
Regional Health Information Organizations: State of the Industry

Texas Institute for Health Policy Research Shared Vision Project

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FINAL REPORT

Prepared by



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Section I: Executive Summary

Background

The idea of connecting healthcare information through a community-based network has been discussed since the mid-1990s. Few, if any, of the Community Health Information Networks (CHIN) started then survive today, largely due to the lack of a sustainable business model. However, the Regional Health Information Organization (RHIO), the 21st century successor to CHINs, is being recognized today as a principle component in the effort to utilize health information technology to help improve efficiency, safety, and effectiveness in health care delivery.

National studies in the United States have produced evidence that substantial savings could be achieved if providers, payers, patients, and other health care stakeholders had access to a network of health information.¹ The savings are driven in large part through safer health care delivery (i.e. reducing errors and the care associated with fixing the errors), elimination of redundant and conflicting treatments, streamlining administrative processes, and proactive patient management.

President Bush launched the role of the National Coordinator for Health Information Technology (ONCHIT) and named Dr. David Brailer to the job in May 2004. ONCHIT has begun planning for how the nation will connect providers, patients, payers, and others in a national network. In addition to the attention within the Executive branch, there are several legislative initiatives proposed in Congress with bipartisan support with the objective of promoting HIT as a means to transform healthcare delivery. Clearly, the federal government is serious about pursuing HIT as a means to transform healthcare delivery.

There are at least 24 states, in 2005, that have one or more bills regarding HIT pending in or passed by the state legislature. Across the United States there are more than 200 documented regionally-based health information technology efforts underway, (The rapid proliferation of these efforts makes an exact count difficult to pin down.) There are some geographic subdivisions within Texas that are pursuing, or considering establishment of a RHIO although there is no statewide approach to the initiatives.

The Texas Institute for Health Policy Research (Institute) through its Shared Vision for Health Care in Texas Project is seeking to identify best practices for the development of a RHIO. The Information Technology Workgroup of the Institute engaged Healthlink, an IBM company, to research the subject and to survey the RHIO efforts within and outside Texas in preparation of this report.

For the purposes of this project, we have defined a Regional Health Information Organization (RHIO) to be:

an independent entity that provides and supports data, communications, and other technology capabilities that facilitate multiple healthcare entities -- insurance payers, government-sponsored payers, employers, physicians, institutional providers, and patients -- within a specified geographic area to share or exchange and communicate client, clinical, and payment information.

The objectives of a RHIO are to support and improve healthcare quality and outcomes and streamline payment processes within the geographic subdivision. These objectives are achieved by capturing and sharing information needed to avoid duplicate treatments and tests, reduce medication and treatment errors, reduce administrative and direct costs of care and payment, and facilitate disease management programs.

The impetus for forming a RHIO can come from any number of areas. In some states, the state government is involved in the initiation. Many RHIOs, however, have been started by consortia of providers, payers and/or professional organizations (e.g., state hospital associations, state medical associations). Quality Improvement Organizations (QIO) are often among the first participants in the startup of a RHIO.

Summary of Findings

Governance. Most RHIOs are creating a legal corporate structure to act as the operational entity of the network. Some of the corporations pursue a not-for-profit status under the Internal Revenue Service regulations. A few states have passed laws that create an organization specified in the law as a quasi-government entity, but not as a state agency.

Regardless of the origin of the corporation, all of the organizations are created as independent of other larger private organizations with boards that broadly represent the stakeholders in a local health care market. Those RHIOs making progress are utilizing this approach to reassure competitive participants, build trust, and recruit additional participants.

Financing. Whether it is planning funds, start-up capital, or a sustainable business model for funding, nearly all regional network initiatives have a need for solutions to funding. Funds are needed to pay for the planning effort, legal fees, and organization costs at the outset. Initial capital is needed to acquire the technology infrastructure and servers, to pay staff salaries, and to sustain working capital for operations. Most regional initiatives sought grants to provide initial planning funds. Finally, a business model is needed that will generate a flow of funds needed

¹ September 2005 RAND study, February 2005 GAO study

to build and maintain a viable regional network. The most common business model deployed or planned is a subscription model in which each participant pays a flat fee per period to connect and share data. A careful analysis of who uses and who benefits from using the information on the network may drive who pays and how much is paid by subscribers.

Privacy and Security. RHIOs are subject to the same requirements to protect the privacy of personal health information under the HIPAA regulations as any other information system or network containing patient's health information. Systems and procedures to protect the privacy and security of patient health records must be created. In addition, patient communication and education, consent forms, privacy notices, and opt-out provisions must be part of the RHIO operating procedures.

Technology Architecture. Two broad technical models are emerging for RHIO development – a central data repository model and a “distributed” data model. The RHIOs studied in this project all utilize, or plan to utilize, one of these technical models. Each has advantages and disadvantages when it comes to deployment and maintenance. It is expected that one model will emerge as the preferred model over time, but until then both models are finding application in the RHIO venue. There is a need as the national model for healthcare IT data exchange forms to harmonize the regional model with the national model of data exchange.

Regardless of the underlying data storage method, most RHIOs will utilize a “portal” to access and view the data. The portal is an Internet browser-based presentation protocol that supports a “low-technology” access approach and presentation similar to a web page.

