Exchange of Clinical Performance Data Using Direct Query Technology:

A Proof of Concept with California Providers and Health Plans

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Contents

I. Introduction

Many Physician Organizations (PO) have both Electronic Health Records (EHR) and registries, data warehouses, or quality reporting databases which maintain aggregations of patient clinical data including billing data, upon which performance reporting is based. In a similar manner, Health Plans (HP) have claims repositories as well as data warehouses which contain data required for quality reporting. Since the quality reporting is based on aggregations of patients, it can be assumed that the POs and HPs have capabilities of joining patient longitudinal data to create a patient-based history from which many of the metrics are derived.

Even though these organizations may have used sophisticated queries against their reporting databases to compile the data to be reported, the measurement reporting process to the Integrated Healthcare Association (IHA) for the Pay for Performance (P4P) program has not kept pace; participating organizations manually push their measure results files. Further, it is still burdensome to share lab, pharmacy, and other clinical data between trading partners due to a lack of a secure, systematic, and auditable exchange process.

The Integrated Healthcare Association (IHA) initiated a pilot project to demonstrate that direct query architecture can be used to automate the process of gathering and analyzing quality improvement and performance measurement results periodically, when it is timely and relevant, rather than many months after the fact. The pilot project sought to explore the utility of using a query process to gather both health metrics and individual patient data from both POs and HPs for use in performance and quality reporting, care management, and in development and testing of potential new measures.

A direct data query architecture allows a software agent to be placed behind a PO or HP client's firewall and used to pull appropriate data for transmission to other organizations in the network. It was anticipated that the solution would include:

- The client-side software agent;
- The "master" agent software used for configuring the distributed agents and for posting queries from the master instance;
- Appropriate network capabilities to allow agents to act as peers for query purposes;
- Appropriate security and authorization functionality;
- All necessary components in order to facilitate connectivity to client-side systems.

The pilot included two sub-projects. Subproject 1 is direct query for exchange among POs, HPs, and IHA. This subproject consisted of exchange of eight quality measures from the Medicare Star Measures from two POs (Monarch and Ascender[1]) and two HPs (SCAN and United Health Group) to IHA and exchange of associated member-level information between the POs and HPs. The subproject was conducted from September 1, 2013 through February 10, 2014.

Subproject 2 was added on November 1, 2013 and considered the feasibility of exchange of admission, discharge, and transfer (ADT) data from hospitals to HPs. This subproject investigated the provision of ADT alerts from hospitals to HPs when their members are admitted, discharged, or

[1] Ascender is an intermediary contracted by physician organizations to aggregate and prepare their data for submission to the P4P program.

transferred. For admission and emergency department registration notifications, the plan would send back to the hospital information that would assist the hospital in better managing the patient, e.g., information about the patient's health status and any specific care alerts. This data access may benefit both the hospital and the health plan by having more timely and complete information about the patient.

Funding for the project was provided by the California Office of Health Information Integrity (CalOHII) with matching funding from IHA. This project was supported by CalOHII through funds from the American Recovery and Reinvestment Act (ARRA) of 2009, specifically the State Health Information Exchange Cooperative Agreement #90HT0029.

CalOHII is a State office within the California Health and Human Services Agency, which provides policy guidance and support to ensure that health information can be shared with the patient, the patient's providers and other key stakeholders in accordance with state and federal law. CalOHII provides education that may be used to shape policy and, when needed convenes stakeholders and implements regulation to enable the secure transport of health information, provides oversight and review of departments' compliance with implementation of HIPAA regulations, and has an investigative arm to prosecute individuals that violate California medical information privacy laws.

This report provides information on the project plan, implementation, results and lessons learned which will inform the future phases of IHA's rollout of data exchange for pay for performance (P4P) and quality measurement capabilities. This report may also help other organizations exploring these capabilities.

II. Approach

A. Project Management

IHA had overall responsibility for the pilot project and collaborated with other organizations to accomplish its goals. California Quality Collaborative contributed to the vision and the objectives of the pilot, as well as selection of the technical vendor. Kim Consultants assisted IHA with project management, evaluation and technical guidance.

A project management plan (PMP) to track the progress of the pilot objectives and goals was developed and maintained by the project manager. The PMP was used to keep all project stakeholders including the project sponsor, senior leadership and the project team apprised of the project's status. Weekly standup calls were held which covered the project tasks that were completed the prior week and the tasks that needed to be completed that week. This meeting served as a check-in on any outstanding items from the previous week and what needed to occur moving forward. A Weekly Status Report served as a guide for these meetings. Any issues were dealt with in the weekly call. For pertinent issues, the general project manager and technical project manager would check-in by phone to discuss. A program management review (PMR) is a comprehensive review of activities, staffing availability, schedule and project costs. A PMR was conducted twice during the pilot to assure project execution was on track and all expectations were being met.

Table 1. Original Project Plan

Task	Milestone	Start date	End date
IHA Data Query P4P Pilot Project		10/1/13	1/31/14
Select vendor	Vendor selected and kickoff meeting scheduled	10/1/13	10/1/13
Kickoff Meeting/Project Startup	Kickoff Meeting/Project Startup Completed	10/08/13	10/08/13
	IHA Data Query P4P Project Kickoff Meeting	10/08/13	10/08/13
	Vocabulary development	10/08/13	10/08/13
Identify and confirm HPs and POs	2 HPs and 4 POs confirmed	09/01/13	10/14/13
Pre Project Evaluation	Pre Project Evaluation	10/14/13	10/21/13
Client needs assessment	Client needs assessment complete	10/21/13	10/31/13
Technology installation	Technology installed at all sites	11/01/13	11/25/13
Local Testing at sites	Local Testing Complete	11/08/13	11/27/13
Data exchange	Data exchange go-live	12/02/13	1/31/14
Technical evaluation	Technical evaluation complete	1/13/14	1/24/14
Post Project Evaluation	Post Project Complete	1/10/14	1/21/14
Weekly Check-In's		10/08/13	1/30/14
GINA Training (Initial vs. Final)	GINA Training Completed	1/20/14	1/24/14
Project Evaluation Report	Report Complete	1/21/14	1/31/14

B. Technology Selection

Technology vendors were interviewed about their technology capability to provide the software for this pilot. David Minch and Katherine Kim, Kim Consultants, led the interviews. Although all interviewed vendors received an RFP, only some were told they were qualified to submit. The other vendors were told their software did not meet the established project criteria, but if they felt differently, they could still choose to submit. Proposals were read through by a review committee that consisted of two IHA staff, two California Quality Collaborative staff and consultants from Kim Consultants. All reviewers used a rating guide and the review committee then met and determined who should be asked to demonstrate their solution. Three vendors were asked to present at a two-hour interview and webinar demonstration of their solution covering a pre-determined use case.

Creek Technologies (CreekTech) was selected to implement the query technology. Their technical solution included the Global Information Network Architecture (GINA), an advanced object-oriented data management technology solution that can be applied to solve cross-entity interoperability on a peer-to-peer basis, and has been used extensively in Department of Defense (DoD) contracts. CreekTech's technical approach provided advanced methods to automate integration and interoperability without the need of traditional coding, programming, and central data aggregation. This method provided rapid configuration and integration of GINA services to securely exchange data between multiple configurations of participating providers and plans.

C. Project Evaluation

The project evaluation consisted of two major areas: technical evaluation and user evaluation. The technical evaluation included testing, performance of the data modeling, and exchange results. The technical evaluation was conducted by CreekTech with verification of exchange by the participants. The technical evaluation process and results sections of this report were written by CreekTech with review by Kim Consultants and IHA.

The user evaluation was conducted by Kim Consultants. The user evaluation included pre- and post-pilot components. A brief pre-evaluation survey was given to PO and HP participants. The questionnaire included questions about expectations of the pilot and current challenges in data exchange. A post-evaluation interview was conducted by Kim Consultants by a member of the team who was not responsible for implementation, with at least two staff at each of the participating organizations. At the participating PO and HP sites we interviewed the main contact, network or IT lead, and data lead. At IHA, the two project leaders were interviewed. At Kim Consultants, the lead technical advisor was interviewed. And, at CreekTech, the project manager and technical lead were interviewed. The interviews each lasted 30 – 60 minutes.

The report was written by Kim Consultants and reviewed by IHA.

III. Direct Query for Data Exchange Among Physician Organizations, Health Plans, and IHA

A. Goals

There were three primary goals for subproject 1.

Goal 1: Demonstrate a direct data query technology for performance measurement and analytics.

Goal 2: Demonstrate the ability to use direct query technology layered onto an existing health information organization (HIO).

Goal 3: Collect and exchange data for CMS Medicare Stars triple-weighted outcome measures and related performance and quality improvement analyses. The measures included:

- Adult BMI Assessment
- Diabetes Care – Blood Sugar Controlled
- Diabetes Care – Cholesterol Controlled
- Controlling Blood Pressure
- Medication Adherence for Oral Diabetes Medications
- Medication Adherence for Hypertension (RAS Antagonists)
- Medication Adherence for Cholesterol (Statins)
- All-Cause Readmissions

The pilot explored two use cases for exchange of data.

Use Case #1: Compiled numerators and denominators for the purpose of public reporting of quality from PO to IHA and from HP to IHA.

Use Case #2: Compiled member-level data to allow tracking of individual patient data year-over-year and provide input to the aggregated Medicare Stars quality measures. This use case included exchange of member-level pharmacy and readmission data from HP to PO, and laboratory, vital signs and other clinical data from PO to HP. The exchange involved data for patients who were verified as members of each PO and HP pair. IHA did not have access to member level data.

B. Participant Engagement

IHA recruited two HPs who were current participants in the pay for performance program in the southern California region, and approached POs that had a substantial number of members with each plan. A brief summary of the intended pilot was sent to each. Once the participant expressed interest, a call was arranged to discuss the details of the project including: goals, potential benefits, the data exchange process, legal considerations, and technical requirements. The HP or PO was asked to consider if they could dedicate the staff resources including a data expert knowledgeable about Medicare Stars measures and the organization's data repository, an information technology expert for implementation of the software, and a network operations expert for authorizing and setting up access to the environment, to participate within the short timeline for the project. A memorandum of understanding and a HIPAA-compliant business associate agreement, if not already in place, was signed by appropriate parties.

The pilot participants were:

SCAN Health Plan is a Medicare Advantage plan serving the needs of more than 145,000 members in California and Arizona. SCAN is located in Long Beach, California.

UnitedHealth Group is a national carrier with Medicare Advantage plans and used their information and technology subsidiary named Optum to carry out this project.

Monarch Healthcare is a physician organization located in Orange County, CA and is the largest association of physicians in private practice. Monarch HealthCare's independent, private-practice physicians are part of a coordinated network.

Ascender Software has a complete data management suite designed specifically for physician organizations. Ascender functions as an intermediary contracted by physician organizations to aggregate and prepare their data for submission to the P4P program. They represented two POs for this project: Choice Medical Group and High Desert Primary Care Medical Group (which includes both Premier and St. Mary's High Desert).

