

PHIX: Public Health Information eXchange

Objectives and Architecture Overview



Office of Surveillance, Epidemiology, and Laboratory Services

Public Health Laboratory Interoperability Solutions and Solution Architecture



PHLISSA Project Objectives

- Standards-based architecture and platform to support full interoperability among public and clinical health labs and healthcare providers
- PHIX (previously PHLISSA Hub) in development environment for demonstration purposes
 - EHR meaningful use, ELR, Immunization & Syndromic Surveillance
- PHLISSA ETOR (Electronic Test Order and Result) will be limited use production pilot involving PH labs and CDC OID Salmonella lab



PHIX Intended Goals

- Maximize prevention using Health Information Exchange and HIT
- Increase Informatics capability of public health agencies
- Create opportunities for leveraging the project
 - Develop the Core PHIX using open architecture components
 - Consider reuse of existing CDC components where available
 - Leverage shared experiences with existing teams where possible
- Support ARRA Meaningful Use
 - Improve population and public health
 - Improve quality, safety, efficiency and reducing health disparities
 - Improve care coordination
- Foster and share new knowledge in public health informatics
 - Evaluate “best” technologies for common HIE services
 - Create PHIX white papers and PHI demos



Messaging Standards – PHIX

Standards, Implementation Guides, and Vocabulary

Public Health Lab Interoperability Project (PHLIP) Electronic Test Order (ETOR)

HL7 v2.6 OML^O33

PHLIP ETOR Application Order Acknowledgement

HL7 v2.6 ACK^O33

PHLIP Electronic Laboratory Surveillance Message (ELSM)

HL7 v2.3.1 ORU^R01

PHLIP Electronic Test Result

HL7 v2.6 OUL^R22

HL7 Electronic Laboratory Reporting to Public Health Implementation Guide

HL7 V2.5.1 ORU^R01

HITSP IS01

HL7 v2.5.1 ORU^R01

HL7 Version 2.5.1

Implementation Guide for Immunization Messaging

ISDS - Core Processes and EHR Requirements for Public Health Syndromic Surveillance

HL7 Version 2.5.1

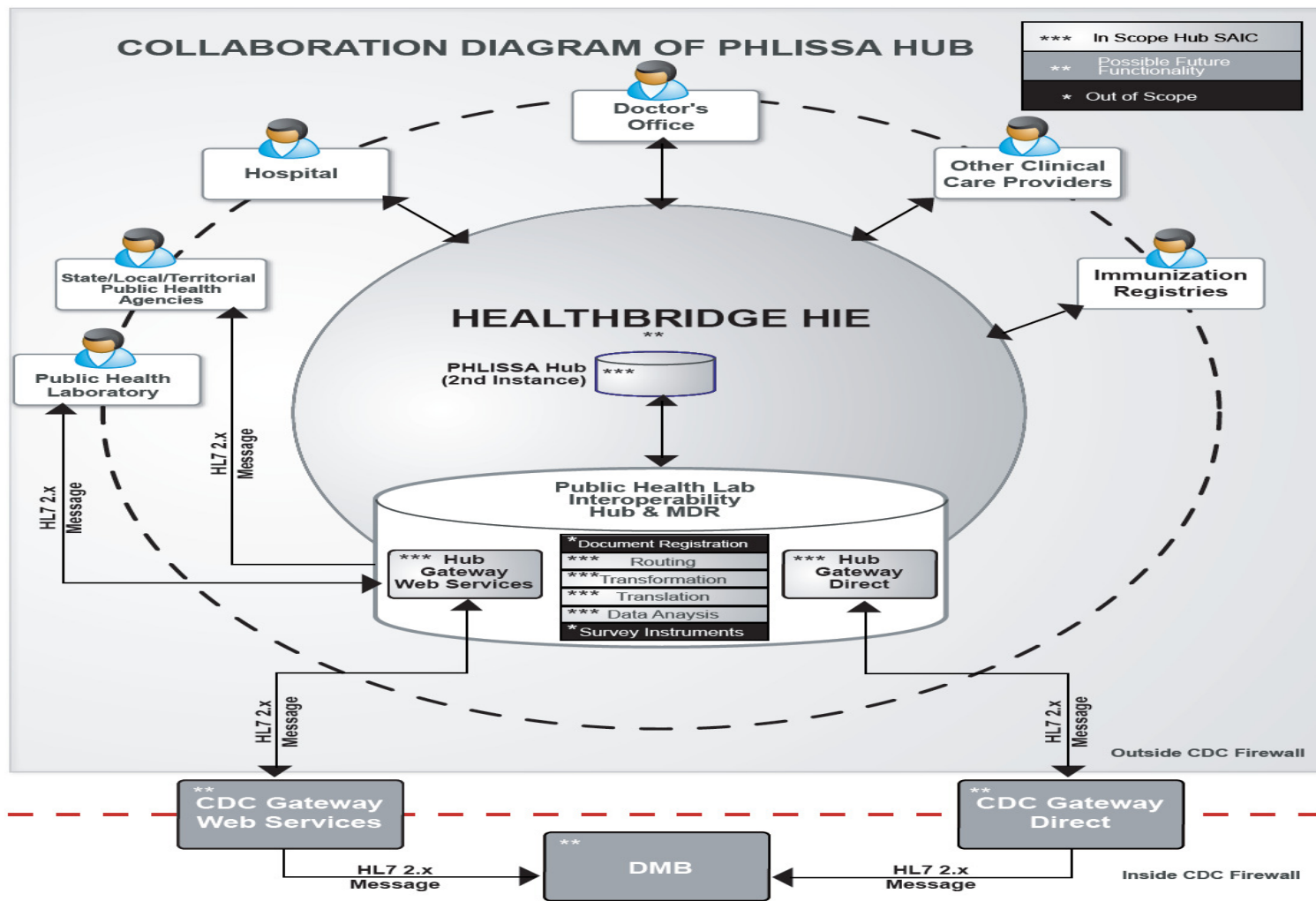
National vocabulary standards that support the above mentioned standards



