

# Public Health Information Network

## How PHIN Supports Core Public Health Activities

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# Public Health – Problem Statement

- Public health and terrorism preparedness involve many organizations working together and exchanging information
- The current public health information cycle (clinical event to response) is too long and frequently involves the manual exchange of information
- The fragmented and heterogeneous technologies in the U.S. healthcare system do not readily share consistent data with public health
- The new realities of terrorism and disease trends require a new level of operation



# Public Health Information Network - Vision

To transform public health by electronically enabling:

- real-time data flow
- computer assisted analysis
- decision support
- professional collaboration
- rapid dissemination of information to public health, the clinical care community and the public



# What is PHIN?

Gartner – a multi-organizational business and technical architecture

- Technical standards
- Data standards
- Specifications to do work

Is also a process

- Commitment to the use of standards
- Commitment to participating in development and implementation of specifications



# Public Health Information Network - Characteristics

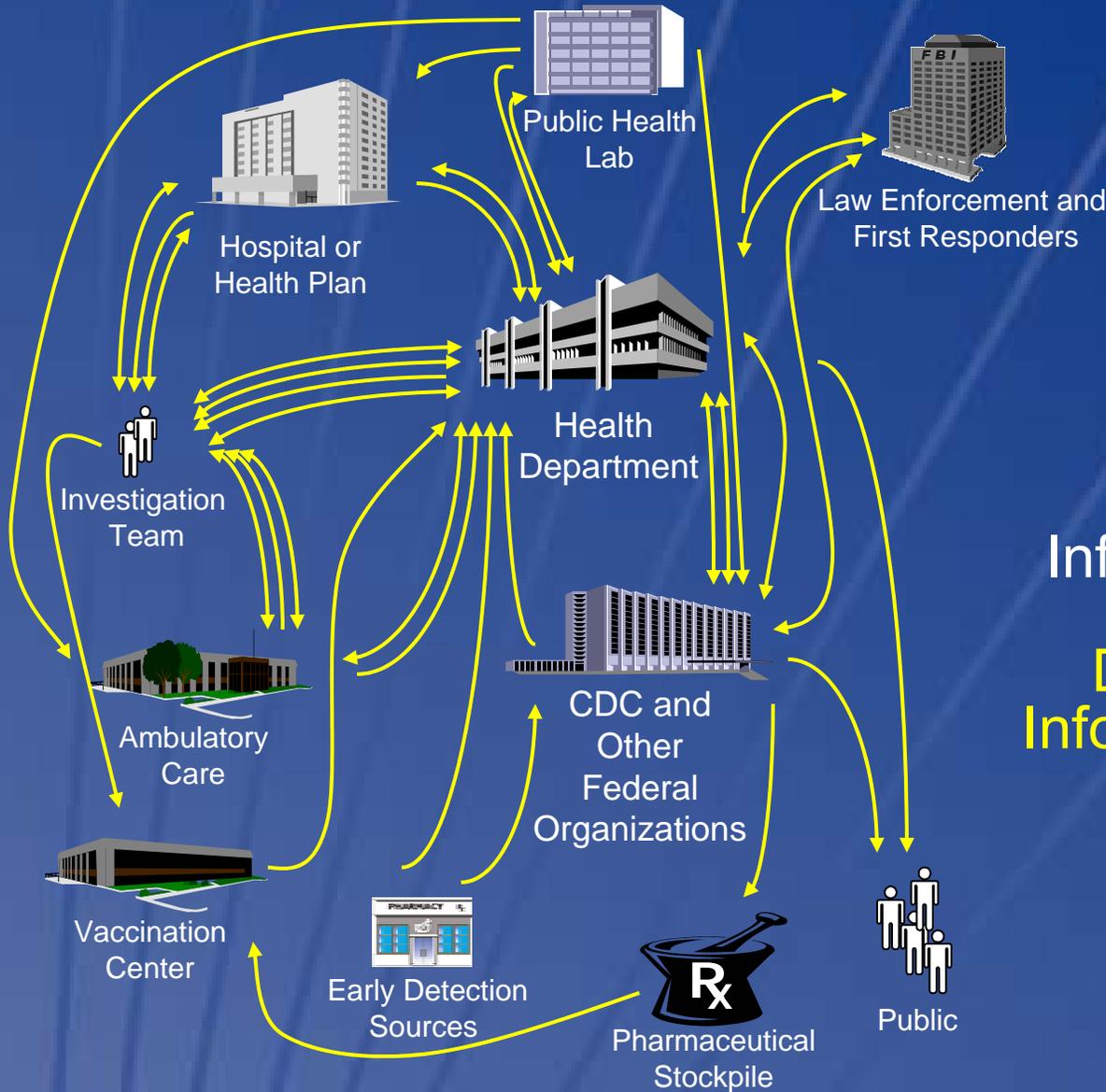
- **An interoperable network** – A common framework to integrate public health systems and functions while using industry standards to work with other networks / systems
- **Dual use** – Directly enhance homeland security and transform routine public health practice
- **Reduce Reporting Burden** - use existing electronic clinical data
- **Live data** – continuous monitoring of nations health, continuous detection and evaluation of threats
- **Support users** - provides information and decision support to the public and public health professionals at all levels



