

Challenges of Emergency Response Information Exchange

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How did we get here?

- **National Electronic Disease Surveillance System (NEDSS)** – describing and implementing the standards
- **West Nile Virus** – highlights need for rapid information sharing across functional and political boundaries
- **9/11 and Anthrax** – public health assumes new responsibilities and partners
- **SARS** – emerging public health threats – global reach of infectious diseases



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Where are we going?

Public Health Information Network (PHIN)

Vision – To transform public health by coordinating functions and organizations with infrastructure and information systems that enable:

- ◆ Real-time data flow
- ◆ Computer assisted analysis
- ◆ Decision support
- ◆ Professional collaboration
- ◆ Rapid dissemination of information to public health, clinical care and the public



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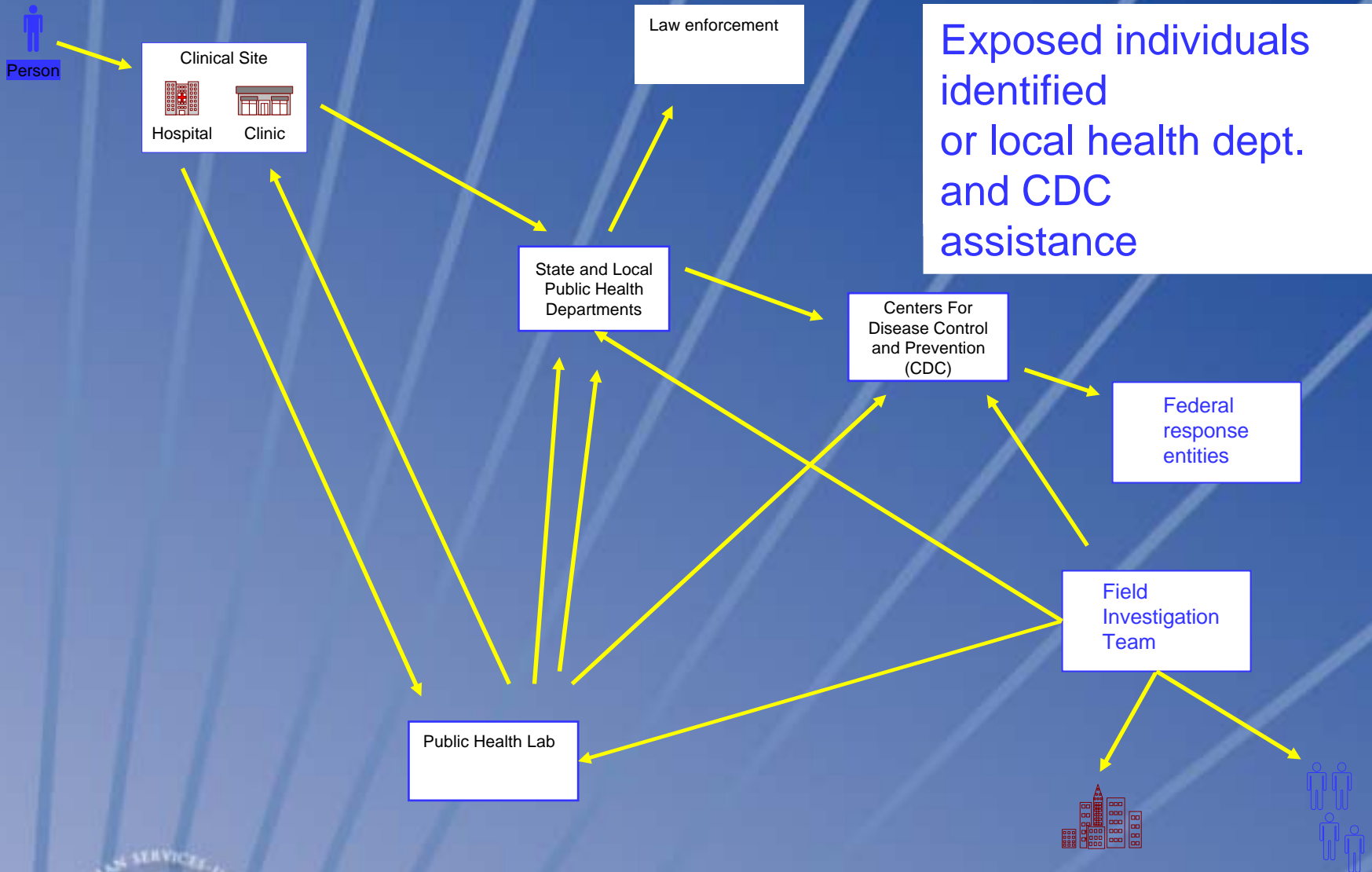
Network of Partners



