creates a single pipe from HIE to any registry
- Leverages EHR Meaningful Use compliance (VXU) of HIE product
- Sufficient for creating HIE immunization “edge server” provided registries also send hand-entered data to HIE
- Edge server responds to provider requests

Immunization Registry SOA Design



Reporting Options

- Separate reporting and OLTP servers
- San Diego found 50% reduction in CPU usage and disk reads by creating separate reporting server
- An immunization registry reporting server mirrors the immunization registry edge server

EHR Role of immunization registries

- Immunization registry plays the same role as any other EHR in the HIE
- Creates opportunity to separate “EHR” role entirely

Large Uploads and HL7

- HL7 and Non-HL7 batches are translated into HL7 to send to immunization registries (by batch or as single messages)

Routing opportunities

- San Diego found that in-migration doubles the size of a patient database in a single age band in 18 years
- Complete immunization histories are dependent upon national (and international) routing

Cell Phones and Beyond

- Let individuals read immunization data from HIE edge server and save it in a PHR
- Track contraindications and precautions indicated by complete medical record elements
- Cell phone application for patients to enter IZ data
- Multiple schedule options for patients
- Coordinate with surveillance to make vaccine policy responsive to outbreaks

Summary

- SOA + immunization registries is a powerful combination
- SOA approach gets orders of magnitude better ROI
- With better information, we can tackle the challenge of better overall care, for….

Happy People!!!

And happy lizards!!!

Thank you!