# Public Health Information Network

## Preparedness Information Architecture

### Data Exchange and Information Management



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# Public Health Information Network - Setting

Early Event Detection  
BioSense

Outbreak Management  
Outbreak  
Management System,

Connecting w/ Lab  
Systems  
Lab Result Reporting

Surveillance  
NEDSS

Communications & Alerting  
Epi-X, Health alerting

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Administration



Federal Health  
Architecture &  
Consolidated  
Health Informatics,  
NHII



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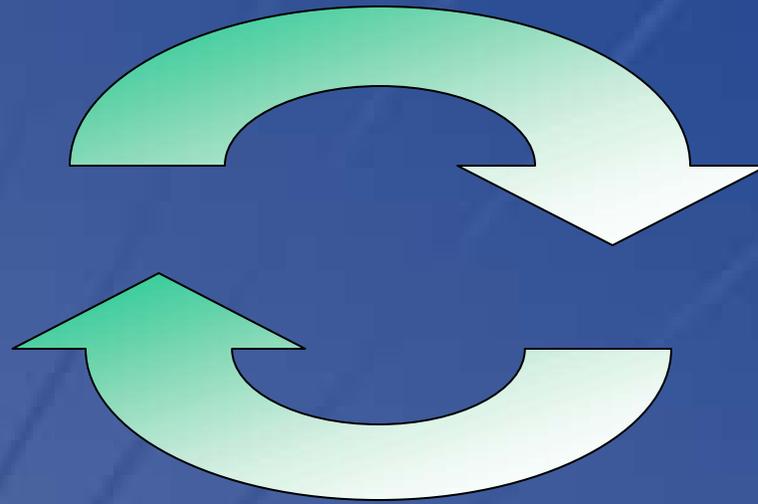
# Public Health Information Network - Process

1. Document **functional requirements** to support public health activities (starting with preparedness)
2. Identify relevant **industry standards** - technical and data
3. Develop **specifications** based on the standards that are concrete enough to do work
4. **Fund** through the functions, standards and specifications
5. Make **systems available** to support these functions and that use these standards - now
6. Develop **software elements and artifacts** to be used in other systems that implement the standards
7. Support **certification** of the functions and specifications



# Critical Success Factors

- Broad participation by stakeholders in Joint Application Requirements, Design, Development, User Testing & Evaluation



# PHIN – Select Progress

- First year of funding – 2004
- > 4,700 PKI digital certificates installed nationally
- > 55,000 HL7 standard public health lab results from 18 LRN labs
- > 40 million patient records sent in HL7 format from DoD to public health (BioSense), > 30 million records sent in HL7 format from VA to public health (BioSense)
- >16,000 HL7 standard, clinical lab notifiable disease results sent to 15 states
- Reduction in communicable disease reporting time from ~30 days to 1-2 days (NEDSS base system)
- Experience with making standards work in information systems (benefits and issues)



# Public Health Information Network - Status

## Public Health and Social Services Emergency Fund

- \$1 billion for state and local public health capacity (estimate that 30% of funding is going to IT)
- CDC and HRSA stipulate use of standards for IT investments

All 50 states have received funding for HAN (starting in fy1999) and NEDSS (starting in fy 2000)