Conclusions

Characteristics of Successful RHIOs. RHIO efforts across the nation are meeting with growing success. There are some common characteristics among these efforts that should be noted as keys to success.

- **Broad-based, Independent, and Collaborative.** Oversight of the RHIO effort through a board, or organizing committee, is provided by a broad-based, collaborative group representative of the stakeholders in the regional healthcare market.
- **Focused on Benefits.** The focus of the collaborative RHIO development initiative is on benefits to the community in general and to the patient in particular.
- **Benefits Drive Technology.** The organizers should seek agreement on the benefits desired and how to realize them, and then find the technology platform best suited to deliver them.
- **Business Model Based on Subscriptions.** As the typical RHIO is considered an independent business entity, it must develop a viable business model to sustain itself. The predominant business model deployed by RHIOs is a subscription model.
- **Need for Start-up Funds.** Regardless of business model, every RHIO needs funding for planning, start-up, and working capital. The primary source is grants.

Common Challenges for RHIOs. Among the RHIO programs studied, notwithstanding the relative success or failure to this point, there are a set of challenges, or barriers, that have been experienced.

- **Lack of Standards.** Interoperability standards are needed, but in the short term, these do not exist. Meanwhile, there are ways to exchange health information, albeit less seamlessly.
- **Funding.** Every organization needs start-up funding and a sustainable business model for ongoing operations.
- **Technology Blueprint.** RHIOs are challenged by the need to develop a viable technical architecture. In addition, the low adoption level of EHR systems in physician offices makes for a challenging information exchange environment.
- **Politics.** Working with stakeholders representing disparate interests, unequal resources, and divergent competitive pressures requires high “political” skills. Finding or creating a neutral entity to sponsor the RHIO is important.
- **Competitive Differences.** In some geographic subdivisions there are multiple competitors of some strength. Overcoming the competitive forces and building trust among the various stakeholders in the regional market is difficult but necessary.

Critical Success Factors for an Individual RHIO. The critical success factors we identified for an individual RHIO are:

- **Stakeholder buy-in**
- **Ownership and governance by a neutral entity**
- **Protection of privacy and security of data**
- **Funding, both start-up and ongoing**
- **An implementation plan that fits the needs of the market**
- **Accurately identifying patients and linking information**

Functionality Generations and RHIO Evolution. The estimated adoption rate of EHRs by physicians and hospitals is 25% or less. Any RHIO that requires that a physician office or hospital have a fully functional EHR to participate will be waiting a while to get most of them connected. It is preferable to offer a staged functionality approach that capitalizes on existing data sources (e.g., PBMs, claims data) to drive benefits for the community. This approach offers opportunity for participants to realize benefits while making investments and process changes at a pace that meets individual practice needs.

Funding Model. Analysis of funding options shows that some combination of subscription fees and pay-for-use charges is a viable funding model. A study of RHIO efforts underway today indicates that an equitable model can be structured around the benefits accruing to participants from use of the RHIO. This is based on the premise that a participant’s fee would be less than,

or equal to, the value realized through savings created by using the data and processes resident in the RHIO's IT-enabled functions.

Recommendations

Based upon the findings and conclusions in this report, the following recommendations are offered:

- 1. RHIO development should not wait until Electronic Health Record (EHR) systems are adopted in all provider settings.**
- 2. RHIO development should not wait until interoperability standards are defined and adopted.**
- 3. The statewide healthcare advisory board (e.g., SHCC) should take the lead in creating an environment, specifying governance guidelines, identifying funding sources, encouraging EHR adoption, and assisting in negotiating purchase agreements.**
- 4. The state should encourage the creation of advisory board or committees to set state-specific guidelines and to help interpret national standards.**
- 5. Use the Institute's reputation as an "honest broker" to convene discussions with individual stakeholders who are interested in Texas-based RHIO development.**
- 6. Multiple RHIOs be deployed within Texas as opposed to a single statewide RHIO.**
- 7. The state should act to facilitate the connection of individual RHIOs within the state. Facilitation may take the form of standard setting, grant and funding assistance, regulations, and promoting a collaborative environment.**
- 8. Create a forum within which the various RHIO initiatives within Texas can exchange ideas, successes, lessons learned, and other valuable information.**

Section II: Background

The concept of community-based connected healthcare information is not new. In the early 1990s, Community Health Information Networks (CHINs) were started in many areas around the country. Only a few of these efforts survive to this day, however, with most failing due to lack of a sustainable business model. Times have changed, however, and Regional Health Information Organizations (RHIOs) are a principle component in the renewed focus on utilizing health information technology to help drive improved efficiency and effectiveness in healthcare delivery.

With recent reports from the Center for Information Technology Leadership (CITL) and information gathered by the Office of the National Coordinator for Health Information Technology (ONCHIT), there is evidence that substantial savings could be achieved if providers, payers, patients and others had access to a network of health information. The numbers are in the tens of billions annually. While pundits may argue over the validity of a \$78 billion dollar annual savings or a number half that size – the benefits are clear. These cost savings are driven in large part through safer health care delivery (i.e., reducing errors and the care associated with fixing those errors), elimination of redundant and conflicting tests and therapies, streamlining of administrative processes and proactive patient management (i.e., preventing healthcare crises in chronically ill patients and thereby preventing ED visits and hospitalizations.)

