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

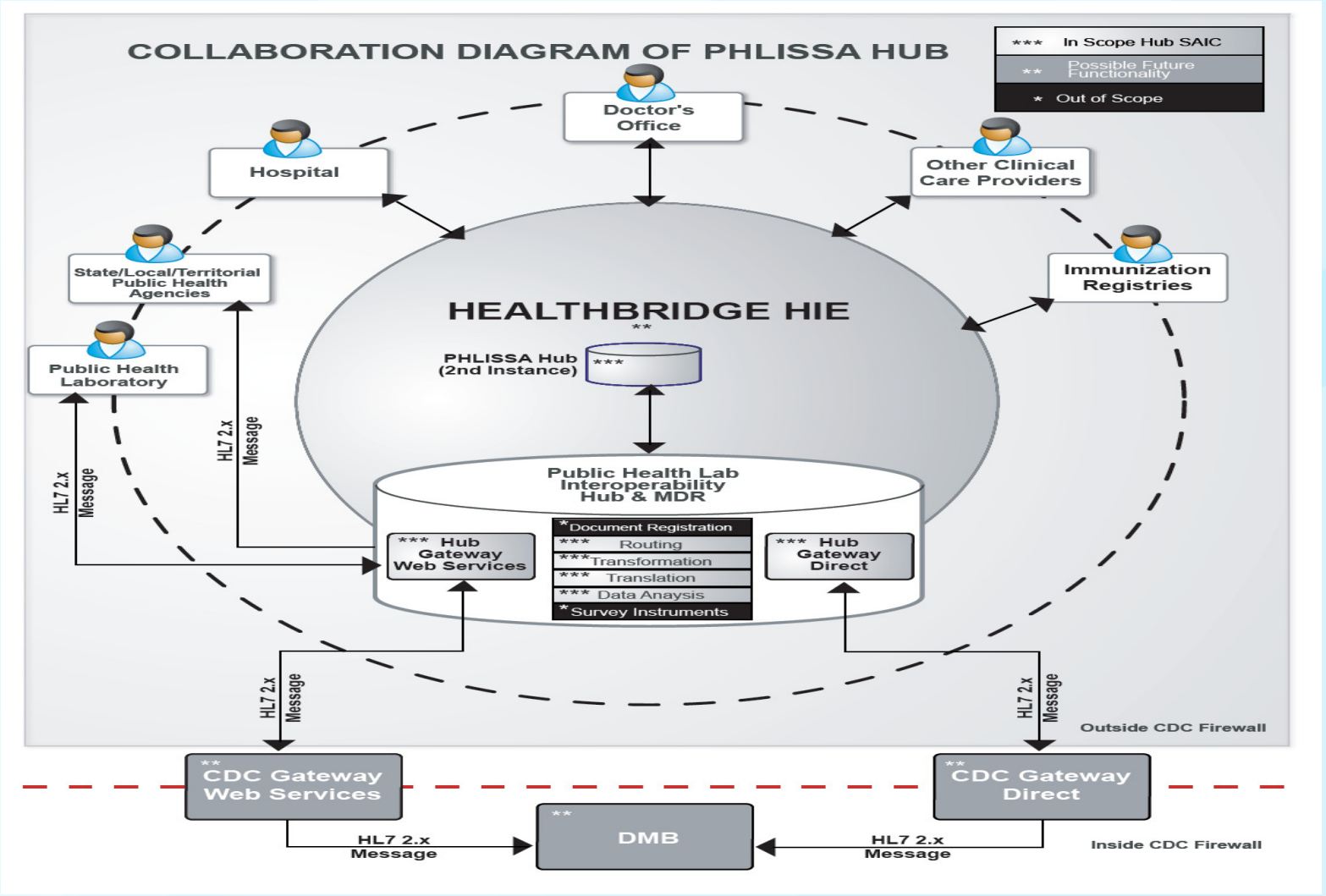
PHIX Intended Goals

- 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

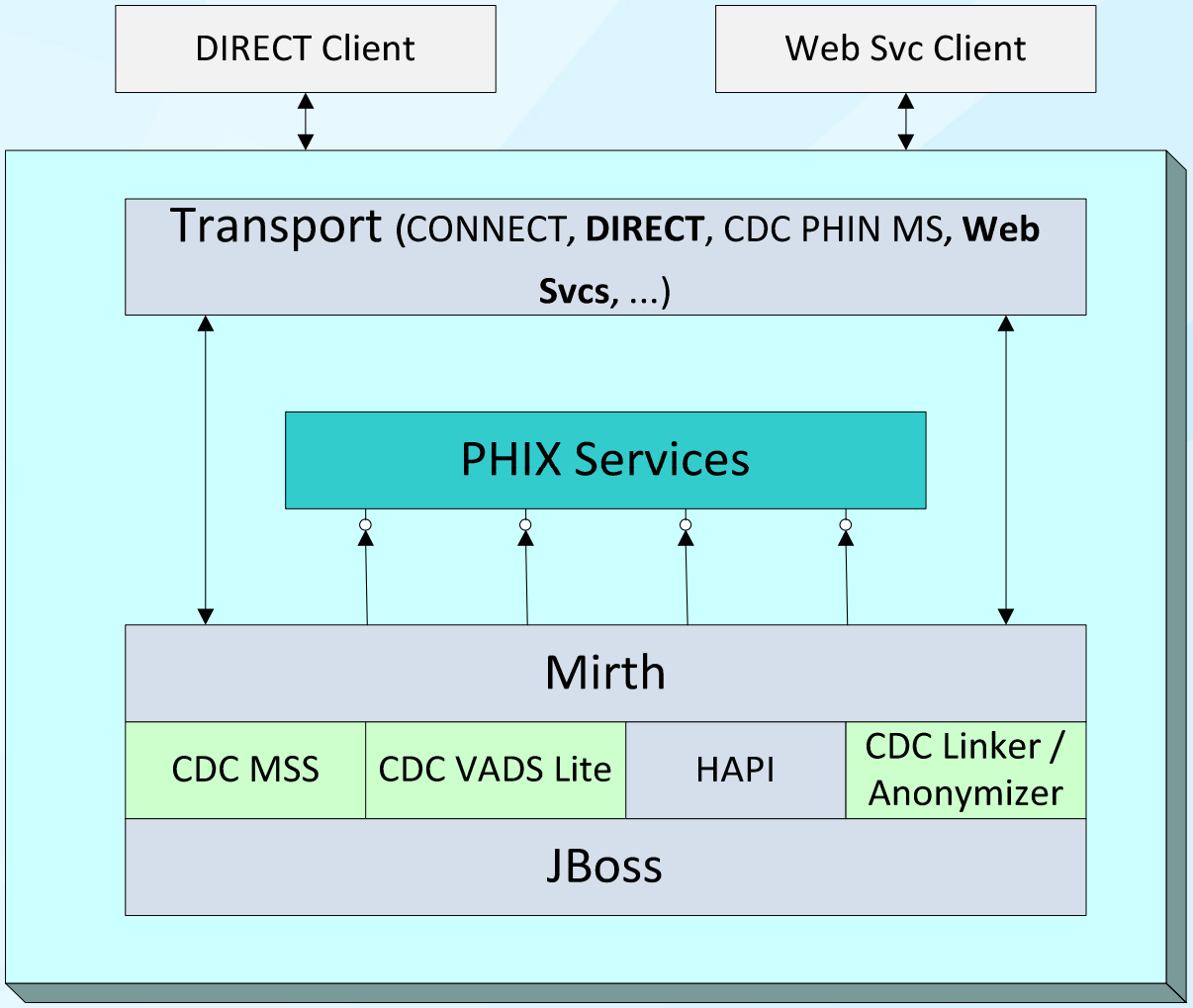
Messaging Standards – PHIX

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

Collaboration Diagram - PHIX



