

Move Health Data Forward Challenge

Submitted by:



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Executive Summary

A recent study showed that 62% of insured adults rely on their doctors to manage their health records, and nearly 29% of the respondents indicated that they keep them in a home-based physical storage location like a folder or shoebox. The proposed solution will provide individuals with the power to access their health information electronically, and actively direct its flow so as to take charge of their own health and make more informed decisions. The solution is based on implementation specifications developed by the HEART Workgroup and has the potential for individuals to securely and electronically authorize the movement of their health data to destinations they choose. These could be between and among their clinicians, hospitals, health-care providers, or even family members.

Target Consumer Population and Target Healthcare Providers

Individuals in all age groups who can download care provider reports and discharge summaries from patient portals on different EHR systems that are certified for Meaningful Use. These individuals will now have the ability to direct electronic transfers of their healthcare records between care providers.

Physicians participating in the Meaningful Use program (and using Certified EHR Technology), who currently provide the ability to view and download relevant health data, will now be able to fulfill true 'Transmit' requirements of the V/D/T (View/Download/Transmit) portion of the Meaningful Use program. Upon being directed by their patients, they will be able to transmit data instantly, well within the requirements of doing it in 4 business days.

Similarly, Hospitals participating in the Meaningful Use program and using a certified EHR platform will be able to transmit data electronically to other care providers well within the requirements of providing discharge summaries within 36 hours.

Problem being Addressed

With over 300 different EHR systems in use today, when visiting a doctor, the average patient's experience is recorded within at least 3 different information systems of record. That same patient also sees 18.7 different doctors in his or her lifetime. For patients over 65 years of age, the average increases to 28.4 individual doctors, including primary care, specialists, hospital and urgent care providers. Between all of these doctors and all of these systems, there is little-to-no communication. This leaves a patient's medical record scattered across many different types of systems controlled by many different IT departments and behind many different firewalls. This renders the patient, and their respective providers, lacking a holistic view of the patient's health.

Results from various studies clearly indicate that individuals experience big gaps in health information exchange, such as:

- Store, copy and carry hard copies of X-rays, MRIs or other types of test results on appointments
- Redo tests or procedures because results of earlier tests are not available
- Have to submit the same health information repeatedly because reports are not available from one care provider to another

Medical errors resulting from lack of information and manual transfer of information from one system to another are attributed to 195,000 deaths a year in hospitals. Similarly, 1.5 million Americans are

sickened, injured or killed each year by errors resulting from lack of automation in prescribing, dispensing and taking medications according to the Institute of Medicine.

Technology Used in Developing the Solution

Clinical data that comes from EHR or other clinical systems is critical to the planning, execution, and management of coordinated care plans for patients. Clinical data can be exchanged between the proposed system and various EHRs using HL7 FHIR standards. Our solution consists of servers running on Amazon Web Services (AWS) and a mobile app that runs on iOS and Android phones. We use Substitutable Medical Apps Reusable Technologies (SMART), a healthcare-specific implementation of OAuth2, with the goal of creating a secure way of sharing what can be extremely sensitive data in a manner that uses standard industry protocols such as the HEART profiles and specifications for OAuth 2.0, OpenID Connect and User-Managed Access (UMA).

Individuals can use a browser on a laptop or a mobile application with a user interface that lets her securely and electronically authorize the movement of their health data to destinations they choose. The mobile app implements standard OAuth2 functionality to authenticate itself by embedding a browser in the app and storing the refresh token by encrypting it.

The proposed solution has the following major functional components:

- Setup Mobile/Portal Application
- Setup API
- Request Application
- API to Create Request
- Fetch Token Process
- Data Transfer Process
- AWS Configuration

The setup Mobile/Portal Application is built using AngularJS/HTML5 and enables patients to add credentials for all their health record applications. The Mobile/Portal Application manages security credential create/updates using REST APIs hosted on AWS. JAVA Batch processes running on AWS use AWS Cognito mode for the implementation of OAuth2.0, OpenID Connect and User Access Method specifications.

The Data Transfer Application first needs to fetch access tokens from the authorization servers of EHR/EMR applications before fetching or updating data. Data Transfer Application hosted on AWS then uses FHIR APIs of EHR applications to fetch health data from source application and update target data. The AWS components of Lambda , SQS and databases like RDS and DynamoDB are used to manage and store profile and refresh tokens as well as fetching data using FHIR APIs of EMR/EHR applications.

Financial Overview

Development Costs						
Category	Details	Month 1	Month 2	Month 3	Month 4	Full Period Total
Office Expense		\$4,000	\$4,000	\$4,000	\$4,000	\$16,000
Development						
	@US\$50/man-hour	\$36,000	\$36,000	\$36,000	\$36,000	\$144,000
	AWS Hosting Costs	\$500	\$500	\$500	\$500	\$2,000
Utilities		\$500	\$500	\$500	\$500	\$2,000
Month total		\$41,000	\$41,000	\$41,000	\$41,000	
Total						\$164,000
Monthly Recurring after Development						
Category	Details	Month 5	Month 6	Month 7	Month 8	Month 9 Onwards
Revenue	EMR Companies pay \$1/subscriber/month	\$10,000	\$15,000	\$20,000	\$40,000	\$50,000
Office Expense		\$4,000	\$4,000	\$4,000	\$4,000	\$4,000
Operations and Hosting						
	@US\$35/man-hour	\$25,200	\$25,200	\$25,200	\$25,200	\$25,200
	AWS Hosting Costs*	\$500	\$750	\$1,000	\$2,000	\$2,500
Utilities		\$500	\$500	\$500	\$500	\$500
Monthly expense total		\$30,200	\$30,450	\$30,700	\$31,700	\$32,200

* Assumption: cost of hosting an individual's account = \$0.05 per month. Add \$2,500 monthly cost for every additional 50,000 subscribers

The project will be initially funded by angel investment in the amount of \$125,000.