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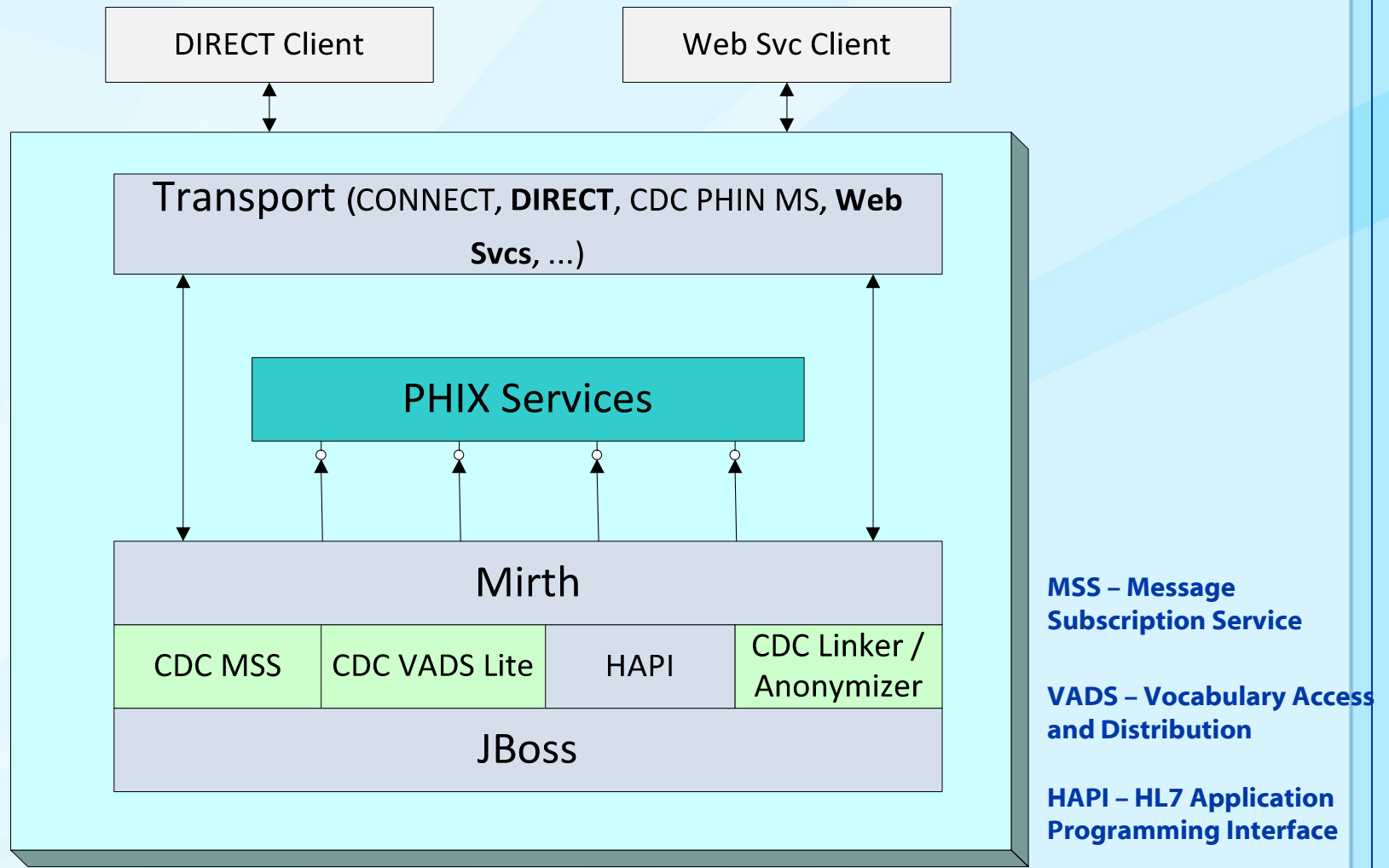
Collaboration Diagram - PHIX