PHIX Architecture Overview

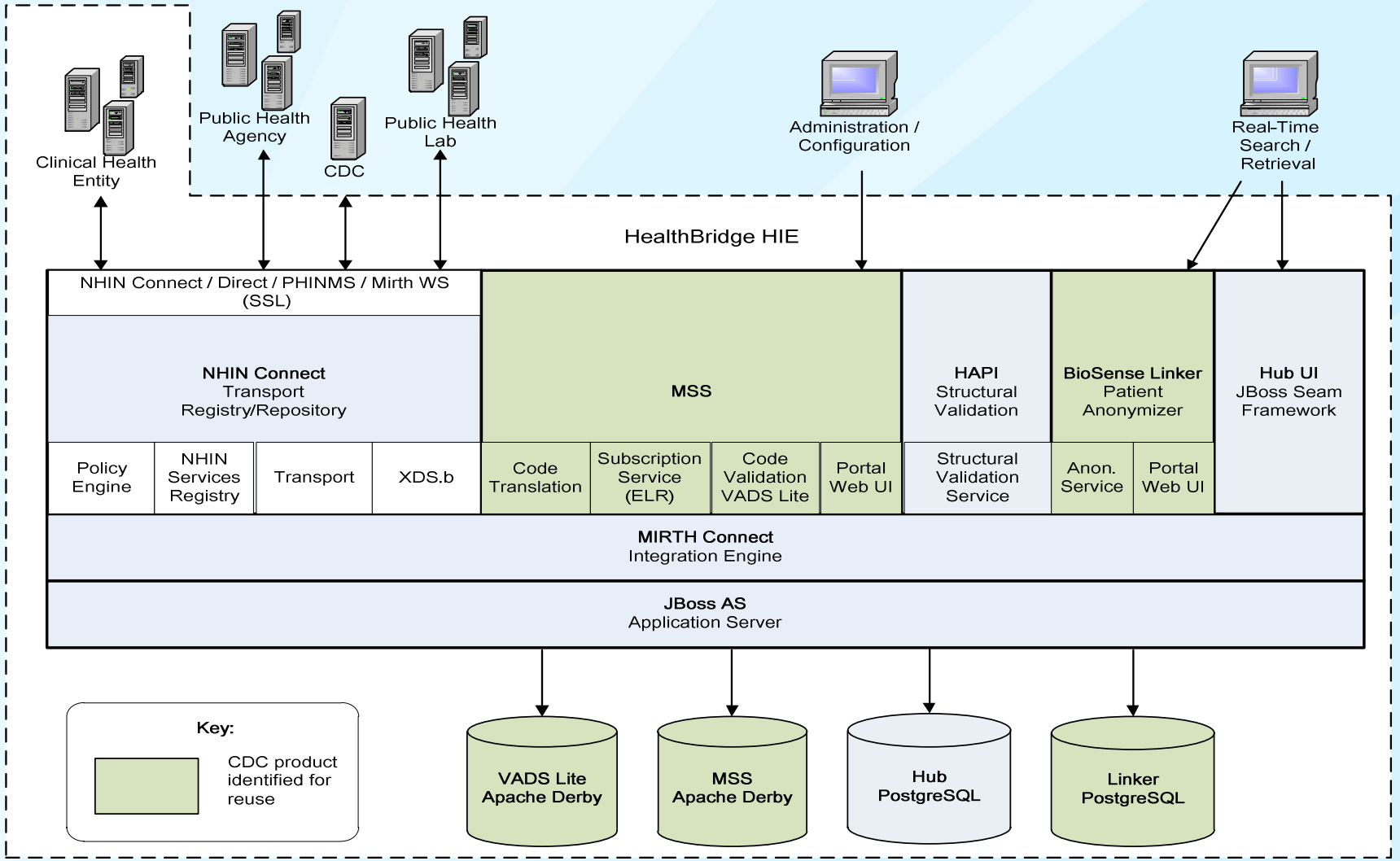


MSS – Message Subscription Service

VADS – Vocabulary Access and Distribution

HAPI – HL7 Application Programming Interface

PHIX Architecture Diagram



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.

Vocabulary Translation

