

1 **ebXML Case Study**

2 **Centers for Disease Control and Prevention,**
3 **Public Health Information Network**
4 **Messaging System (PHINMS)**

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12 Abstract:

13 The U.S. Centers for Disease Control and Prevention (CDC), an agency of the
14 Department of Health and Human Services, operates the Public Health Information Network
15 Messaging System (PHINMS), with state and local health agencies, clinical facilities and medical
16 labs across the U.S. PHINMS makes use of ebXML's Messaging Service and Collaboration
17 Protocol Agreement specifications.

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1 Executive Overview

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1.1 Business Need

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The Public Health Information Network Messaging System (PHINMS) provides a secure and reliable messaging system for the Public Health Information Network. The Centers for Disease Control and Prevention (CDC) says that there are currently multiple systems in place that support communications for public health labs, the clinical community, and state and local health departments. However, many of these systems operate in isolation, not capitalizing on the potential for a cross-fertilization of data exchange. A crosscutting and unifying framework is needed to better monitor these data streams for early detection of public health issues and emergencies. To meet these requirements, the Public Health Information Network will enable a consistent exchange of response, health, and disease tracking data between public health partners. Ensuring the security of this information is also critical as is the ability of the network to work reliably in times of national crisis.

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1.2 Project Description

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Developed by the Centers for Disease Control and Prevention, PHINMS uses the ebXML, infrastructure to securely transmit public health information over the Internet. PHINMS is a generic, standards-based, interoperable and extensible message transport system. It is platform-independent and loosely coupled with systems that produce outgoing messages or consume incoming messages.

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2 Participants

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2.1 Industry

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Public health community, consisting of federal, state, and local agencies, as well as private and commercial clinical and laboratory providers

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2.2 Users

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?? Centers for Disease Control and Prevention

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?? State, territorial, and local public health departments

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?? Participating health care providers

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?? Medical laboratories

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?? Emergency first responders, e.g. law enforcement and emergency medical teams

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2.3 Other

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3 ebXML Specifications Used

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OASIS/ebXML Messaging 2.0

73 OASIS/ebXML Collaboration Protocol Agreement 2.0
74

75 3.1 Other Standards Used

76 HL7 2.x messages for exchanges with clinical and lab facilities
77 HL7 2.x bioterrorism response messages
78 HL7 3.x messages for public health case reporting
79 Standard medical vocabularies: SNOMED, LOINC
80 W3C XML Signature
81 W3C XML Encryption
82 LDAP, X.509 PKI, SSL, J2EE, JDBC

83 4 Technical Description

84 PHINMS functions as a component in the National Electronic Disease Surveillance System
85 (NEDSS). PHINMS is loosely coupled with the Message Transformation Component, another
86 component of NEDSS. It uses a Transport Queue interface to read and write outgoing and
87 incoming messages. The Transport Queue is implemented as a database table or as a file
88 system directory.

89
90 PHINMS has three major components: the Message Sender, Message Receiver, and Message
91 Handler.

92
93 The **Message Sender** functions as the client. It is a Java application that runs on a workstation or
94 server. The Message Sender polls the Transport Queue for outgoing data. The Transport Queue
95 can be a database table or a file system directory. When outgoing data is found, the Message
96 Sender packages the data as an ebXML message and sends it to the Message Receiver.

97
98 The **Message Receiver** functions as a server. It is a servlet that runs on a J2EE compliant
99 application server. When the Message Receiver receives a message, it processes the message
100 envelope, decrypts the message, verifies the signature and then forwards the message payload
101 to the Message Handler or writes the message directly into a worker queue.

102
103 The **Message Handler** can process synchronous messages posted by the message receiver or
104 poll the worker queue. It is a servlet that runs on a J2EE compliant application server. The
105 Message Handler and the Message Receiver can reside on the same system. When the
106 Message Handler receives the message payload from the Message Receiver in synchronous
107 scenarios, it processes the message payload and then sends a response, which contains the
108 Message Handler's status, back to the Message Receiver. In asynchronous scenarios, the
109 message handler polls its worker queue to receive the incoming message.

110
111 PHINMS also performs routing functions, either in direct message exchanges or through
112 intermediaries.

113
114 **Route Mapping.** A configuration file, called routeMap, maps the route to its Collaboration
115 Protocol Agreement, the CPA. The route is specified in a field in the Message Queue database
116 table or as a field in the file descriptor that is associated with an outgoing message. The CPA is
117 read to determine the Message Receiver's end point, and security attributes, such as the
118 authentication mode.

119
120 **Use of intermediaries.** When the Message Sender and the recipient, which can also be a
121 Message Sender, are behind separate firewalls, they need an intermediary to communicate. A

122 Router Message Handler acts as this intermediary. It "routes" the message to a temporary
123 Message Bin instead of reading it.
124
125 To retrieve the message from the Message Bin, the recipient polls the Message Receiver, which
126 communicates to the Router, which retrieves the message from Message Bin. This scenario is
127 called "route-not-read."
128

129 **5 Benefits and Challenges**

130 **5.1 Business**

131 CDC has had the PHINMS in operation for over a year with deployments in some 30 locations
132 across the country. The agency says the number will expand greatly in the near future.

133 **5.2 Technical**

134 CDC reports some difficulties with security and interoperability issues. The system's manager
135 says the lack of specific security details in ebXML means vendors will implement various security
136 solutions (e.g., S/MIME or XML Encryption), leaving it up to CDC to integrate these solutions.
137 The system manager attributes some of the interoperability problems to the absence of
138 authentication standards within ebXML specifications, and the fact that CDC needs to
139 interoperate with multiple authentication mechanisms in order to conduct peer-to-peer
140 messaging.

141 **5.3 Lessons Learned**

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143 **6 Future Plans**

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145 CDC says it is currently working on requirements gathering for version 3.0 which will address
146 some of the management, deployment, versioning, integration and security issues we have been
147 dealing with.
148

149

Appendix A. Acknowledgments

150

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Centers for Disease Control and Prevention

Appendix B. Revision History

Rev	Date	By Whom	What
CDC-01	09-14-2003	Alan Kotok alankotok@cs.com	Initial version, draft 1
CDC-02	09-28-2003	Alan Kotok alankotok@cs.com	Draft 2, incorporating comments from Dr. Rhodes
CDC-03	10-01-2003	Alan Kotok alankotok@cs.com	Draft 3, incorporating further comments from Dr. Rhodes and his colleagues
CDC-FINAL	10-04-2003	Alan Kotok alankotok@cs.com	Completed case study submitted for publication

155 **Appendix C. Notices**

156 None provided.