Enabling the rapid development and deployment of Health Information Exchange (HIE)

Overview.......... 2

Section 1: The challenge 3
- America's fragmented health record system.......... 3
- Syndromic surveillance 3
- Seeking solutions: Establishing the Montana Health Information Exchange Pilot Project.......... 4
- Data-sharing agreements 5

Section 2: Technology solutions.......... 5
- Standards-based data sharing 5
- Availability, reliability, scalability, and affordability 6
- Hub-and-spoke architecture 6
- Crossflo CDX value 6
- Privacy and security 6
- Rapid deployment.......... 6

Section 3: System overview.......... 7
- System processes 8
- Data elements.......... 9

Section 4: Project management methodology and system implementation.......... 9
- Project team 10
- Project phases 11

Section 5: Pilot project outcomes and lessons learned 14
- Future applications.......... 15

Overview

Despite efforts to move toward electronic data, America's ailing healthcare system remains overwhelmed by mountains of paper: paper medical records, paper prescriptions, paper orders, paper results – ubiquitously paper. Residing in this antiquated system are critical pieces of clinical data, patients' medical information and knowledge that remain largely unlinked to anything but the surrounding paper and the paper clip holding it all together.

Modern Electronic Medical Record (EMR) systems are now replacing archaic paper-based record systems while offering the promises of increased efficiency, accuracy, safety, and quality of care. With a growing mandate and financial incentives to move toward EMRs, clinicians and healthcare administrators will begin adopting EMR systems at an accelerated pace. In fact, while outlining his economic recovery plan, President Obama said, "We will make the immediate investments necessary to ensure that within five years all of America's medical records are computerized." Funding made available in the American Recovery and Reinvestment Act of 2009 confirm this commitment. Implicit in the President's statement is that these computerized records will somehow be interoperable. However, this is not a given, and in fact, is often the most expensive and challenging part of the problem.

As providers rush to broadly adopt EMRs and other forms of health information technology, the US healthcare system remains fundamentally disconnected with limited ability to share clinical or other health data between disparate data silos. This presents yet another pressing problem for our healthcare system – How do we securely share clinical data among thousands of independent health data systems linked into a single, unified, interoperable national health data and information network?

Unprecedented efforts are now underway to seek solutions to this daunting problem. This paper describes such a project to implement an operational health information exchange (HIE) developed for syndromic surveillance. The challenges of creating interoperable health data exchanges are as vast as the location chosen for this pilot project – under the Big Sky of Montana.

Responding to the state and national need to create interoperable health information exchanges, the National Center for Health Care Informatics (NCHCI) joined forces with Hewlett-Packard Company (HP) and Crossflo Systems, Inc. (Crossflo) to demonstrate an integrated software and hardware solution to quickly, efficiently, and affordably link disparate health data sources in a near-real-time health information exchange. Entitled *The Montana Health Information Exchange Pilot Project*, this effort linked four Montana hospitals' Emergency Departments (ED) with the Montana Department of Public Health and Human Services (MT DPHHS) to share syndromic surveillance data.

Crossflo and HP were chosen for this initiative because Crossflo DataExchange® (CDX) software running on HP's Integrity NonStop server offers fast, "out of the box" deployment (hours or days, not weeks or months) using existing staff and no other changes to existing systems or infrastructure. The NCHCI served as the host for the pilot project, seeking involvement and cooperation from all participating entities.

Herein is a summary of the information and data challenges facing our healthcare system, a description of the use case for the pilot project (syndromic surveillance), the technology solution chosen for the project, a system overview, outcomes and lessons learned, and future opportunities to expand the pilot efforts.

Section 1: The challenge

America's fragmented health record system

Health Information Exchanges (HIE) will be critical infrastructure components of our healthcare system if America is to be transformed from a fragmented, inefficient, paper-based system to a value-based, integrated delivery system based upon transportable electronic health records. In April 2004, President George W. Bush took a decisive step for the future of healthcare in the United States by declaring his intent to have interoperable electronic health records in place for all Americans by 2014. President Barack Obama has clearly articulated the need to accelerate and expand the adoption and use of electronic health records. His priorities involve a healthcare system that puts the needs of the patient first, is more effective for medical providers, and operates with greater cost efficiencies. From general comments that President Obama has made, his plans appear to be based on the following tenets:

- Medical information will follow consumers so that they are at the center of their own care
- Consumers will be able to choose physicians and hospitals based on clinical performance results made available to them
- Clinicians will have a patient's complete medical history, computerized ordering systems, and electronic reminders
- Quality initiatives will measure performance and drive quality-based competition in the industry
- Public health and bioterrorism surveillance will be seamlessly integrated into care delivery
- Clinical research will be accelerated and post-marketing surveillance will be expanded