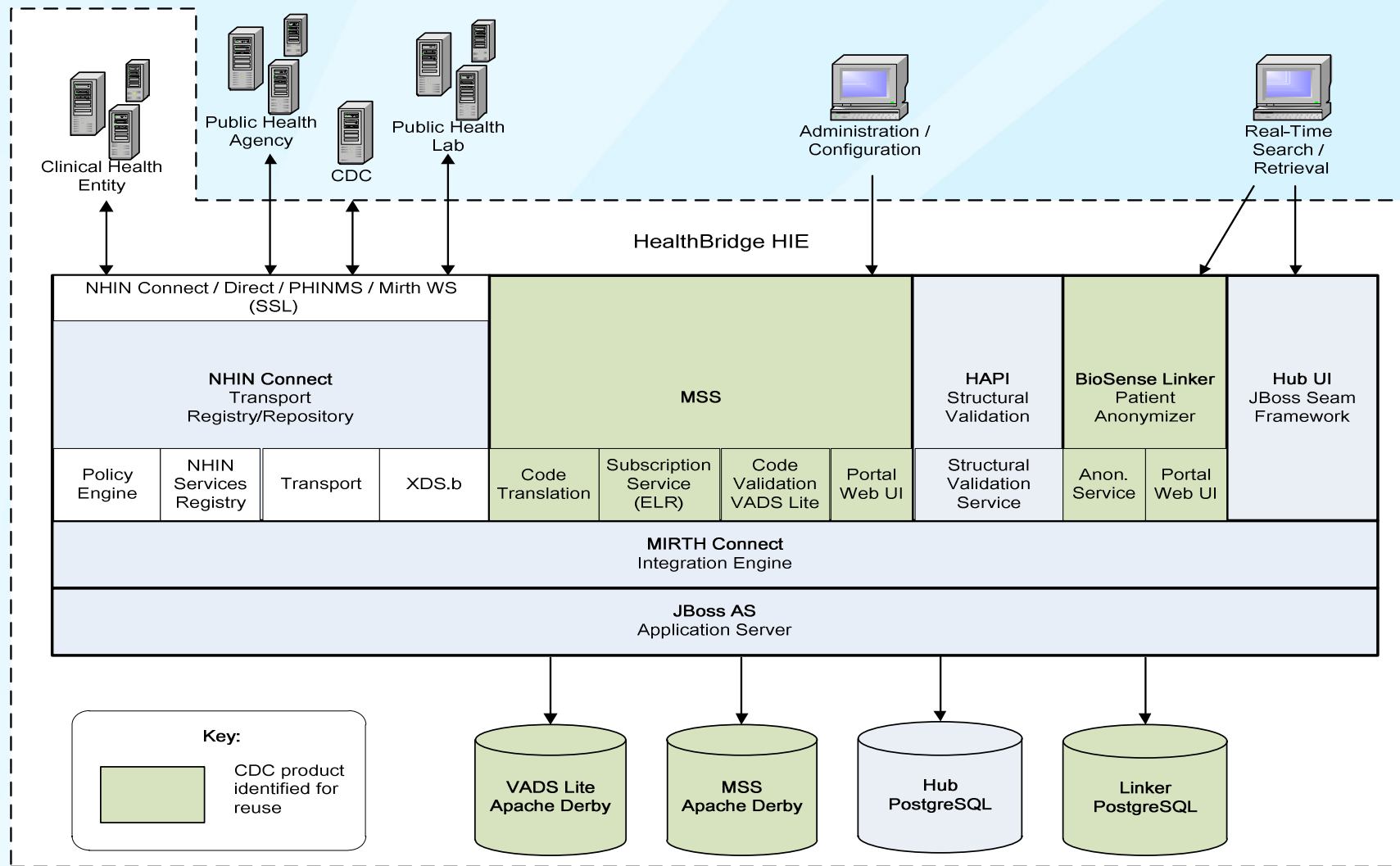
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PHIX Architecture Overview



PHIX Architecture Diagram



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PHIX – Components

PHIX – Mirth integration engine consuming a collection of discrete internal web services to validate, transform, translate, and produce notifications for HL7 messages.

Anonymizer/Linker- Stores patient identifiable data in a secure database, generates a key required for later re-identification and retrieval, and erases patient identifiable data from outgoing messages. Solution includes a secure web portal for later re-identification. Source: BioSense, with Mirth custom configuration and PostgreSQL database port by PHIX team.

Code Translation Service – Augments localized vocabulary with standardized vocabulary (e.g., LOINC, SNOMED, CVX). Source: MSS (Apache Derby database port).

Code Validation Service- Uses VADS Lite version of PHINVADS to determine validity of fields containing standardized vocabulary (e.g., LOINC, SNOMED, CVX). Source: MSS (Apache Derby database port), VADS Lite (Apache Derby port).

Component Routing Service - Determines routing and which components will be called based on message type, trigger event, HL7 version, and sending and receiving organizations. Configuration information stored in the PHIX PostgreSQL database, but accessed by Mirth via web service calls during runtime message processing. Transport-agnostic component that was custom developed for the PHIX.



PHIX – Components (cont.)

Email notification- Utilizes Mirth to send automated responses to preconfigured recipients when notifiable conditions are detected. PHIX custom component.

Runtime Translation – Mirth based field-to-field copying and segment additions based on differences between source and destination message versions. PHIX custom component.

Subscription Service- Evaluates specified files containing numeric, textual, or coded results for conditions that are considered “notifiable” and therefore require public health notification. Source: MSS (Apache Derby database port).

Structural Validation Service- Uses HAPI to determine structural validity based on an HL7 message and a constrained conformance profile. PHIX custom component.



