

# SYNOPSIS

In order to reform healthcare it is necessary to institute radical changes in the way medical providers keep records. The science of medicine continues to evolve exponentially while the systems that support it lag further and further behind. With some simple and important changes these systems can be fixed in order to provide better service to patients, providers, and governments. Our technology can be key to making these changes. We have developed a technology that will allow individuals to manage their own records while making them easily and securably accessible to providers. Our technolgy is also an invaluable tool which will allow healthcare professionals at all levels to standardize their systems, not on ly making them better at running their businesses but also in the quality of care they are able to provide and in developing modern and effective medical technologies.

# Roadmap

From paper to global interoperability in 4.5 seconds

## Introduction

Health care as we know it is in jeopardy but it is also about to get a radical makeover. Medical administration is at a precipice. It is an antiquated way of doing things that no longer works; a massive wave of paper with patient medical histories, x-rays and lab results, prescription drug receipts, medical bills, insurance claims forms, malpractice suits as well as government bureaucracy with signed copies of everything in triplicate. The medical establishment can choose to either stand fast or be engulfed by a wave of paper dragging them into a bottomless chasm, or vault over that chasm and reach firm ground where through a single computer terminal they can access and share any information about any patient anywhere in the world.

This technology has the potential to boost the quality of life for most of the human race. It addresses the much neglected and now highly publicized problem of how to effectively deal with the global problem of managing the health of a growing and aging population. The systems that are currently in place are not working and it is time that we jump the proverbial chasm and introduce health care to the 21st century.

## Current affairs

The last decade has seen a radical increase in software created for the health care industry.  Large hospitals have their own IT teams writing custom software, while smaller providers buy turnkey solutions from a plethora of health IT vendors. Insurance companies also have large custom built systems for processing claims while the automated billing industry that integrates with most providers is rapidly expanding and enjoying much growth. Personal health sites have joined the fray and are focusing on the needs of the patient. This industry is poised for much growth in the decade to come as the need for real-time health care data management becomes more and more imminent.

So with all this technology at our fingertips, why is it that a patient still needs to fax in a request for her journal from one doctor, pick it up in person, and deliver it in person to another doctor? Why is it that one hospital cannot communicate with another hospital, let alone 10 other hospitals? Why, with all the technology we have, are there still misdiagnoses because of lack of information? The reason is quite simple. The old paradigm of paper doesn’t work AND the old paradigm of writing massive applications for healthcare in a silo doesn’t work. We need to create a new paradigm where this information is readily available, yet still secure. Enter the HIE (Health Information Exchange) and the RHIO (Regional Health Information Organization)!

## An HIE Roadmap

A Health Information Exchange is defined as the mobilization of healthcare information electronically across organizations within a region or community.

HIE provides the capability to electronically move clinical information between disparate health care information systems while maintaining the meaning of the information being exchanged. The goal of an HIE is to facilitate access to and retrieval of clinical data to provide safer, more timely, efficient, effective, equitable, patient-centered care

-- Wikipedia

What are the ingredients of a true HIE then? In this section, I will try to outline, in no specific order, a set of requirements based on what we encountered while building our own HIE platform.

### Portable user

The concept of portable user holds the basic premise that a user entity has a unique identifier and that it is HIE independent. The identifier gets associated with all her related medical data stored in any one of the many HIEs in the world, across many different services, such as a calendar, PHR or EMR.

### Data discovery

With maybe hundreds of RHIOs in the world that are dependent on the large data aggregators, namely the HIEs, they rely on the data aggregators to make available all the data for a specific patient. The data for a patient might not reside with one HIE at the time the request is made, so an HIE needs to be aware of other HIEs or lesser data access points. Which leads to the biggest requirement of all:

### Interoperability

In order to make e-health a reality, computers must speak the same language and use the right words. In other words, we must have uniform standards for security, protocol, data, classification, technology and, let us not forget, regulatory standards. Building a system such as this will require more complexity than building an application for a bank.

It is important to support existing standards, such as HL7 RIM, while keeping abreast with promising, newer technologies, such as the semantic web. Being able to support multiple standards is very important as other organizations might already have e-health applications running that support one standard but not the other.  It will be the responsibility of the HIE to bring disparate systems together.

### Pluggable services and applications

An HIE platform needs to be built in a modular fashion. It needs to support “hot-deployments” and “versioning” of new and updated artifacts without having to restart the platform. Building a system based on smart, “self-aware” components backed by a Service Oriented Architecture is essential. An HIE cannot be another gargantuan system that “can do everything” but be obsolete within a year. An HIE should be able to easily deploy new applications without impacting existing functionality.