In order to operationalize the functions embodied in these tenets, HIE efforts are underway across the US to demonstrate technically viable and sustainable solutions. In 2005, four initiatives were funded by the federal government to create prototypes for a Nationwide Health Information Network (NHIN). Since then, numerous contracts have been awarded by the Department of Health and Human Services to demonstrate and implement a variety of health information exchanges. While significant progress has been made, there is much more to be accomplished and the challenges remain daunting. However, solutions such as the one described in this paper will help bring the industry closer to its goal of an efficient, integrated healthcare system. As national efforts to develop the NHIN move forward, local, regional, and statewide efforts similar to the Montana project must occur simultaneously to demonstrate new HIE solutions.

Syndromic surveillance

In addition to the indispensability of EHRs for the creation of a NHIN are the important public health and safety benefits of syndromic surveillance (biosurveillance).

The Avian Flu virus (H5N1) is a growing threat and has recently been detected in Europe. Its propagation across Asia into Europe is a warning sign that gives America the chance to prepare for this infectious agent before it reaches our shores. However, bird flu is not the only pathogen of concern. In the aftermath of September 11th, 2001, the potentials for bioterrorist attacks pose another compelling reason for the healthcare community to mobilize its diagnostic resources to detect the presence of toxins or infectious biologic agents at the earliest possible moment.

These efforts are a part of 'syndromic surveillance,' which is the ongoing, systematic sharing, aggregation, analysis, interpretation, and application of near-real-time indicators that can detect naturally occurring or bioterrorist pathogens. If preventive measures fail to stop a naturally occurring or bioterrorist attack, hospitals, physicians and state agencies will be the front-line defenders against

potentially devastating public health consequences. The timely recognition of diagnostic or symptom pattern trends in the pre-epidemic phase are the optimal means to minimize the potentially catastrophic effects on our citizens' health.

Seeking solutions: Establishing the Montana Health Information Exchange Pilot Project

Beginning in the summer of 2005, the NCHCI engaged in discussions and activities necessary to create a Regional Health Information Organization (RHIO) for the state of Montana. As a non-profit corporation, the NCHCI recognized the important role it could play as an independent, neutral entity to help facilitate data exchange among highly independent, and often competitive, healthcare facilities.

Recognizing the promise of Crossflo DataExchange (CDX) software as a possible solution for HIE, in May 2007, the NCHCI joined forces with Crossflo and HP to develop the Montana Health Information Exchange Pilot Project. The stated purpose of the project was to demonstrate interoperable health information exchange using Crossflo software running on HP Integrity NonStop servers.

Criteria and requirements were established to help guide the project. Most importantly, a well defined use-case was required to demonstrate health data exchange. Further, to simplify data sharing among participants, a limited, "de-identified" data set needed to be selected. And finally, the participant pool needed to include a minimum of four hospitals with electronic emergency department systems geographically dispersed across Montana.

In evaluating the criteria for the Montana HIE Pilot Project, the project team selected Syndromic surveillance as the use case because it represented a highly defined data set that could be de-identified (i.e., not containing identifiable personal health information as defined by HIPAA). Four hospitals, geographically dispersed across Montana and each with electronic emergency department data systems, were chosen to participate (see Figure 1).

Figure 1. Montana Health Information Exchange Pilot Project participants

Since the objective of syndromic surveillance is to detect diseases in their pre-epidemic phase, the Montana HIE was designed to aggregate diagnoses data from the participating emergency rooms at the four participating hospitals and then electronically publish the data to a syndromic surveillance application already in place at the MT DPHHS. The data would be examined at regular intervals to identify symptoms and diagnoses patterns that may indicate the presence of a naturally occurring or bioterrorist pathogen in the population. Currently, infectious disease diagnoses are typically made only after physicians have examined patients and obtained cultures to determine the types of organisms, a process that usually takes several days. From a practical standpoint, diagnoses are actually made at an interval that is later than optimal. The best possible time to detect diseases is in the patients' symptoms phase.

With a project framework in mind and a use case of syndromic surveillance selected, the project team moved into the initial development phase of the pilot. Participating sites were evaluated and selected, a planning meeting with all participants was conducted in the state's capitol city of Helena, and planning documents were prepared, reviewed, and approved.