The vision is to leverage information technology to help create a safer and more efficient healthcare delivery system. And while this is certainly the right thing to do from a human perspective, it is also a vitally important thing to achieve to keep the United States competitive in the global economy. Healthcare costs in this country are approaching 16% of GDP – nearly double that of the European Union – and are projected to continue to rise. The single highest expense for a car produced in Detroit is not steel but healthcare. The federal government realizes that this rate of healthcare expenditure is unsustainable – particularly since there is no evidence that our health outcomes are any better than countries that spend far less.

The President has identified healthcare as one of his top agenda items. He mentioned the need to transform healthcare delivery through the use of information technology in each of his last two State of the Union addresses. He launched the role of the National Coordinator for Health Information Technology in April, 2004 and named Dr. David Brailer to the job in May, 2004. In July, 2004 Secretary of Health and Human Services (HHS), Tommy Thompson announced the “Decade of Health Information Technology” as critical to transforming our healthcare system. Simultaneously, Dr. Brailer unveiled the ONCHIT’s “Framework for Strategic Action” which laid

out a high level plan on how the healthcare industry will move from where it is to where it needs to be in 10 years.

The “Framework for Strategic Action” delineated four goals. Each goal has three strategies. The goals and strategies in the Framework are:

1. Inform clinical practice
 - a. Provide incentives for EHR adoption
 - b. Reduce risk of EHR investment
 - c. Promote EHR diffusion in rural and underserved areas
2. Interconnect clinicians
 - a. Foster regional collaborations
 - b. Develop a national health information network
 - c. Coordinate federal health information systems
3. Personalize care
 - a. Encourage use of Personal Health Records (PHRs)
 - b. Enhance informed consumer choice
 - c. Promote use of telehealth systems
4. Improve population health
 - a. Unify public health surveillance architectures
 - b. Streamline quality and health status monitoring
 - c. Accelerate research and dissemination of evidence

Running through the entire framework is the need to IT-enable healthcare delivery and connect providers, payers, patients and others in a national network. So, unlike the CHINS of 10-15 years ago, there is intense federal attention and energy being applied to the creation of a national network, which it is recognized will be pieced together by interconnecting Regional Health Information Organizations (RHIOs). At present, more than 180 different RHIO initiatives are in various stages of development around the country – with most in the early formative stage.

While the interest of the federal government is certainly feeding the momentum around RHIOs, other factors are contributing to the likelihood that they just might happen. Most significant of these is the existence of the Internet. When CHINs were attempted in the last decade, the mechanism to connect providers needed to be created – which added significantly to the cost and complexity. With ubiquitous access to the public Internet, nearly anyone, anywhere in the country can “get on line” and tap in to an information source.

Creation of a National Health Information Network (NHIN) and the RHIOs that will support it, still face many challenges. The discussion below addresses these challenges and proposes approaches that may help ensure success.

Requirements for success at a national level

Early indications from the ONCHIT have listed a number of areas of focus critical to successful deployment of a National Health Information Network. These areas are:

- Standards – interoperability standards and policies, including direction from the federal government and leadership from the private sector;
- Governance – appropriate governance structures that protect the public's interest, particularly the interchange between the public and private sectors;
- Privacy – ensuring that patients have control over their information and that the information is protected from misuse;
- Regionalization – allowing different areas of the country to craft a network that meets their needs, within the overall framework of the national network;
- Financing – both public and private investment is needed, and a sustainable business model is essential;
- Architecture – utilize the public Internet in a way that leverages this existing infrastructure but ensures protection of sensitive health information;
- Regulation – avoiding unfunded mandates and allowing relief from laws that prevent the diffusion of information technology between hospitals and physicians (e.g., Stark).

On June 3, 2005, the ONCHIT followed these general observations with a summary of the 512 responses received to its Request for Information regarding how to build and deploy a National Health Information Network (NHIN). As a direct result of the evaluation of these RFI responses, Health and Human Services Secretary Michael Leavitt unveiled the American Health Information Community (AHIC) on June 6, 2005. The AHIC will be chaired by Sec. Leavitt and will include up to 17 commissioners representing a broad spectrum of the healthcare community from consumers to clinicians to employers to payers. The role of the AHIC will be to facilitate collaboration in the definition and adoption of interoperability standards and to advise the federal government on issues of healthcare IT policy.²

The day following the AHIC announcement, National Coordinator for HIT Dr. David Brailer announced the release of four RFPs aimed at addressing the most critical issues required for attaining a NHIN, as identified in the analysis of the RFI responses. These RFPs are:

- **Standards harmonization** – a single contract will be awarded to develop, test and evaluate a feasible prototype standards harmonization process;
- **Certification** – a single contract will be awarded to evaluate the feasibility and effectiveness of a compliance certification and inspection process for EHR applications;
- **Prototypes for an Internet-based NHIN architecture** – up to six contracts will be awarded to develop non-proprietary, real-world functioning NHIN architectures utilizing the Internet as the communication pipe;
- **Privacy and security for health data exchange** – a single contract to evaluate the myriad of federal, state and local privacy regulations and identify challenges and possible solutions for the secure and private transmission of health information.