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Vocabulary Translation

- Performs code translation tasks to allow mapping between vocabularies
- Mapping of local codes to standard

Vocabulary Management

All Mapped Codes

Mapped Codes						
From Facility ↕	From CodeSystem Name ↕	From Code ↕	From Code Description ↕	To Code System ↕	To Code ↕	To Code Description ↕
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
13D34567	L	GENCU	GENITAL CULTURE	LOINC	10352-3	Bacteria Genital Aerobe Cult
13D34567	L	GYNSU	GYN SURGICAL CULTURE	LOINC	21020-3	Bacteria XXX Anaerobe+Aerobe Cult
13D34567	L	SURG	SURGICAL CULTURE	LOINC	21020-3	Bacteria XXX Anaerobe+Aerobe Cult
13D34567	L	MISCC	MISC OTHER CULTURE	LOINC	6463-4	Bacteria XXX Cult
13D34567	L	MOUT	MOUTH CULTURE	LOINC	32355-0	Bacteria XXX Resp Cult
13D34567	L	TONG	TONGUE CULTURE	LOINC	32355-0	Bacteria XXX Resp Cult
13D34567	L	NOSEC	NARE CULTURE	LOINC	10353-1	Bacteria Nose Aerobe Cult
13D34567	L	PDIAC	PERITONEAL DIALYSIS CULTURE	LOINC	9822-8	Bacteria Dial fld Cult
13D34567	L	SKINC	SKIN CULTURE	LOINC	620-5	Bacteria Skin Aerobe Cult
13D34567	L	SPTC	SPUTUM CULTURE	LOINC	6460-0	Bacteria Spt Cult



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Vocabulary Validation

- Performs field-level validation tasks
- Validate message elements against a code systems and/or a value sets maintained by PHIN VADS

MSS Dashboard

Message Validation Service

Subscriptions

Validations

- [Update Validation Service](#)
- Validation**
 - [Profiles](#)
 - Vocabulary**
 - [All CodeSystems](#)
 - [Facilities](#)
 - Map Field To XPath**
 - [Profiles](#)
 - Map Field to Code System**
 - [Profiles](#)
 - Map Field to Value Set**
 - [Profiles](#)
 - Map CodeSet to OID**

Translations

System Configuration

Validation Management

Map field to Code System Keys for Profile: phlissa-cs

[Create](#) [Delete](#)

Profiles				
	Name ↕	Value ↕	Field Name ↕	Code System Name ↕
<input type="checkbox"/>	RXA-5.1	2.16.840.1.113883.12.292	Administered Code	CVX
<input type="checkbox"/>	OBX-3.1	2.16.840.1.113883.6.1	Observation Identifier	LOINC

[Create](#) [Delete](#)



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Vocabulary Subscription

- Performs message routing tasks based on criteria specified to direct when and where messages are delivered
- Set up Notifiable Conditions criteria for Coded values

MSS Dashboard

Message Validation Service

Subscriptions

Subscription Management

Subscribers

- Salmonellosis Program Area
- Hepatitis C Program Area
- Influenza Program Area
- ADT Program Area
- Immunization Program Area
- ETOR Program Area

Validations

Translations

System Configuration

Subscription Management

Criteria for Subscription: SAL Blood by Culture_1

Description: SAL Blood by Culture (LN: 600-7)

Create Delete

Criteria					
	Condition ↕	Occurrence ↕	Operator ↕	Value ↕	Actions
<input type="checkbox"/>	ORUR01 Lab Test (OBX.3)	Standard Code (CE.1)	Equals	600-7	✕
<input type="checkbox"/>	ORUR01 Lab Test Result (OBX.5)	Standard Code (CE.1)	Equals	5595000	✕

Create Delete



Notifiable Condition Email Notification

- *An email alert is triggered for results that are identified as a Notifiable Condition*
- *This email can be tailored based on requirements of details to be reported*

Email Contents:

From: administrator@dejongp.us.saic.com [mailto:administrator@dejongp.us.saic.com]

Sent: Friday, June 17, 2011 9:13 PM

To: Dejong, Paul R.

Subject: PHLISSA Hub- notifiable condition alert

This email notification is being sent to alert you that laboratory test results were received that have met Notifiable Disease Condition criteria and to inform you of the need to initiate Public Case Reporting.

Notification Program: Influenza

Test Code: 6603-5

Test Description: FLUV Throat Cult

Result Code: 442352004

Result Description: Influenza A virus subtype H1N1 (organism)

Placer Order Number (Entity ID): 1105023

Please do not respond to this automated email notification.



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PHIN VADS

Vaccines Administered (CVX) Code System

- Code System OID - 2.16.840.1.113883.12.292
- Code System Code - PH_VaccinesAdministeredCVX_CDC_NIP

The screenshot displays the PHIN VADS web application interface. The browser window title is "Code System Details - Windows Internet Explorer". The address bar shows the URL: <http://phinvads.cdc.gov/vads/ViewCodeSystem.action?id=2.16.840.1.113883.12.292>. The page header includes "PHIN Vocabulary Access and Distribution System (VADS)" and a "CDC" logo. A search bar is visible at the top left of the application area.

Code System Information

- Code System OID:** 2.16.840.1.113883.12.292
- Code System Name:** Vaccines administered (CVX)
- Code System Code:** PH_VaccinesAdministeredCVX_CDC_NIP

