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D-ATM, A Working Example of Health Care Interoperability: From Dirt Path to Gravel Road.

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Abstract - For many years, there have been calls for interoperability within health care systems. The technology currently exists and is being used in business areas like banking and commerce, to name a few. Yet the question remains, why has interoperability not been achieved in health care? This paper examines issues encountered and success achieved with interoperability during the development of the Digital Access To Medication (D-ATM) project, sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA). D-ATM is the first government funded interoperable patient management system. The goal of this paper is to provide lessons learned and propose one possible road map for health care interoperability within private industry and how government can help.

I. INTRODUCTION

Achieving interoperability across patient management systems has been a goal of the health care industry for many years. Advocates argue that it would save money and time, reduce medical errors, and serve the public good. Others argue that while the technology currently exists, there are high costs and privacy concerns.

The goal of D-ATM is to assist patients in obtaining medication in the event there is a service disruption at their home clinic. The initial focus of D-ATM was for working with opioid treatment programs (OTP), but the approach could be used for many other programs as well.

SAMHSA's Website provides full discussion on the technical architecture for D-ATM. The architecture development and implementation for the pilot were performed by Z-Tech, an ICF International Company under contract for SAMHSA. Composed of non-government organizations and government organizations, the project had a steering committee that provided advice and guidance. The genesis for the project came after the terrorist attacks of September 11, 2001.

Quoting from the D-ATM Website:

> In the fall of 2005, SAMHSA/CSAT funded the pilot project, called Digital Access to Medication, or D-ATM. A patient advocate serving on the project's Steering Committee suggested the name "D-ATM" as representing a Web-based system that will allow patients to access medication in certain situations in almost as routine and dependable fashion as bank machines are used to obtain cash.
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> From the beginning, the project has been guided by four principles: simplicity, affordability, acceptability, and confidentiality, with a particular emphasis on confidentiality. Accordingly, system development has incorporated the protection of personal information as an absolute core requirement. The result is a centralized information source that multiple OTPs can access while protecting highly private, and potentially powerful, information.

Much of the information about D-ATM can be found on the SAMHSA Website at www.datm.samhsa.gov.

The architecture of D-ATM is based on commercial of the shelf technology (COTS) and relies on three elements for it core operations: biometrics, a database, and the Internet. The biometric tool, an identification process that has been advocated since the publication of The WEDI Report, was composed of a finger scanner that could be attached to a computer via an available universal serial buss (USB) port. The scanner captured a finger scan, in this case, data points referred to as "minutiae", combined that information with a randomly generated number to form the unique patient identifier. Medicine orders and a record of recent dosing events are added to this identifier and stored in D-ATM. OTPs access this information when the patient uses the system at a clinic that is not considered their regular "home clinic".

Though D-ATM is a government managed system, the clinic's actual patient information is store at the clinic's site. D-ATM acts as a gateway exchange between various clinical management systems via an application program interface (API). D-ATM never stores a patient's personal identifiable information. Even the finger scan information is just composed of the minutiae data not an image of the finger scan. After a period of ninety-days, the medication information is deleted.

The fields that D-ATM used and transferred amongst patient management systems were medicine orders, dosages, dates of events, OTP clinic, a D-ATM ID, and finger minutiae. Neither the patient's name, social security number, nor any other personal identifiable information as identified under The Health Insurance Portability and Accountability Act (HIPAA) were ever needed for D-ATM to work successfully.

Patient participation was voluntary. Patients had to sign a consent and release form. There was no penalty to the patient for not participating in D-ATM.

The clinic maintains all patient information and guest patients that use D-ATM must enroll in the guest clinic and follow the business procedures of that guest clinic. So what is the benefit of using D-ATM? Namely speed and preserving dignity of the patient while preserving the autonomy of the clinic. Without D-ATM, patients would have to wait a long time, sometimes even a day, before they could be processed. Patient enrollment in D-ATM is voluntary. If the patient decides not enroll, they may still receive treatment at a clinic, but they may experience longer delays in receiving treatment because the clinic will have to call the patient's home clinic to do verification activities.

In the case of OTP's, their operations are governed by finances, local and federal laws and regulations. These clinics serve a unique community of patients. Funding is not large and patient community is not generally affluent. A service disruption to a patient is more than an inconvenience, it can be painful to the patient, and severely affect their well-being. When there is a service disruption, clinics have been known to continue to operate but in a diminished capacity. A clinic using D-ATM can now choose to address issues affecting their operations and send their patients to another clinic with the full confidence that the patient will not suffer any unusual delays in treatment or loss in dignity. The clinic preserves its autonomy of operations without the loss of data integrity.

OTPs that did not have a patient management system could use D-ATM for that service, but only for medical information. D-ATM did not manage health financial information and billing and the OTP would have to use whatever process/system that they had. The OTP would need to have at least a working computer within the defined specifications as well as access to the Internet.

II. SUCCESS FACTORS

As with any health informatics and information project, the challenges faced were not technology, but instead were cultural challenges. As a business discipline, health care lags behind other industries with regards to information technology and information exchange. There were several success factors to this project as well as several lessons learned.

The primary success factors were the speed and security of the system, its affordability, that there was strong support from this specific medical community, and that there were early adopters to the project.