Data-sharing agreements

Recognizing the need to comply with the privacy rules of HIPAA, Data Use Agreements were drafted and disseminated between project participants. The initial draft data sharing agreement was deemed far too complex by participants and was replaced by a Data Use Agreement for Disclosures of Limited Data Sets. This simplified agreement outlined the responsibilities of the entities sharing their data (the four participating hospitals) as well as the recipients of the data (the NCHCI and the MT DPHHS). While significant effort was expended and unanticipated delays were experienced, creating a workable data-sharing agreement identified the legal, privacy, and security issues that would need to be addressed in any future HIE activities. It was further recognized that moving from a 'de-identified' data-sharing environment to one in which 'identifiable patient data' is shared adds substantial complexity to the project and to the legal data-sharing agreements between participants.

Section 2: Technology solutions

Crossflo Systems and HP were chosen for this initiative because Crossflo DataExchange (CDX) software integrated on HP Integrity NonStop servers offers an institution's existing staff, systems and infrastructure very rapid and relatively inexpensive data sharing. This feature of using each facility's existing personnel and data systems was an imperative given the disparate nature of the many hardware and software configurations found in hospitals, medical offices and public health entities.

Crossflo DataExchange Software has a number of important features that make it uniquely suited for a rapidly deployable and scalable HIE environment.

Standards-based data sharing

Crossflo's CDX software provides standards-based data sharing with most major healthcare data systems and national data standards, including HL7, Global Justice XML Data Model (GJXDM), National Information Exchange Model (NIEM), EDXL, CAP and NCPDP. Standards-based data sharing is important in all healthcare environments and especially for sharing syndromic surveillance information. The reason is that clinical facilities must interface with other first responders, such as public safety and Department of Homeland Security professionals. To accomplish this, CDX is able to harmonize the various data sharing standards used across multiple agencies, such as HL7 and the NIEM. Specifically, for this HIE project, Crossflo started by analyzing the HL7 data model and developed corresponding business objects. These HL7 business objects were used to build a NIEM-based HL7-equivalent schema. This ensures that the schema follows industry accepted methods and conforms to the ongoing efforts to add a healthcare-specific domain to NIEM in the future. Crossflo's

experience with working in highly secure environments, such as data sharing among and between the New Jersey State Police and local law enforcement agencies as well as with the FBI, was an important factor in selecting this technology for Montana.

Availability, reliability, scalability, and affordability

The HP hardware provides 24/7 availability, reliability, and extensive scalability with low initial cost and low ongoing total cost of ownership due to resource efficiency and easy manageability. The cost implications for the hardware and software were of prime importance at the beginning of the project. Reasonable costs and ease of use will be even more important to the success of extensibility and scalability of this project in the future. The Crossflo DataExchange Version 3 (CDX) platform provides an effective, controlled and scalable solution for the sharing and integration of data across virtually any combination of platform, vendor application and location. CDX harnesses the power of Extensible Markup Language (XML), Service Oriented Architectures (SOA) and other non-proprietary, standards-based technologies to link disparate data sources at a fraction of the cost and time required by traditional solutions. CDX maintains database vendor neutrality by leveraging Web services, XML, and Java. The CDX technology is agnostic to platforms, application servers, and application databases.

Hub-and-spoke architecture

DataExchange employs a 'hub-and-spoke' architecture to minimize deployment costs. As part of the hub-and-spoke architecture, the exchange of data is orchestrated using a 'publish and subscribe' data-sharing model. This powerful, multi-directional system allows immediate data sharing using existing IT infrastructure with no breaks in operational continuity.

Crossflo CDX value

The greatest value of Crossflo DataExchange lies in what the software does NOT do. It is NOT limiting. Crossflo CDX does not require a change in behavior by its users, which is a critical factor when dealing with multiple bureaucracies, nor does this technology require a massive budgetary commitment of time and money. CDX does not compromise data security by exposing an agency's database to others' data, limit the number, types, or geographical locations of the databases to be linked. It also does not require a commitment to 'the ultimate data integration solution' by all participants before the critical first step of data sharing can commence. Possibly the most important feature is that it does not dictate or limit any future design, application, or technological direction.