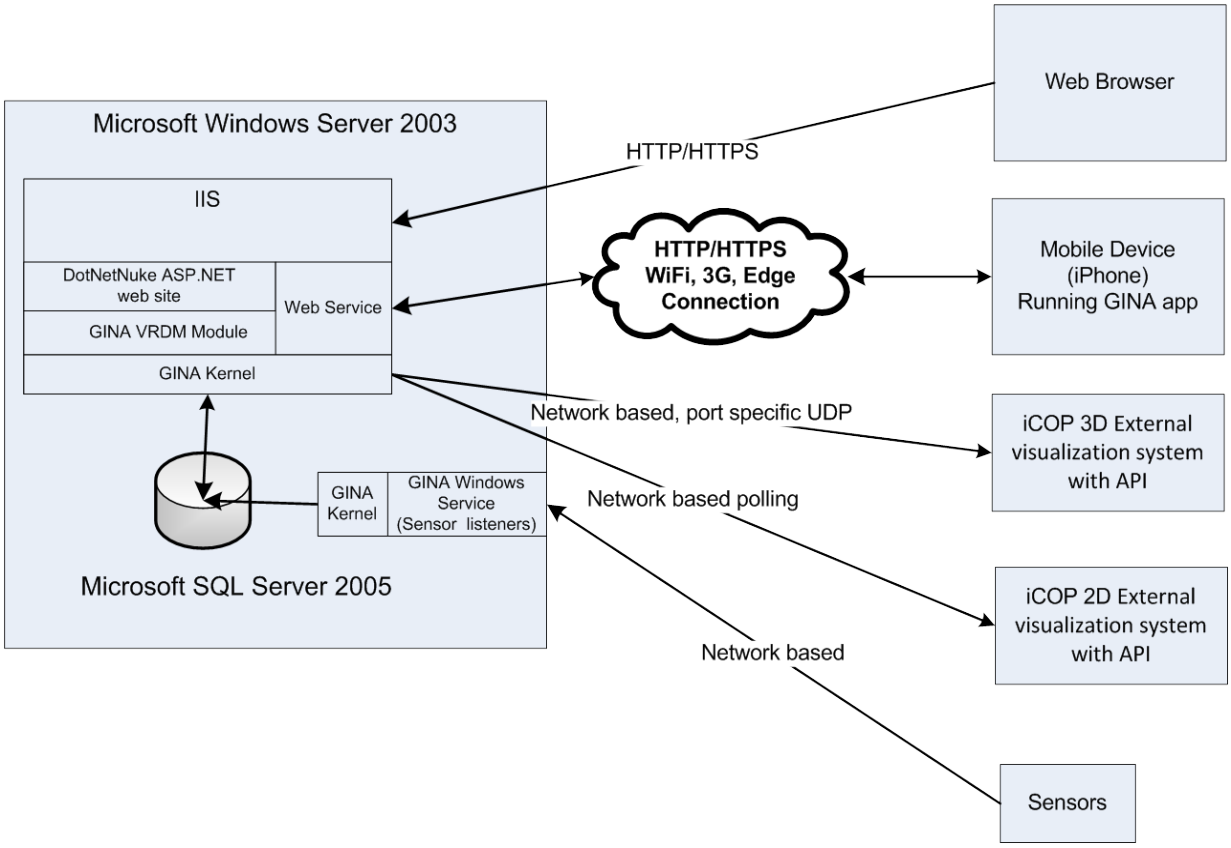
Three potential HIO candidates were approached to participate in the pilot. Two were community HIOs, and one was a PO using exchange technology only for its own providers. These organizations declined to participate due to the short timeline, so Goal 2 was not achieved in full. Nonetheless, with the inclusion of Ascender in the pilot group, we did demonstrate the use of a third-party aggregator as a data source which was the intention of including HIOs. It should be noted that all of the HIOs approached were very interested in the pilot and the concepts being explored – their reason for declining participation was simply the short time frame involved.

C. Architecture and Data Flows

The pilot project utilized the Global Information Network Architecture (GINA), a patented information modeling environment that uses a descriptive approach to defining and implementing information models through domain-relevant application-specific metadata (termed "supermetadata" by the developer). These supermetadata include the data content, e.g. elements of a quality measure, and the policies for exchange, e.g. the relationship between HP and PO that allows access based on application of HIPAA privacy rules. GINA allows efficient description and implementation of a data model that includes data acquisition, data transformation, and interoperation processes.

GINA can represent the output of conventional query processes as new, transportable information datasets that can both gather and send quality metrics, and package individual patient data from both POs and HPs into transportable, mutually understandable information packets for loading and use in quality reporting and care management compliance, and in development of potential new measures. The GINA software is placed behind the PO or HP's firewall and used to push or pull appropriate data for transmission to/from other organizations in the network. Figure 1 illustrates the GINA architecture, a subset of which was used for the IHA pilot.

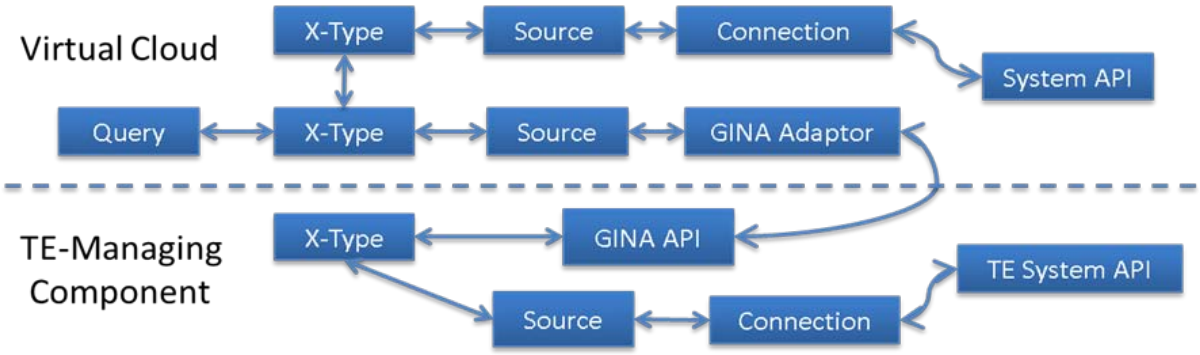
Figure 1 IHA GINA Architecture



The basic flow in and out of the GINA environment is described in Figure 2. User access is controlled in each local instance of GINA where interaction rules are defined in the model allowing both local and remote data access. Aggregation of local data is also defined in the model for transmission of numerators and denominators to IHA. The GINA-patented vector relational data modeling allows attachment of complex processing rules to individual data elements. This unique capability is leveraged to describe the exact data relationships and related processing necessary for this pilot project.

GINA modeling functionality includes a universal information management structure termed an "X-Type" that allows any process or data flow modeled within GINA to be transparently managed both locally and remotely. Once a local user or application notifies the model of the need for data, the remote instance of that X-Type mapped to the requested data is signaled, and after confirmation of the querying party's identity, the external system mapping is executed, as required, to capture the requested data. Using cross-X-Type messaging, and cross-X-Type modeling structures, virtually any configuration of data from mapped information sources is possible.

Figure 2 Data Workflow



D. Data Model

Data modeling utilized within GINA creates a "virtual cloud" that allows all users of the environment to interoperate as though they were a single instance of GINA. The IHA pilot included an instance of GINA installed at each participant's location that communicates to the other instances as appropriate. Five instances were implemented, two HPs, two POs, and an overall measurement environment that is the instance at IHA. Secure connections were established using a GINA to GINA service chain communication channel through secure Web services connections between each of the GINA instances.

GINA provides an advanced method to model relationships descriptively, rather than programmatically. These descriptions, called "supermetadata" are a key capability that enabled implementation of the IHA model in a way that is easily applied at each location where it is mapped to each participant's data. The team created the IHA model by defining the desired query vocabulary in GINA as a series of "X-Types", with each X-Type representing a domain-relevant type of information. The collection of X-Types used to model the entire vocabulary also included relationships among the X-Types. GINA's relationship modeling capability, unlike traditional object-oriented software or middleware, models domain-relevant relationships across unrelated data stores used at PO and HP locations without the need to create custom definitions and code that supports those relationships.

From the users' perspective, the IHA model in GINA presented discrete or aggregated information in result tables generated from a series of standard queries using the domain-relevant vocabulary of each pilot participant. The translation of that vocabulary to the back-end IHA-defined vocabulary was done automatically and transparently to the user. Some of the top level data models designed to facilitate the IHA pilot project and proof of concept are provided in Appendix A. Figures 1-4 in that appendix are examples of the modeling of data element content whereas Figures 5-8 show modeling of participant relationships that drive policy enforcement for privacy and access controls to assure that a PO-HP pair only shares data for patients covered by their contract.

E. Agreements

A draft memorandum of understanding (MOU) was provided to each participating site. The MOU was a basic agreement that described the pilot project, described the pilot project partners (Integrated Healthcare Association, Creek Technologies and Kim Consultants) and listed in general what a participating PO or HP could expect to do.

- Participate in the pilot project from Oct. 1, 2013 to Jan. 31, 2014
    - Identify primary point of contact accountable for project coordination, timeline, and progress
    - Allow remote access to the instance of GINA through third party software
    - Allow Creek Technologies to implement query software at your site
- Participate in a 1 day onsite technical assessment conducted by IHA, Kim Consultants and Creek Technologies
    - Provide network connectivity and conference room for onsite meetings
    - Data center manager, network engineer and data analyst/modeler in attendance of meeting (including someone who programs the Medicare Stars measures)
- Participate in data exchange with IHA and appropriate POs or HPs
- Participate in technical interchange meetings as needed (conference call or on site)
- Participate in a brief evaluation questionnaire.
- Designate one network engineer to work 2 days total over pilot period
- Designate one analyst/data modeler (someone who understands data warehouse) to work on the pilot 7 days total over the pilot period

The MOU was refined by each participant to include organization specific terms, particularly regarding non-disclosure and confidentiality language. IHA, Creek Technologies, and Kim Consultants co-signed the MOU and confidentiality agreements. A HIPAA business associate agreement was required for Creek Technologies which had access to personal health information both during the data modeling and during the exchange. A licensing agreement was signed that covered the use of GINA by the pilot participants for the pilot.

F. Technical Implementation Process

The implementation began with internal meetings with IHA, Kim Consultants, and CreekTech to determine what information was needed from participating sites, resulting in a preliminary technical questionnaire. In addition, an initial data model was created with detailed field-by-field mappings to the relevant data housed by HPs' and POs' in respective site's databases and tables. HPs and POs view data storage requirements differently based on their respective business needs. As a result, we provided a separate questionnaire for POs and HPs.

Phase One: Preliminary Questionnaire for HPs and POs

A preliminary questionnaire was sent to the participants to assist in collecting the information needed for setup of the technical environment, installation of GINA software, and preparation for data modeling. This information was requested in advance of a scheduled in-person installation site visit by the IHA/CreekTech technical team. The participants completed some of the information on

their own in advance and completed the remainder during the site visit. Slightly different versions were created for POs and HPs. The questionnaires were refined at the end of the project to reflect information collected throughout the project. The questionnaires are provided in Appendix B.

Second Phase: Installation/in-person site visits

Team CreekTech visited Ascender, Monarch, SCAN and UHG to support the installation of each respective GINA instance. During these visits, site privacy officials and local subject matter experts met with CreekTech team members to understand both the data and the necessary structures that were available to be used to create the universal information data exchange structures. Even at this early stage of the work, defining and implementing, the mapping was performed by local subject matter experts under the supervision of CreekTech personnel as a learning exercise. The mapping was revised after the first PO and HP were installed. The remainder of the final mapping of GINA configurations to internal databases, tables and fields was completed off-site by team members. A second round of revisions was necessary to update the access rules between participants to assure that measures and PHI were sent only to those participants with the appropriate business relationships.