D-ATM achieved its speed because only the essential data elements were exchanged, namely the minutiae for the finger scans, a few dates and times, and medical dosage information. The total size of this information was only a few kilobytes for each patient transaction. Since no personal identifiable information was stored on D-ATM, it did not pose as an attractive target for intrusion. All personal identifiable information remained with the clinics.

The most time-consuming activity was the patient's initial enrollment. This generally took less than 1 minute per patient. "Guest" visits that occur during a disaster or other service disruption will consist of little more than taking a finger scan and retrieving the patient's medicine order and recent dosing history.

The system was also very affordable. The additional equipment needed the clinics were small COTS finger scanners and accompanying software drivers. Most clinics have their patient management software running on computers and the minimum requirements

As was mentioned at the beginning of this paper, there was a strong support for this project from the patient community. This provided advocacy within the community as well as subject matter expertise regarding clinic operations. It also facilitated obtaining early adopters to the system.

Lastly, of all the elements that contributed to the success of the pilot, obtaining early adopters of D-ATM was the most significant. Sometimes with a government project, there is a perceived need to survey potential participants. Government surveys require copious paperwork, some of which is to satisfy "The Paperwork Reduction Act." Creating a survey can take time in part because there is a temptation to edit and re-edit until one is in a cycle of editing edits. It also can prevent dialogue with interested parties.

Fortunately, this approach was not used. Instead, information packets were developed that announced the program, provided an overview of the data flow, and listed the minimum requirements. That the Steering Committee members were able to act as advocates and entice the voluntary participation of a clinic into the pilot was especially helpful, since the goal of this system to provide a service to clinics.

A similar approach was used to enlist voluntary participation of the makers of the patient management system being used by the clinics. Information letters were sent to the clinics, and sample code for developing the API was placed on the program Web site. The sample code was developed in .Net and JAVA. These languages were the most used by the vendors. The API code was also patient management system independent, thus multiple vendors could use it. The vendors were able to incorporate the API code into their products at their own discretion. After completing a few simple test scripts, the vendor could be judge "D-ATM Ready". Typically vendors chose to place that claim on their Web sites, to boost the marketability of their products.

III. THE LESSONS LEARNED

There were a few lessons learned that did not derail the project, but will be of value to any future government-private partnership that strives to develop interoperability.

The first and foremost lesson learned is to plan marketing material for two audiences, the patients and the clinics or care givers. The best approach is to solicit and market to the care givers first as they can act as local advocates to the patients. The material needs to be concise and addresses patient fears and concerns.

Technical specifications should also be included. Plan the system to include current generation technology and one generation behind current.

Using D-ATM as an example, repeated statements were made that the system does not collect patient names, addresses, or any other type of personal identifiable information. This would seem like a logical action and not worthy of mentioning in a paper, but trust and confidence are the heart of any interoperable patient management system. If the trust is low, no one will use it.

In the case of D-ATM, rumors and speculations included that this system:

- Would be difficult to use
- Would dictate how treatment was to be managed
- Would require massive cash and infrastructure support from each clinic
- Was part of a larger project to implant micro-chips for brain control

All of these speculations were false but could have derailed the project if not addressed.

One side note, D-ATM used finger scans, not finger prints. Finger prints have connotations of law enforcement, criminal background check, and possible invasion of privacy. A finger scan just collects the minutiae.

The second lesson learned is that many vendors are not ready or capable of either participating in data standards development. Many vendors see the standards development process as a moving target and that it is a costly exercise to incorporate into their applications. Fortunately, though the Health Level Seven (HL/7) data standards were not defined for the needed data elements, D-ATM used a simple API to transact the few data elements that were needed. The sample code to use the API was published for any vendor to use. By publishing the API, the vendors only had to identify where in their patient management system the API would best fit. Publishing the code for the API also demonstrated that no personal identifiable information was being collected, and served to address the first lesson learned.

The third lesson learned relates to the technology. Finger scanners come in small affordable products. D-ATM used Microsoft or Granule scanners. Both were easy to install.

IV. Conclusion

The Information Super-Highway, as the Internet was heralded, is being used by many companies and organizations for data transaction to support such activities as event reporting, inventory management and commerce. Each industry has built their own entrance ramp and collectively they have addressed network standards, security and interoperability. The health care industry, especially the area of patient management, has been cautious and reticent about using healthcare information technology. Their concerns are legitimate and this paper does not judge them.

Currently, the health care industry has started building a dirt path to use information technology to transact patient information. There are many successful portals that provide useful medical literature to educate, but in the area of electronic medical record exchange for patient medical record management, there are very few tools. Government and industry leaders have long advocated and continue to advocate for interoperability. These leaders would do well to take a chapter from the D-ATM book, namely, build the interoperable tools, don't just advocate standards. The solution was not perfect, but the goals were achieved and there was no damage done to anyone. By making the API code available to vendors, early adoption was easy to achieve at very little cost. Confidence in the system was also achieved and D-ATM was used across clinics using own their patient management systems. Biometrics eliminated the need for personal identifiable information. As a model, D-ATM was successful in building a gravel road for clinical interoperability of patient management data.

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