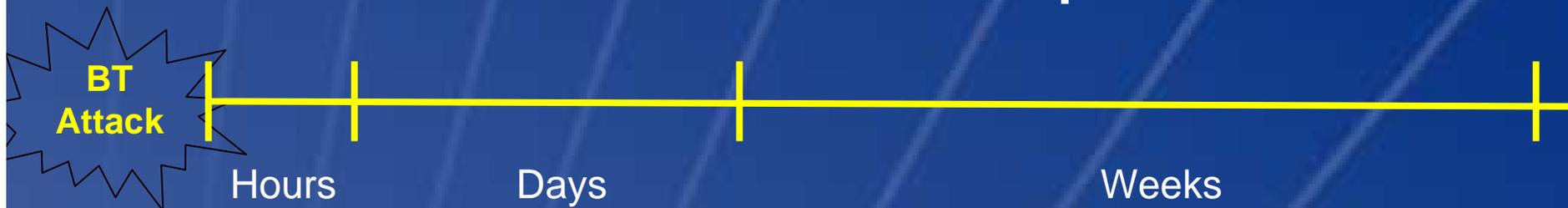
- 16 implementing NEDSS compatible state-developed systems, 20 proposed use of NEDSS Base System (NBS)

CDC approves naming of IT Functions and Specifications as Public Health Information Network Standards

Center for Public Health Informatics – 2004



# All Hazards Detection and Response Data



Early health seeking behaviors – OTC, absenteeism

Ambulatory care visits / Nurse call lines

Tertiary Care, morbidity and mortality (traditional)

Initial detection

Subsequent detection, quantification, localization

Outbreak management, contact tracing, case confirm

Countermeasure admin, isolation, prophylaxis, Rx



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# Draft PHIN Functional Areas

	Early Event Detection	Surveillance	Communication & Alerting	Connecting Laboratory Systems	Outbreak Management	Registries	Countermeasure & Response Administration	Recovery	Information Dissemination & Knowledge Management
AVR & GIS	★	★			★		★	★	
Collaboration Tools	★	★	★		★		★	★	★
Directories	★	★	★	★	★	★	★		★
Automated Data Exchange	★	★	★	★	★	★	★	★	
Vocabularies	★	★	★	★	★		★	★	★
Data Models	★	★		★	★		★	★	
Security & Infrastructure	★	★	★	★	★	★	★	★	★
Others									



# The Future of the State/Jurisdiction PHIN Portal

- Anytime, Anywhere Access
- Secure and Authenticated Access
- Multiple Systems Shown Through One Interface
- Easy Point and Click Windows-based solutions
- Robust Analysis and Visualization Tools
- Multiple Data Layer Views



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**Centers for Disease Control and Prevention - Microsoft Internet Explorer**

Address: <http://aops-irm-sas2/ter>

**BioSense Home | Health Indicators | BioWatch | Laboratory | Workbench | Help | CDC Home**

### Atlanta, GA

City: Atlanta, GA

**Data Transmission**

- OTC did not load this morning since DCTS was stopped last evening for the upgrade.
- VA is caught up with a normal load yesterday.
- DOD while small seems to be a normal load since it was weekend data.

**Specific Infection**

02/06	30030	DOD
Spirillary Fever		
02/07	30333	VA
Boutonneuse Fever		
02/10	30346	DOD
Rocky Mountain Spotted Fever		

**Health Indicators**

Gastro-intestinal, Respiratory, Fever, Hemorrhagic illness, Lymphadenitis, Localized Cutaneous Lesion, Neurological, Rash, Specific Infection, Botulism-like, Severe Illness/Death

High, Low, 02/06, 02/10, 2/10/2004

× Cusum □ SMART

**Map**

2/10/2004

**Respiratory**

Overall Region	Fri	Sat	Sun	Mon	Tue
OTC	15,438	15,987	11,206	18,536	16,717
VA_ACD	42	9	6	66	58
DOD_ACD	1	0	0	0	0

	Fri	Sat	Sun	Mon	Tue
30002 VA_ACD	0	0	0	5	0
30004 OTC	152	100	104	168	117
30005 OTC	75	44	53	106	109
30008 OTC	54	48	27	71	68
30011 OTC	58	84	42	65	64
30012 OTC	26	31	12	44	54
30013 OTC	59	109	32	97	81
30022 OTC	186	242	190	274	209
30038 OTC	98	127	44	99	74
30039 OTC	75	79	80	65	87
30062 OTC	530	555	395	621	567
30068 OTC	158	190	207	189	173
30108 OTC	80	121	57	80	81
30126 OTC	516	602	261	662	430
30189 OTC	164	95	195	155	153
30294 OTC	66	94	60	93	134
30296 OTC	97	157	62	114	85
30307 OTC	223	133	163	232	209