Privacy and security

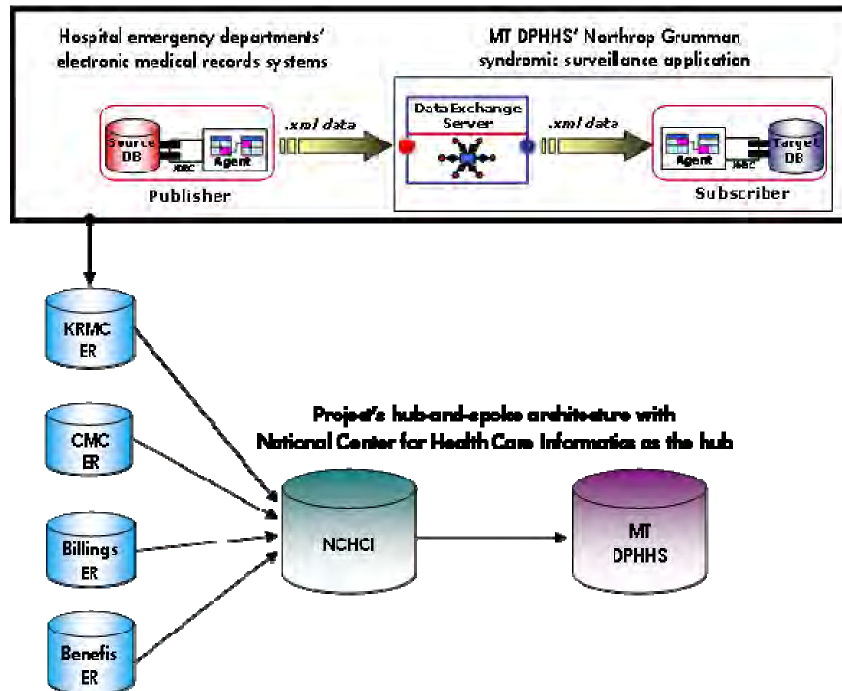
Security is a critical issue for public safety and healthcare. The CDX software facilitates the encryption of an entire record or of any field within the record. This is particularly important for patient security, as the patient may not want any providers, other than his/her psychiatrist, to have access to the fact that the patient is being treated for a mental disorder.

Rapid deployment

The Crossflo DataExchange software dramatically reduces the time and cost for databases in different, disparate entities to share data. DataExchange relieves the pain of data sharing by being invisible to the end user and, as stated above, incorporates the latest Federal data sharing standards. The owners of the data maintain control of their own databases. Each determines what data to share, how often, and with whom.

In the execution of the pilot project, HP and Crossflo system architects worked with the hospitals' IT departments to analyze each hospital's database and mapped the appropriate fields of information to the HL7 standard and then to MT DPHHS' database (See Figure 2). The immediate, initial results of the pilot project are that the MT DPHHS can view patients' subjective complaints from the hospitals' ER systems, which are critical to the analysis, reporting, and correct response to identified health incidents. This model supports the CDC/HHS overall national data sharing effort to facilitate early diagnoses from multiple treatment facilities and thereby combat bioterrorism and support pandemic planning.

Figure 2. Current project architecture



Section 3: System overview

The MT HIE System is comprised of three major functional components that interact to perform the data extraction, transformation and data loading. These components include:

- MT HIE Server: The data exchange server that provides the data exchange function
- Data Source: A data source that provides patient information
- Data Target: A data receiver that consumes the mapped and transformed patient data

The pilot exchange hospital participants include:

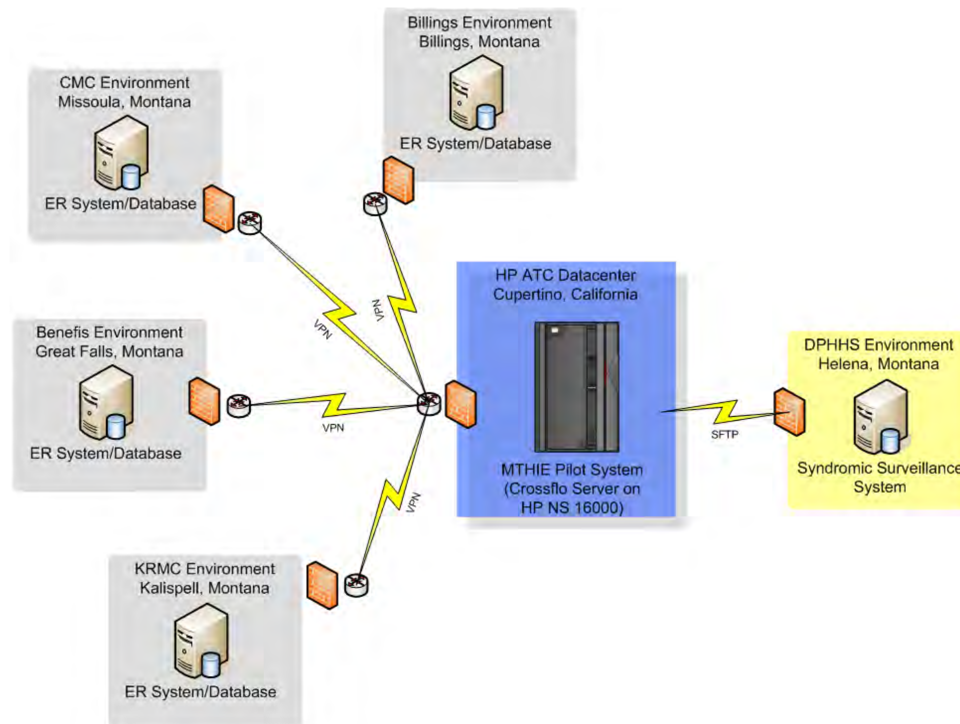
- Department of Public Health and Human Services (MT-DPHHS), Helena, MT
- Billings Clinic, Billings, MT
- Community Medical Center (CMC), Missoula, MT
- Kalispell Regional Medical Center (KRMC), Kalispell, MT
- Benefis Healthcare, Great Falls, MT