The basic approach consisted of three steps:

1. Data Access
   Capture the actual tables and field definitions for relevant data as "Information Sources" in the GINA modeling environment, and the way to identify each individual record. This was done by executing a number of scripts, and by capturing a "key" field for each table.
2. Mapping
   Map the basic data to the universal IHA model. This was done by using the GINA Interactive Development Environment (IDE) to map the captured information source components to the IHA model.
3. Coding
   Define the basic approach to coding each information package component with (a) the patient, plan, and provider that is appropriate for each record, (b) the appropriate universal code, e.g., LOINC or CPT, for each record, and (c) the organization(s) with legal right to receive the record. This was also done in the IDE by defining the relationship between each record type and the coding system, the current provider or plan identifier from the patient record or enrollment records, and the relationship between those and the other GINA instances.

Third Phase: Local testing

This phase was conducted via remote support. As part of the configuration, we created both screens and staging tables for each transaction, both coming and going, so that we could validate accurate access to records of each type and accurate local transmission to the staging table. Because GINA is a configured, component-based modeling environment, testing is much easier than in a traditional environment. The testing process has the following steps:

1. PO:
- **1.1.** Sending Lab Results and Vital Signs
  - **1.1.1.** Can records be viewed on the user interface?
  - **1.1.2.** Can a record be sent to the staging X-Type?

1.1.3. Does the record get coded with the correct MemberId, HealthPlanId, Provider Organization Identifier, standard codes?
1.1.4. Are all of the targeted fields carried forward?

1.2. Receiving Encounters and Medicine Fills (dummy data)
1.2.1. Can you create a record in the staging X-Type?
1.2.2. Will it import into the correct standard X-Type?
1.2.3. Can imported records be viewed on the user interface?
1.2.4. Did the record get coded with the correct PatientId and HealthPlanId?
1.2.5. Are all of the targeted fields carried forward?

2. HP:

2.1. Sending Encounters and Medicine Fills
2.1.1. Can records be viewed on the user interface?
2.1.2. Can a record be sent to the staging X-Type?
2.1.3. Does the record get coded with the correct MemberId, ProviderOrganizationId, and standard codes?
2.1.4. Are all of the targeted fields carried forward?

2.2. Receiving Lab Results and Vital Signs (dummy data)
2.2.1. Can you create a record in the staging X-Type?
2.2.2. Will it import into the correct standard X-Type?
2.2.3. Can imported records be viewed on the user interface?
2.2.4. Did the record get coded with the correct PatientId and ProviderOrganizationId?
2.2.5. Are all of the targeted fields carried forward?

GINA includes an access control mechanism and complete audit trails. In addition, the staging X-Types were built so they could manage data integrity when the transfer occurred.

Fourth Phase: Exchange set up and Sample Transfer

This phase required set up and sample data transfer. Each GINA model on each server was configured to exchange data with the IHA model instance on other GINA servers. Each site created an opening for GINA to communicate via HTTPs Web Services, both outbound and inbound, using the standard HTTPs port 443. Each site also had to provide an externally available fixed TCP/IP address or URL which was registered in the GINA model. In addition, because we would be transferring PHI, each site had to get a trusted Certificated to support their HTTPs traffic, so there would be no chance for "spoofing", i.e., a hacker acting like one of the sites and receiving data illegally.

After these addresses were created, certificates installed, web sites set up with proper URLs, CreekTech supplied each site with the three other site addresses. The sites then configured their network access control lists to allow inbound HTTPs traffic from those addresses.

When CreekTech received access to the data sources containing patient record data, debugging and optimization of interface connections was conducted. This consisted of interrogating system and data logs, services and mapping configurations to facilitate an optimized form of error free exchange of data between the sites.

Fifth Phase: Data exchange

Once these steps were completed, the sites shifted from test data to live data. Exchange between the paired POs and HPs included member-level clinical data. The exchange between PO to IHA and HP to IHA included only numerators and denominators for the eight measures.

G. Results

Exchange Process

Table 2 illustrates the basic exchange process. The X-Type column is the master concept. The purpose indicates what the X-Type is used for. The owner is the organization that houses the specific X-Type. And the location is the GINA instance where that X-Type resides.

Table 2. Exchange Process

X-Type	Purpose	Owner	Location
Encounter			
HMEncounter	Source for transfer	SCAN	SCAN
HMCodedEncounter	Data Staging	Transfer process	SCAN
HMProviderCodedEncounter	Data Staging	Transfer process	SCAN view of Monarch
HMCodedEncounter	Data Staging	Transfer process	Monarch
HMEncounter	Receiver of transfer	Monarch	Monarch
MedicineFill			
HMMedicineFill	Source for transfer	SCAN	SCAN
HMCodedMedicineFill	Data Staging	Transfer process	SCAN
HMProviderCodedMedicineFill	Data Staging	Transfer process	SCAN view of Monarch
HMCodedMedicineFill	Data Staging	Transfer process	Monarch
HMEncounter	Receiver of transfer	Monarch	Monarch
LabResult			
HMLabResult	Source for transfer	Monarch	Monarch
HMCodedLabResult	Data Staging	Transfer process	Monarch
HMPlanCodedLabResult	Data Staging	Transfer process	Monarch view of SCAN
HMCodedLabResult	Data Staging	Transfer process	SCAN
HMEncounter	Receiver of transfer	SCAN	SCAN
VitalSignReading			
HMVitalSignReading	Source for transfer	Monarch	Monarch
HMCodedVitalSignReading	Data Staging	Transfer process	Monarch

X-Type	Purpose	Owner	Location
VitalSignReading			
HMPlanCodedVitalSignReading	Data Staging	Transfer process	Monarch view of SCAN
HMCodedVitalSign	Data Staging	Transfer process	SCAN
HMEncounter	Receiver of transfer	SCAN	SCAN

Testing Results

After agreements were reached, the implementation occurred between November 2013 and February 10, 2014. The table below illustrates the status of each step of implementation by site.

Table 3. Status of Technical Implementation by Site

Step	Site	Dates	Status
Initial Install	Monarch	11/19-11/23	Complete
	SCAN	12/16-12/18	Complete
	UHG	12/9-12/11	Complete
	Ascender	12/19-12/20 1/27-1/28	Complete
Data Exchange Install	Monarch	1/6-1/9	Complete
	SCAN	1/6-1/9	Complete
	UHG	2/6	Complete
	Ascender	2/7	Complete
Network Exposed Server	Monarch	1/6-1/9	Complete
	SCAN	1/6-1/9	Complete
	UHG	1/22	Complete
	Ascender	1/21	Complete
Certificate installed	Monarch	1/22	Complete
	SCAN	1/24	Complete
	UHG	1/28	Complete
	Ascender	1/28	Complete
Live Data	Monarch	1/7	Complete
	SCAN	2/3	Complete
	UHG	1/27	Limited
	Ascender	2/10	Limited
Final Testing	Monarch	1/8-2/7	Complete
	SCAN	1/8-2/7	Complete
	UHG	2/6-2/10	Complete
	Ascender	2/6-2/10	Complete
Complete data exchange	Monarch	2/8-2/10	Complete
	SCAN	2/8-2/10	Complete
	UHG	2/3-2/20	Complete
	Ascender	2/10-2/26	Not fully achieved

Data Exchange Results

All POs and HPs have successfully submitted at least some measurement results to IHA. Measurement results include the denominator of members who meet the eligible population criteria, as well as the numerator of the members who were identified as compliant.

Complete exchange of live data successfully occurred between one HP and one PO. Monarch and SCAN successfully exchanged all of the relevant member level records for 2013. The total number of records in live exchange represents records that were identified as a member in the PO-HP contract, that was sent from the source to the destination instance of GINA, and was verified as received and committed into the destination database.

Very limited exchange occurred between UHG and Monarch, and between UHG and Ascender. UHG provided only 73 records to use in their shadow database for "live" over-the-wire data exchange. These records were representative of real data used in the UHG environment. However, the validation steps built into the GINA query process requires that a member be confirmed by both the sending organization and the receiving organization as their member. Due to the limited number of records in the UHG database, only a few member records were confirmed and exchanged.

The Ascender-SCAN exchange was not implemented due to a legal privacy hurdle and subsequent timing issue. The POs that Ascender represents have contracts with SCAN. Ascender has contracts with the POs and is authorized to send measurement data to IHA. However, Ascender and SCAN do not have a formal business relationship. By the time IHA obtained authorization from the POs for Ascender to release their data to SCAN, the pilot had already concluded.

Table 4 provides detailed data exchange results.

Table 4. Data Exchange Results

Exchange Partner	Test Exchange	Live Exchange Type of record	# of records	Comments
Monarch to IHA	All testing is completed, no errors to report	Numerator Denominator		Measurement results at aggregate levels include numerator and denominator. Complete or partial results for several measures accessed via GINA by IHA.
Ascender to IHA	All testing is completed, no errors to report	Numerator Denominator		Complete results for 2 Ascender POs for most measures accessed via GINA by IHA.
SCAN to IHA	All testing is completed, no errors to report	Numerator Denominator		Complete results for Monarch for all measures accessed via GINA by IHA.
UHG to IHA	All testing is completed, no errors to report	Numerator Denominator		Complete results for all 3 POs for most measures accessed via GINA by IHA.

Exchange Partner	Test Exchange	Live Exchange Type of record	# of records	Comments
Monarch to SCAN	All testing is completed, no errors to report	Lab Results Vital Signs	45,055 42,303	There were 45,055 lab results and 42,303 vital signs records that Monarch identified as SCAN members, and that SCAN successfully matched to their patient ID and brought into their database.
SCAN to Monarch	All testing is completed, no errors to report	Medicine Fills Inpatient Claims	76,657 55,210	There were 76,659 Medicine Fills that SCAN identified as Monarch members, and that Monarch successfully matched to their patient ID and brought into their database.
Monarch to UHG	All testing is completed, no errors to report	Lab Results Vital Signs	3 2	Of the 73 records in the UHG database, a few of them were identified as Monarch members and records were successfully sent to Monarch. Although Monarch identified many more UHG members, only a few records could be transferred to UHG because the members had to match the members in the UHG database.
UHG to Monarch	All testing is completed, no errors to report	Medicine Fills Inpatient Claims	2 0	
Ascender to SCAN	All testing is completed, no errors to report			All record types were initially configured and data exchange was successfully tested in the lab. However, additional authorization was needed from POs to allow Ascender to exchange data with SCAN. By the time the PO authorization was obtained, the pilot had already concluded.
SCAN to Ascender	All testing is completed, no errors to report			
Ascender to UHG	All testing is completed, no errors to report			Not achieved because no members matched in the UHG database.
UHG to Ascender	All testing is completed, no errors to report			UHG successfully transmitted records over the wire to Ascender, but they couldn't be loaded into the Ascender database because Ascender hadn't given insert permissions to CreekTech.

Evaluation Results

Pre-pilot questionnaires completed by business leaders from three of the four participating organizations revealed several reasons for participation in the pilot:

- To increase efficiency in achieving Medicare Star rating targets by having access to EHR data that is not available through claims data alone
- To achieve better health outcomes for members by having access to comprehensive data including hospital, lab and prescription data
- To learn more about EHR integration technologies in the industry
- To learn about technologies that can transmit data that is relevant to HEDIS and STARS between plans and providers
- Understand what vitals, labs, and other supplemental data is generally available from providers' EHRs, and in what format the data is available

Before starting the pilot, POs and HPs also identified some current challenges related to the collection and transmission of performance measurement data. While some recognized internal difficulties with collecting P4P data, all felt it was more difficult to access data from external sources. Two organizations also reported it was difficult to transmit performance measurement data to external organizations. In order to prepare for potential challenges during the pilot, participants were asked to identify the challenges they felt the pilot might run into and suggestions for overcoming those challenges. These are summarized in Table. 5.