Code System Concepts | Code System Details

137 Code System Concepts found

Concept Code	Concept Name	Preferred Concept Name	Code System
82	adenovirus, NOS	adenovirus vaccine, NOS	Vaccines administered (CVX) Details
54	adenovirus, type 4	adenovirus vaccine, type 4, live, oral	Vaccines administered (CVX) Details
55	adenovirus, type 7	adenovirus vaccine, type 7, live, oral	Vaccines administered (CVX) Details
24	anthrax	anthrax vaccine	Vaccines administered (CVX) Details
19	BCG	Bacillus Calmette-Guerin vaccine	Vaccines administered (CVX) Details
27	botulinum antitoxin	botulinum antitoxin	Vaccines administered (CVX) Details
26	cholera	cholera vaccine	Vaccines administered (CVX) Details
29	CMVIG	cytomegalovirus immune globulin, intravenous	Vaccines administered (CVX) Details
56	dengue fever	dengue fever vaccine	Vaccines administered (CVX) Details
12	diphtheria antitoxin	diphtheria antitoxin	Vaccines administered (CVX) Details
28	DT (pediatric)	diphtheria and tetanus toxoids, adsorbed for pediatric use	Vaccines administered (CVX) Details
20	DTaP	diphtheria, tetanus toxoids and acellular pertussis vaccine	Vaccines administered (CVX) Details
106	DTaP, 5 pertussis antigens	diphtheria, tetanus toxoids and acellular pertussis vaccine, 5 pertussis antigens	Vaccines administered (CVX) Details
107	DTaP, NOS	diphtheria, tetanus toxoids and acellular pertussis vaccine, NOS	Vaccines administered (CVX) Details
110	DTaP-Hep B-IPV	DTaP-hepatitis B and poliovirus vaccine	Vaccines administered (CVX) Details



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Demonstration Environment - Configuration

PHIX #1 Environment



**Clinical Care
Stakeholder**



**Internet
Email server**



**Public Health
Lab #2**



**Real-Time
Search /
Retrieval**



**Health Information
Exchange**

PHIX #2 Environment



**State/Local
Public Health
Departments**



**Public Health
Lab #1**



**State
Immunization
Registry**



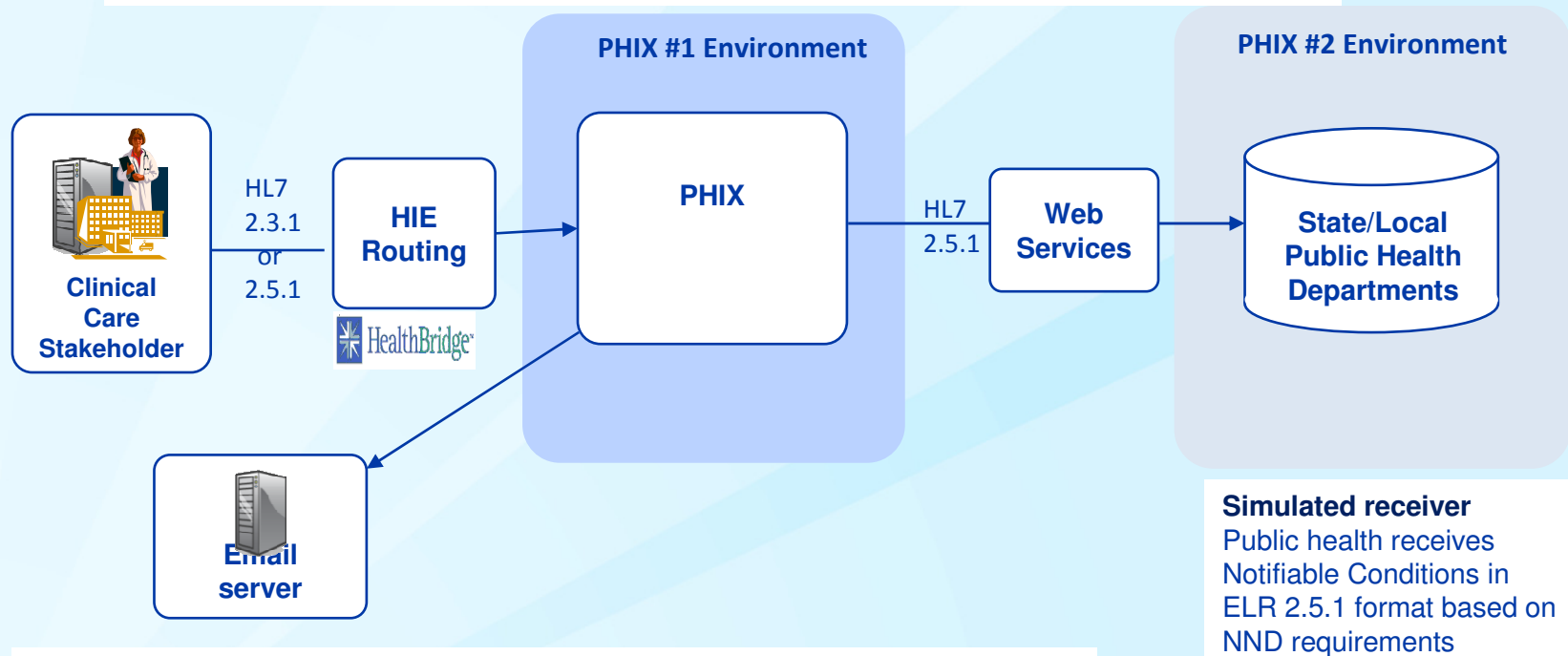
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Scenario 1 – Report Notifiable Laboratory Results

Notifiable Results Reporting

- Define 3 Disease Conditions for demonstration purposes
 - 1) Hepatitis C
 - 2) Influenza (H1N1)
 - 3) Salmonellosis
- Transforming v2.3.1 messages to ELR 2.5.1 format and creates SPM and SFT segments
- NND triggers based on LOINC Codes and various result data
- Public health receives Notifiable Conditions in ELR 2.5.1 format based on NND requirements