The existing DPHHS Syndromic surveillance system was the data target system that received and stored the patient data captured from the hospital systems. The hospitals provided the data sources for the emergency room patient data including demographics, symptoms, and diagnosis.

This data-sharing system was implemented using the Crossflo CDX Server software running on an HP Integrity NonStop NS16000 server platform. The data-sharing environment was hosted at the HP NonStop Advanced Technology Center in Cupertino, California.

Figure 3 presents a high-level view of the system architecture.

Figure 3. High-level system architecture



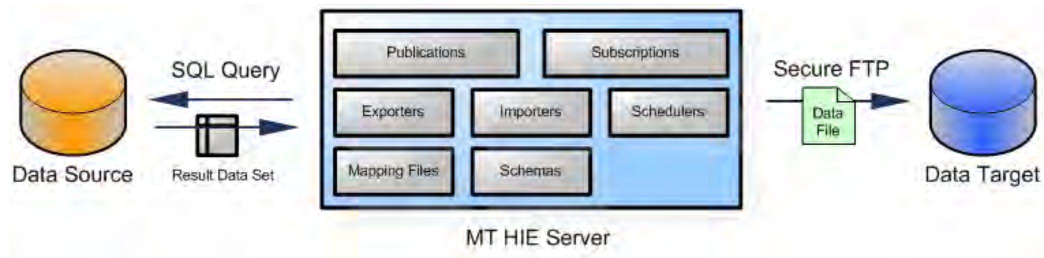
System processes

Two interfaces were used to perform the data extraction and data distribution:

- A SQL query was used to extract patient data directly from the hospital data source through a Virtual Private Network (VPN) connection. The data was then mapped and transformed through the CDX application software.
- Secure FTP was used to push the mapped data to the data target (i.e., the syndromic surveillance system at DPHHS).

Figure 4 illustrates the system process components and interactions.

Figure 4. Pilot system process components



Publication and subscription processes were defined for each hospital and configured using the CDX application. The publication definition included the data source, schema, mapping file and schedule for generating issues for desired subscribers. Through a VPN connection, the publication extracted data from the source systems at participating hospitals using the SQL queries. The publication process took place daily at a time designated by each hospital.

The extracted data was then converted to an XML-based document. Once the exported publication was completed, the server notified the subscriber that an issue had been published and was ready to be picked up immediately.

When an issue was picked up, the subscription applied an XSLT to convert the XML document to the format consistent with the syndromic surveillance system's data definition, and then pushed the data file to the target system's FTP site.

The existing syndromic surveillance system load process was used to parse and load the data from the data file into the appropriate tables of the syndromic surveillance system.

Data elements

The data elements were extracted from the emergency room systems and databases at the participating hospitals. The minimum data elements required by the syndromic surveillance system include:

- Information source ID: The code that identifies the hospital providing the data
- Event ID: An ID number that represents the patient visit
- Date of the event: Date of the patient visit to the emergency room
- Chief complaint: Text field representing the symptoms and chief complaint described by the patient during the visit

Optional data elements include: Time of visit, patient's resident location, age, gender, weight, height, travel history, and occupation. It was left up to the hospitals to decide which optional data elements they would provide to the exchange.

Section 4: Project management methodology and system implementation

The pilot project was executed using the HP Global Method for Project Management. The methodology is based on best practices and concepts used by the Project Management Institute, incorporating the project management knowledge areas for integration, scope, time, cost, quality,

human resources, communications, risk, and procurement management. These project management functions are integrated throughout the life cycle of a project.