Table 5. Pre-pilot Data Exchange Challenges

Challenge	What would be needed to overcome
Gaining approval from internal IT security department to cross firewall	Internal process to review the software.
Data mapping	Need to assign appropriate personnel on both sides to avoid lengthy back and forth communication. Have database expertise available Have good documentation available
Member identification mapping	Need to thoroughly understand and identify which data keys will be used to match members to a provider's roster and how timing of data impacts this since members may move between providers or have claim data with multiple providers
Network connectivity	Need firewall configuration, connectivity informationand new server setup
Data integration	Data structure and data flow documentation

The post-evaluation interviews revealed some common themes and some discordant themes from among the interviewees. There were five common themes that all interviewees expressed, regardless of the organization represented. They are described in no particular order below.

First, trust in IHA was responsible for sites' willingness to participate. All the sites had pre-existing relationships with IHA as part of the P4P program, as members of the board and/or through participation in other projects. IHA's reputation is a trusted and neutral party whose goal is to help

move the industry forward in a way that benefits participants. As one interviewee said, "No one came in to try and sell this at a technical level. They spoke to the business benefit that could come out of it. Let the business justification drive it through the organization." This trust was essential to participants' commitment to the pilot.

Second, participants viewed the pilot as extremely important. The interviewees expressed that their leadership had communicated the high priority level of the pilot project. They believed that the type of data exchange proposed was important to their strategies for partnering with POs and HPs on quality and health outcomes as well as their focus on improving data analytics. The championship of a leader in the organization allowed the teams to put resources on the project that might otherwise have been redirected. This became critical to addressing the next theme of the extremely short timeline for accomplishing the project.

Third, the project was perceived to be virtually impossible to accomplish within the timeframe. The entire project from selection of the technology partner to completion of live exchange occurred during a four-month period, October 1, 2013 to February 10, 2014. The timeline was driven by the funding source. Funding from the American Recovery and Reinvestment Act was set to expire and the funding had to be expended by January 31, 2014 although IHA matching funds could be expended later. Designated resources for networking, data operations, and data analytics were identified almost immediately on initiation of the project and designated individuals were very responsive to scheduling requests for in-person and conference call meetings. However, within these enterprises there are a number of tasks that are not within the control of the designated project resources. Requests needed to be submitted, approved, assigned, and completed. For example, for one PO team, there were people in multiple departments involved crossing IT and clinical departments. This was an internal challenge. In another example, testing was intended to be accomplished on dummy data for internal testing. Within an HP, dummy data had to be hand-created and approval received from the compliance department. A third example, at an HP, building the server, placing it in a DMZ, opening an inbound port, and opening an outbound port were separate IT tasks that required individual additional requests. The intervention of the business leader was critical in escalating these requests. Members of one of the HP teams expressed surprise at the speed at which they received responses. For example, tasks that might normally take 3-5 business days, were being escalated and completed in one day. As one HP team member stated, "We didn't know anyone who had already done this at [organization], creating an external connection through the firewall in the DMZ, and how to navigate all of the organization's business units to get it done."

Fourth, the technical project management was a challenge. Interviewees all recognized that as a pilot, they did not expect well-documented processes and step-by-step instructions. But the technical project management lacked coordination and timely communication on expectations and next steps throughout the pilot. Due to the short timeframe for delivery of the project, many interviewees felt they were receiving all requests as urgent and their enterprises were not always able to respond in rushed fashion. Additionally, as issues arose and were addressed, the documentation tended to be in email threads with different combinations of addressees. The information was not collected in a management system that allowed access by all on the project. There were also a number of different parties involved in the project from the sites, to IHA and its two subcontractors CreekTech and Kim Consultants. It was not always clear who was responsible for managing the details of technical implementation as communications came from several different people. This meant that there was no single individual who had a full picture of the status of the project. One site had weekly meetings with the IHA/subcontractor team and this proved to be quite valuable in running the implementation smoothly.

Fifth, the data exchange results are equivocal. All interviewees described their definition of success as exchange of a complete data set between partners with the ability to access the content locally. The definition of complete differed based on the use case. For the POs and HPs, the complete data set included individual patient records for those Medicare Advantage patients covered by the specific PO-HP contract. For IHA, a complete data set was defined as the numerator and denominator for each Medicare Stars measure for each PO and HP. Data was exchanged bi-directionally between one PO-HP pair, Monarch and SCAN, demonstrating a proof of concept that the infrastructure was operational, that the data model was implemented, and that verified exchange occurred on both ends of the channel. However, a limited number of records were exchanged. For other participants, the exchange had not yet occurred so they were unable to assess the success of the pilot.

One major discordant theme was revealed regarding the value of the GINA technology. The sites consistently reported that implementation of the Microsoft technology stack and the use of GINA for modeling was neither easier nor harder, more or less useful than other technologies that they had worked with. The sites were exposed only to the modeling that was relevant to their local data. For this single purpose, GINA may not have great utility. In contrast, IHA participated with CreekTech in initial modeling and updating of the relationships and policies for data exchange across the sites as the site visits and implementations were conducted. These relationships are called "vectors." With GINA, the vectors are updated easily making thee technology scalable across a large number of sites. Without use of GINA, these vectors would have required software programming with each new iteration, incurring much greater overhead in terms of engineering and quality assurance resources. While the model can be updated easily, the process of distributing and installing the updates in each instance is a manual one. For scalability, an automated update capability will be necessary.

H. Lessons Learned

The pilot successfully moved data bi-directionally between one pair of POs and HPs and between most of the sites with IHA. In the process, much was learned about the differences in how the participant organizations conduct business. As with any project involving data exchange, we had to learn the details of data as stored at each organization. Our experiences revealed a number of lessons that will inform continued refinement of the pilot and planning for the next phases of exchange.

Project Management

Communication and collaboration were very important to accomplishing this project in the constrained timeline that was required. There was a general project manager for IHA who was responsible for organizing the group meetings, coordinating site visits, updating the project plans, and tracking execution of contracts. However, technical project management was not centralized. There was no single point of contact for technical set up, installation, testing, and technical evaluation. This caused miscommunications that delayed certain tasks and no single individual had a complete understanding of the implementation at each site. In the future, general and technical project management should each lie with one individual through whom all communication can be coordinated. Weekly standing meetings were held within the IHA/subcontract team and between this team and one HP team. These meetings were valuable in assuring all team members were aware of the items that needed to be done, what challenges were being faced, and necessary

preparations for the next week's work. This site-specific meeting was also helpful in confirming that the IHA/subcontract team's understanding of the issues and progress were aligned with those of the site team. Regular site-specific check-ins should be instituted with all sites.

Technology

Installation and Set up

A critical learning is that much more detailed definition of setup requirements is required. Two examples illustrate the problem: (1) one of the sites interpreted "data exchange" as allowing data to come in, but kept firewall rules in place that prevented data from going out; and (2) HTTPs connectivity for HIPAA-covered data has to be done with trusted certificates, but since this was not specifically written in the instructions sites were either not aware or were unclear whether it was a requirement.

It is imperative that a clear business requirement be documented to move data only as authorized between each PO and HP, i.e. only records for Monarch patients were to transfer from SCAN to Monarch as SCAN has data for patients managed by non-Monarch POs. This policy was enforced through the modeling in GINA.

Installation of GINA and associated hardware/software was fairly straight forward. CreekTech provided an installation guide to each participant location and provided remote technical support during installation however there were some steps when instructions were not complete. Regardless of location, advanced notification is required to allow internal approvals to be received prior to installing the GINA server. This could be done by early coordination with technical staff using questionnaires to understand internal technical requirements. In addition to this questionnaire, a detailed implementation project plan will need to be developed. The project plan should spell out the technical team's access privileges, e.g. the ability to start/stop/reset system services and processes, retrieve system logs and install DLL and configuration files remotely, and whether the internal or external team members would be allowed these privileges in order to debug integration errors and installing files. While it is true that GINA has extensive flexibility in configuration, the very presence of that flexibility led to having to make unneeded choices, so the implementation plan should allow for only those choices that are truly required for site implementation.

Structure of Data Exchange Files

Each of the sites had very large tables in their data files with minimal key structures, i.e., they did not have ways of identifying each row ("primary key"), nor had they indexed critical data elements such as the PO ID (at the HP) or the HP ID (at the PO). Hence, queries such as which patients for a particular HP have lab results required full table scan search to retrieve the results. This made the processing time for data retrieval and preparation for transfer much slower than expected. It would be preferable in future to encourage/require some structuring of the data prior to GINA installation with primary and secondary keys in order to improve system performance.

Configuration/Mapping

Initial configuration was performed remotely using GINA test servers. Once initial configuration was completed, CreekTech either remotely installed the software or assisted site staff as they

installed the configuration files locally. CreekTech then deployed data modelers and configuration specialists to perform final testing of configurations onsite. This approach was mutually beneficial to the success of the project and enabled knowledge transfer to the site technical staff.

Data Exchange

Although GINA had been used with very large Oracle databases in the past, this was the first instance of a large data set using Microsoft technology. Some of the clinical data files consisted of 45 million records which exceeded the maximum single file size that could be processed by the MS SQL Server software. This required the development of a method to create packets of 5,000 records sequentially. Automated processes were created that moved records from a source system in multiple segments and reassembled them on the target system. This method provides minimal latency during the assembly process. While this workaround was adequate for the pilot, it needs to be tested for scalability for a larger scale rollout.

For the testing phase, test or dummy data was used. This approach ended up causing delays and rework because live data was not structured exactly as the test data was. Future implementations should involving testing with samples of real data to assure that correct mappings to internal data are accomplished early in the project.

Agreements

The time required to educate the potential sites about the project and get their willingness to participate can take a long time. Although this was accomplished fairly quickly for this project, more upfront education about the technology and project, as well as discussion about potential pitfalls and challenges and setting of shared expectations would have been beneficial. In particular, issues around privacy of the data and the safeguards to assure that individual patients' data would be transmitted only to authorized partners would have helped the legal and compliance staff at the sites feel better prepared to address those requirements in the appropriate agreements.

In addition to privacy concerns, we dedicated intense attention to accuracy of data as it was transferred. Audit trails exist at each PO and HP to record every byte of data transferred over the wire. For accuracy, we implemented two-person compliance for all data transfer analysis. This greatly aided our anticipation of potential problems in measurement details, and should be continued.

The execution of contracts often requires an even longer lead time. For all sites, an MOU and a confidentiality and non-disclosure agreement was co-signed by IHA, CreekTech, and Kim Consultants. A business associate agreement (BAA) was also required of CreekTech. It was made clear that IHA and Kim Consultants would not have access to individual-level data and a BAA was not required. Some sites also required a code of conduct and credentials of technical employees to include a background check, training on data access and regulatory requirements, and a complete system security documentation audit.

IV. Direct Query for Data Exchange between Hospitals and Health Plans

The ADT exchange feasibility subproject was initiated on November 1, 2013 and targeted completion by January 31, 2014. The goal of this project was to consider the feasibility of a query technology to support real-time availability of patient specific admission, discharge and transfer (ADT) information from hospitals to HPs. The availability of this information electronically could allow for rapid coordination on assignment of case management resources, and facilitation of timely transitions of patients from acute care settings to appropriately identified post-acute resources. Given the short timeframe, a feasibility analysis was deemed reasonable.

A. Participant Engagement

Health Plans

IHA approached the United Health Group (UHG) and SCAN to see if they were interested in the add-on of the ADT pilot. A high level descriptive use case document was sent to the contacts at each organization who were already involved with the first subproject of the pilot. SCAN found the add-on to be interesting, but were unable to commit their resources in the timeline proposed. UHG was interested in exploring the concept and a meeting was set up between the key stakeholders, IHA, and Kim Consultants' technical advisor. The attendees discussed the value of such an exchange, with ADT notifications going from hospital to HP (and also the PO), and the return of information to the hospital.