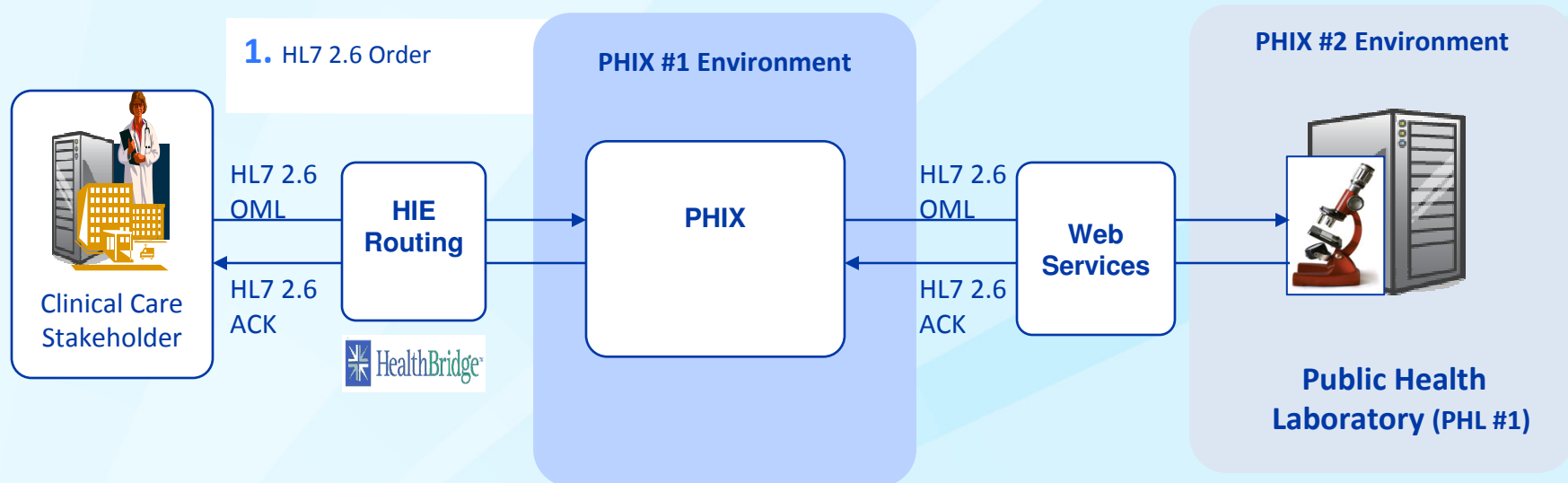
Case Rpt Notification

PHIX provides an email notification indicating that a Notifiable Disease Condition has been detected to serve as a prompt to initiate Case Reporting procedures.



Scenario 2 (parts 1 & 2) – EHR/EMR to PHL Test Order & Result Order

- Send HL7 2.6 OML message to PHL for identification/confirmation of Salmonella organism
- Patient demographics are provided in PID, PV1 and PV2 segments
- MSH Control Id field used to identify ACK message
- PHL provides order Acknowledgement (ACK) to clinical care stakeholder
- Used for validation of initial identification or confirmation of disease condition