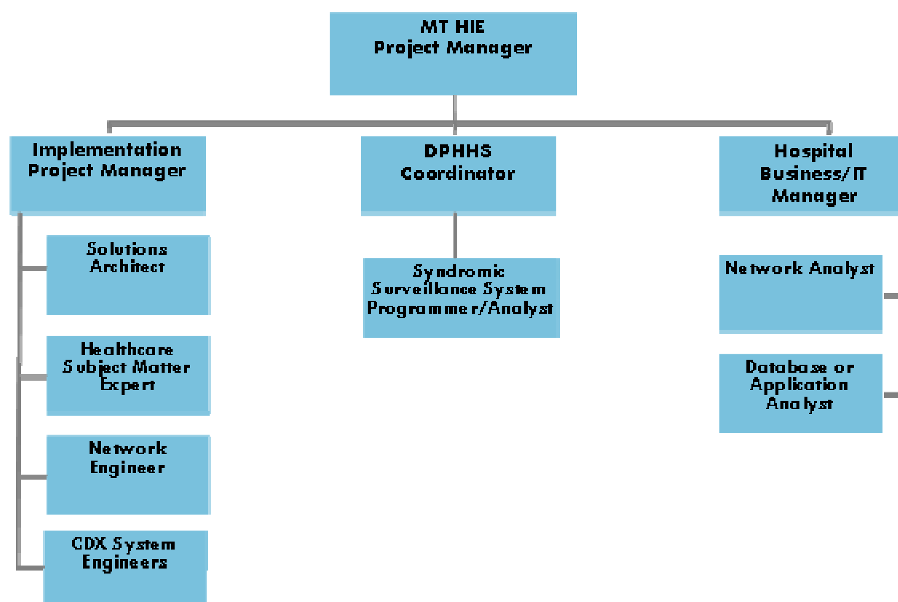
To ensure consistent quality of delivery, HP Global Method provides tools, templates, and guidelines for the various phases of a project. The project plan, status reports, specifications, and other documents created in this project were based upon templates provided by the methodology. The pilot project processes also were structured to meet the standards of the methodology.

Project team

The project team consisted of representatives from the various stakeholder groups, including the National Center for Health Care Informatics (NCHCI), the Montana Department of Public Health and Human Services (DPHHS), the four hospitals, and the HP/Crossflo implementation team. NCHCI spearheaded the initiative and served as the overall project manager and primary point of contact for the implementation team and the exchange participants. The HP project manager led the implementation team activities and worked closely with the NCHCI project manager in the planning and execution of project activities.

The organizational structure for the pilot project is shown in Figure 5.

Figure 5. Organizational structure



The team member roles and responsibilities are further described below. The Montana team included the following:

- **MT HIE Project Manager/Coordinator**
  Served as the project manager representing the state initiative, and was the liaison to the hospital participants. Collaborated with the HP project manager to develop and execute the project plan and address issues throughout the project.
- **Target System Coordinator**
  The MT-DPHHS epidemiologist supervisor served as the coordinator for the implementation activities related to the Syndromic surveillance system (e.g., SFTP process, data load, testing).

- **Hospital Business and IT Managers**
  Provided input and approval in the data-use agreement process. Also assisted the project managers in the coordination of the hospital implementation activities, and allocated the appropriate resources to the various implementation tasks.
- **Hospital Network Analysts**
  Worked together with the HP network engineer to set up the VPN connection between the HP server and the hospital system.
- **Hospital Database/Application Analysts**
  Worked with the HP and Crossflo architects to confirm the data mapping, set up the appropriate system/database access, and in some cases, created a separate database environment required for the mapping and transformation process.

The HP/Crossflo implementation team was comprised of the following members:

- **Implementation Project Manager**
  Provided general oversight and was the primary point of contact for the customer.
- **Solutions Architect**
  Led the design of the overall system and provided technical oversight of the implementation activities.
- **Healthcare Subject Matter Expert**
  Provided organizational expertise and clinical oversight for the design and implementation phases.
- **Network Engineer**
  Installed and configured the HP NS16000 server at the HP NonStop Advanced Technology Center. Set up the VPN connections between the hospital systems and the server at the HP Datacenter.
- **CDX System Engineers**
  Installed and configured the CDX software and led the initial hospital data mapping implementations. Provided expertise on the CDX software.

The HP/Crossflo team worked with NCHCI and hospital IT managers to coordinate the implementation activities, and subsequently with the hospital network and database analysts to complete the mapping and transformation processes. In addition, the team worked with the DPHHS management and technical team on the syndromic surveillance system data load implementation, and testing.

