Section A. Identifiers

1. Name and Title of Submitter:

Linh H. Le, M.D., MPH, New York State Environmental Public Health Tracking Network Information Technology Coordinator Research Scientist IV New York State Department of Health, Bureau of Healthcom Network Systems Management

2. Public Health System Name:

New York State Environmental Public Health Tracking Network (NYS EPHTN) Data Exchange System.

3. Address: 800 North Pearl

4. City: Albany State: NY Zip Code: 12204

5. Telephone: 518-473-1809 Fax: 518-486-1632

6. E-mail: lhl02@health.state.ny.us

7. Website: http://www.health.state.ny.us/nysdoh/environ/epht.htm https://commerce.health.state.ny.us

8. Description of community (ies) served:
NYS EPHTN Data Exchange System serves public health users across New York State at the local, regional and state level. It also aims to provide environmental hazard and health outcome data exchange and collaboration between neighboring states, localities and federal agencies. In collaboration with CDC, lessons learned as well as technical design and specifications from this project has made significant impact on the development of the National EPHT Network, which is an initiative to integrate data from environmental hazard monitoring, and from human exposure and health effects surveillance into a network of standardized electronic data that will provide valid scientific information on environmental exposures and adverse health conditions as well as the possible spatial and temporal relations between them.

The NYS EPHTN Data Exchange System is part of New York State (NYS) Health Commerce Network, which is an enterprise-wide architecture for secure, Internet-based, health-related electronic commerce between New York State Department of Health and its public health partners. It supports over 100 critical applications and 50,000 users in 13,000 organizations with an expected total number of users is 120,000 by the end of year, 2,800 user logins/day, 450,000 access hits/day. The NYS Health Commerce Network connects all local health departments, local social service units, 242 hospitals, 679 nursing homes, community health centers, 4,000 pharmacies and 12,000 physicians, 988 clinical and 867 environmental laboratories.

9. Number of FTEs:

a) In entire organization (list by staff category): New York State Department of Health: approximately 6,000 Bureau of Healthcom Network Systems Management: approximately 120 Center for Environmental Health: approximately 400

b) Directly involved in submission project: 4.5 FTEs.

NYS EPHTN Data Exchange System is designed and developed by New York State Department of Health (NYSDOH), Bureau of Healthcom Network Systems Management (BHNSM) in collaboration with NYSDOH Center for Environmental Health (CEH) and New York State Department of Environmental Conservation (NYSDEC) with support from Center for Disease Control and Prevention (CDC) Environmental Public Health Tracking program and Environmental Protection Agency (EPA) Office of Environmental Information (OEI).

Table 1: NYS EPHTN Data Exchange System Staff

Role	Percent Time
BHNSM Director – EPHT Grant Co-Investigator	10%
BHNSM Research Scientist IV – EPHT Information Technology Coordinator	15%
CEH Research Scientist IV – Environmental Health Surveillance Section Chief	10%
NYSDEC Project Manager	15%
BHNSM Database Analyst I	100%
BHNSM Database Analyst I	100%
BHNSM Information Technology Specialist III	100%

10. Description of Public Health Program(s) directly affected by submission:

The Environmental Public Health Tracking program's goal is to develop a tracking system that integrates data about environmental hazards and exposures with data about diseases that are possibly linked to the environment. This directly impacts public health through a variety of environmental health monitoring and surveillance programs. The system allows federal, state, and local agencies, and others to monitor and distribute information about environmental hazards and disease trends, advance research on possible linkages between environmental hazards and disease and develop, implement, and evaluate regulatory and public health actions to prevent or control environment-related diseases. As the communication backbone of the NYS EPHT network, the NYS EPHTN Data Exchange System not only provides data about environmental hazards, exposures and health effects over space and time, but also enables real-time data flow, joint decision support, professional collaboration and rapid dissemination of information to both NYSDOH and its public health partners including NYSDEC, CDC and EPA. This project has established infrastructure for an interoperable "live" network for data exchange between NYSDOH and its public health partners. Moreover, it has demonstrated the ability of CDC PHIN Messaging System and EPA Exchange Network to exchange information and predictably use the information that has been exchanged. It also support the development of capacity for data exchange, analysis and integration, which resulted in an automated data flow from NYSDEC to NYSDOH for air monitoring data in a timely and secure manner that is the first in many potential applications. This innovative approach to data exchange is providing the EPHT program in NYS with a wide range of benefits. Data exchange often requires dedicated resources and in many cases, data must be transferred manually between systems through labor intensive data entry. Implementation of the data exchange system reduces the cost and resource requirements of data sharing. This project improves data quality by incorporating data standards up front and establishing standard business rules in the XML schema used to package the data for exchange as problems with traditional data exchange methods often compromised the quality of environmental data. Metadata is also wrapped in the exchange easily so the data can be qualified. The system has provided a large and high quality ambient air quality dataset to the EPHT program for research and surveillance activities. It contains about 16.5 million records of ambient air quality monitoring data from 1995 to present. The data is from 80 plus active air monitoring stations where various parameters are measured using continuous and/or manual instrumentation. This data is currently used for linkage with hospital discharge and vital record data to estimate the effects of air pollutants on childhood respiratory hospital admissions in New York State including the cumulative effects of ozone on childhood respiratory hospital admissions and examined whether ambient air pollutants (O3 and PM10) are associated with birth weight and prematurity among singleton births occurring in NYS. With bidirectional data exchange capacity, the system provides the infrastructure for exchanging valuable new data between NYSDOH and NYSDEC as well as EPA and CDC. We continue to expand the system to allow the additional flow of data to and from other health and