**Data Records Received vs expected for most recent five Event Days**

Records Per Day	Fri 2/06	Sat 2/07	Sun 2/08	Mon 2/09	Tue 2/10
OTC	106%	106%	101%	103%	4%
DOD	69%	69%	47%	4%	
VA	56%	29%	0%		

Yesterday

	Fri	Sat	Sun	Mon	Tue
StoreReports					
Encounters					
Encounters					



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The screenshot displays the 'Outbreak Management System' interface. On the left, a 'Browse Subjects' tree shows a hierarchy: OMS Today > Person > Jones, Fred [82121]. Below this are 'Recent Selections' and a 'Navigation Menu'. The main area shows a profile for 'Jones, Fred [82121]' with tabs for Demographics, Investigation, Exposure Contacts, and Relationships. The 'Investigation' tab is active, showing fields for Suspected Agent (Monkey Pox), Jurisdiction (DeKalb County, GA), Investigation Start Date (05/11/2004), and Investigation Status. An 'Activity Log' table is visible below, with columns for Date of Activity, Activity Type, Initiated By, Point of Contact, Contact Info, Reason, Edit, and Delete. The system is running on a Windows XP desktop with a taskbar showing 'Outbreak Manag...', 'Inbox - Microsoft Ou...', and 'Rational ClearQuest ...'.



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The screenshot displays the 'Laboratory Response Network' web application. The interface includes a menu bar (File, Search, Subjects, Send Messages, Setup) and a tabbed navigation system with 'Subject Detail', 'Specimen Info', 'Ordered Test', and 'Test Results'. The 'Specimen Info' tab is active, showing a form for entering specimen data. The form fields include:

- \* Specimen ID: 12353
- \* Type: 1
- \* Specimen Parent ID: 77554
- \* Source Type: BBL - Blood bag
- Description: Pig tail sample
- Specimen Quality: E - Excellent
- Collection Method: NYP - Plate, New York City
- Collection Site: NY Health Center
- Collected: 2 /10/2003 @ 12:44:23 PM
- Received: 2 /10/2003 @ 12:44:23 PM
- Container ID: pig tail
- Type: [dropdown]
- Container Parent ID: 47477
- Specimen Additives: None
- Handling Code: AB12
- Number of Containers: 8
- Specimen Condition: Good
- \* Specimen Role: Primary
- Specimen Source Site Information: n/a
- Shipping Label Information: n/a

At the bottom of the form are three buttons: 'Add Specimen', 'Save Specimen', and 'Delete Specimen'. Below the form is a table with the following data:

SpecimenId	SpecimenPar...	SpecimenUID	SpecimenType	SpecimenSo...
777777777	yy	176	0	ASP - Aspiate



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**Epi-X The Epidemic Information Exchange**

**All Epi-X Reports**

Below are the 325 currently posted reports. You can:

- ▶ select a title to see the report,
- ▶ sort the list by selecting an underlined column heading,
- ▶ view titles only or longer descriptions, or
- ▶ click the "Search" option at the top of the page to find all other reports.

Matches 1 to 25

<u>Title</u>	<u>Location</u>	<u>Category</u>	<u>Posted</u>	<u>Archived</u>
Recall: Demoulas & Market Basket Complete Pancake & Waffle Mix -- March 26, 2004	MA, NH	Environmental Health: Poison Control	3/29/2004	Current
Continuing High HIV Prevalence in Botswana and Identification of Critical Points of Intervention	Other Country	Infectious Disease: Human Immunodeficiency Virus (HIV), Sexually Transmitted Diseases, Viral	3/29/2004	Current
Update: Additional Steps to be Taken in FDA Class I Recall of SolutionsE Ageless Formula II	USA	Environmental Health: Poison Control	3/27/2004	Current
FDA Class I Recall of SolutionsE Ageless Formula II -- March 26, 2004	USA	Environmental Health: Poison Control	3/27/2004	Current
Update: Laboratory Results for Rash in Cheerleading Competition Participants -- March 26, 2004	MD, NC, WV	Infectious Disease: Bacterial, Possible Infectious - Insufficient Data to Characterize	3/26/2004	Current
Update: Second Confirmed Case of Measles -- Iowa, March 26, 2004	IA	Infectious Disease: viral; Vaccine-Preventable: Child Vaccine Preventable	3/26/2004	Current
Update: Nasal Spray Contaminated with	USA	Infectious Disease: Bacterial	3/26/2004	Current



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**Information Resources Management Office**  
**Pre-Event Vaccination System**