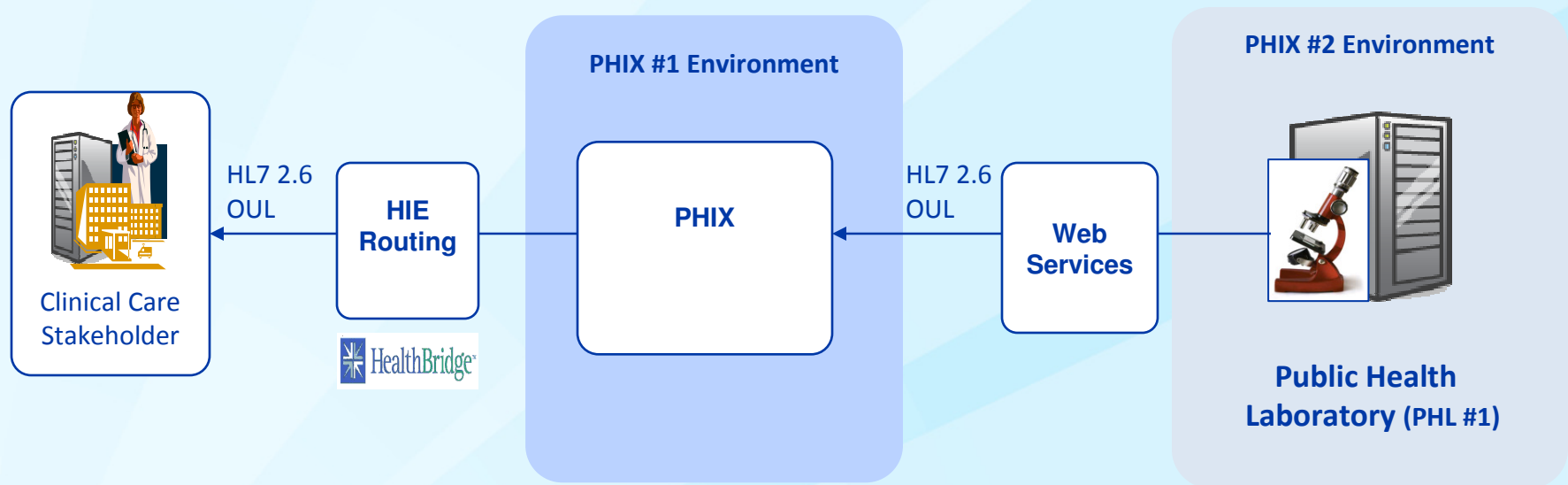


2. HL7 2.6 Acknowledgement from PHL



Scenario 2 (part 3) – EHR/EMR to PHL Test Order & Result

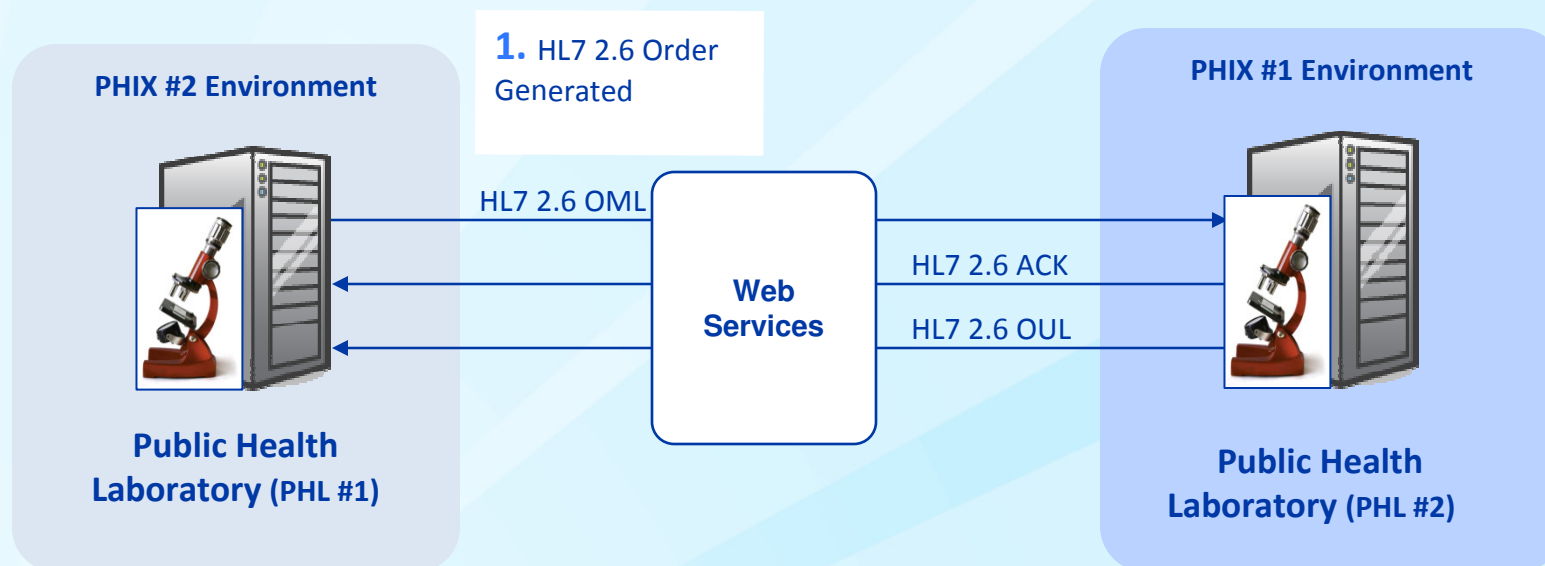
- HL7 2.6 result. PHIX facilitates routing results to HIE/Clinical Care Stakeholder



3. HL7 2.6 Result
Results based on orders from prior slides.

Scenario 3 – PHL to PHL Test Order & Result

- Send HL7 2.6 OML message to PHL for identification/confirmation of Salmonella organism
- Patient demographics are provided in PID, PV1 and PV2 segments
- MSH Control ID used to identify ACK message
- PHL provides order Acknowledgement (ACK) to ordering PHL
- Used in the event of workload capacity overflow and testing availability