environmental agencies including EPA, CDC, New York City Department of Health and Mental Health and Maine State Center for Disease Control. It also contributes significantly to the National EPHT program by not only providing recommendations to other state and federal environmental and public health agencies regarding how an open standard-based message broker can deliver advanced intersystem messaging capacity to respective state and national systems and providing feedback and lessons learned for other states that are embarking on similar projects, but also an unique and innovative Integration Broker that can be used as technical foundation of data exchange within the National EPHT Network. This data exchange system is an essential component of the infrastructure for the National EPHT Program. It illustrates the potential benefits of efforts by both health and environmental agencies to collect, link and analyze health effects, and environmental hazards and exposures as described in a case study by Association of State and Territorial Health Official (http://www.astho.org/pubs/Informatics.pdf). Since much of the data needed for the EPHTN reside within state health and environmental agencies, this project is key to the creation and success of a National EPHTN.

The importance of EPHT has been recognized by state and national policy makers. The NYS Senate and Assembly have a keen interest in EPHT. Bills have been introduced into both legislative houses to provide for the development of an environmental health tracking system within the NYSDOH with cooperation from other state agencies (Assembly Bill 969-a, Senate Bill 23626-a). The state legislature has a particular interest in collecting information on environmental risk factors for cancer and in geographically linking of cases from the Cancer Registry to facilities that may represent environmental hazards. The legislature has introduced bills which specifically "direct the commissioners of environmental conservation and health to produce environmental facility and cancer maps" (Assembly Bill 1884, Senate Bill 7080).

11. NYS EPHTN Data Exchange System team members (those marked with an asterisk are authors of the application):

Ivan Gotham*
Linh Le*
Tom Talbot
Leslie Brennan
Dan Hulchanski*
Sean Kelly*
Hongmei Yu*
NYS EPHT Program Staff
BHNSM Staff
NYSDEC Division of Information Technology Staff
CDC EPHT Branch Staff
Windsor Solutions, Inc.

Section B. Guidelines for Application

The Organization

The NYSDOH is one of the preeminent public health agencies in the nation. It provides health assessment, assurance, and policy development through an organization that includes offices of Public Health, Health Systems Management, Patient Safety, Medicaid Management, Managed Care, Continuing Care, and Health Statistics. Over six thousand people work for the Department to provide these services in collaboration with 57 local health departments across the State.

The Center for Environmental Health (CEH) applies scientific, medical, engineering, and public health expertise to identify, understand, prevent and mitigate risks to human health from New York State's living and working environments. The Division of Environmental Health Assessment (DEHA) provides environmental epidemiology, toxicological, and risk assessment expertise in support of the Center's and New York's environmental health and protection programs.

The Bureau of HEALTHCOM Network Systems Management at the NYSDOH is responsible for design, development, implementation, management and operation of the NYS Health Commerce Network. It is an Enterprise-wide secure Internet system (100 critical applications and 50,000 users in 13,000 organizations in local, state and federal levels), featuring enterprise-wide network services (ADSM backup, DNS, printing, secure internet/web access, LAN connectivity, e-mail), Enterprise-wide Lotus Notes office automation (6000 users), Enterprise production mainframe data systems, Enterprise Data Warehouse and production Unix servers. It has the overall technical and project responsibility for Public Health Informatics infrastructure and critical internal information technology infrastructure systems.

The NYS EPHTN Data Exchange System is a part of the NYS Health Commerce Network is entirely Web-based and designed to be the NYSDOH's strategic infrastructure to support and integrate all of its information interchange activities with external agencies. It is accessible via the Internet and by other venues supporting IP protocol communications. It is based on standards espoused by DHHS HIT framework and CDC PHIN standards and specifications. The NYS Health Commerce Network is comprised of three domains, each tailored to the specific information exchange needs of the intended audience. The Health Information Network (HIN) is the web 'portal' by which Local Health Departments access the Commerce system. The Health Provider Network (HPN) is the portal by which the clinical/Health provider organizations access the commerce system. The Health Alert Network (HAN) is a third domain on the NYSDOH Health Commerce System which provides health alerting for public Health Preparedness for both the HIN and HPN. The commerce system is available at https://commerce.health.state.ny.us.

Management

a. Objectives

In 2002, NYSDOH received a grant from CDC to conduct public health tracking projects including planning and development of the NYS EPHT Network. The goal was to integrate data from environmental hazard monitoring, and from human exposure and health effects surveillance into a network of standardized electronic data that will provide valid scientific information on environmental exposures and adverse health conditions as well as the possible spatial and temporal relations between them.

In 2004, NYSDOH received supplemental funding to develop a Pilot Data Exchange System between NYSDOH and NYSDEC. The Pilot Study was aimed at further exploration of the data exchange scenarios between NYSDEC and NYSDOH. As a result of that study, technical specifications and system architecture for the data exchange between NYSDOH and NYSDEC using PHINMS v2.0 (including authentication protocols that meet PHIN standard for security and critical infrastructure protection) have been developed.