**Patient Vaccination**  
The asterisk (\*) denotes a required field.

\*Vaccine Type: Smallpox

\*Organization: Douglas County Health Department

\*Batch: 9: 4020077 : Feb 9 2003 3:30PM

\*Referring Organization: Avera St. Anthony's Hospital

\*PVN: PVN1000000000

\*Vaccination Date: 02/27/2003

\*Administered By: Doraine Reynolds

Consent To Photograph:

Consent To Survey:

Take Response: -Select-

Exam Date: (mm/dd/yyyy)

Examiner: -Select-

Take Response:  Major  
 Equivocal  
 No Take

Adverse Events:



# Public Health Information Network Software Available to Participants in Public

## Messaging system

- Secure industry standards based (ebXML) inter organizational, bi-directional messaging
- Specific web service for HL7 and other message payloads, encryption and security

## Laptop deployable systems

- Case management, contact tracing, specimen and results management, vaccination and prophylaxis management

## Specimen Management and results reporting

- Enables HL7 messaging for labs

## NEDSS Base System

- Web based surveillance software for health departments
- Supports electronic laboratory reporting, case management, notifiable disease reporting



# Public Health Information Network Interoperability Strategies

- **Systems architecture**
- Shared data model and vocabularies
- Live network for the exchange of specific data



# Health Department

Directory of PH Involved Personnel

Data Reporting

Content Delivery

Reporting, GIS and Analysis

Unified Person (Patient) Registry

Integratable Data Repositories

PH Logical Data Model (Derivative of HL7 RIM)

Integratable Data Repositories

Communications and alerting



HL7...