The types of data that could be exchanged were also discussed. It was also discussed that notifications of ADT should be sent to the PO with capitated responsibility as well as to the plan. We further discussed what information could be of value to the hospitals that could be generated in near real time by the HP. That data included authorization number, eligibility status (important for payment), medication list, and recent encounters (hospitalizations and outpatient) which took place elsewhere from the hospital. Possibly other encounter-related data such as chronic conditions was also thought to be potentially helpful. It was determined that follow-up conversations were needed with participating hospitals to confirm specifically what types of data would be desirable.

In terms of transmission, we discussed a very limited scale effort which might involve the collection of ADT messages for a covered set of managed care patients (targeting Medicare Advantage, as in subproject 1) and sending those messages in near real time using either:

- Direct secure messaging (if someone in Intake at UHC has a Direct mailbox), or
- Secured FTP mailbox inside the UHC firewalls, with perhaps an internal notification from the FTP mailbox to an intake management person.

In order for this exchange to be feasible for UHG, no additional agreements could be required beyond the MOU/BAA that had already been executed, and no additional software could be placed at UHG.

In a subsequent technical discussion with UHG, it was determined that they have not yet implemented Direct, but it was in their development pipeline for later in 2014. They use Intersystem's Ensemble interface engine for moving data around internally, and for controlling external data feeds. Their preference would be use of Ensemble through a real-time gateway using

Minimal Lower Layer Protocol (MLLP)[2] or HTTPS[3]. They would prefer to receive HL7 v2.5.1 messages as they are easily parsed and used by the interface engine.

While the UHG participants in the calls felt that it would be a simple process to receive and distribute ADT message content to the appropriate location, they also explained that it would be impossible to accomplish an implementation of this pilot before the 1/31/2014 deadline. The participants also said that they would need an executive sponsor and would have to get a set of approvals before the project could proceed. However, they thought this would be possible with additional time.

Hospitals

Discussions took place between IHA and two hospitals: Cedars Sinai Health System and MemorialCare Health System. The conversation consisted of getting a sense of what the hospital applications were and what interface capabilities they had. Both use the same EHR, and consequently have the same interface engine, that produces standard ADT messages (HL7 v2.5). Both also use Ensemble as their external interface engine, which is the same interface engine package used by UHG.

In a subsequent technical conversation with the hospitals and UHG's Optum subsidiary that manages data exchange for UHG, it was determined that both would prefer to use the hospitals' raw HL7 feeds, and the preferred bidirectional transport of MLLP over a VPN. This is because both hospitals can easily fork their existing ADT feeds within their interface engine and filter for the Medicare Advantage patients which can then be sent over the existing MLLP capability (a VPN to United would have to be established for each). While it was agreed that setting up point-to-point VPNs would not be a highly scalable approach, it would be easiest to set up in a very short period of time given they had the capabilities in place. Neither the hospitals nor UHG/Optum have Direct implemented today, however all parties said they expect to be setting Direct up during some time in 2014. Using Direct was seen as the preferred method of transmission going forward due to its standardization and scalability.

The ADT data feeds themselves were discussed during the technical conference call, and while there is typically a lot of variation in ADT message content, everyone agreed that they could produce the data segments and fields outlined in the specification (Appendix C). Trigger events were also discussed, and it was noted by both hospitals that there are typically many updates that occur after the admission event which are mostly transmitted using the demographic update trigger (ADT^A08). We agreed that this information would also be of value for the Plan, and it was added to the specification. In summary, then, the following trigger events were agreed upon:

- ADT^A01: Admission
- ADT^A02: Transfer
- ADT^A03: Discharge
- ADT^A04: Emergency Registration
- ADT^A08: Demographic Update

[2] Minimal Lower Layer Protocol (MLLP) provides a minimalistic session-layer framing protocol which is typically used for sending HL7 v2.x messages over an IP network. MLLP is normally used in conjunction with a VPN for the secure transmission of messages.

[3] HTTP over an SSL-secured circuit – this is a communications protocol widely used in communications over the internet to encrypt and therefore secure messages that use the Hypertext Transfer Protocol.

The following segments were also agreed upon as containing the content that would be needed by the plan:

- Segments required: MSH, PID, PD1, PV1, INS, DG1
- Additional segments mapped if found: OBX, AL1, DRG

Subsequent to the technical conversation with all parties, conversations were held between the IHA team and the hospitals regarding data that would be useful to the hospitals. While the hospitals noted that for Medicare Advantage they typically know about out-of-network hospitalizations when they occur, they did indicate that for other patient populations there is definitely a dataset that would be clinically useful. That dataset includes:

- All encounters (both inpatient and outpatient) in a sequence of most recent first.
- Claims data with encoded fields translated into their textual equivalents. Looking for data like:
    - Date of service
    - Provider name / hospital name
    - Reason for encounter / visit
    - Primary diagnosis / procedure for the encounter (only need primary diagnosis – don't need all of the secondary diagnosis information)
    - Copy of the discharge data set for prior hospitalizations
    - Visit summary for outpatient visits
- Pharmacy Fill information – purpose is to help with Medication Reconciliation – they specifically would like the patient's medication profile. If the plan doesn't maintain a mock medication profile compiled from the fill data, then would likely need 6 months of fill data.
- Lab data was thought to be helpful, although it was acknowledged that it was not typically widely available at the Plans
- Other: Managed care plans typically track patients with chronic conditions, and they have protocols set up for those patients – exams or testing that is due / overdue, medication adherence, and other tracking. It would be useful to know if patients are on a specific chronic disease protocol, and what steps that the institution should be looking to take as part of the protocol.

The hospitals both agreed that the inbound data format from UHG should be (in priority order of desired format):

- CCDA document (HL7 v3.1 with CCDA metadata headers) – it was noted that this is not a familiar format to the Plans, and hence would likely not be feasible for the pilot, however, it is the format best understood and most usable by the EHRs.
- XML document with a style sheet that would allow a PDF rendering for a simple attachable document to an email. Later this format would also provide consumable data for the hospitals into their EHRs.
- Flat delimited file. Would require the most work on the hospitals' end to render for the clinical receivers to use.

Routing of received data was only minimally discussed – to the extent that it would require workflows to be established for the plan data coming in, and that would require additional technical experts to be involved who were not part of the calls to this point.

B. Pilot Project Timeline

The potential pilot participants agreed that they could not possibly achieve an operational pilot in the timeframe expected. Subsequent discussions between the IHA team, the hospitals, and UHG/Optum laid out the likely timeline for such a pilot to proceed once all necessary sponsorship of the project is secured, and the necessary approvals are obtained:

Timeline for ADT Feed Outbound

- Paperwork: 4-6 weeks
- Setting up VPN and punching through the Firewall: 3 weeks (2 weeks for Chief Security Officer signoff, then 2-4 days for actual configuration and testing)
- Interface team – development of the ADT feed: 1 week for creating the physical feed, 2-3 weeks for translations and conversions depending on specifications. The fewer changes needed to the raw feeds, the better, so the task is to get a detailed field-level description of the raw feeds from both hospitals and normalize between them to a single feed description going to the Plan.
- Testing – this can be a quick as 2 weeks if both ends are fully implemented, up to as much as 6-8 weeks if a lot of fields need to be tweaked and there are connectivity issues.

Total: a minimum of 12 to 20 weeks from the point at which the organization's executive sponsor has signed off on the project.

Timeline for Return Data

The return data from health plans to hospitals is more problematic in that it is a function of the data layouts coming back in, and making a determination of where the data needs to go (setting up a workflow to determine destination, and then creating the automated workflow to place it into the appropriate mailbox(es)). While this effort can proceed in parallel with the ADT outbound feed, it is in many ways harder, because the data does not fit any existing structure of expected inbound data. No estimates were secured for this side of the project.

C. Architecture and Data Flows

Refer to Appendix C for the proposed architecture and data flows. While there was general agreement on the transmission method and the standards used for communicating data to the Plan, no decision was reached on the data format being returned to the hospitals. It seems likely that at least initially, an XML format would be most feasible to use, until such time as UHG develops experience with the standard CCDA format. The data flow is expected to be near-real time, which is a typical characteristic on an MLLP data feed over a VPN. The return data flow is also expected to use MLLP over the same VPN. It is unknown at the time of writing this report what the timing of the return flow of data will be as the data sources for the requested data had not been identified. It was generally acknowledged, however, that at least some of the data should be available within minutes of receiving the ADT trigger (encounters and fill history as examples).

D. Data Model

No data model has been specified for this project. The ADT feed traveling from Hospitals to Plan will be HL7v2.5 (specifically v2.5.1), and will be normalized based on translations and conversions performed in the Hospitals' interface engines, to a standard agreed to by the parties during the project's technical design phase. A data model for the return data will be constructed once the content is fully defined.

E. Agreements

It is possible that the ADT and return data can flow according to the rules in both HIPAA and CMIA / California Public Health (treatment purposes) with no additional agreements. However, it may still be appropriate for the hospitals and UHG to sign an agreement relative to the transfer and use of data (similar to an HIE participation agreement). If the Hospitals and UHG become a party to the CaDURSA, then transfer of the data would be covered under that agreement.

F. Feasibility

The feasibility of such a pilot has been established, and agreed upon. All parties have agreed that there is value in establishment of such a set of feeds, and are interested in pursuing the pilot. In both the hospitals' case, as well as UHG, the development teams were concerned about making sure that they had the appropriate authorizations from within their organizations before proceeding. All organizations also cautioned that this pilot project would need to be prioritized along with all of their other projects in the development queue so that the appropriate resources can be assigned.

The initial focus of the pilot will be to get the ADT messages flowing to the appropriate endpoints within UHG. Concurrent with that effort, the feed to the hospitals will be designed and the feed mechanics and workflows will be developed based on additional interviews and design sessions. It is anticipated that the flow back to the hospitals will likely lag the ADT flow by 1 to 3 months. While the pilot was determined to be of interest to the participants and potentially valuable, it is only feasible with a longer timeframe for implementation.

V. Conclusion and Next Steps

While the pilot did not accomplish all of its goals, it made a huge step forward. We demonstrated that a direct query technology could be implemented in a short timeframe to enable the exchange of Medicare Stars data including summary performance measures (numerators and denominators) and member level detail. We showed the utility of the GINA technology for efficiently mapping data content, vector relationships, and policy enforcement. Because the full scope of data exchange was not accomplished for all four PO and HP participants, it did not fulfill all of the expectations of participants. The project was a successful proof of concept and many lessons were learned that will contribute to IHA's next phase of work.

The team will continue to work pro bono over the next month to complete the demonstration of live data exchange. In addition, the collective detailed learnings will be used to revise the technical questionnaires, implementation documentation, project descriptive materials, and project management protocols so that IHA is prepared to consider the next stage of pilot implementation.