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

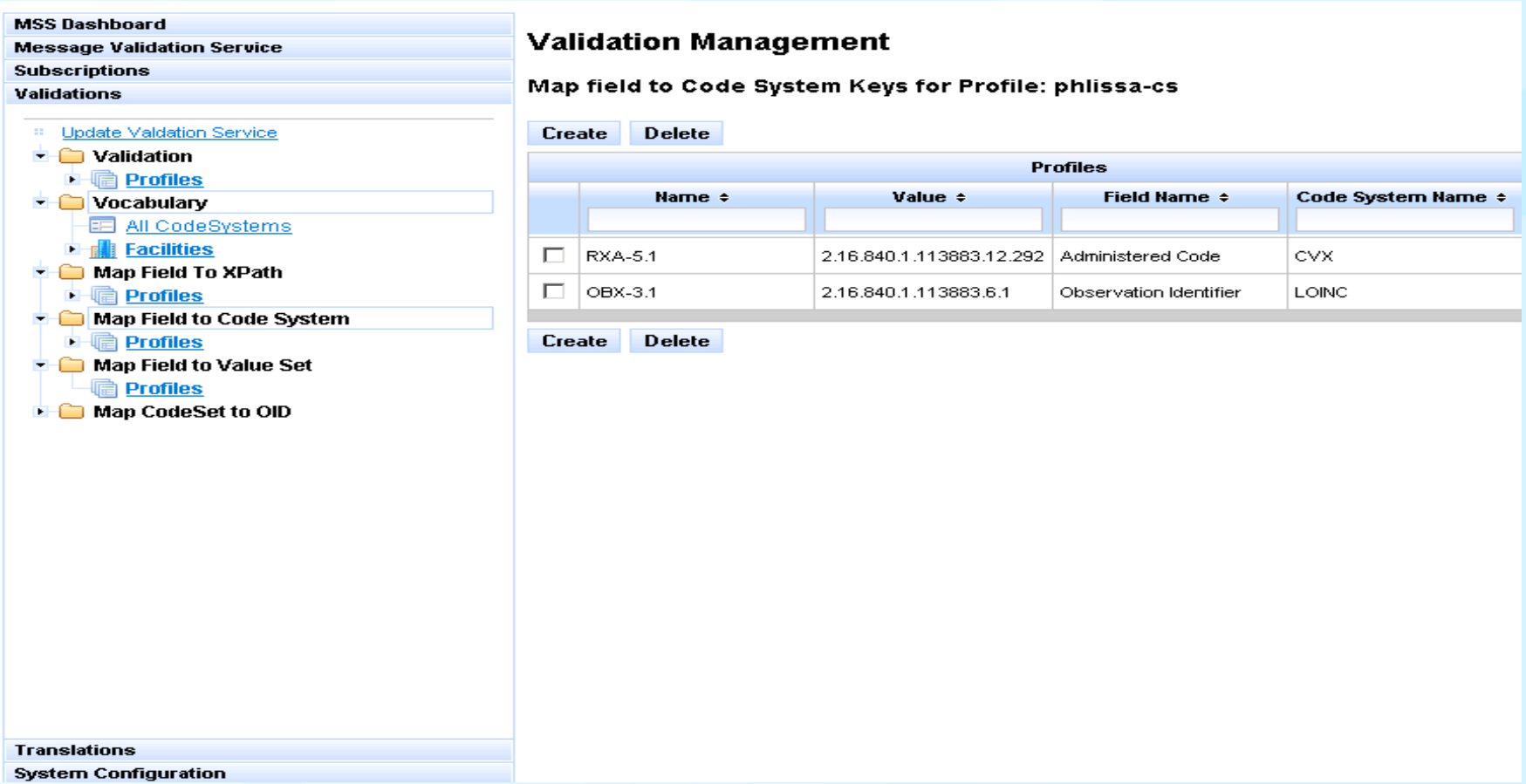
Vocabulary Management

All Mapped Codes

Mapped Codes						
From Facility	From CodeSystem Name	From Code	From Code Description	To Code System	To Code	To Code Description
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