Based on results of this pilot project, in 2005, NYSDOH received additional funding from CDC to extend the original Pilot Study objectives by bringing forward the integration of the Environmental Information Exchange Network and NYSDEC Network Node, and makes this integration a core part of the support for the data exchange. Specifically, this project builds on and extends the Pilot Study in the following areas:

- Technical architecture definition tasks will focus heavily on the early integration of the Exchange Network and the PHINMS, with emphasis on establishing direct, automated communication.
- Flow specification tasks have been included to consider the design of the data exchange from a business perspective. An appropriate XML schema will be designed that will be based on the

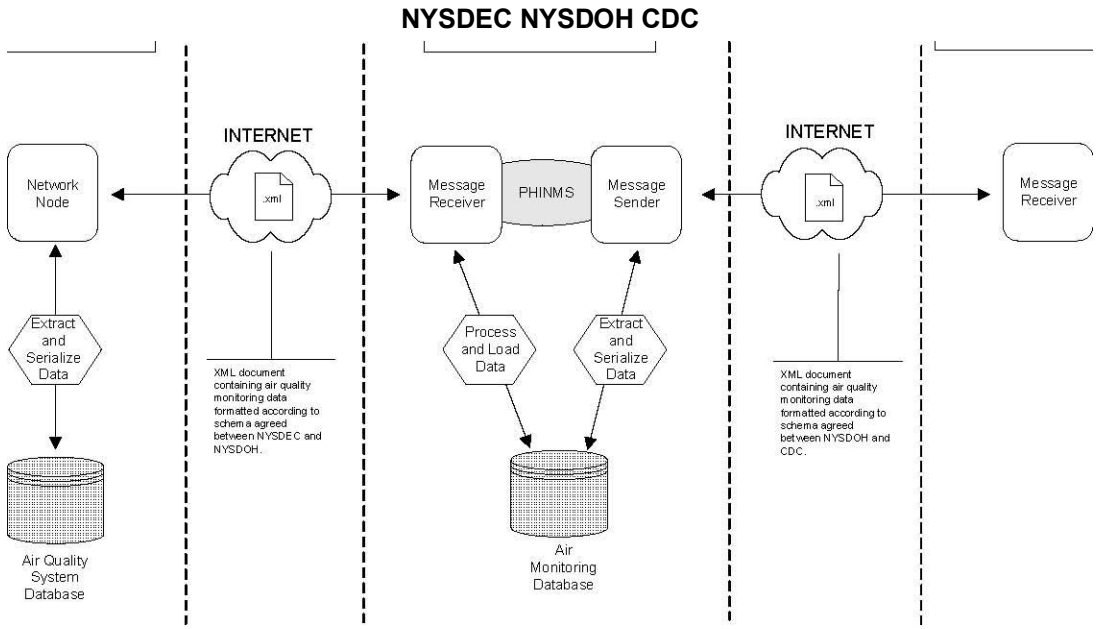
existing AQS schema but may be revised as necessary according to the business needs of NYSDOH. The flow configuration and trading partner agreement documents will serve to fully describe the mechanism and rules governing the flow between the agencies.

- The future implementation of additional data flow from NYSDOH will serve to further enhance the data exchange and increase the mutual benefits to the two agencies.

This system is an important contribution to the overall EPHT Program. The foundation of the EPHT Program is the routine flow of data between the collaborating agencies, on an essentially "real-time" basis. This data flow must proceed without technical obstacles and is completely dependent upon the information technology infrastructure put in place to support that exchange.

The following figure illustrates our vision for the data exchange. This data exchange will be accomplished through the following steps:

1 Ambient air quality monitoring and/or other environmental information will be extracted from an NYSDEC and/or other agency database and formatted according to an agreed XML schema.
2 The resulting XML document will be passed through the NYSDEC Exchange Network Node Web services to the PHINMS Message Receiver service across the Internet.
3 NYSDOH will then process the received information into their own database for analysis and linkage to other NYSDOH health data sources.
4 NYSDOH may then make the data available to CDC in an agreed upon format. With the necessary architecture in place, reciprocal flows of data may be established as appropriate.



b. Project Organization

Ivan Gotham, BHNSM Director, Co-Investigator and Chief informatics scientist of the EPHT grant, is responsible for the public health informatics and information technology activities including the development and design of architecture, data and technical specifications for the NYS EPHT network. Linh Le, BHNSM Research Scientist IV, oversees the development of NYS EPHTN Data Exchange System as Information Technology Coordinator of the EPHT grant. The responsibilities include day-to-day oversight of the project, liaising with the CDC, EPA, NYSDEC and other state and national agencies involved in public health tracking network efforts, and chairing the Network Architecture Subgroup of the EPHT Standards and Network Development Workgroup. Sean Kelly, BHNSM Information Technology Specialist III, ensures NYS EPHTN Data Exchange System meet state and federal security, privacy and architectural standards. Dan Hulchanski, BHNSM Database Analyst I, oversees the day-to-day technical components of the project including data transmission, processing and loading, data quality controls, and database design/administration. Hongmei Yu, BHNSM Database Analyst I, facilitates all aspects of research and development and application programming. This includes design and development of new programs and data integration techniques.