² Sec. Leavitt appointed 16 commissioners to the AHIC on September 13, 2005 (www.hhs.gov/news)

The RFP responses were due in mid-July 2005. It is expected the contracts will be awarded between September 2005 and February 2006. Results from each of the contracts are expected within 12 months of contract award. Clearly, the federal government is serious about pursuing HIT as a means to transform healthcare delivery. And at the heart of the federal government's efforts is the drive toward the identification and adoption of interoperability standards. What is clearly absent from these new initiatives is the issue of how the development of a NHIN will be funded.

Many have argued that the issue of financial incentives (offered by either the government or other payers) for participation in HIT initiatives is the most critical determinant for whether or not the NHIN will ever become a reality. Modest financial incentives have been included in recent legislation introduced in Congress, some private payer pay-for-performance programs, and CMS pilot programs mandated by the Medicare Modernization Act of 2003. And while federal (and state and private) incentives are certainly important, we would argue that without HIT interoperability standards, incentives alone will not be the single most important factor for the success of the NHIN. We came to this conclusion through the following analysis.

Assuming the two variables – incentives for participation in HIT initiatives and interoperability standards – can run the gamut from “none” to “all”, we looked at the possible combinations, which resulted in four scenarios.

Scenario 1 – little or no incentives for HIT participation and limited or no interoperability standards

This, in our opinion, is today's environment and not sustainable. The high cost of trying to connect all providers through “brute force” interfacing with no commonality of vocabulary and only minimal transaction standards coupled with no incentives to support these costs is a fatal combination. There may be health information networks deployed in this environment, but the scope would be limited to proprietary, or closed, entities sharing data through a common software system. The financial model for this system would be based upon the internal network factors.

Scenario 2 – incentives for HIT participation with limited or no interoperability standards

While the effort to connect providers is the same as the prior scenario – complex, time consuming and fairly fraught with errors – the availability of incentive funds from government or private sources will at least encourage some stakeholders to make the attempt. The concentration will be on acquiring the technology solutions that would qualify for incentives, but in the absence of interoperability standards, sharing of data would be limited to interfaces with compatible systems. This will result in “islands of interchange” where those

willing to take the plunge will try and make it work, while those less technically savvy, or simply unconvinced that connected providers will make a difference in healthcare delivery, will not make the effort. Ultimately, some providers will be connected but probably not enough to create the critical mass to make a significant difference in the efficiency and effectiveness of healthcare delivery.

Scenario 3 – incentives for HIT participation and interoperability standards are present

Many would think that this is the ideal confluence of factors to ensure success of an NHIN and transform health care. We would agree to a point. The correct monetary incentives are provided and the requisite standards are in place to facilitate interoperability. While ultimately success may be achievable, we believe that the availability of “easy money” from government, or another source, will cause stakeholders to jump right to the decisions of technical architecture, applications and implementation – bypassing the necessary building of stakeholder buy-in and mutual recognition of benefits received for effort expended through from network participation. Early “success” will, over time, deteriorate because the broad-based collaboration and community benefits focus will not be the strong foundation upon which the network is built. It will be important to guard against that trap.

This scenario, we believe, will result in successfully transforming health care so long as the necessary work of bringing together all the parties, gaining consensus on the benefits, and moving forward in a collaborative manner. The perfect network may be built with the capability to connect all providers, but all must also understand why they should participate. There are examples of individual RHIOs that were well funded at start up, built an infrastructure and are now needing to go back and work to build the trust, support and buy-in from the providers, employers, consumers, payers and other stakeholders in their community.

Scenario 4 – Little or no incentives for HIT participation with interoperability standards

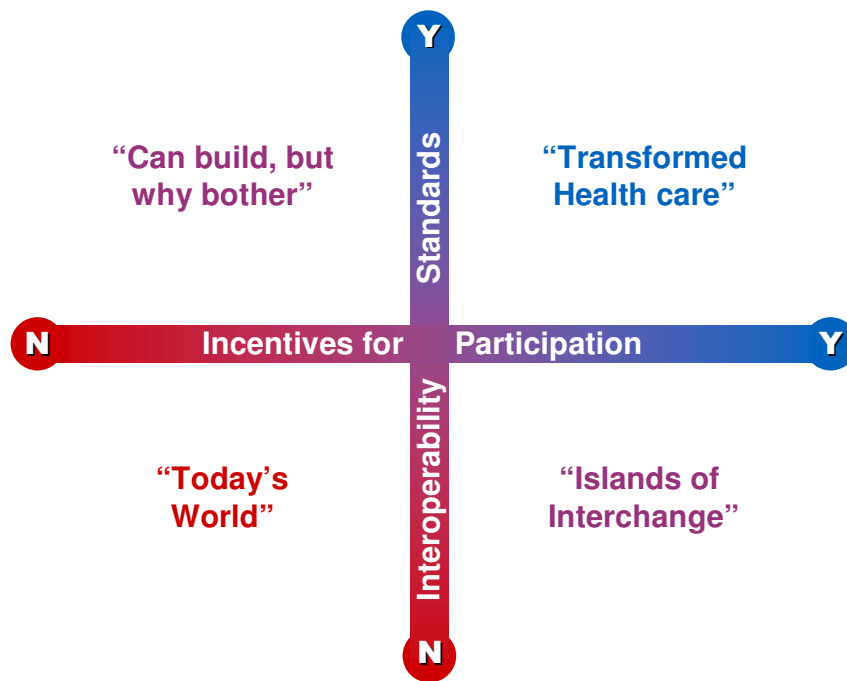
This scenario assumes that interoperability standards will be developed and matured over time. It also assumes that little or no government and/or private sector incentives are available to help defray costs and help support investments in technology. A lack of extra incentives that are based upon meeting health quality outcomes measures will tend to focus the need for sharing data and the benefits of it rather than acquisition of technology to qualify for incentives. This could be described as “You can build it, but why bother?” The answer must rely on understanding the benefits of sharing the data.