Alean Kirnak

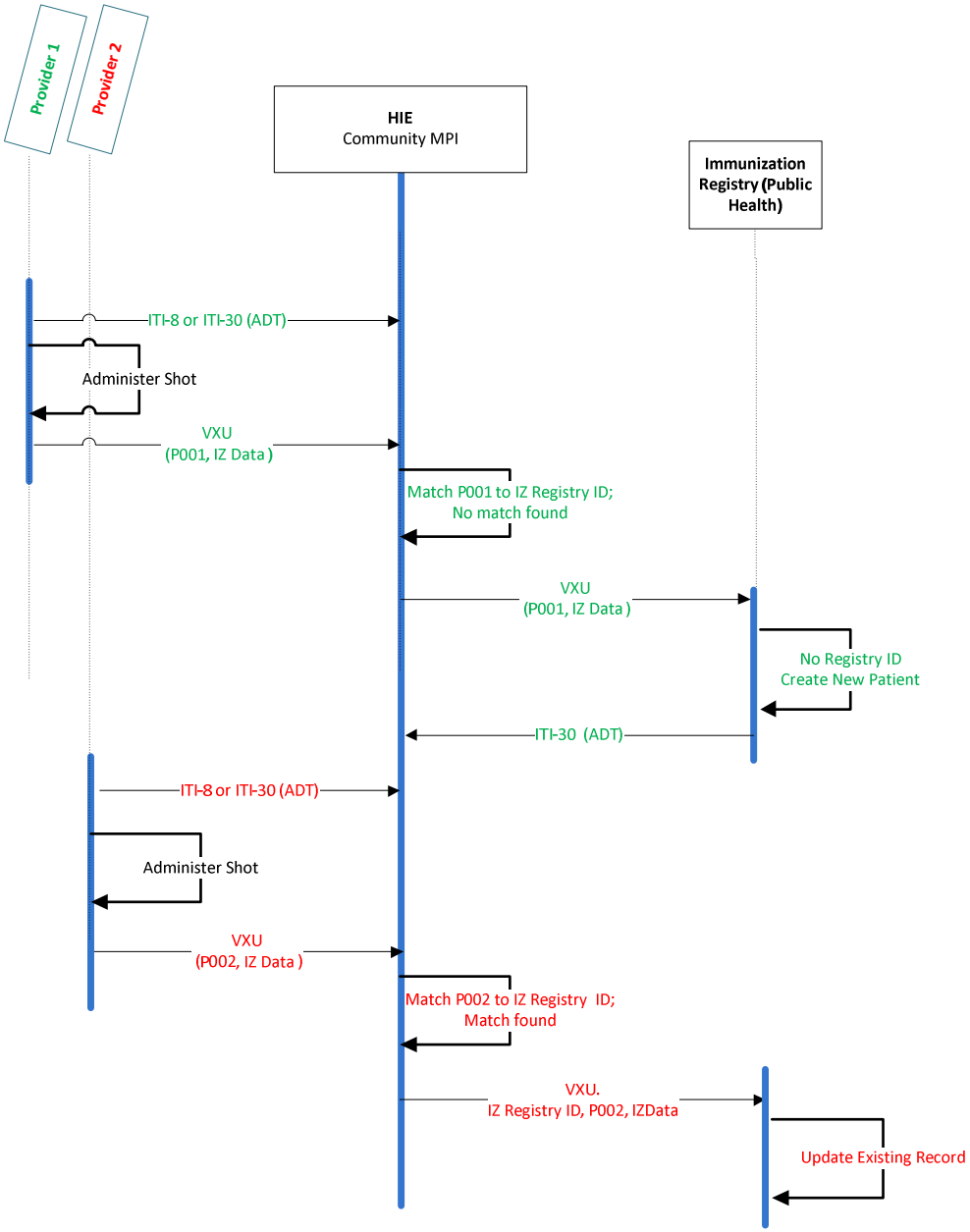
Software Partners LLC

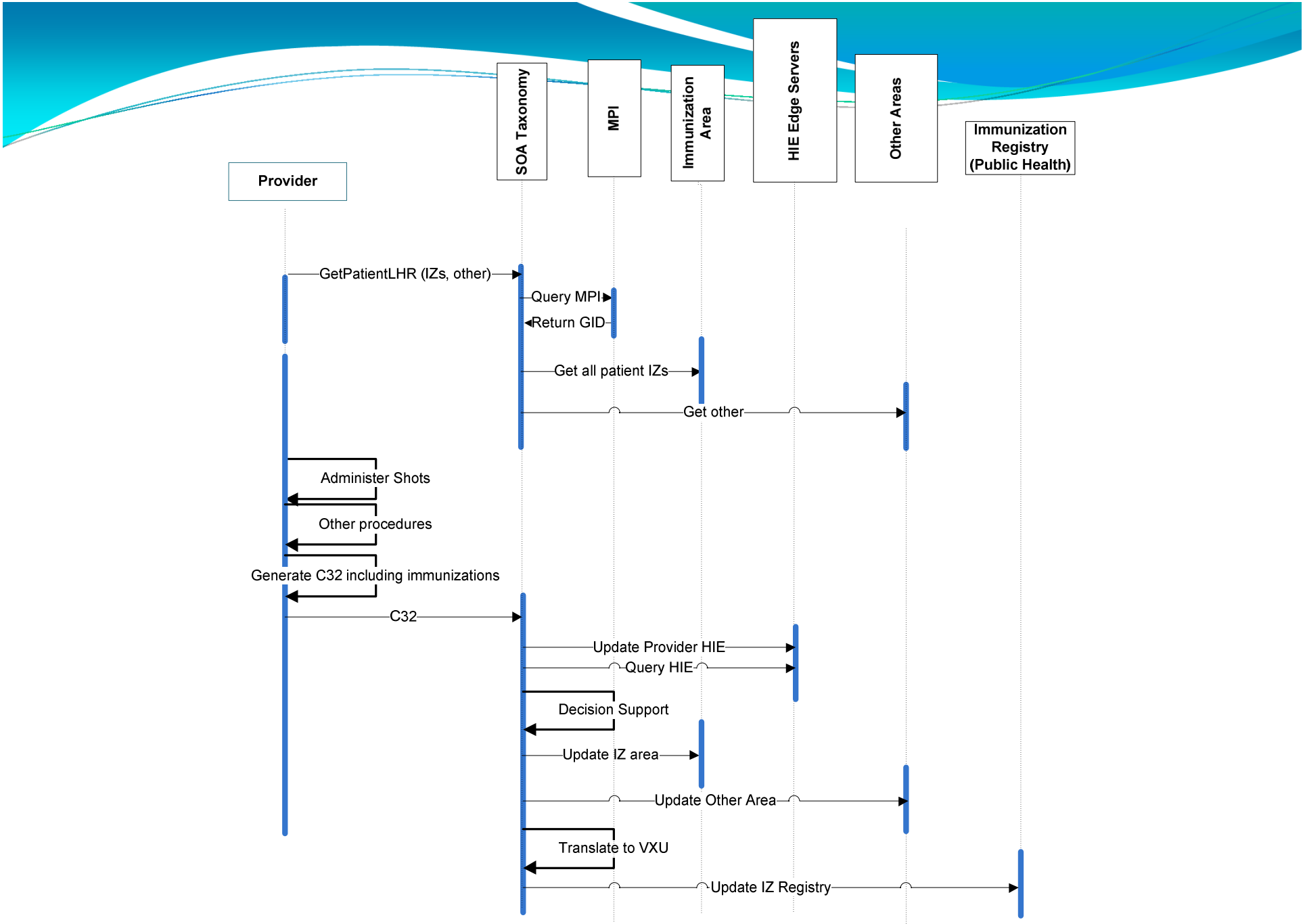
akirnak@swpartners.com

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




Provider
SOA Taxonomy
MPI
Immunization Area
HIE Edge Servers
Other Areas
Immunization Registry (Public Health)
GetPatientLHR (IZs, other)
Query MPI
Return GID
Get all patient IZs
Get other
Administer Shots
Other procedures
Generate C32 including immunizations
C32
Update Provider HIE
Query HIE
Decision Support
Update IZ area
Update Other Area
Translate to VXU
Update IZ Registry