Development Plan and Timeline

Month 1	Month 2	Month 3	Month 4	Month 5
Application Design	Application Development	Field Testing	Final Development	Full Launch

Metrics for Success

- ✓ Number of new subscribers on a monthly basis
- ✓ % of hospitals, labs and physician offices trading medical records electronically with individuals
- ✓ % of medical records traded electronically every year by each hospital, lab and physician office with individuals
- ✓ % of hospitals, labs and physician offices trading medical records electronically among themselves
- ✓ % of medical records being traded electronically among hospitals, labs and physician offices
- ✓ % of medical records successfully merged into their own EHR system upon receipt from another EHR system or individual
- ✓ Cost and time savings resulting from hospital or physician office staff's time to retrieve records, make copies, fax copies or send the results by mail

- ✓ Reduction in errors because of timely availability of accurate information that is less prone to errors from manual entry

Potential Risk and Mitigation Strategies including Security

Amazon Web Services (AWS) enables covered entities and their business associates subject to HIPAA to securely process, store, and transmit Protected Health Information (PHI). As an AWS customer, we would use only those AWS services which are U.S. Health Insurance Portability and Accountability Act (HIPAA) eligible services as defined in the AWS Business Associate Agreement (BAA). Eligible services will be used in an account designated as a HIPAA Account. The proposed solution running on AWS is a HIPAA compliant application and complies with HIPAA Privacy and Security Rules for protecting Protected Health Information (PHI). The solution uses features provided by AWS to encrypt data in transit and at rest, and features that can be used to meet HIPAA requirements for auditing, back-ups, and disaster recovery.

The proposed solution uses services such as AWS Lambda and Amazon EC2 Container Service (Amazon ECS) to orchestrate and schedule EC2 instances. The actual PHI is processed on EC2 and stored in S3 (or other eligible services) and our solution ensures that EC2 instances processing, storing, or transmitting PHI are launched in dedicated tenancy and that PHI is encrypted at rest and in transit. Any application metadata stored in Lambda functions, Chef scripts, or task metadata does not contain PHI.

Participant Roles, Responsibilities and Capabilities

kreateloT is a leading edge solution provider for the healthcare industry. The team at KreateloT has several hundred man years of experience in designing, building and implementing distributed computing platforms for high end processing and scalability. kreatelot has recently focused on the application of blockchain technology to address interoperability challenges facing the healthcare industry. It recently published a ground breaking research paper titled "Using off-chain (kreateloT) with a public blockchain to achieve patient privacy, security, scalability and interoperability of Electronic Healthcare Records". The kreateloT team is responsible for coming up with a solution to build a personal Electronic Health Record System (EHR) system for Health Information Exchange (HIE) of 1.

Koncero was founded in 2008 to provide customization services for enterprise platforms that use cloud platforms such as Amazon Web Services. Koncero also provides software products and services for community portal development, administration and mobile enablement services. Koncero has implemented several projects for large and medium size companies like Putnam Investments, Associated Press, Digital Mobile and First Mobile. Koncero team includes expert enterprise consultants, software developers and project managers who will be responsible for working closely with the Technatomy team to build the API solution for the healthcare industry.

Technatomy is an award-winning Service Disabled Veteran Owned Small Business (SDVOSB) built on corporate confidence and integrity. A dynamic, highly focused government IT contractor, Technatomy brings a 15-year history of providing Program Management support, Software Development, and Technical Support Services to Federal customers, including more than 10 years of service to the Department of Veterans Affairs (VA). This high-profile effort requires an experienced management team that understands the VA environment and culture to be successful. Technatomy applies consistent management processes and tools on all our VA task orders (TOs), based on the Project Management Institute's (PMI) Project Management Body of Knowledge (PMBok), our Capability Maturity Model Integration (CMMI) Maturity Level 3-assessed engineering processes, International Organization for Standardization (ISO). Technatomy has achieved ISO 9001:2008, ISO/International Electrotechnical Commission (IEC) 20000-1:2011, and ISO/IEC 27001:2013 registrations, and has been appraised at Maturity Level 3 of the Software Engineering Institute's (SEI) CMMI for Development.

An example of Technatomy's success is the Emergency Department Integration Software (EDIS) system, an extension to Vista/Computerized Patient Record System (CPRS) for tracking and managing the delivery of care to patients in an Emergency Department. The EDIS system provides: recording and tracking of Emergency Department patients during incidents of care, display of the current state of care delivery, and reports and data extracts on the delivery of care. The EDIS system can be configured specifically for different VA Emergency Departments. Technatomy is using agile development to incrementally develop, test, nationally release, and deliver the EDIS v3 application which improves overall patient safety, cost effectiveness and delivery of emergency medical care to patients. We perform the work in a VA environment and in accordance with VA's PMAS Guidelines and ProPath processes.

Technatomy will be responsible for project execution employing best practices for software development and project management. Technatomy staff will handle the ongoing operations of the proposed solution.