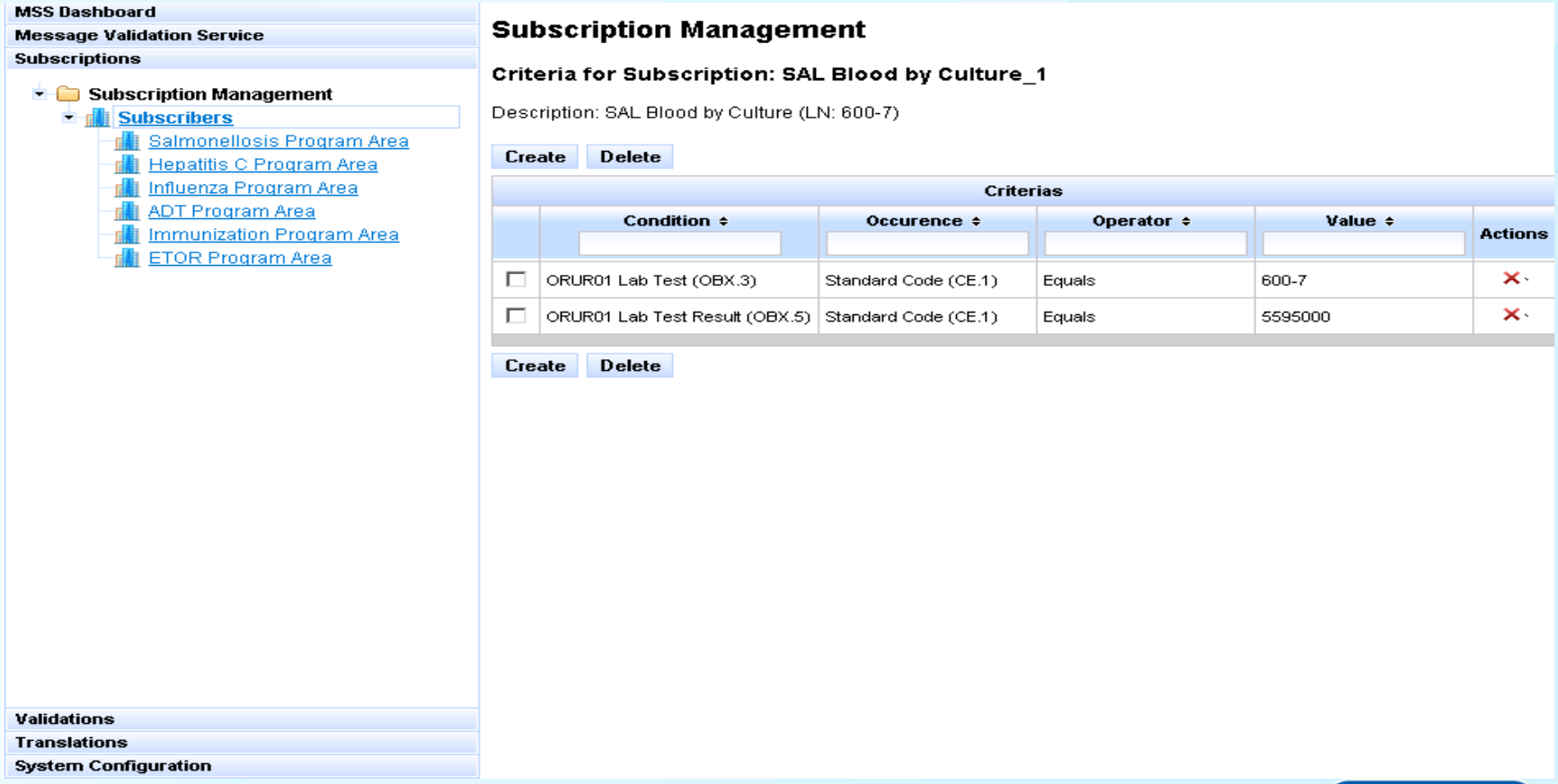
Vocabulary Validation

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



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*



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

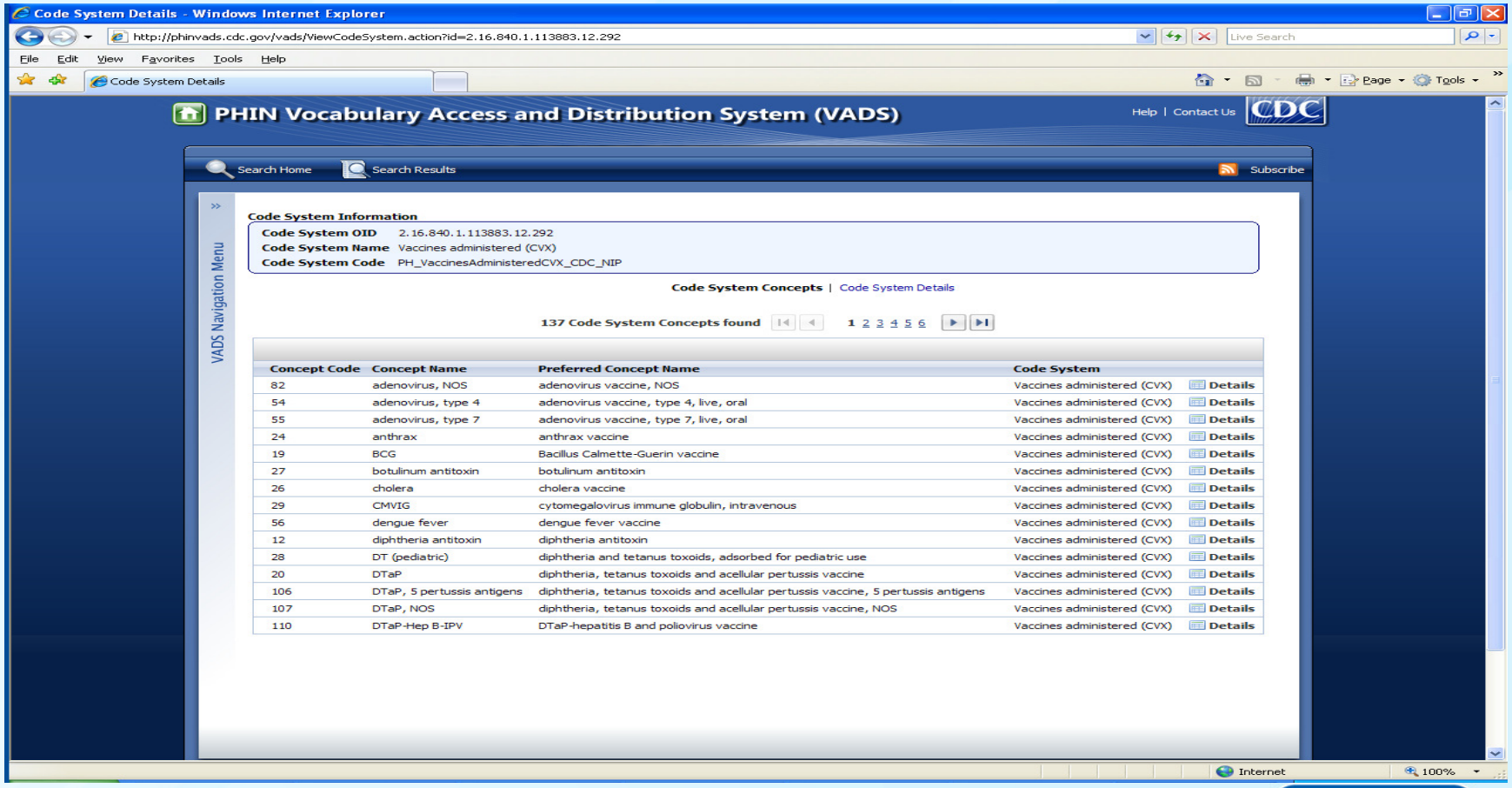
Test Code: 6603-5
Test Description: FLUV Throat Cult
Result Code: 442352004
Result Description: Influenza A virus subtype H1N1 (organism)

Placer Order Number (Entity ID): 1105023

Please do not respond to this automated email notification.

PHIN VADS
Vaccines Administered (CVX) Code System

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



PHIX Public Health Information eXchange

Office of Surveillance, Epidemiology, and Laboratory Services

Public Health Laboratory Interoperability Solutions and Solution Architecture

CDC

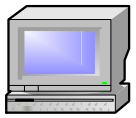
Demonstration Environment - Configuration