Implementation

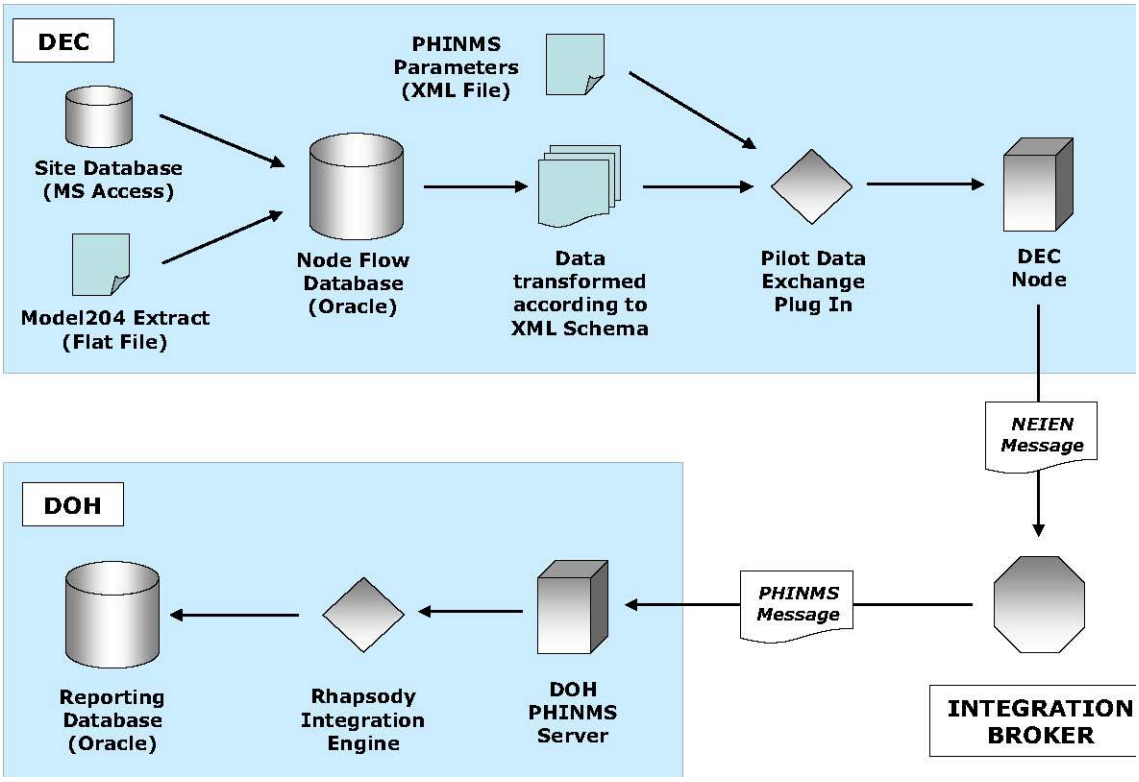
a. Public Health System

NYS EPHTN Data Exchange System is currently used as an automated data exchange system by NYSDOH and NYSDEC for environmental data but it is being extended to include other federal, state and local agencies such as CDC, EPA, Maine State Center for Disease Control and New York City Department of Health and Mental Health, data flows are also extended to include both health effect and environmental hazard data.

b. Scope

Overview

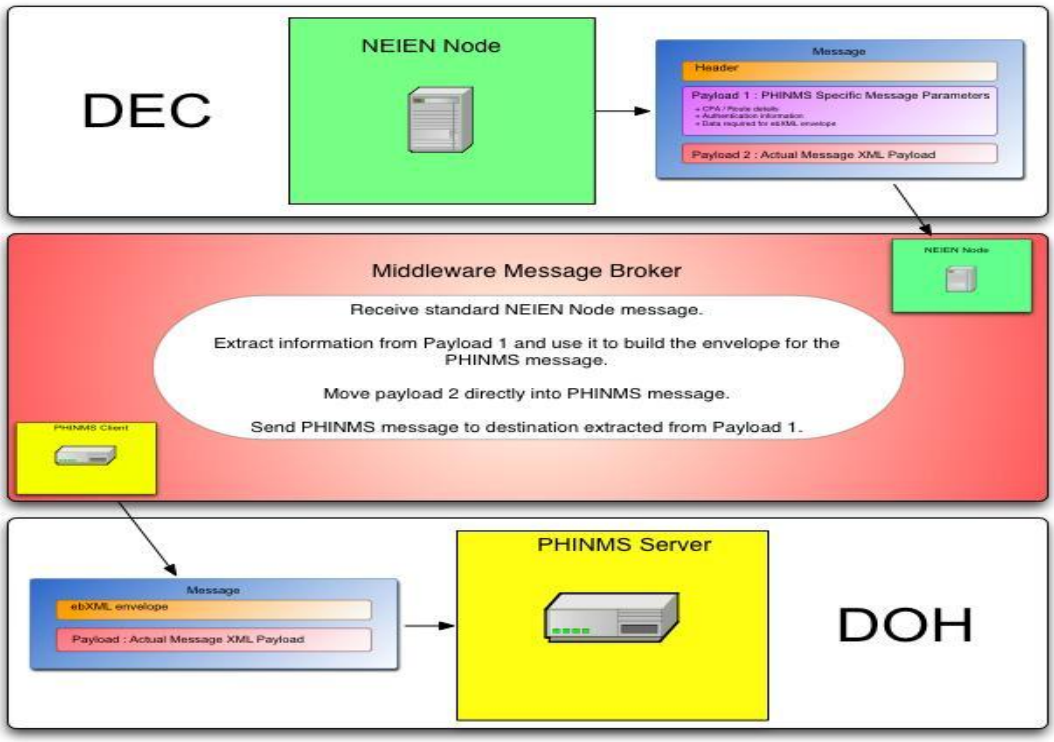
The design of the NYS EPHTN Data Exchange System was developed using a joint application development process with involvement from both NYSDOH and NYSDEC technical and program staff to enable each agency to better understand the needs and capabilities of its partner's information management processes, and to build consensus for a mutually acceptable data exchange approach. The system design process was also participated by technical and program staff from CDC and EPA, which provide not only invaluable technical input from the PHIN MS and Environmental Information Exchange Network but perspective for interoperability for these systems at national level with lessons learned from this project. The following figure illustrates the design of the NYS EPHTN Data Exchange System.