This scenario also relies on the stakeholders coming together, defining a common purpose, delineating the benefits each will accrue from the network and agreeing on the level of

financial commitment each is willing to make to realize those benefits. It may take longer to get the network built, but it will be rooted in a mutual understanding of value.

While the implementation of an NHIN is much larger than any implementation at even the largest IDN, the principles of a successful IT-related implementation still apply. That is why we believe if the key stakeholders are “bought in” to the benefits of the network, they will find a way to make it financially viable, regardless of the level of available outside funding or incentives. Without interoperability standards, however, the economic model just doesn’t work, since the level of technical effort (as stated previously) is so high and will yield uncertain results.

The graphic below illustrates these four scenarios.



Federal government attention on interoperability standards

In summary, the intense attention by the federal government on driving the creation and adoption of interoperability standards is well placed. This is certainly the focus of the recently created AHIC. While some government funding will likely be required to jump start efforts

around the country³, in the long run, no one will be successful at “connecting providers” without the backbone of interoperability standards.

Overview of State Legislative Activities

There are a number of states whose legislatures are considering or have approved bills in support of health information technology. At the current time, at least 24 states have one or more bills pending in or passed by the state legislature. The bills are wide ranging in scope and funding. Some bills simply endorse the use of health information technology for improvement of health care. Other states are proposing modest funding for studies of the feasibility of regional networks and creating study commissions. A few states, such as Delaware, have created independent boards or commissions to organize a RHIO within the state. Appendix C is an overview of the state legislative activity including the status at this writing of the bill.

Recap of RHIO Activities around the Country

There are more than 200 documented regionally-based health information technology efforts underway across the United States. At least one RHIO, or RHIO-like, effort is underway or planned in 42 states. These HIT activities are typically sponsored by providers, business coalitions, health plans, or government-related entities in the locale of the RHIO. It seems as if nearly every day a new effort is being conceived and planning begun.

It is important to understand that every one of these HIT efforts does not rise to the level of the definition of a RHIO used in this research. Some efforts represent a subset of the health care stakeholders, or functions, within its service area. In other words, the exchange of health care information is being conducted among a specific group for a fairly narrow purpose. An example of such an effort would be the exchange of patient immunization data between the county health department and local emergency rooms. There are other examples of limited connectivity and data exchange that while bringing significant value to its constituents, do not fully meet the RHIO definition, and we have designated it as “RHIO-Lite” in contrast to the full definition.

Appendix D is an inventory of the RHIO and “RHIO-Lite” efforts across the United States. On a cautionary note, there is such a high number of new RHIOs beginning to organize around the country that a static listing is almost always out of date upon its distribution. The listing in Appendix D is current through the end of June, 2005.

³ The infusion of some federal funding is strongly recommended by the September 2005 RAND study.

Engagement Context

RHIO Focus

Texas has some geographic subdivisions and organizations that are pursuing, or considering, development of a Regional Health Information Organization (RHIO). For the purposes of this project, we have defined a Regional Health Information Organization (RHIO) to be:

an independent entity that provides and supports data, communications, and other technology capabilities that facilitate multiple healthcare entities -- insurance payers, government-sponsored payers, employers, physicians, institutional providers, and patients -- within a specified geographic area to share or exchange and communicate client, clinical, and payment information.

A RHIO is often organized, or sponsored, by one or more government, or government-affiliated, organizations within a geographic subdivision. The objectives of a RHIO are to support and improve healthcare quality and outcomes and streamline payment processes within the geographic subdivision. These objectives are achieved by capturing and sharing information needed to avoid duplicate treatments and tests, reduce medication and treatment errors, reduce administrative and direct costs of care and payment, and facilitate disease management programs.

Shared Vision for Health Care in Texas

The Texas Institute for Health Policy Research (TIHPR) is creating an opportunity for the strategic transformation of health care through its Shared Vision for Health Care in Texas Project (SVP). The statewide collaborative project brings stakeholders together to provide leadership in developing innovative products, ideas, and demonstration projects to improve the state's access, effectiveness, and efficiency of health care. SVP workgroups are focused in six areas: workforce, health care delivery, information technology, community/public health, finance, and rural health.

The information technology workgroup is identifying best practices for the development and implementation of Regional Health Information Organizations (RHIO). Although Texas has communities and organizations considering the establishment of a regional health information organization, there is no statewide approach to the initiative. In an effort to learn the status of local and/or regional initiatives within Texas and to help formulate a policy and approach for a statewide effort, the Institute desires information from the geographic subdivisions within (and outside) Texas regarding plans, successes, lessons learned, structure, and funding model.

There is presently no state-wide approach that we are aware of to track the success of various efforts, communicate lessons learned, and coordinate these efforts. Some states such as Kentucky, Indiana, Wyoming, Delaware, Massachusetts, and Rhode Island are pursuing state-wide efforts at some level.