Challenges

- Provide public health officials with rapid access to information from a variety of sources
- Enable information sharing with multiple partners using common interface technologies and standards
- Support a broad spectrum of activities
- Enable information sharing across politically and functionally distinct organizations
- Ensure information semantics and context are retained across multiple transactions
- Minimize cost of implementation



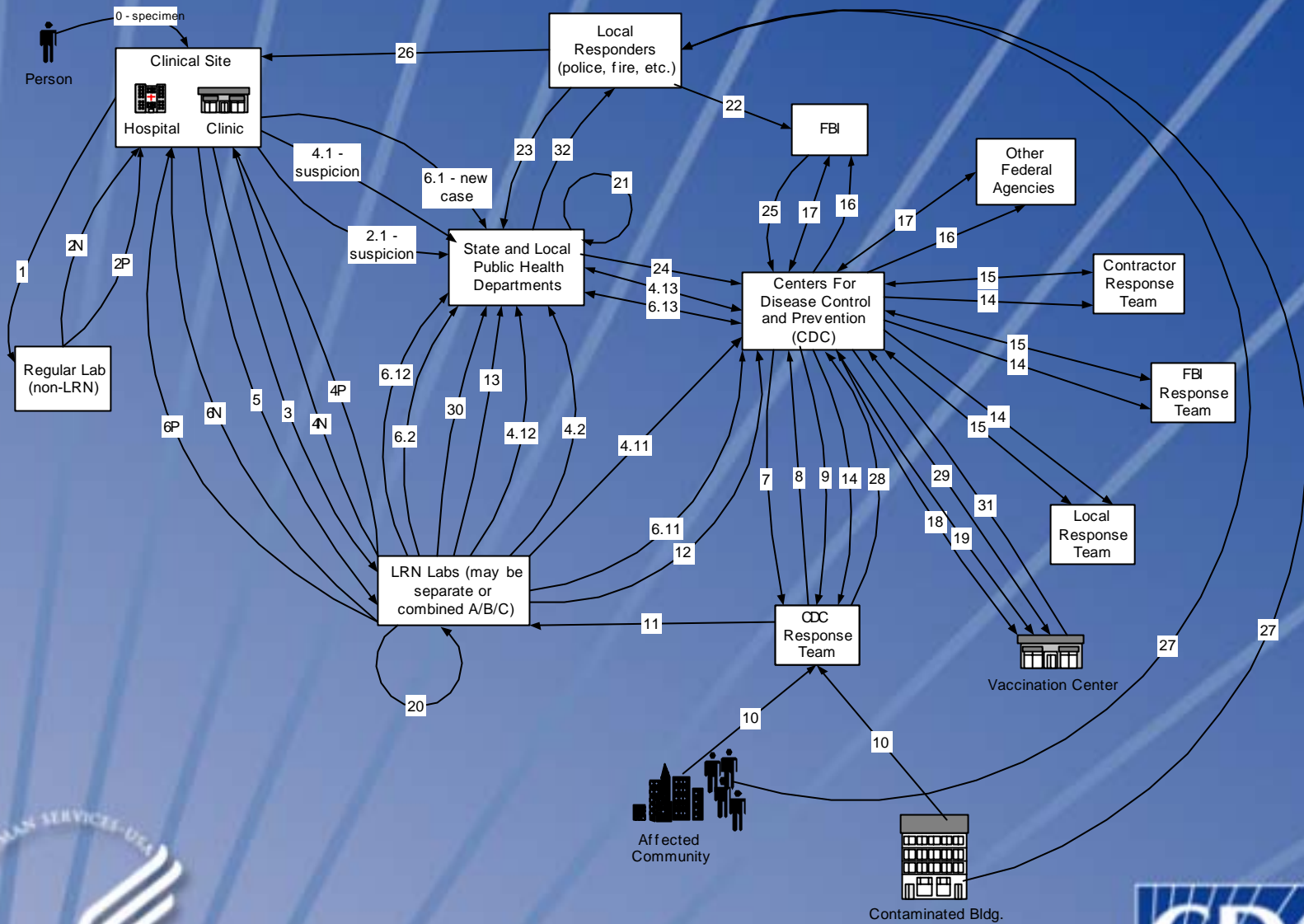


Anthrax: Clinical Case Detection and Response



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Defining the Solution

- Business processes
- Information types
- Semantic model
- Terminology
- Standard messages
- Transport components
- Routing infrastructure