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

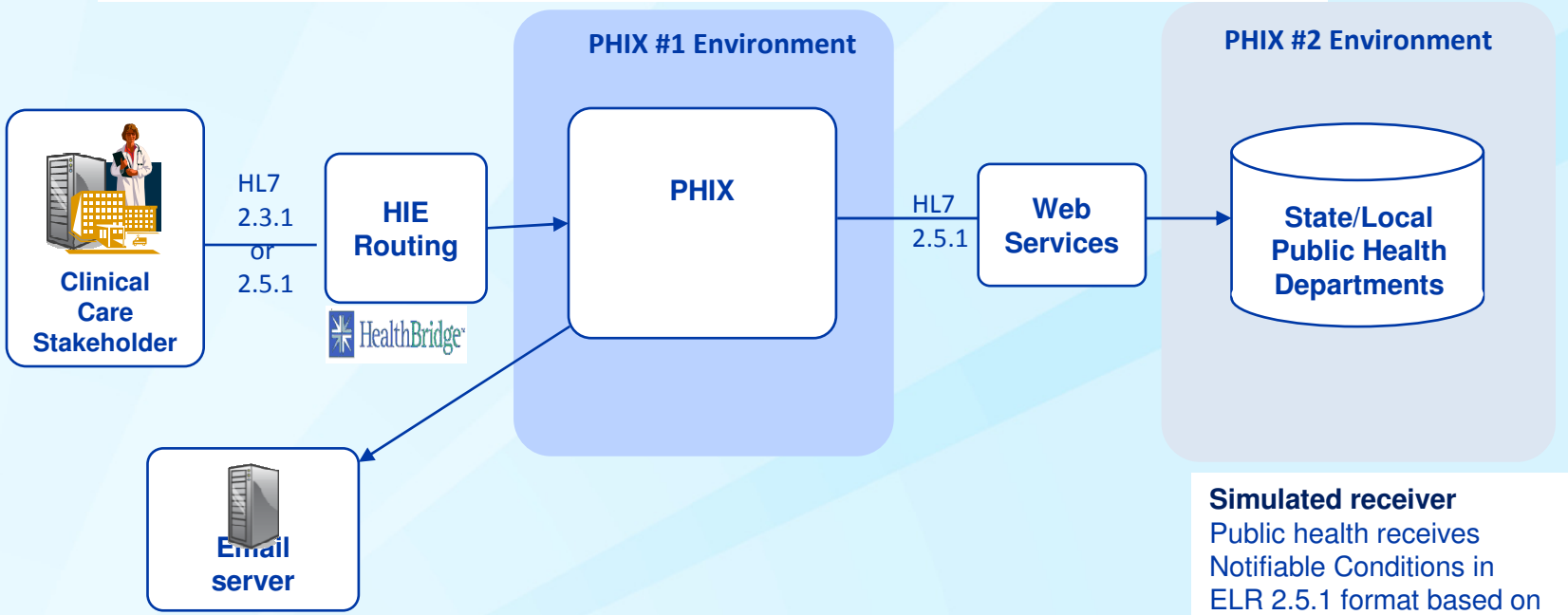
Public Health Lab #1

State Immunization Registry

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

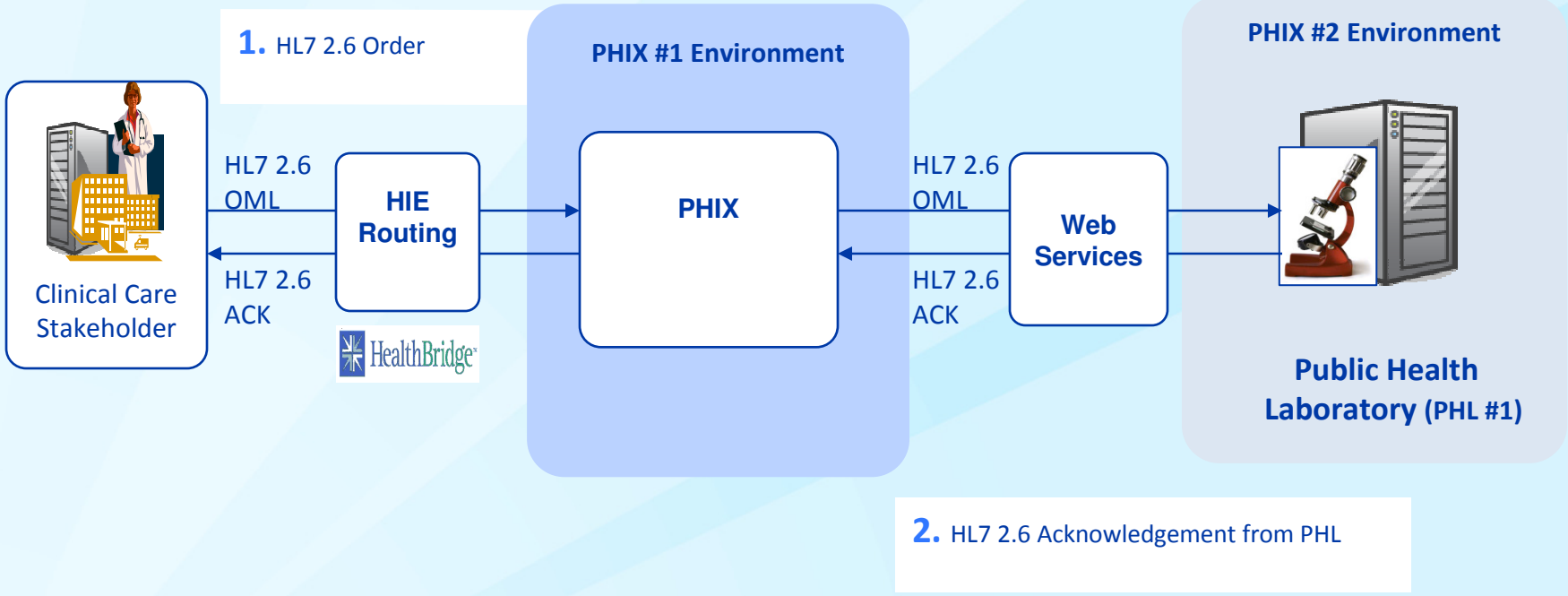


Simulated receiver
Public health receives Notifiable Conditions in ELR 2.5.1 format based on NND requirements

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.