Appendices

Appendix A. Top-Level Data Models

Figure 1. Vital Signs

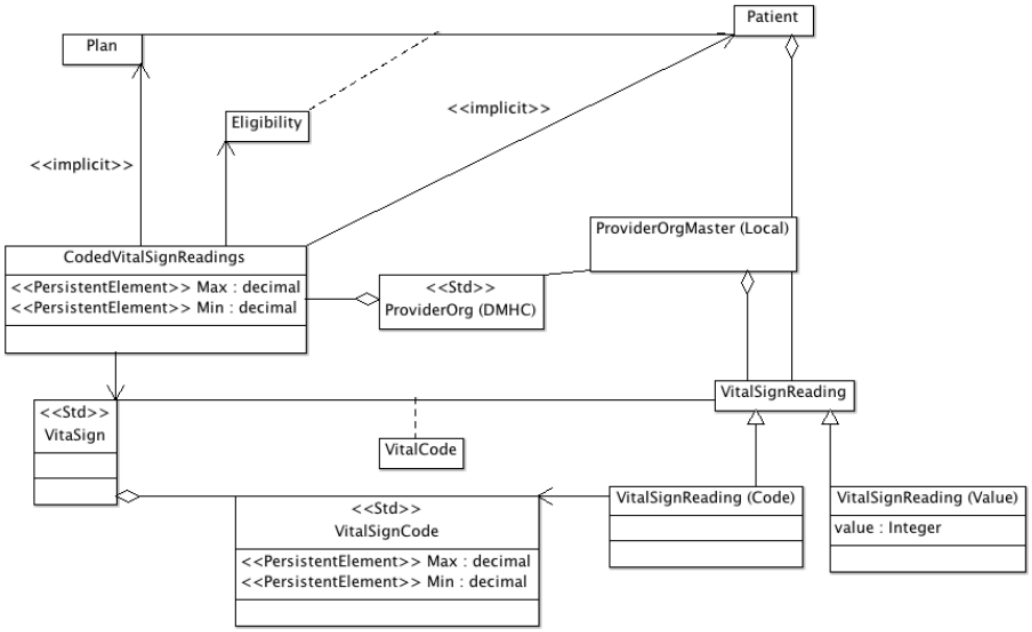


Figure 2. Measurement

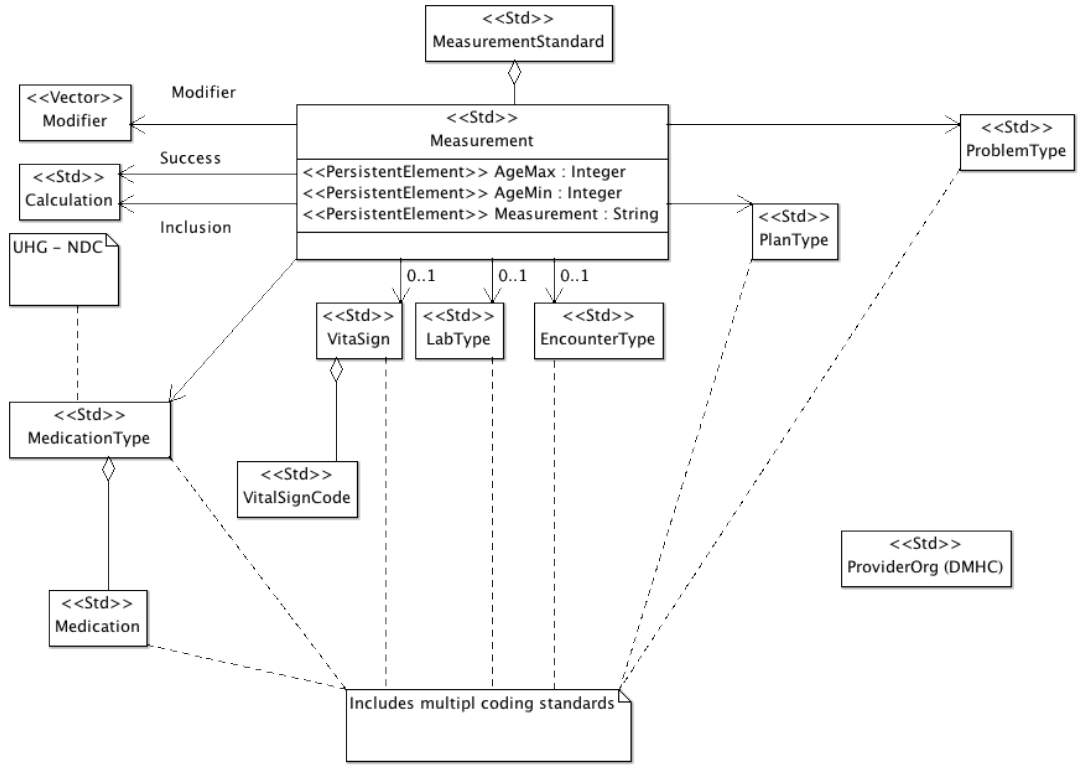


Figure 3. Patient and Plan

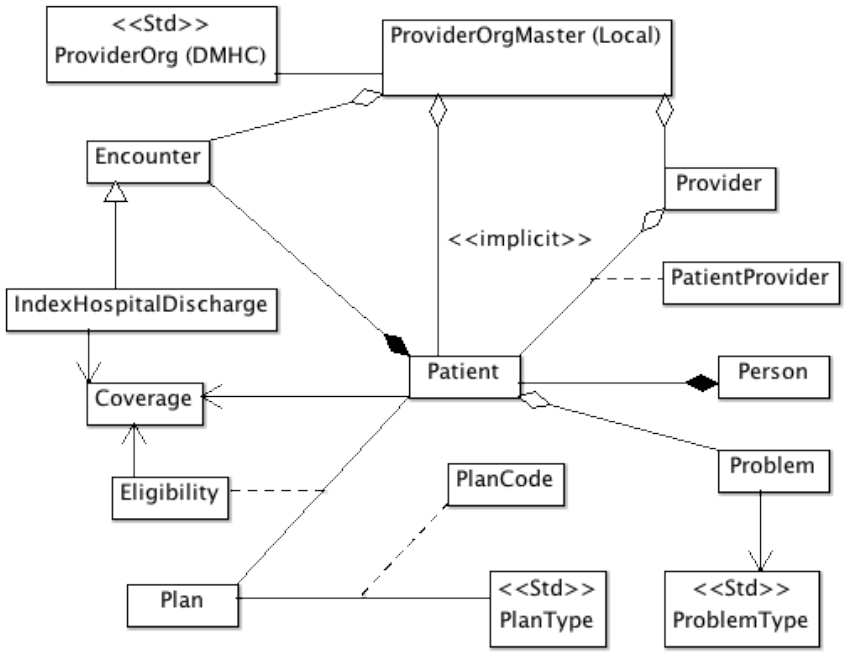


Figure 4. Patient Measurement

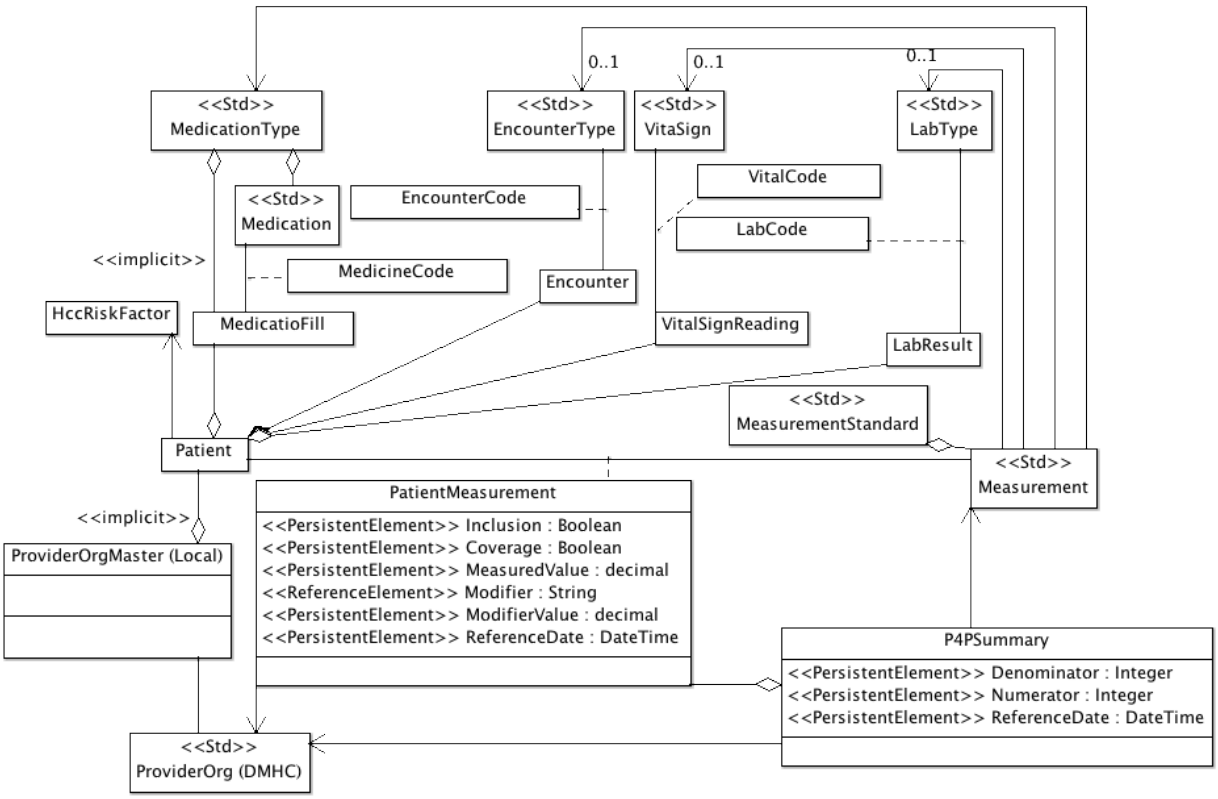


Figure 5. Plan from Provider

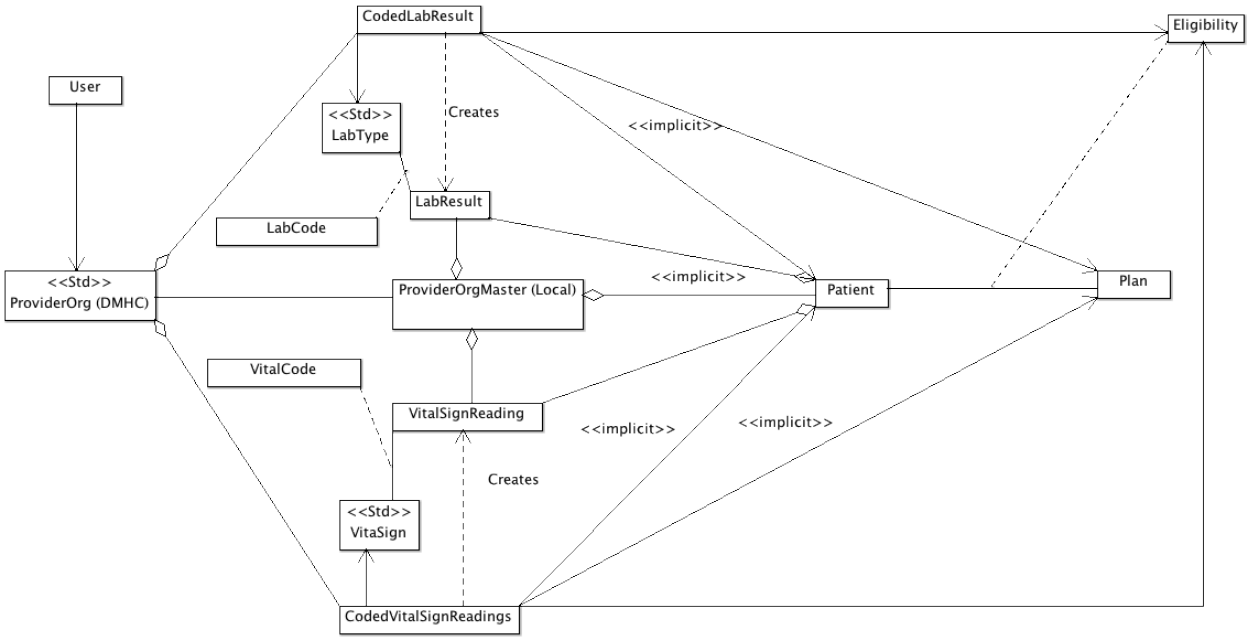


Figure 6. Plan to Provider

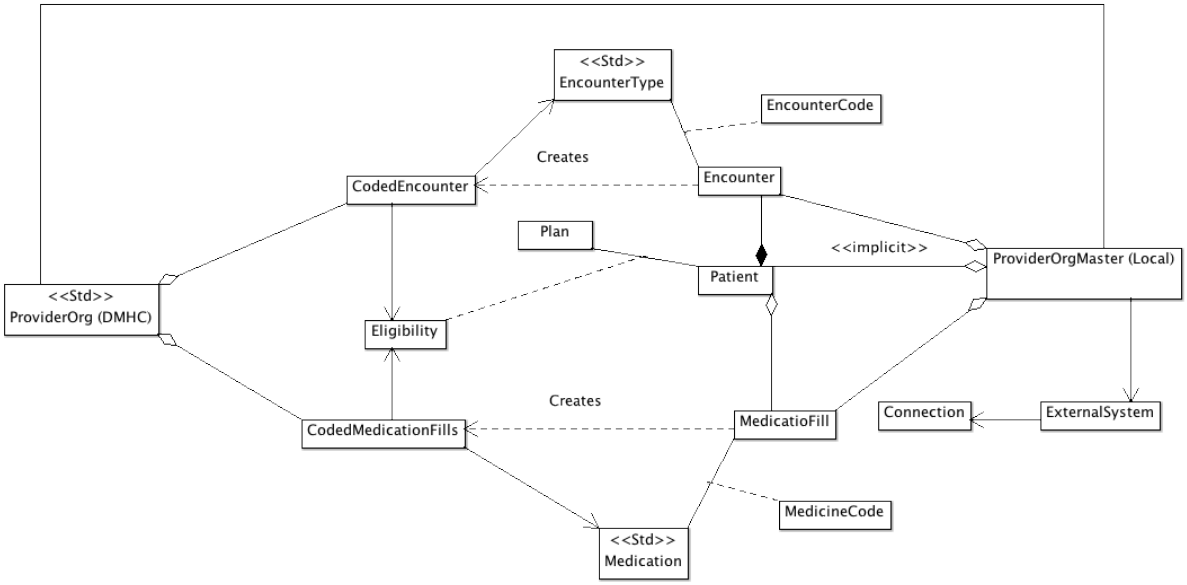


Figure 7. Provider from Plan

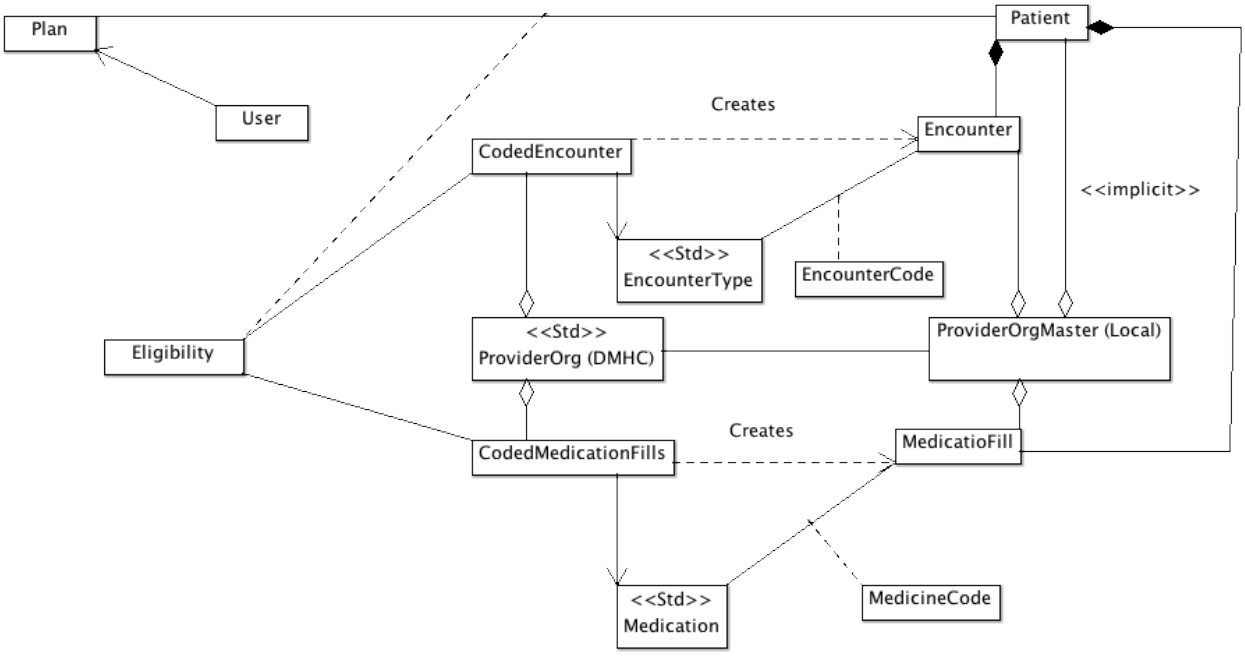
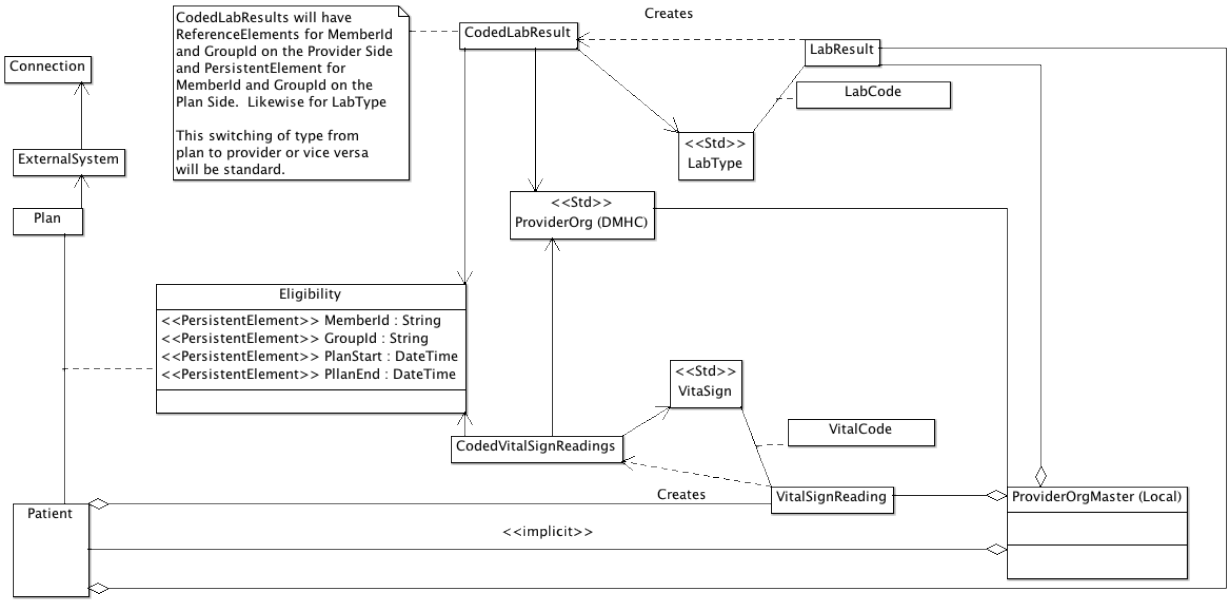


Figure 8. Provider to Plan



Appendix B. Technical Questionnaires

Health Plan Installation Questionnaire

Your participation will require the installation of an instance of a Microsoft Server-based software environment. At the point we install the GINA software and model, we will need to have installed and ready:

1. Microsoft Server 2008 r2, including
2. Microsoft SQL Server 2008
3. Microsoft IIS (included in MS Server 2008)
4. Hamachi "LogMeIn" or equivalent external access
   The system will be accessing your data through your internal network as required to support the pilot project (as detailed below). It will require less than 250 GB of disk, and can operate within less than 8 GB of memory. This environment will operate using https:-based web service access (preferred) through your firewall ("DMZ") or a virtual VPN, e.g., using DynDns. We would also prefer to use Rlogin or other approved (by your site) remote access application.
   We can install the GINA software in your environment in either a stand-alone physical server, or in a virtual machine environment. If it is to be installed on a virtual machine, what virtual operating software do you use (our preferred VOS is VMware). Our ideal install process would be to send you a VMware image of the environment. You would install it, allowing us to access to it. Then, in a shared visualization, we would configure it with your help while you are watching us do so.
5. Will the implementation process outlined above work for you?

What is required to implement external communications at your site? Specifically, we are looking to determine:

6. What form of contract or agreement is needed by your organization to implement external communications?
7. What agreements will the vendor need to sign (e.g. BAA, other)?
8. Who must approve opening up the external communications?
9. What is the timing of making external access available?

Health Plan System and Data Questionnaire (to be completed during on-site meeting)

The following questions relate to IHA Medicare Stars measure specifications, which are posted in the P4P manual on IHA's website: http://www.iha.org/manuals_operations_2013.html

1) Insurance
   a. Continuous coverage