Information Access and Effective Healthcare Delivery

Health care delivery is a set of information-intensive processes. Currently, nearly all data is shared by telephone, fax, mail, and written or spoken word. It is estimated by CITL and recently in the Journal of the American Medical Association (JAMA) that needed patient data is unavailable in more than 80% of patient visits in the outpatient setting. Healthcare information exchange via a RHIO is designed to improve the way data is shared among providers, utilized for improving and measuring care quality, collected as content for research, and used for treatment of chronic disease.

Utilizing shared, standardized patient clinical data such as test results, medication records, problem lists, immunization records, and medical history, the quality and cost of clinical care can be improved. In addition to reducing the number of duplicate tests and treatments, “real time” review of patient clinical information can also reduce errors. By providing access to treatment records over the RHIO, follow-up treatment can be provided in a more appropriate venue rather than requiring patients to return to high-cost venues such as an emergency room for care.

In rural locations, primary care physicians can utilize shared information to be kept informed of referred patients’ treatment. As a result, the physician is better prepared to continue the treatment when the patient returns to his local primary care physician. Conversely, shared information regarding treatments, problem lists, and medications can be utilized by specialists when accepting referred patients.

Aggregated, standardized clinical data can also be utilized for detecting and tracking potential bio-terrorism and other epidemiological events within a covered population. When connected to other RHIOs, more complete epidemiological studies can be developed and tracked.

Patient access to ones own clinical information will empower the healthcare consumer to take a more active role in his or her health care.

The workgroup engaged Healthlink to assist in gathering information about the state of the industry in health information technology specifically related to RHIOs. Concurrently, Healthlink engaged with the Greater Houston Partnership to assist in the investigation of the feasibility of creating a process for sharing health information to support care of the uninsured and homeless population of the Houston/Harris County area. Both engagements followed a similar approach to the information gathering and the formulation of conclusions.

Section III: Approach

Our approach to gathering information about the present state of Regional Health Information Organizations included a literature search and telephone (or in person) interviews with stakeholders and others involved in RHIO development inside and outside of Texas. The IT Workgroup members and TIHPR assisted in identifying and making these individuals available. Other interviews were sought and conducted with other individuals representing emerging RHIO efforts across the country as they became known. Appendix A is a listing of the emerging RHIO efforts across the country that were formally included in this research.

The interviews were comprehensive and designed to provide a means to learn the process and success factors of each RHIO or planned RHIO. An interview guide was created to provide a consistent interview assuring that each interviewee was asked to provide the pertinent information. Appendix B provides a copy of the interview guide and a listing of the interviews.

The interviews included discussion of key factors in the RHIO including:

- Initiation and planning
- Governance
- Funding and funding sources
- Deployment and tactical planning
- Stakeholder involvement and buy-in
- Critical success factors, and
- Lessons learned.

The information gathered from the interviews was augmented with other information gathered through research over the Internet, conference attendance, and other supplemental sources. The sources and content of information on the subject of RHIOs in general, as well as specific state and federal initiatives in support of HIT and the National Health Information Network are extensive. Appendix E is a representative listing of other sources of information utilized in this research.

Section IV: Assumptions

In the process of evaluating the various drivers for RHIO development, several assumptions were made. First, while the ultimate goal of an IT-enabled, connected healthcare delivery system seems to be fully interoperable Electronic Health Records (EHR) capability (i.e., the ability for any EHR native to a particular provider to obtain and display patient information from any number of disparate, distant and dissimilar information sources to create a comprehensive view of a person's health history and status), we assumed that for RHIOs to form and begin to drive value not all providers in the RHIO needed access to EHR capability.

Second, while clearly defined, harmonized and widely adopted interoperability standards are not only desirable but necessary, we assumed that these standards would not exist for the near term (12-24 months) and that emerging RHIOs would need to "just do it" without them.

Since the United States is in the early stages of RHIO development with many different RHIO initiatives under way, RHIOs will take on many different forms and architectures. Some will have to be re-architected and reconstructed as NHIN and other requirements become better defined. Stated differently, many RHIOs will be implemented before clearly defined standards have been identified and an over-arching NHIN architecture specified. The absence of these critical elements, however, should not stymie RHIO development. In fact, other drivers may exert a significant influence on HIT adoption and RHIO success.

Influence of Pay for Performance on EHR Adoption

The emergence of pay-for-performance (P4P) reimbursement programs, in both federal and private pay environments, may hold the greatest promise for wide-spread adoption of HIT – particularly in the physician office. Pay-for-performance is a relatively new reimbursement mechanism in healthcare that provides incentive-based payments to providers based on their conformance to evidence-based practice standards and the outcomes of their patients. It is an attempt to structure healthcare payments according to value received and holds the promise of being a more rational approach to control healthcare costs than simply setting price or access limits.

Many P4P programs require that physicians submit clinical data so that it can be determined if they achieved the outcome targets established by the program. (Some programs simply use claims data – an easier but far less "accurate" source of information on clinical outcomes.) Some P4P programs also offer additional incentives if physicians use an EHR. Physicians who participate in a P4P program without an EHR must spend the resources to manually abstract

the required clinical data for reporting. They also do not benefit from the automatically generated alerts and reminders that help them achieve their quality targets. P4P may well be the single biggest motivator physicians have for adopting an EHR.