Project phases

The pilot project included the typical phases of a system development lifecycle process.

Project initiation
Project kick-off meetings and conference calls were held with all stakeholders to plan for the project activities. The meetings/calls included the HP/Crossflo team, NCHCI, the Department of Public Health and Human Services, and participating hospitals. A baseline project plan was developed during this phase, and was updated on a regular basis throughout the project. The communications plan, including points of contact, and status report format and schedule, was also established during this phase. The initial data-use agreement template was developed. As previously described, the data-sharing agreement went through multiple iterations that spanned several phases of the project.

Requirements analysis
The objective of the requirements analysis process is to understand each hospital's environment, and gather information on the existing systems, data, and processes. The information is then analyzed to determine the most appropriate design and configuration for the mapping and transformation process. The Requirements Analysis activity is critical in any project, as it is the process through which

the implementation team obtains key information to successfully design and implement the new system. In addition, it is an opportune time to provide information to the exchange participants, gain their commitment to the project, and ensure understanding of roles and responsibilities.

The following sequence of activities was performed during the pilot project requirements analysis process:

- **Implementation briefing** conference calls conducted with the hospital staff members participating in the requirements process introduced the team members and briefed the participants on the project scope and the requirements-gathering process.
- A **questionnaire** was developed and distributed to each participant prior to the face-to-face requirements discussion. The questionnaire was used to document information about the network environment, the existing patient information systems, types of databases used, data elements captured in the existing system, and system maintenance schedules.
- A **face-to-face meeting** was subsequently conducted to review questionnaire responses and gather additional information on the participants' existing environment and processes, future plans and needs, and any questions or concerns regarding the pilot project.
- A **meeting summary** was completed and distributed to verify the information captured and action items agreed upon.

The requirements analysis phase culminated with the creation of a requirements specification. The document summarized the information gathered through questionnaires and meetings, and described the system data and processes required to move forward with the implementation. In addition to the specification, a data reference guide was also developed to provide hospitals with definitions of the required and optional data elements, as well as a recommended data model for those setting up a separate environment for the exchange process.

System design

The objective of the system design phase was to create the overall architecture of the MT HIE Pilot System, and the design of the data model and information exchange process. The system architecture and general design of the various processes and data structures were documented in the System Design Specification. The Design Specification also included the Medical Event Information Exchange Package Documentation (IEPD), which provided detailed specifications for the exchange of medical event information between the DPHHS repository and the hospital systems (e.g. data model, mapping templates, additional technical documentation, etc.). The IEPD is an integral part of the Crossflo CDX implementation methodology. Figure 6 displays some of the types of information that can be found in the IEPD.

Figure 6. Index of IEPD contents

Medical Event Index

IEPD Document	Definition \ Folder Location
Overview Documentation	
• Exchange Specification Document	This document provides an overview of the project and the stakeholders and the objective of the pilot project. \Medical Event IEPD\Overview Documentation\Product Exchange Specification.doc
• Exchange Major Components Diagram	Identifies Entities(objects) and their relationships that are reflected in the project schema \Medical Event IEPD\Domain Artifacts\UML Object Diagrams\Medical Event.gif
• Change Log	History of changes used for version control \IEPD Library\Medical Event IEPD\Overview Documentation\Changelog.doc
Domain Artifacts	
• UML Object Diagrams	Folder with Representations of Unified Modeling Language (UML) Diagram of Objects used in the project \Medical Event IEPD\Domain Artifacts\UML Object Diagrams\
• NIEM 2.0 Properties and Types Sheet	Listing of the business data objects and the NIEM Objects and their attributes and properties that reflect the pilot project HL7 equivalent schema elements \Medical Event IEPD\Domain Artifacts\Types and Properties.xls
Mapping Artifacts	

Implementation

Once the system design was completed, the team was ready to move into the implementation phase, and execute on the design specification, and create the data mapping and transformation processes. The implementation phase consisted of the following activities:

- **Datacenter environment set-up**
  The Data Center environment was prepared and the HP NS16000 was installed and configured.
- **Crossflo software installation and configuration**
  The Crossflo CDX server was installed and configured on the HP server.
- **Network connections**
  The VPN network connections were set up between the hospital systems and the HP server.
- **DPHHS SFTP process set-up**
  The team acquired an account and access permission to send files to the SFTP site at DPHHS.
- **Hospital data mapping and transformation**
  The hospital data mapping and transformation process included the set-up of the individual hospital environment, and the mapping and transformation of the data to the syndromic surveillance system format. Some hospitals allowed the CDX application to access the production patient information system directly. Other hospitals opted to create a separate staging environment where the data specific to this project was stored.