Data Exchange Messages

Integration Services

Strong Security  
PKI or VPN

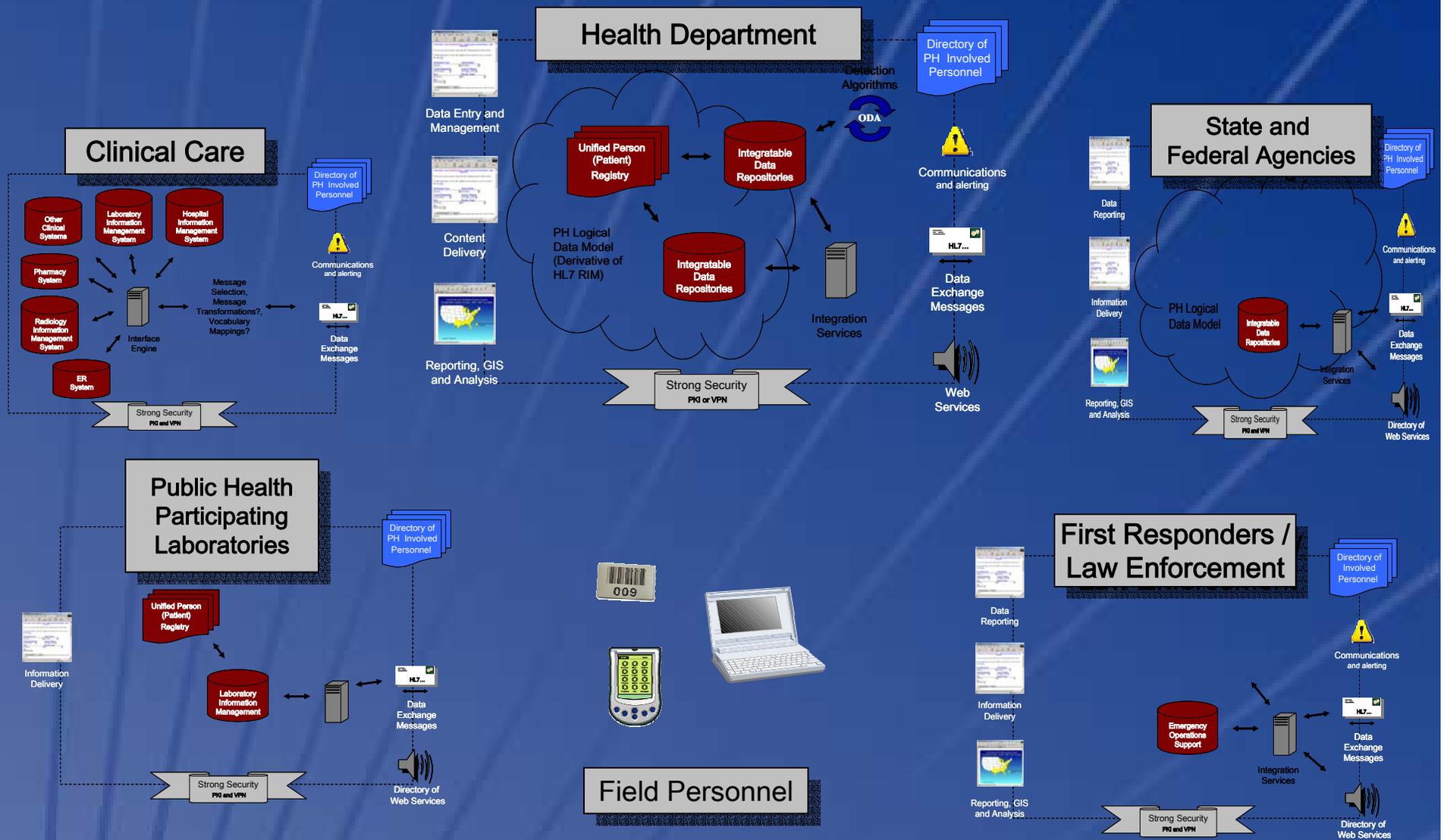
Web Services



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# Public Health Information Network – Systems Architecture



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# Public Health Information Network Common Data Language

## For public health participants:

- Require the use of industry standard data model, vocabularies and messages
- Use technology standards to ensure that software can be used in many settings

## For clinical data coming to public health:

- Public Health Information Network standards conform with federal e-Gov directions and related standards:
  - National Committee on Vital and Health Statistics (NCVHS)
  - Consolidated Health Informatics (CHI)



Data

HL7 RIM

PH Domain  
Information  
Model

Other Industry  
Data Models

Specificity

Environmental  
Health Tracking,  
BT, etc.

PH  
Logical  
Data Model

Physical Database Implementations

Messages



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# Public Health Information Network – “Live Network”

“Live” Exchange of and Access to Specific Data  
for Interoperable Systems – Messages and Storage

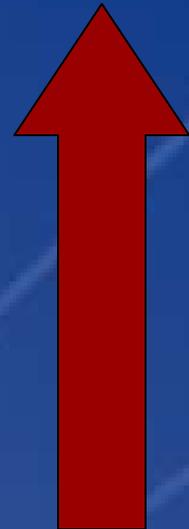
Specific Data Content – Vocabulary Terms

Data Structure – Data Models

Transport / “Handshake Between Information Systems” - ebXML

Encryption / Security – HTTPS, ebXML

Connectivity – Continuous Internet Connectivity



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# Public Health Information Network Messages

## Routine Public Health and Investigation of BT Detection Messages

### Clinical

- Microbiology results
- Orders
- Chief complaints
- Lab results
- Discharge diagnosis

### Public Health

- Nationally Notifiable Diseases
- Hepatitis
- Meningitis
- Electronic Lab Reporting

## Response Messages

- Lab test request
- Lab result
- Case report
- Test result available notification
- Specimen container shipment
- Specimen context
- Intervention request
- Intervention result report
- Contact list report
- LDIF directory exchange
- Alerts and public health information dissemination



# Public Health Information Network - Process

1. Identify relevant **industry standards** -technical and data (e.g. HL7)
2. Develop **specifications** based on standards that are concrete enough to do work (e.g. implementation guide for lab result)
3. **Fund** through the specifications (e.g. IT functions and specifications for > 1 billion in 2002)
4. Develop **“transitional software”** that implements the standards now (e.g. the messaging system)
5. Encourage **partners and private sector** to implement the specifications (e.g. NEDSS compatible state systems)
6. Support **conformance testing** (e.g. NIST labs)



# Insert PHIN Certification Slide

- **Compliance** - the exact use of PHIN standards, specifications, and technical artifacts in a system.
  - e.g. – the exact implementation of the PHIN Logical Data Model as the relational table structure for a system
  - e.g. – the exact implementation of the PHIN LDAP Schema as the operational directory for a system
- **Compatibility** – The ability to perform all the required functionality and interact with other PHIN compatible systems using appropriate technical and data standards
  - e.g. – a system that uses different data model but maps vocabulary into a PHIN standard message structure to exchange data
- **Certification** – The process to establish whether systems can meet the high-level functionalities and detailed messages/metrics required to support public health activities.
- We will certify compatibility of systems, not compliance, of systems



# Questions and Prizes

- Maybe answers.....