Additionally, in the absence of good clinical information to determine what is “good quality” (which is what P4P aims to reward), payers are simply using cost as a differentiator for “value” – and the lowest cost provider “wins” – which is not a good model for sustaining high quality care. As quality becomes a more significant factor in reimbursement, the need for good clinical data grows and the need for IT-enabled healthcare delivery to capture that data as an automatic by-product of care also grows. The following table illustrates the relationship between different payment mechanisms and the need for clinical systems – EHRs.

	Admissions	Days	Procedures	Importance Of Quality	Financial info	Clinical info
Reimbursement						
FFS	+	+	+	0/-	Low	0
Per diem	+	+	-	0/-	Low	0
DRGs / case rates	+	-	-	0	High	Medium
Capitation	-	-	-	0	High	Low
P4P	+	+/-	+/-	+	High	High

Under traditional reimbursement systems there was no incentive to undertake the potentially costly and complex process of implementing an EHR. There was little or no need for robust information – especially clinical information – in order to be paid. Quality of care did not factor into any reimbursement calculation. In fact, the financial incentives under fee-for-service, per diems and even case rates are perversely skewed toward poorer quality – since additional reimbursement is possible through services delivered to correct medical errors. In P4P programs, however, providers are incited to be proactive in patient management to maintain good health status and avoid crisis-driven care that is inevitably costly.

Accelerated rates of EHR adoption are also good for RHIOs. The faster physicians and other providers are more fully able to leverage the benefits of a RHIO, the more benefits will be available. So in one sense, P4P programs are a catalyst for RHIO success.



As this diagram illustrates:

- P4P programs spur adoption of EHR functionality by providers;
- The more data and health care functions that are IT-enabled in the provider setting makes more data available to participants in the RHIO which makes the RHIO more valuable to all participants, and therefore more successful;
- The more successful the RHIO, the more (de-identified) data the RHIO has to use in quality and outcomes research, which can help identify improved standards of care;
- The more we understand about appropriate practice standards and associated expected outcomes, the better P4P programs can differentiate good quality care, and reimburse accordingly.

So, it seems from this “virtuous cycle” that P4P programs can certainly accelerate and contribute to the success of RHIOs. If P4P programs also start offering incentives for participation in RHIOs, the relationship becomes even tighter.

Section V: Summary of Findings

Based upon the interviews, literature research, Internet research, and other sources of information, we developed findings summarized into four categories critical to the successful RHIO. These four categories are:

- Governance,
- Financing,
- Privacy and security, and
- Technology architecture.

A successful RHIO should develop and execute plans to address each of these planning and execution components. While an organization may emphasize these and other organization characteristics in varied ways, our findings show commonality of these characteristics, or components, across the population of successful regional initiatives.

Governance

Governance refers to the corporate and management structures, processes, and organizational protocols employed within an organization to accomplish its mission, strategies, and goals. It is described in an organization's legal corporate or operating agreement, its by-laws, and other organizational documentation. It is carried out through its board, or management, structure, and various operating committees.

Most RHIOs are creating a legal corporate structure to act as the operational entity of the network. Some have utilized the Limited Liability Company (LLC) as the platform for incorporation due to the more simplified organization documents required. However, it is also common to use a standard legal incorporation ("C" corporation) as the method to charter the legal entity. In any case, legal representation is advised in order to create the necessary corporate entity most appropriate for operation, financing, and legal protection.

Some of the corporations pursue a not-for-profit status under the Internal Revenue Service regulations known as Section 501(c)(3).

A few states have passed laws that create an organization as a quasi-government entity, but not as a state agency. In some cases, these laws specify the governance plan for the organization and establish it by statute. The board membership is specified within the law as well as its frequency of meeting, committee structure, and reporting requirements. Although the statutory board may acquire meeting space and administrative support from a state department or agency, it is independent of that department according to law. Delaware is one state in which the state statute sets the governance structure and board process.

Regardless of the origin of the corporation, or board, all of the organizations are created as independent of other larger private organizations. That is, while ownership of the corporation may be shared among the constituents in the region, the corporation is designated as an independent organization. Careful attention is given to defining the board of directors in a way that broadly represents the stakeholders in a local health care market respecting the level of investment, or ownership, by each. Those RHIOs making progress are utilizing this approach to reassure competitive participants, build trust, and recruit additional participants.

At the working level, RHIO boards are creating committees to begin detailed planning and work in a number of areas. Typical working policy committees include areas such as finance, technology, privacy and security, legal, and marketing and communication. Members of these committees are drawn from the various stakeholder organizations within the regional or market area.

Financing

There is one consistent theme running through the information gathered from nearly every RHIO initiative across the country – the need for sources of funding. Whether it is planning funds, start-up capital, or a sustainable business model for funding, nearly all regional network initiatives have a need for solutions to funding. Funds are needed to pay for the planning effort, legal fees, and organization costs at the outset. Initial capital is needed to acquire the technology infrastructure and servers, to pay staff salaries, and to sustain working capital for operations. Finally, a business model is needed that will generate a flow of funds needed to build and maintain a viable regional network.