- **Publication and subscription configuration**
  Publication and subscription processes for each hospital were created in the CDX system. Processes ran daily at times designated by the hospital.
- **Testing**
  All processes were tested end-to-end, from data extraction to loading into the Syndromic surveillance system. The data was validated in the Syndromic surveillance system using an existing user interface.
- **System support guide documentation**
  A system support guide was developed that provided a description of each hospital's overall set-up for the exchange process, and included information on the data mapping configuration and publication schedule for each hospital.

Training
A system demonstration and training session was conducted where the system architecture and processes were presented. Various queries and results were demonstrated in the Syndromic surveillance system using the existing system interface. In addition, the system support guide documentation and general operational procedures were reviewed.

Project close-out
The team evaluated all aspects of the project and shared lessons learned from the project as part of the project close-out process. The updated documentation deliverables were submitted to the customer, and final project sign-off was completed. The lessons learned are provided in Section 5 of this paper.

Section 5: Pilot project outcomes and lessons learned

As a result of the Montana Health Information Exchange Pilot Project, the MT-DPHHS is now able to monitor and analyze syndromic surveillance data from four Montana Hospitals on a daily basis. The system, as envisioned and designed, is fully functional and provides a platform from which to build future capabilities.

Throughout the project, the team experienced many challenges and project delays that needed to be overcome. Following are the key lessons learned from the Pilot Project:

Project needs to be CEO-driven
When the pilot project was being developed, the NCHCI began working with key IT managers within the participating hospitals and the epidemiologists at the MT-DPHHS. As a voluntary effort, the NCHCI asked each facility and the MT-DPHHS to dedicate staff time to this project. While all participants worked hard to deliver on the requests of the project team, activities occurred as staff had time to complete tasks. Often, long delays resulted as participants juggled to fit this project into their daily schedules. In retrospect, the NCHCI should have garnered the buy-in of the CEOs of each hospital and the administrator for the MT-DPHHS. As such, specific staff time could have been designated or allocated to this effort, thus expediting the entire project schedule. Dialogue with other HIE efforts across the US confirmed the need to drive the project at the CEO level.

Project funding
Very limited funding was made available to support this pilot project. The NCHCI, HP, Crossflo, and the project participants all made significant, non-reimbursed commitments to the project. Delays occurred as other funded activities took priority. Adequate funding to support staff time would have significantly accelerated the project timeline.

Data-sharing agreements
As previously mentioned, the team started the project with a data-sharing agreement that was far too complicated and did not adequately reflect the unique nature of the pilot project. With time, the team

evaluated the data-sharing agreement and opted for a much less complicated or more appropriately targeted agreement. Significant time was lost managing this process.

Technologically, the project was executed as planned with very minor technical challenges. The technical aspects of the project occurred in a timely manner and as envisioned.

Future applications

The project team has recognized the need to scale-up this pilot project to demonstrate additional capabilities of the HP Crossflo Health IT Solution for the healthcare sector. An infinite number of opportunities exist for expanded pilot projects that can demonstrate the capabilities of this solution. Here are a few possible future applications for this solution that meet immediate needs:

- Integrate syndromic surveillance data from many additional data sources demonstrating the ability to create a state-wide or region-wide syndromic surveillance capability.
- Incorporate additional data elements, including 'identified' patient data to augment the proficiency of the syndromic surveillance system.
- Develop the capability to bi-directionally share clinical data between participating health facilities.
- Provide intra-facility data sharing for pharmacy, radiology, laboratory, and other disparate health data sets.
- Extend the utility of the interoperable information infrastructure to all other first-responders, such as state and local police, national and local fire agencies, and other utilities that must share information in the course of their normal work schedules as well as during emergencies.

This technical whitepaper was jointly authored by Bill Mohlenbrock, MD, Healthcare Subject Matter Expert, Crossflo Systems, Inc., Ray Rogers, CEO, National Center for Health Care Informatics, and Yvonne Yoneshige, Program Manager, Hewlett-Packard Company.

Funding for this project was provided by HP, while substantial in-kind contributions of labor were provided by the NCHCI and Crossflo. The NCHCI extends its sincere appreciation to the pilot participants who donated substantial time and effort toward the success of the project.

Technology for better business outcomes

© Copyright 2009 Hewlett-Packard Development Company, L.P. The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

Crossflo DataExchange is a registered trademark of Crossflo Systems, Inc.

4AA2-4674ENW, February 2009