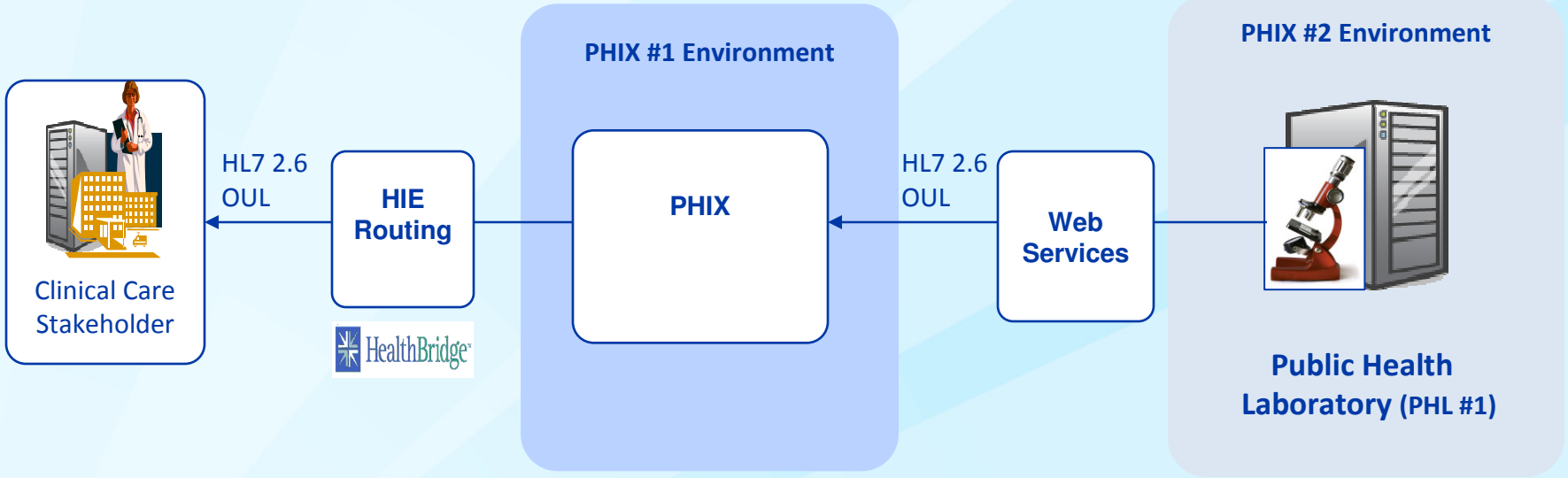
Scenario 2 (parts 1 & 2) – EHR/EMR to PHL Test Order & Result Order

- 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



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

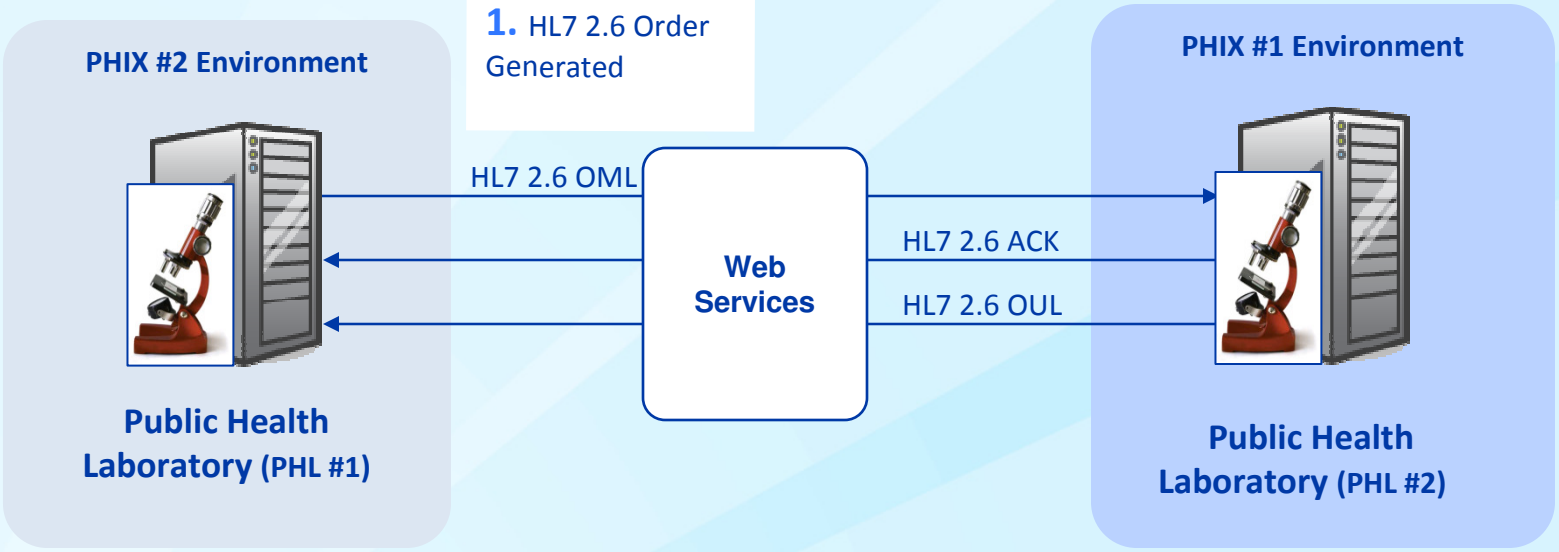
• HL7 2.6 result. PHIX facilitates routing results to HIE/Clinical Care Stakeholder