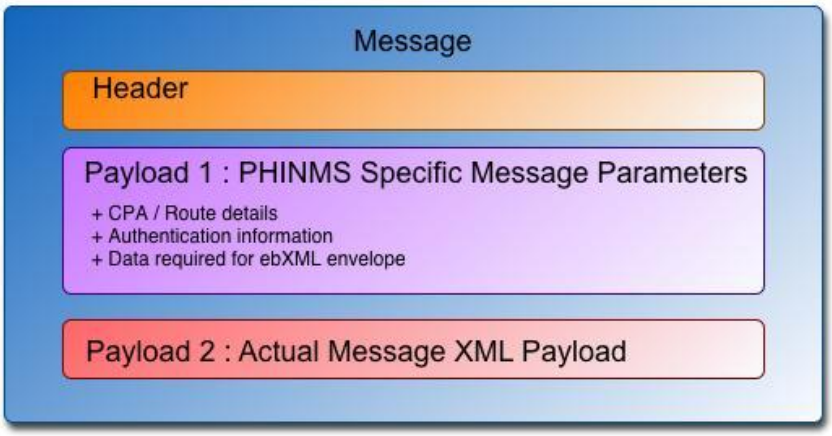
INTEGRATION BROKER

Technical Architecture

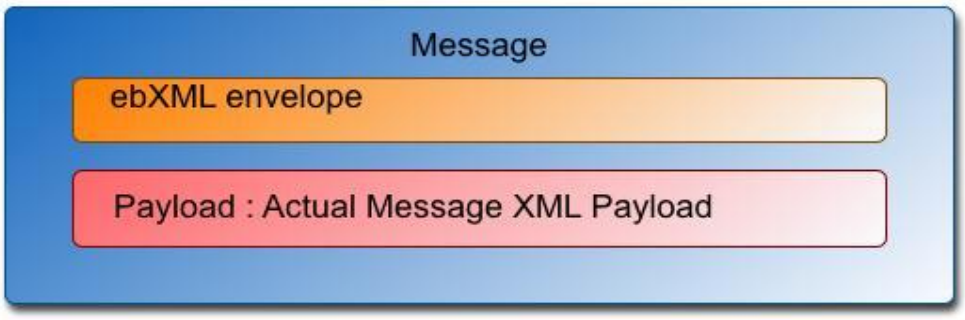
The technical architecture design for the NYS EPHTN Data Exchange System was developed as a process that is independent of the existing Environmental Information Exchange Network and PHINMS systems so that it can provide agency-agnostic, facilitating future information exchange without agency specific development. A unique Integration Broker was designed and developed as a stand alone application, written in Java, which operates as an intermediary between a Network Node and a PHINMS receiver. The Integration Broker is able to receive an Exchange Network message, translate it to a PHINMS-compliant message format and pass it to the destination PHINMS server. With this approach, the DEC Node will operate using its normal SSLbased Node to Node communication protocol, and the DOH PHINMS server receives only recognizable PHINMS messages. It is envisioned that the Integration Broker will be able to operate in any situation where a Node needs to pass messages to PHINMS, and will not be environment or agency specific.



While it is envisioned that the Integration Broker will eventually be capable of bidirectional data transfers, for the purposes of the initial data flow, the Integration Broker is only developed to handle messages sent from NYSDEC to NYSDOH. The Integration Broker has been designed in such a way that it could be hosted by any party in any location, and utilized by unlimited trading partners. In order for the Integration Broker to be sender and receiver agnostic, it must be able to operate without any knowledge of the endpoints. In order for this to occur, the actual endpoint information must be encoded in the message itself. An operational PHINMS client uses a combination of XML files and database tables to store the parameters that are required to construct the PHINMS message. This metadata was encrypted and stored in XML files accessible to the NYSDEC Node. The information is extracted by a component of the NYSDEC Node, and is wrapped in the first payload of the message generated by the NYSDEC Node. This information includes Route information, destination Service and Action information, message encryption and signature flags, public key information, and any required certificates. The following figure outlines the structure of the Environmental Information Exchange Network message generated by the NYSDEC Node.