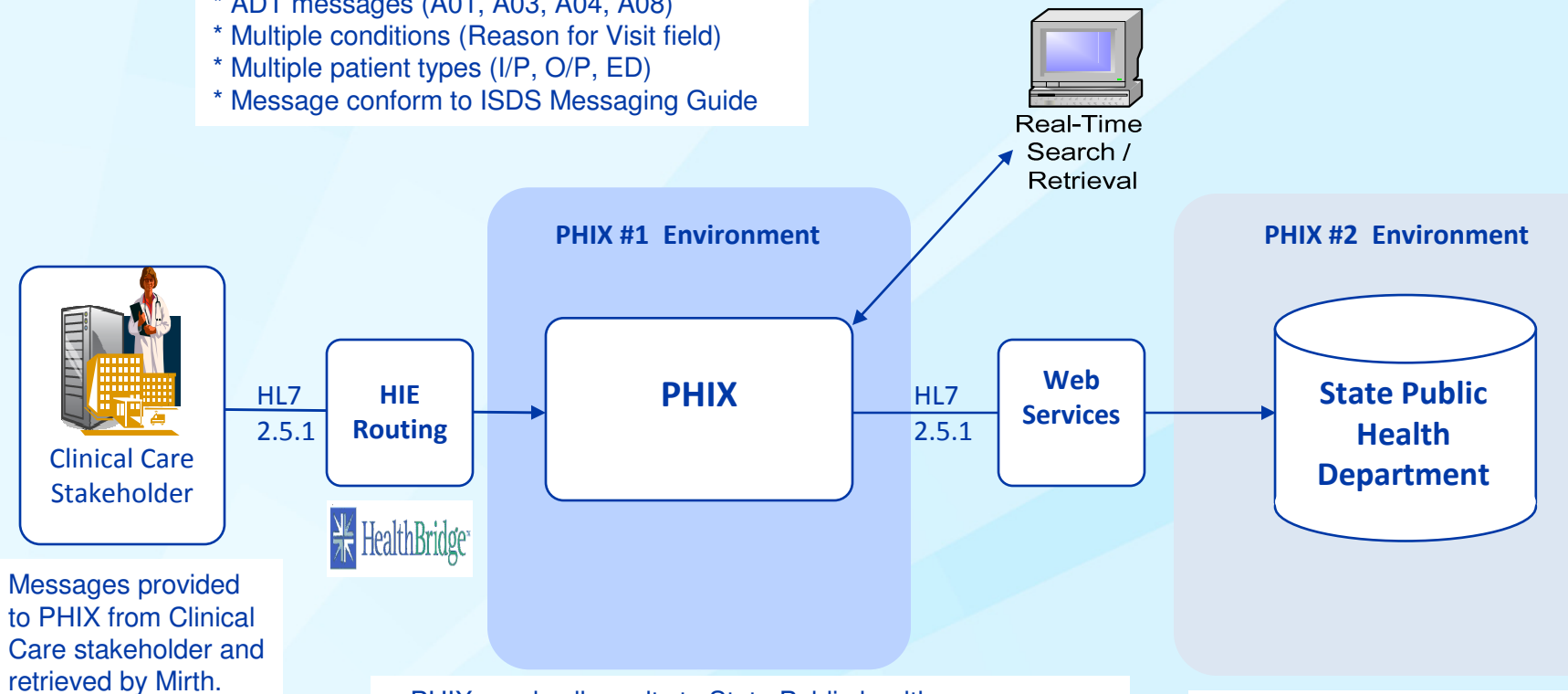
2. HL7 2.6 Acknowledgement from PHL

3. HL7 2.6 Result from PHL, based on prior orders received by PHL#1

Scenario 4 – Send Unsolicited ADT Messages (Syndromic Surveillance)

Syndromic ADTs

- * ADT messages (A01, A03, A04, A08)
- * Multiple conditions (Reason for Visit field)
- * Multiple patient types (I/P, O/P, ED)
- * Message conform to ISDS Messaging Guide



- PHIX sends all results to State Public health as anonymized data.
- Current ISDS specification is silent on filtering conditions based on visit (Recurring) or patient service (Psych/AODA) visits.
- Ideally HIE would provide filtering if required.
- Patient re-identification functionality (public health emergency)

* **Simulated receiver**

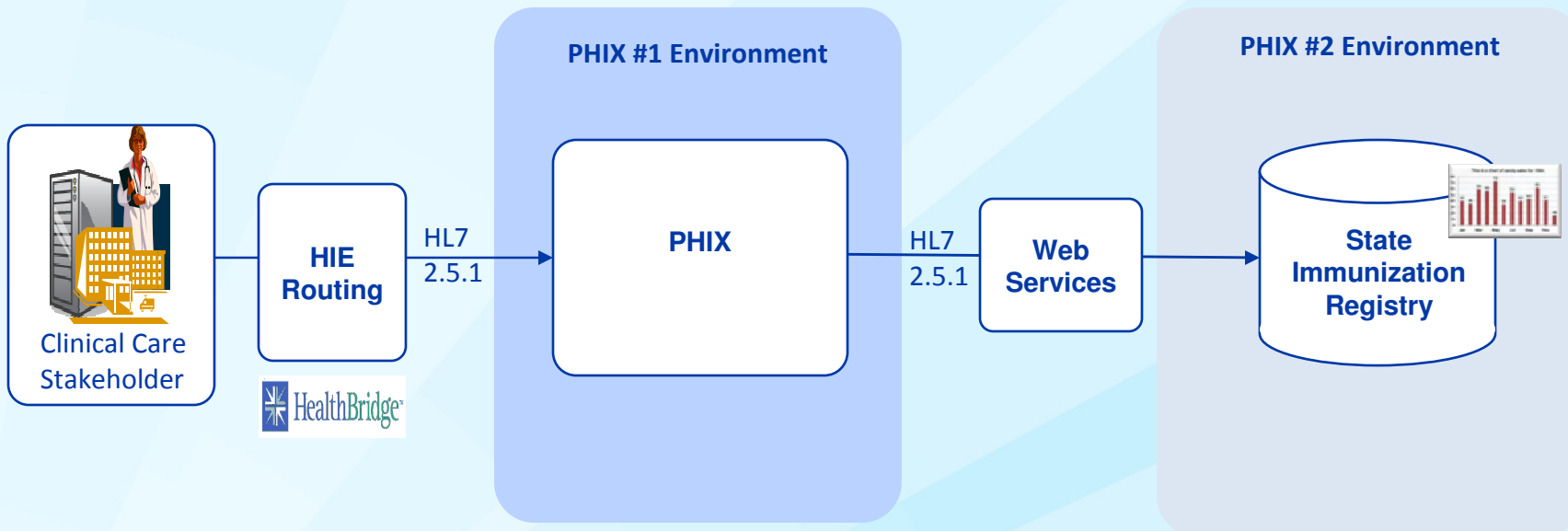
- 2nd PHIX instance provides receiver support.
- Natural language processing rules defined to put data in correct syndromic category



Scenario 5 – Send Unsolicited Vaccination Messages

* HL7 VXU 2.5.1 messages

* 3 – 4 different vaccines across the messages with code validation



- Messages provided by Clinical Care Stakeholder and retrieved by the PHIX.
- Inpatient, Outpatient and ED patient data from hospital
- Unsolicited messages only. No queries.

- Secure web services out of the PHIX
- Emerging immunization specification
- SAIC provides a virtual secure web services interface