### Licensing

Licensing goes hand in hand with “plugability”, by giving e-health vendors a place to sell their new services. Because the HIE platform already supports the more generic features such as security and knowledge of other HIEs and their services, vendors can focus on the service they wish to sell, the bells and whistles if you may, and not the functionality that is common to every other application. This will help reduce cost and the time-to-market of new functionality.

### Federated security

By letting HIEs be responsible for handling medical data in a centralized fashion, federated security is now possible. Questions such as these can now be answered across the board as a common piece of functionality:

Can a user log in?

Does a user have the right privileges to access a certain record?

Can a program access another program?

Does an organization have the rights to synchronize data with us?

Can an application be viewed by a user who works for this organization?

Can a country access services in another country?

... the list goes on

### Regulations

In a centralized system such as this, regulations can be set for countries and regions and the services can implement them across the board. Services that aren’t compatible with a certain country yet will not be able to offer that particular service to their clients in that country. HIPAA can be enforced this way. “NATO level-3 marked Restricted” security policies can be enforced this way. Creating regulations on the meta level and having them implemented on a country/state level in the respective services does extract a wealth of information that shouldn’t be hidden or “reinvented” in a single application but should be accessible to all applications.

### Customization

Being able to support custom interfaces based on user preference or responding to the particular needs of diverse organizations is also important. The HIE and the application set the degree to which customization is possible. The modular nature of the HIE approach, allows, for example, one hospital to subscribe to service A while another hospital subscribes to service B because, though each service is very similar, it offers distinct differences that are valuable to the end user. In this case, the hospitals only need to worry about finding the right service. For further customization, the user experience might be different based on what country the user is in. Some countries might have stricter rules regarding the availability of information or functionality contained on the page. Another type of customization is the visual one. One provider might want to have his interface match the color scheme / logo / etc, of his existing internal applications. Another might want pagination of records while pagination is turned off by default. It is at the discretion of the e-health vendor to what degree the application can be customized but it is a highly regarded feature and vendors will be more competitive if it is easier for end-users to control the nuts and bolts of the application they are subscribing to.

### Sharing

A centralized approach to sharing data makes life much easier for everyone involved in creating an HIE platform that can grow. The main point of view going forward is the need for a patient-centric system. This is a system where the patient is in charge of her own medical data and is able to electronically share any one of her records with doctors, providers and other organization entities associated with the system. The introduction of MS HealthVault, Google Health, Revolution Health and WebMD are example of regular people managing a wide variety of their health related data.

A patient-centric approach is only part of the solution. For a patient-centric system to work we are assuming that the patient enters in valid data. Valid data is defined as correct information and accurate diagnoses. We are also assuming that the patient has an account with one of the RHIOs and that she has marked her important records as records that are available in the case of an emergency when someone needs access to them.

The patient-centric model needs to merge with the hospital model where they can both co-exist. A hospital should be able to create a record for a patient that is not yet in the system and another hospital should be able to access that record without the patient first allowing the transaction. Patient data should be secure but also transparent. The role of the HIE will be to secure the data and share data only with trusted entities using the patient-centric model more as a social network. This entails creating relationships, sharing items created by the patient, making appointments with the doctors and receiving statuses and notifications.

### Opening up old silos

The tail end of all this is how to deal with legacy systems. You would think it should come before anything else mentioned above. The problem with this is that it would never work and we would wait an eternity for everyone to get onboard. We have to start with the “if you build it they will come” attitude. This last process will be slow but a necessary one. Hospitals need help to migrate their existing data out of their silos and onto HIEs.

## Conclusion

Building an HIE is not trivial and there are technical and political hurdles to overcome. Moving away from the old paradigm, where hospitals each have their own silo of patient data, to a new paradigm with global medical data aggregators that everyone can tap into is a radical change and not one that will happen over night. However, the advantages of a centralized medical system such as this are too numerous to ignore. Countries could do data mining on an entire population. Outbreaks of diseases could be tracked. A patient could get exactly the right treatment anywhere in the world. The rate of misdiagnoses would decrease. Hospitals, insurance companies, not to mention governments, would save vast amounts of money on administrative overhead and IT costs. The next decade will show a profound change in how we interface with our health and we believe HIEs will play a major role in what is to come.