The NYSDEC Node transfers the generated message to the Integration Broker using the Submit primitive method. The Integration Broker presents a standard Network Node interface. When the Integration Broker receives the Network message, the first payload is extracted from the message and is used to build a PHINMS-compliant message, including the necessary ebXML wrapper. The second payload included in the original Exchange Network message contains the actual message data. The data from this payload is transferred to the PHINMS message with no modifications. The resulting PHINMS message is transferred to the PHINMS receiver, with the Integration Broker emulating the operation of a normal PHINMS client. The following figure outlines the structure of the PHINMS message to be generated by



The Integration Broker is written in Java and where possible reuses much of the existing Network Node and PHINMS source code in order to provide for greater stability and easier maintenance. From the Exchange Network perspective, the Integration Broker will essentially behave as a functioning Network Node. Communication to and from the Integration Broker uses Exchange Network specific standards, and it appears identical to other Nodes. From the PHINMS perspective, The Integration Broker will behave as a functioning PHINMS sender, and will be able to send messages to the designated PHINMS receiver, in this case that maintained by DOH.

Integration Broker as an Exchange Network Node

The Environmental Information Exchange Network Node Functional Specification version 1.1 requires that "A Node is a service provider. Thus, the key interfaces that must be implemented in a Node include the following Web methods: *Authenticate, Submit, Query, GetStatus, Notify, Solicit, Download, NodePing, GetServices, Execute*." Therefore, in order for the Integration Broker to be Exchange Network Node compliant, all ten of these methods must be implemented. However, not all of these methods are actually needed for the function of the Integration Broker and specifically for the purposes of the Pilot Data Exchange only the *NodePing, Authenticate*, and *Submit* methods are required. The other seven methods are responsive, but disabled. If any of the remaining seven methods are called on the Integration Broker, they return a standard Node Fault as specified by the Exchange Network Node Functional Specification version 1.1 section 3.4. Specifically, the Node Fault that is returned when one of the unused methods is called is E_UNKNOWNMETHOD with the description of "Integration Broker does not support" and the name of the method requested. When invoked the *Submit* method receives the file and passes it to the Integration Broker specific code, which will process the file. The file that is submitted to the Integration Broker will be a compressed file containing (wrapping) two files. The two files contained within the ZIP file will be the PHINMS metadata for the PHINMS destination, and the data payload itself.

Integration Broker as a PHINMS Sender

The PHINMS metadata file is an XML file that contains the minimum amount of data needed to compose a PHINMS message. The Integration Broker processes the metadata file and builds the PHINMS

context and record objects. In a standard PHINMS installation the PHINMS client will read various XML files on the client system, such as sender.xml and routemap.xml, then build the context and record for the message to send based on the values in those files. The Integration broker will not have those configuration files, instead the pertinent configuration parameters are derived from the PHINMS metadata file that the Integration Broker received from the calling Exchange Network Node. The minimum elements that PHINMS needs to compose a valid message are:

Data required	**Location found in PHINMS stock install**
Connection Time Out	Sender.xml
Data Read Time Our	Sender.xml
CACerts Password Identifier	Sender.xml
Party ID	Sender.xml
Sync Reply	Sender.xml
Ack Requested	Sender.xml
Signed Ack	Sender.xml
My Domain	Sender.xml
File Descriptor Format	Sender.xml
Max Attempts	Sender.xml
Authentication Type	CPA.xml
Protocol	CPA.xml
Custom Login Page	CPA.xml
Custom Secret Params	CPA.xml

Data required	**Location found in PHINMS stock install**
To Party ID	CPA.xml
To Host	CPA.xml
Soap Action	CPA.xml
Custom Login Params	Passwd
CACerts password	Passwd
Routing Info	Descriptor file
Service	Descriptor file
Action	Descriptor file
Argument	Descriptor file
CPA ID	Routemap.xml

These values must be in an XML file with the following format, for the Integration Broker to understand them[1]:

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<PHINMSData>
        <sender>
                <connectionTimeOut>30</connectionTimeOut>
                <dataReadTimeOut>300</dataReadTimeOut>
                <CacertsPasswdIdentifier>cacertsPasswd1</CacertsPasswdIdentifier>
                <myPartyId>*</myPartyId>
                <syncReply>true</syncReply>
                <ackRequested>false</ackRequested>
                <signedAck>false</signedAck>
                <myDomain>dec.state.ny.us</myDomain>
                <fileDescriptorFormat>nameValue</fileDescriptorFormat>
                <maxAttempts>2</maxAttempts>
        </sender>
        <CPA>
                <authenticationType>custom</authenticationType>
                <Protocol>SSL</Protocol>
                <customLoginPage>*</customLoginPage>
                <customSecretParams>userid=*2&amp;amp;password=*</customSecretParams>
                <toPartyID>*</toPartyID>
                <toHost>*</toHost>
                <soapAction>*</soapAction>
        </CPA>
        <password>
                <customLoginParams>userid=*&amp;amp;password=*</customLoginParams>
                <CacertsPassword>*</CacertsPassword>
        </password>
        <filedescriptor>
                <RoutingInfo>DOH</RoutingInfo>
                <Service>commerce</Service>
                <Action>send</Action>
                <argument>*</argument>
        </filedescriptor>
        <routemap>
                <CPAID>CPA_DOH</CPAID>
        </routemap>
</PHINMSData>
```

The NYSDOH uses a customized version of PHINMS that implements specific security features for the New York State secure Health Commerce Network in addition to all of the normal functionality of PHINMS as deployed by CDC. However, the basic structure, and methods explored in this pilot are readily extensible to include all of the standard functionality, authentication mechanisms, and encryption methods that PHINMS includes. The Integration Broker skips over the methods that would normally be used by PHINMS to read the associated values from the configuration files, instead populating them itself using the values that are read from the submitted PHINMS Meta Data. A context object and a record object are instantiated by the Integration Broker manually. Some items from the context are used by the LoginManager object to login and establish a connection to the PHINMS server. For the purposes of the Pilot Data Exchange, only the “custom” login type is used. The other types of logins could be called based on additional information that could be passed in the PHINMS meta-data XML file in the

[1] Actual values not included for security reasons

future. Once the connection is established, the context and record object are passed into a slightly modified FileUploadManager object. The modifications allow direct access to the "send" method without needing to read values from the normal PHINMS configuration files (since the context and record objects have already been built). From this point on, mostly standard PHINMS principles are used, with a few slight modifications in the area of SSL transport (SSLManager) which allow for reading certificates from the local machine, or being passed in in the future pending other configurations. As implemented, the Integration Broker for the Pilot Data Exchange will connect using the default CACerts implementation that ships with Java 1.4. If the connections occur quickly enough, a "Success" response will be returned to the sending Network Node. However, due to the multiple steps that are involved, it is possible for the sending Network Node to timeout and believe that the send was a failure while the actual PHINMS send is processing, and eventually completes successfully. Future work should focus on the need to synchronize the Node and PHINMS process to allow for more connected timeout procedures. PHINMS sending errors should be returned to the sending Network Node in the form of Exchange Network compliant error messages.

c. Integration Level

The NYS EPHTN Data Exchange System is completely integrated with the NYS Health Commerce Network. The system architecture and technical specifications are based on standards of the PHIN Messaging System and Environmental Information Exchange Network and other industry standards including Web Services and ebXML. The XML Schema for the Air Quality Monitoring (AQS) is based on the National AQS XML schema from EPA and consistent with the EDSC Environmental Sampling, Analysis and Results (ESAR) data standard.

d. Privacy Protection

NYS EPHTN Data Exchange System ensures that all data are transferred, stored and output in a secure manner, which meets or exceeds requirements of federal and state information security policies and standards. The system uses strong authentication methodology implemented by NYS Health Commerce Network with all data is transferred using HTTPS, 128-bit SSL encryption. Firewalls are utilized to securely provide access to an ebXML – based PHINMS receiver.
The system is built on ebXML and Web Services, which are industry standard that enables the secure, bi-directional and immediate exchange of messages between business partners via the Internet. They offer the high degree of specificity needed for the transport, acknowledgement and processing of industry standard data messages such as HL7, X12 and others and also allow for the use of existing encryption and digital signature standards.

e. System Implementation

The NYS EPHTN Data Exchange System has evolved out of three distinct development stages. From 2003 to 2004 NYSDOH received funding from CDC to work with NYSDEC to design and develop a proof-of-concept to determine the feasibility of automated data exchange with environmental information systems using PHINMS. As a result of that project, technical specifications and system architecture for the data exchange between NYSDOH and NYSDEC using PHINMS v2.0 (including authentication protocols that meet PHIN standard for security and critical infrastructure protection) have been developed. From 2004 to 2005, the NYSDOH was funded to extend the original Pilot Project objectives by bringing forward the integration of the Environmental Information Exchange Network and NYSDEC Network Node, and makes this integration a core part of the support for the data exchange. Specifically, this project proposal builds on and extends the Pilot Study in the following areas:

- Technical architecture definition tasks will focus heavily on the early integration of the Exchange

Network and the PHINMS, with emphasis on establishing direct, automated communication.
- Flow specification tasks have been included to consider the design of the data exchange from a business perspective. An appropriate XML schema will be designed that will be based on the existing AQS schema but may be revised as necessary according to the business needs of NYSDOH. The flow configuration and trading partner agreement documents will serve to fully describe the mechanism and rules governing the flow between the agencies.
- The future implementation of other data flows will serve to further enhance the data exchange and increase the mutual benefits to all exchange parties.

From 2005, the system is utilized for automated transfer of air quality monitoring data from NYSDEC to NYSDOH. Additional data flows such as health outcome data for the Public Health Air Surveillance Evaluation (PHASE) project and exchange partner such as Maine State Center for Disease Control and New York City Department of Health is also being added to the system.