   Implementation or access to one of the two following:
      i. Plan participant information sufficient to determine p4p specified coverage in terms (1) one year, (2) two year, and readmission criteria
      or
      ii. P4P compliant calculations of each of these available by patient.
   b. Do you identify patients as being Medicare Advantage participants? If so, how?
   c. What is the method of identification of deceased and disenrolled patients?
   d. What is the method of access of either the insurance information or patient information as required to support the above, i.e., what is the API, including access method? Is it available through ODBC?

2) Proportion of Days Covered by Diabetes Medications (PDC Rate 3)
Implementation or access to one of the two following:
   a. Patient diabetes medication analysis that conforms to the p4p measure for clinical benefit, i.e.,
      i. A fill of a diabetes medication between Jan 1 and Sep 30
      ii. At least two fills
      iii. Treatment period or disenrollment or death
      iv. Number of days covered or 80% coverage
   b. What is the method of access to support the above, i.e., what is the API, including access method? Is it available through ODBC?
3) Proportion of Days Covered by Statin Medications (PDC Rate 2)
Implementation or access to one of the two following:
   a. Patient cholesterol medication analysis that conforms to the p4p measure for clinical benefit, i.e.,
      i. A fill of a cholesterol medication between Jan 1 and Sep 30
      ii. At least two fills
      iii. Treatment period or disenrollment or death
      iv. Number of days covered or 80% coverage
   b. What is the method of access to support the above, i.e., what is the API, including access method? Is it available through ODBC?
4) Proportion of Days Covered by RAS Antagonist Medications (PDC Rate 1)
Implementation or access to one of the two following:
   a. Patient blood pressure medication analysis that conforms to the p4p measure for clinical benefit, i.e.,
      i. A fill of a blood pressure medication between Jan 1 and Sep 30
      ii. At least two fills
      iii. Treatment period or disenrollment or death
      iv. Number of days covered or 80% coverage
   b. What is the method of access to support the above, i.e., what is the API, including access method? Is it available through ODBC?
5) All Cause Readmissions (PCR)
   a. Continuous coverage analysis (per 1 above), defined as coverage within one year before, and one month after discharge of an index hospital admission.
   b. How do you support the average adjusted probability of readmission? (HCC analysis?)
   c. What is the method of access to support the above, i.e., what is the API, including access method? Is it available through ODBC?