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Business Processes

- **Detection and Monitoring** – support of disease and threat surveillance
- **Analysis** – facilitating real-time evaluation of live data feeds
- **Information resources and knowledge management** – reference information, distance learning, decision support
- **Alerting and communication** – transmission of emergency alerts, routing professional discussions, collaborative activities
- **Response** – management support of recommendations, cases, prophylaxis, vaccinations, lab results, etc.



Preparedness and Response

- Detection and Monitoring
 - ◆ Syndromic surveillance
 - ◆ Health Indicators
 - ◆ Existing surveillance for specific agents
 - ◆ Laboratory Response Network (LRN)
- Response
 - ◆ Outbreak management systems
 - Dynamic information requirements
 - Configurable
 - Integrate with existing activities
 - ◆ Laboratory Response Network
 - ◆ Clinical care data



Information Types

- Cases, contacts and exposure groups
- Laboratory orders and results
- Syndromic and health indicator data
- Interventions
- Environmental data
- Spatial data
- Health alerts
- Recommendations



Semantic Model

- Must have shared understanding of common concepts
 - ◆ What is a Case? Sample? Outbreak? Investigation?
- Concepts have explicit relationships to each other
 - ◆ Cases may have contacts that may become cases
 - ◆ Persons may be exposed to agents that contaminate specific locations
 - ◆ Samples for Laboratory orders generate results
- Concepts and relationships are documented in shared semantic models
 - ◆ HL7 RIM
 - ◆ Public Health Domain Information Model (PHDIM)
 - ◆ Public Health Logical Data Model (PHLDM)



Terminology

- Standard code systems will be employed wherever possible
 - ◆ LOINC, SNOMED, NDC, HL7, ...
- PHIN makes use of both standard vocabulary and CDC defined and maintained vocabulary
- CDC and partners will continue to work with standards organizations to fill existing gaps
- Code system tables for PHIN messaging will be made available for electronic download



Standard Messages

- Clinical sector to Public Health
 - ◆ Electronic lab reporting (v 2.3.1)
 - ◆ Chief complaint (v 2.3.1)
 - ◆ Lab, pharmacy and supply orders (v 2.3.1)
- Internal Public Health
 - ◆ Disease specific messages (v 3)
 - ◆ Generic notification message (v 3)
- Bioterrorism
 - ◆ Bioterrorism lab results (v 2.4)



Standard Messages

- Areas of current or future work
 - ◆ Generic disease outbreak messages
 - ◆ Bioterrorism lab orders and queries
 - ◆ Laboratory chain of custody
 - ◆ Additional disease specific messages
 - ◆ Food safety
 - ◆ Environmental sample results



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Message Transport

PHIN Messaging System

- Handles Physical, Network, Session, and Encryption requirements
- Built on ebXML Standard
- Based on message-oriented transactions between a sender and a recipient
- Fully secure – used widely for financial transactions
- Supports XML packaging of any type of data exchange format (both HL7 versions 2 and 3)



Routing Infrastructure

- Information flow in emergencies must be close to real time
- Emergency partners may not be the same as routine partners
- Same network used for routine and emergency data exchange
- Data exchange pathways may not always be in place prior to emergency
- Support dynamic registration of new nodes
- Support dynamic discovery of new nodes and services



Conclusions

- Progress
 - ◆ Understanding business processes
 - ◆ Public health standards adoption
 - ◆ Specific Implementations
- Hurdles
 - ◆ Cost and complexity
 - ◆ Variety of V 2.X implementations
 - ◆ Existing systems and support
 - ◆ Dynamic information requirements of outbreak investigations
 - ◆ Complexity of routing infrastructure