f. Current State

The NYS EPHTN Data Exchange System is currently being used in full production to provide timely and high quality ambient air quality data to the NYS EPHT program for research and surveillance activities. Approximately 16.5 million records of ambient air quality monitoring data from 1995 to present has been transferred. The data is from 80 plus active air monitoring stations where various parameters are measured using continuous and/or manual instrumentation. This data is currently used for linkage with asthma hospitalization data to study the relationship between Ozone and Particular Matter and childhood asthma. With bi-directional data exchange capacity, the system will provide the infrastructure for exchanging valuable new data between NYSDOH and NYSDEC as well as EPA and CDC. The system is being expanded to allow the additional flow of data to and from other health and environmental agencies including EPA, CDC, New York City Department of Health and Mental Health and Maine State Center for Disease Control.

Value

a. Success in meeting objectives

This project has established infrastructure for an interoperable “live” network for data exchange between NYSDOH and NYSDEC. Moreover, it has demonstrated the ability of CDC PHIN Messaging System and EPA Exchange Network to exchange information and predictably use the information that has been exchanged. It also supports the capacity for data exchange, analysis and integration, which resulted in an automated data flow from NYSDEC to NYSDOH for air monitoring data in a timely and secure manner. This innovative approach to data exchange is providing the EPHT program in NYS with a wide range of benefits including rapid data exchange facilitating a timelier link between environmental exposure and health incidence data. Data exchange often requires dedicated resources and in many cases, data must be transferred manually between systems through labor intensive data entry. Implementation of the data exchange system reduces the cost and resource requirements of data sharing allowing limited health department resources to be utilized on other projects. This project improves data quality by incorporating data standards up front and establishing standard business rules in the XML schema used to package the data for exchange as problems with traditional data exchange methods often compromised the quality of environmental data. Metadata is also wrapped in the exchange easily so the data can be qualified. With bi-directional data exchange capacity, the system will provide the infrastructure for exchanging valuable new data between NYSDOH and NYSDEC as well as EPA and CDC. In the future, we will continue to expand the system to allow the flow of drinking water data to EPA. Finally, this system also contributes significantly to the National EPHT program by not only provide recommendations to other state and federal environmental and public health agencies regarding

the technical implementation of automated data exchanges between environmental and health agencies but also the foundation of a dual transport protocol and an unique and innovative Integration Broker that can be used as technical foundation of data exchange within the National EPHT Network.

Lessons Learned

The following recommendations were developed by the project team during the course of this project.

Collaboration with Program Areas

The project team responsible for coordinating the work conducted to develop the NYS EPHTN Data Exchange System was established specifically to include program and technical representatives from both agencies. The development of the design for the NYS EPHTN Data Exchange System also involved a joint group of programmatic and technical representatives from both DEC and DOH. This collaborative and inclusive approach was critical to gaining agreement to the design of the NYS EPHTN Data Exchange System, and to the successful execution of the project. It is recommended that similar projects utilize a like approach to ensure that there is broad programmatic and technical involvement from an early stage in the development process.

Thorough need assessment is also critical to the success of this project as the data need to be exchanged not only timely and securely in a standard format (XML) but also to be made available in appropriate format for research and surveillance (SAS) and stored in easy to access location so it can be used by program areas in various manners and environments (Web or PC).

Flow Design and Agreement

A critical element of the approach to the NYS EPHTN Data Exchange System was the joint design of the data exchange. While the design of the Data Exchange Template and the XML Schema were critical first steps in this process, the development of the Flow Configuration Document and the Trading Partner Agreement was also very important since these documents served to specify the operational and contractual aspects of the data exchange. It is recommended that further implementations of similar partner exchanges also focus on the design of these deliverables early in the process since they serve to establish the foundation for a successful data exchange.

Technical Assessment and Project Planning

It is important that a thorough technical assessment was conducted to not only provide the project a full understanding of current data exchange mechanisms but also to minimize unexpected problems during the development process. Information from the technical assessment should also be translated into the project planning process to ensure the effectiveness and timeliness of the project.

XML Schema Design

It is recommended that any future implementations of similar exchanges further consider the use of future versions of the EPA AQS schema which are expected to be more consistent with the EDSC Environmental Sampling, Analysis and Results (ESAR) data standard currently under development. It is likely that any XML schemas derived from the ESAR standard will be more appropriate to these types of “regional” data exchange since the EPA AQS schema will always require the operational control elements that are not as relevant to those regional exchanges.

Broad Public Health Application

The success of the NYS EPHTN Data Exchange System demonstrated the public health value of a direct exchange of information between a department of health and a department of environment. Based on NYS' success, CDC and EPA elevated that exchange to a national level by collaborating on the CDC/EPA Interoperability Project. This project's objective is to demonstrate a secure, standard based, user-friendly approach for bi-directional information exchange of health and environmental data between CDC, EPA, and their state counterparts.

b. Costs and benefits offsetting costs

All funding for NYS EPHTN Data Exchange System has been from the Centers for Disease Control and Prevention (CDC). While no formal evaluation of the system has been conducted to date, NYS EPHTN Data Exchange System has greatly increased the efficiency of the NYS EPHT program surveillance activities. In addition, users at all related NYSDOH programs are now able to easily access quality and consistent data in a secure and timely manner. By utilizing an automated data exchange system, NYSDOH eliminates the costs associated with manual data transfer and processing.