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

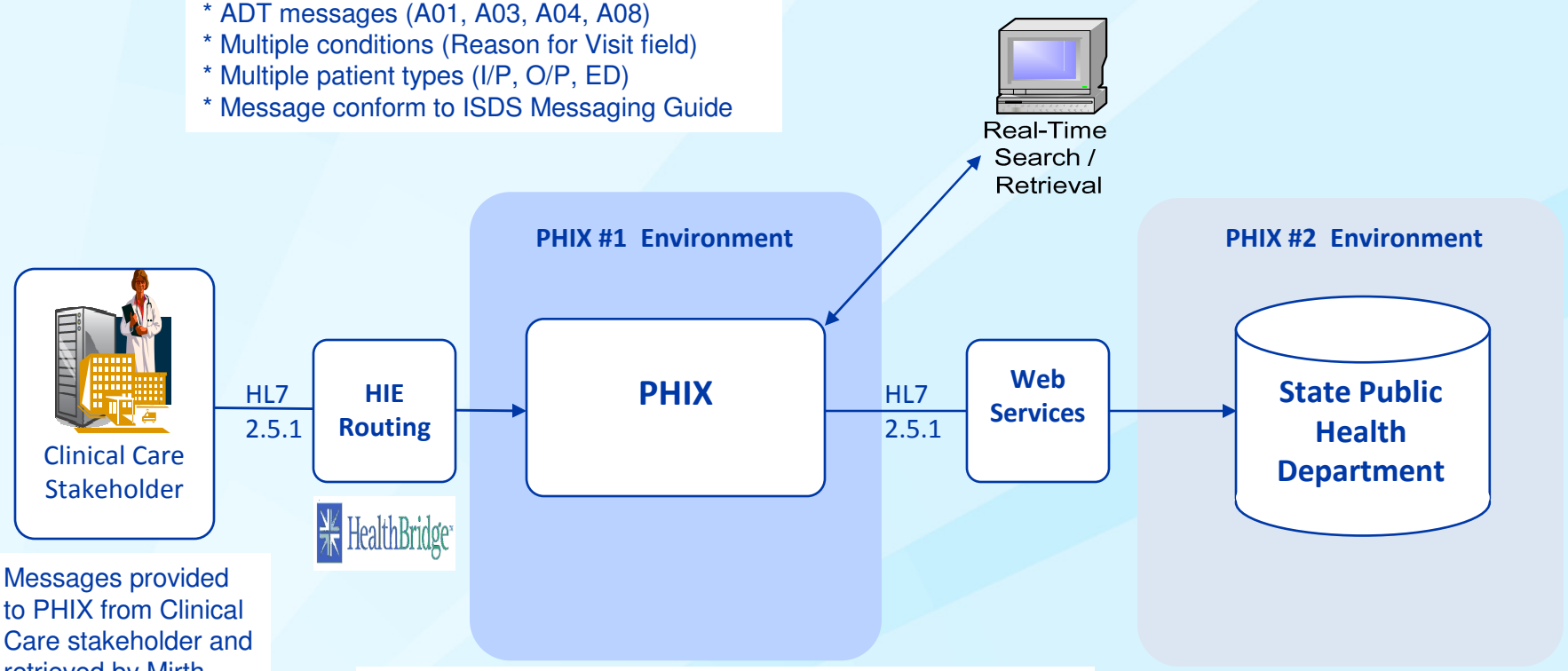


2. HL7 2.6 Acknowledgement from PHL

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



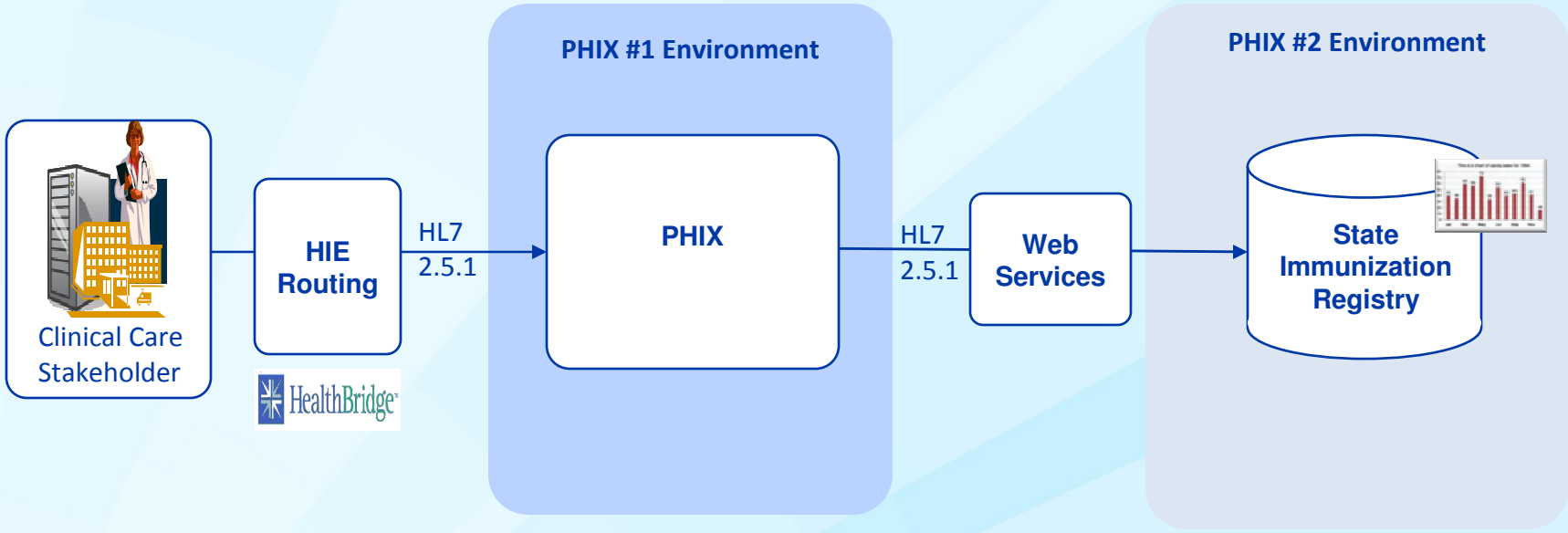
Messages provided to PHIX from Clinical Care stakeholder and retrieved by Mirth.

- 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