Physician Organization Installation Questionnaire

Your participation will require the installation of an instance of a Microsoft Server-based software environment. At the point we install the GINA software and model, we will need to have installed and ready:

1. Microsoft Server 2008 r2, including
2. Microsoft SQL Server 2008
3. Microsoft IIS (included in MS Server 2008)
4. Hamachi "LogMeIn" or equivalent external access
   The system will be accessing your data through your internal network as required to support the pilot project (as detailed below). It will require less than 250 GB of disk, and can operate within less than 8 GB of memory. This environment will operate using https:-

based web service access (preferred) through your firewall ("DMZ") or a virtual VPN, e.g., using DynDns. We would also prefer to use Rlogin or other approved (by your site) remote access application.

We can install the GINA software in your environment in either a stand-alone physical server, or in a virtual machine environment. If it is to be installed on a virtual machine, what virtual operating software do you use (our preferred VOS is VMware). Our ideal install process would be to send you a VMware image of the environment. You would install it, allowing us to access to it. Then, in a shared visualization, we would configure it with your help while you are watching us do so.

5. Will the implementation process outlined above work for you?

What is required to implement external communications at your site? Specifically, we are looking to determine:

6. What form of contract or agreement is needed by your organization to implement external communications?
7. What agreements will the vendor need to sign (e.g. BAA, other)?
8. Who must approve opening up the external communications?
9. What is the timing of making external access available?

Physician Organization System and Data Questionnaire (answers to be further researched and documented during on-site meeting)

Note: During this discussion we will need to meet with the measure computation folks. Questions 1-6 below relate to IHA Medicare Stars measure specifications, which are posted in the P4P manual on IHA's website at http://www.iha.org/manuals_operations_2013.html.

1. In general, what will be the standard method of access to your information to support generation of the measures as further described below:
    a. Are we to use APIs?
    b. Are we to use ODBC?
    c. Is there another method for connecting to and accessing the data?

   In each of the questions below, please indicate any specific access which is different from the above response – please be as specific as possible.
2. Insurance:
    a. Continuous coverage: We will need implementation of or access to one of the two following options:
        i. Plan participant information stored in your warehouse sufficient to determine p4p/Medicare Stars-specified coverage in the database for terms (1) one year, (2) two year, and readmission criteria
        or
        ii. P4p/Medicare Stars compliant calculations of each of these available by patient accessible through API.
    b. How do you identify patients as being Medicare Advantage participants?
    c. What is the method of identification in your database of deceased and disenrolled patients?
    d. What is the method of access if different from the standard method above (e.g. ODBC, API, other)?
3. BMI:
    a. How does your organization describe that a BMI calculation has been performed during an encounter and recorded in a system, database, data warehouse? Is there a code determination?

b. What is the method of access if different from the standard method above (e.g. ODBC, API, other)?

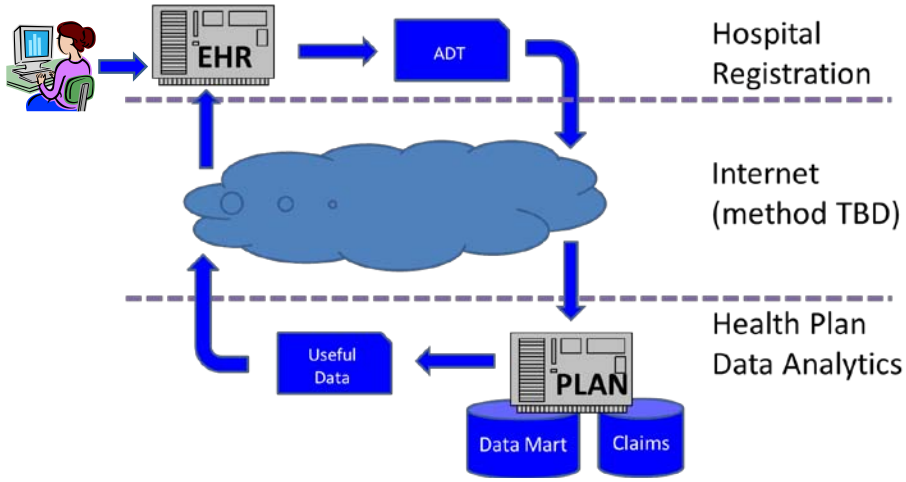
4. Diabetes:
   a. Do you flag patients as having diabetes? Is your definition compliant with the P4P/Medicare Stars definition?
   b. What is the method of access if different from the standard method above (e.g. ODBC, API, other)?
5. HbA1c laboratory results:
   a. Where and how do you identify HbA1c lab tests and results?
   b. What is the method of access if different from the standard method above (e.g. ODBC, API, other)?
6. Cholesterol laboratory results:
   a. Where and how do you identify LDL-C lab tests and results?
   b. What is the method of access if different from the standard method above (e.g. ODBC, API, other)?
7. Blood Pressure:
   a. Do you identify patients with high blood pressure in conformance with Meaningful Use Clinical Quality eMeasure 165? (http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/Downloads/ESpecs_2014_eCQM_EP.zip, and select EP_CMS165v1_NQF0018_High_Blood_Pressure.zip) If so, how is that done in your system?
   b. Do you identify those who have their high blood pressure in control in conformance with eMeasure 165? If so, how is that done in your system?
   c. What is the method of access if different from the standard method above (e.g. ODBC, API, other)?

Appendix C. ADT Subproject Approach

Use Case: Hospital and Health Plans exchange near-real-time data to improve care for the patient. While the ANSI X12n Standard transactions have been mandated since 2006 (HIPAA), they have met with limited success, and are targeted toward the financial side of patient encounters. Hospitals create and maintain clinical data on patients that they treat, and Health Plans gather claims data about those same patients wherever they are treated (inpatient and outpatient). This pilot is intended to demonstrate how the Patient and the Patient's caregivers can benefit from demographic and limited clinical information sent as part of admission, discharge, transfer (ADT) data being sent to the Health Plan's clinical managers who can, in turn, return data useful to the caregivers treating the patient. This pilot will make use of the HL7 v2.5 ADT messages using standard triggers and standard segments.

Pre-conditions:
Patient is admitted to a hospital service (Inpatient or ED), and the patient is known to be in a Medicare or other Managed Care plan with one of the participating pilot Health Plans.

Data flow overview:



ADT Message Requirements:
There are 4 ADT Trigger events specified for capture (others to be added after the pilot):

- ADT^A01: Admission
- ADT^A02: Transfer
- ADT^A03: Discharge
- ADT^A04: Emergency Registration
- ADT^A08: Demographic Update

For purposes of the pilot and to illustrate the feasibility of gathering useful data for the hospital's treatment of the patient at the time of admission, we propose to have the participating hospitals use their existing ADT feeds with existing standard message segments for the transaction messaging.

ADT^A0x Detailed Message Field Requirements:
Segments required: MSH, PID, PD1, PV1, INS, DG1
Additional segments mapped if found: OBX, AL1, DRG

We expect that the sending organization will simply fork their ADT feed, filter the feed based on determination of the patient's being a member of one of the participating Plans, and then send the raw HL7 message to the Plan.

The minimum set of fields required to fully identify the patient and provide information needed for the automation of data retrieval is listed below. Those fields minimally needed to prove the functionality of the pilot are indicated in red. The following fields are listed by HL7 segment (field numbering does not include the set-ID):

MSH:
- 02-Sending Application
- 03-Sending Facility
- 06-Date/Time of Message
- 08-Message Type / Trigger (e.g. ADT^A01)

PID:
- 01-Patient ID
- 02-Patient Identifier List
- 03-Alternate Patient ID
- 04-Patient Name
- 05-Mother's Maiden Name
- 06-Date/Time of Birth
- 07-Administrative Sex
- 08-Patient Alias
- 09-Race
- 10-Patient Address
- 12-Home Phone Number
- 17-Patient Account Number
- 18-Patient SSN Number

PD1:
- 03: Patient Primary Facility (XON) optional repeating
- 04: Patient Primary Care Provider Name & ID No. (XCN) optional repeating

PV1:
- 01-Patient Class
- 02-Assigned Patient Location
- 03-Admission Type
- 06-Attending Doctor
- 07-Referring Doctor
- 09-Hospital Service
- 13-Admit Source
- 17-Patient Type

PV2:
- 03-Admit Reason

DG1 (recurring)
- 01-Diagnosis Coding Method
- 02-Diagnosis Code
- 03-Diagnosis Description

INS:

- 01-Insurance Plan ID
- 02-Insurance Company ID
- 03-Insurance Company Name
- 07-Group Number
- 08-Group Name
- 48-Insured's ID Number (health plan Id – this is the number that the plan will recognize the patient by)

Message Transmission:
Once the raw HL7 message is determined to be appropriate for a participating Plan, it will need to be transmitted (pushed) the specified Plan. Ultimately, we would expect this transmission be through use of Direct or like capability, however for the pilot purpose, we can be flexible on how the data is moved. Encryption in transit is required. Decision on transmission will need to be a joint decision between the plan and hospital, but several options such as, secure FTP or HTTPS-push can be considered depending upon the capabilities of the participating hospitals and plans. IHA will convene the hospitals and plans to make this decision.

Return Content:
We know that the plans have in their available data marts both prior admission information and medication fills, and there is likely other data that the Plans can make available for treatment of the patient. While the pilot is specific to the triple-weighted CMS Medicare Stars measures, we anticipate that other types of managed care patients can also be included. IHA will convene the pilot hospitals and plans to have a conversation on what data would be useful to hospitals and could be retrieved by plans and returned. Clearly, a "pseudo-CCD" composed from claims data could be an ultimate objective, however that is well beyond the pilot capability.

Return Receiver Functionality:
We would suggest for the pilot purpose that the same capability chosen for message transmission be used for message receipt, however that is not a requirement. Again, it will be determined by the pilot participants how best to exchange the data.

Automation Constraint:
It is acknowledged that the pilot timeline is too short to build fully automated mechanisms at either end of the transmission. It was suggested during discussion that the hospitals have highly functional interface engines which can be used to automate the selection, filtering, and transmission of ADT messages. The Plans, however, while they may have existing automated processes to receive the ADT messages, do not have functional automation to route the messages to the appropriate parties today, so there will likely have to be some intervening manual processes to interpret and move the ADT messages to the appropriate patient managers or other individuals.

It is also likely that there will have to be some intervening manual processes at the Plan to query the claims repositories and generate the return messages to be shipped back to the hospital. Once the return message has been constructed, it should be encrypted and sent back to the hospital using the agree-upon technologies.

We would expect that the same automation constraints apply to the hospital receiving the data. The message format should be an XML-based structured message, and it would be desirable (but not required) for the returned message to be in a CCDA-compatible format. Again, at the hospital

end of the transmission, it is expected that there will be some manual process implemented to actually consume and use the Plan's data.

Data Exchange Timeline:
It is expected that the ADT message will be transmitted to the Plan in near-real-time from when the trigger event occurs (within minutes of the event). Because there are likely to be manual processes at the Plan end, however, it is expected that there may be a delay of many minutes to potentially an hour or more before the specified data is returned to the hospital. Once the pilot proves the exchange to be useful to both Plan and hospital, it is expected that the manual processes can be automated to the extent that the data return to the hospital occurs within minutes of the ADT trigger event receipt by the Plan.