The Public Health Information eXchange Comprehensive Solution

To better understand the challenges and opportunities of developing solutions to link public health with clinical care stakeholders, the Centers for Disease Control and Prevention (CDC) selected SAIC to assemble a team of experts on healthcare delivery, data exchange, Health Level Seven (HL7), Integrating the Health Care Enterprise (IHE), medical terminology, and service-based architecture to design and develop a comprehensive standards-based solution for advancing the exchange of data as part of the Public Health Laboratory Solutions and Solution Architecture (PHLISSA) project. This project transcends public health, moving directly into the realm of healthcare to build a single product, the Public Health Information eXchange (PHIX), that enables data exchange among Public Health and Clinical Care providers in support of the Electronic Health Records (EHR) Meaningful Use Stage 1 Objectives and Incentives as defined for Public Health.

To make this solution readily available to public health organizations and health care providers and to further expand the capabilities of the PHIX, the PHIX team is launching an open source community portal as part of the CDC Informatics Research and Development portal. This portal community will focus on the tasks related to the further development and deployment of the PHIX.

PHIX Architecture and Development Goals

The PHIX has been designed to perform a full range of functions and features to support interoperable data exchange including message transformation, vocabulary validation and translation, component routing based on appropriate business rules and organizational requirements, and message component analysis of incoming data streams for specific conditions of interest. The components of the solution are depicted in Figure 1.
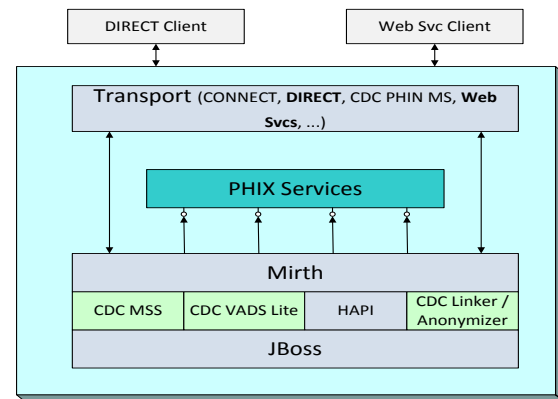

Figure 1. PHIX showing open source and re-purposed CDC components

This functionality was developed to meet the following development objectives.

Development Objectives

- Conduct the design and development of the PHIX with an established set of clinical and public health stakeholders representing a geographical medical service area. SAIC has teamed with HealthBridge, Inc., an HIE serving the greater Cincinnati area that extends into portions of three states and is working with public health partners to demonstrate the value of the PHIX solution.
- Develop the core PHIX using Open Source Architecture components.
- Reuse existing CDC components where available to foster knowledge sharing across development platforms in public health informatics.
- Define the PHIX solution architecture using application standards set by HL7, IHE Frameworks and HITSP Interoperability Specifications, including the following:
    - HITSP IS01 – HL7 2.5.1 ORU
    - Immunization Registry Content (IRC)
    - HITSP IS02 Biosurveillance
    - IHE Laboratory Technical Framework

- Public Health Lab Interoperability Project (PHLIP) Electronic Test Order (ETOR) HL7 v2.6 OML^O33

Use Case Scenarios Developed for Enabling Data Exchange with Public Health

The PHIX has identified five use case scenarios, listed below, that are brokered through the PHIX and connect public health laboratories (PHLs), clinical care stakeholders, and state and public health departments, all of whom are participants in the PHL Interoperability Affinity Domain.

- **Scenario 1** – Reporting of Notifiable Laboratory Results
- **Scenario 2** – EHR/EMR to PHL Test Order & Result Reporting
- **Scenario 3** – PHL to PHL Test Order & Result Reporting
- **Scenario 4** – Send Unsolicited ADT Messages (Syndromic Surveillance)
- **Scenario 5** – Send Unsolicited Vaccination Messages

Figure 2 depicts a sample information flow for the Syndromic Surveillance use case.

Near-term Plans for the PHIX

CDC has established low cost rapid development and interoperability with existing clinical systems as important objectives for this project. To that end, the PHIX will be deployed to an open source community portal supported within the CDC Portal to facilitate the sound application of public health principles to design and develop of solutions and their interfaces to other applications. With the introduction of the PHIX to the portal, CDC hopes to share the efforts and insights of an engaged and active community with the existing stakeholders and contributing partners.

- PHIX will be installed in the PHITPO Open Source Laboratory – Aug. 2011.
- Launch PHIX Open Source Community Portal in PHITPO Open Source Laboratory to support community access – Sept. 2011.
- Complete product enhancements for the PHIX in portal – Oct. 2011.
- Complete planning for pilot deployments with HealthBridge and state/local public health departments in Ohio and additional public health partners – Fall 2011.

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

Real-Time Search / Retrieval

PHIX #1 Environment

Clinical Care Stakeholder

HL7 2.5.1

HIE Routing

HealthBridge

Public Health Information eXchange (PHIX)

HL7 2.5.1

Web Services or Direct

PHIX #2 Environment

State Public Health Department

- **PHIX sends all results to State Public health as anonymized data.**
- **Ideally HIE would provide filtering if required.**
- **Patient re-identification functionality (public health emergency) supported**

* Simulated receiver
- **2nd PHIX instance provides receiver support.**
- **Natural language processing rules defined to put data in correct syndromic category**
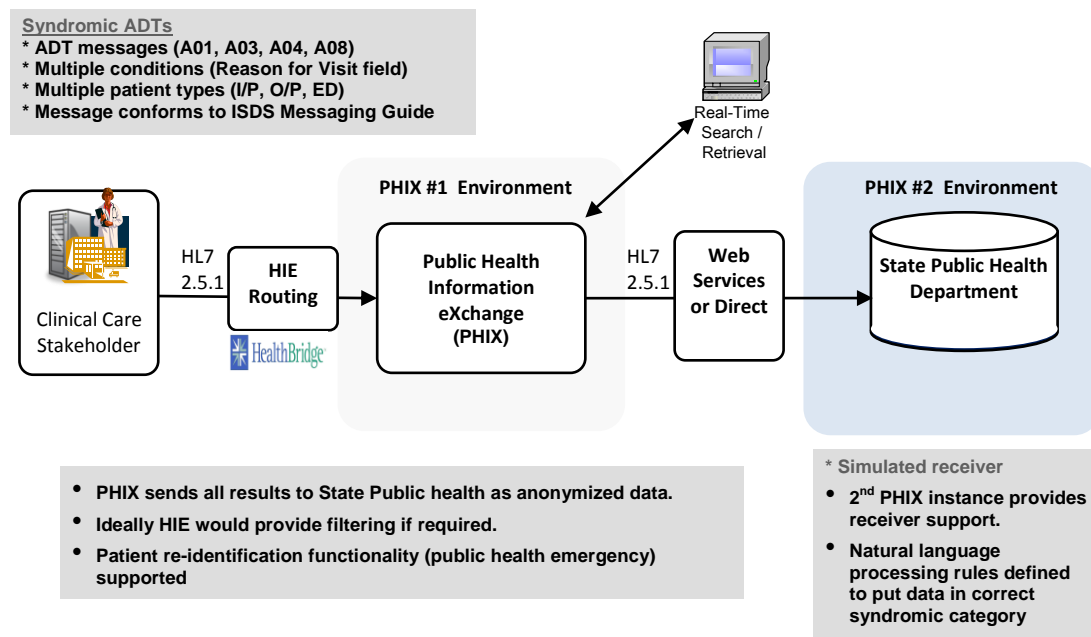
Figure 2. Sample Use Case Scenario demonstrating Syndromic Surveillance process flow