Most regional initiatives sought grants to provide initial planning funds. Grants came primarily from government sources. State health departments and federal sources such as the Agency for Healthcare Research and Quality (AHRQ) are the most frequent public sources of grants. Grants from private foundations such as Connecting Communities for Better Health (CCBH) also provide start-up grants for some network initiatives. Grants in the range of \$50,000 to \$100,000 are common for start-up funding from either public or private sources. The need to apply for grants, to gain approval from the source, and the number available compared to applicants, makes seeking grants an uncertain source of funding for the long term.

At least one regional health information initiative received a grant from a vendor company of technical assistance and equipment to establish a technical infrastructure prototype.

Grants were designated to address research or develop functionality not presently available. One such grant, a \$5 million AHRQ grant received by the Rhode Island Quality Institute, is earmarked for developing a master patient identification functionality. Grants of this type are rare.

Key to the ongoing success of health information networks is the development of a sustainable business model that is capable of supporting the long term financing needs of the enterprise. Although few are presently fully deployed, the most common business model approach is a subscription model. Subscription means that each participant pays a flat fee per a time period to connect and share information. The amount paid is dependent on the classification of the subscriber, i.e. physician clinic, hospital, laboratory, etc., and the relative size of the subscriber within its class.

Another business model under consideration is a pay-per-use plan that would base payment upon the volume of inquiries made by each subscriber. This approach can also be blended with the subscriber model to create a hybrid model that can account for unusually high usage rates during a particular period. Both the pure pay-per-use and the hybrid model pose some contradictions since benefits accrue through the use of the information. It should be expected that user charges would encourage rather than discourage use.

It is generally agreed among the study participants that incentives for subscribing and using the capabilities of the network information sharing are needed. Incentives for early adoption as well as for use of the data to improve patient care are under consideration by emerging network initiatives. In general, one of the first priorities of an emerging RHIO needs to be the identification of benefits derived from RHIO use, the value of those benefits, and who receives that value. Subscription, transaction and other fees can then be more appropriately tied to the value beneficiaries.

It can be said that the CHIN efforts of the mid-1990 failed to some extent because of a failure to reach agreement on who should pay the cost of running the networks. Failure to reach agreement on a reasonable financing model could also doom today's RHIO initiatives to a similar fate. Among the RHIO efforts studied, the boards recognize that it is not reasonable to expect that health care providers will pay all the costs. Nor is it reasonable to expect that payers will pay all the costs. Finding an equitable funding model is a paramount requirement for long-term survival of RHIOs. Therefore, a careful analysis of who pays for and who benefits from using the information on the network may drive who pays and how much is paid by subscribers.

Privacy and Security

Any information system, or network, that contains or transmits patients' health information bears the obligation under HIPAA regulations to protect the privacy of that information. RHIOs are subject to the same requirements. Systems and procedures must be created as part of the RHIO to protect the privacy of patient health records. Other regulatory considerations beyond HIPAA can affect the planning and execution of the RHIO. In addition, patient communication, privacy notices, consent forms, and opt-out provisions must be part of the RHIO operating procedures.

There are other regulatory considerations when it comes to protecting privacy of information over the network within the RHIO. Because financial transactions including credit information, account numbers, insurance policy data, and perhaps, Social Security numbers will likely be part of the information in the database, privacy regulations governing financial transactions and information will also apply to RHIOs. A recently enacted law known as the “Children’s Online Privacy Protection Act (COPPA) designed to protect children from Internet “predators” must also be taken into consideration. COPPA relates to protecting the privacy of children on the Internet, and access by children to information via the Internet.

One developing RHIO in the Northeast found itself being sued by the American Civil Liberties Union (ACLU) for allegedly violating the privacy of patients. As a result, the RHIO governance plan now includes ACLU representation on its Board of Directors.

Consent forms, privacy notices, and opt-in/opt-out provisions must be developed. It is also important to develop a comprehensive communication program around informing patients and subscribers about the meaning of consent forms as well as the advantages and disadvantages of opting in or out. Clearly communicating the advantages of having one’s health information available to providers of care will help insure higher levels of participation by consumers. It is also important to maintain the trust of consumers through diligent protection from unauthorized disclosure of private health information.

There are often conflicting, or at least differing, regulations among states with regard to privacy protections. When a RHIO supports a multi-state, or jurisdictional, population, then it must comply with more than one set of laws. Obviously, it is necessary that the RHIO will adopt the most restrictive privacy and security policy dictated by its relevant jurisdictions’ law. However, it may be the policy of the RHIO to adopt a more restrictive privacy and security standard than is required by any individual jurisdiction. It is hoped that the outcome of the HHS Privacy contract award will help clarify these privacy issues.

Technology

Architecture

Two broad technical models are emerging for RHIO development – a central data repository model and a “distributed” data model. The RHIOs studied in this project all utilize, or plan to utilize, one of these technical models. Each has advantages and disadvantages when it comes to deployment and maintenance. It is expected that one model will emerge as the preferred model over time, but until then both models are finding application in the RHIO venue. There is a need as the national model for healthcare IT data exchange forms to harmonize the regional model with the national model of data exchange.

The centralized data repository model is being employed with some success. It is made more practical for some RHIOs by deploying under an Application Service Provider (ASP) model through a contract with a third party. This allows the data sharing to begin early in the process, but has the disadvantage in most cases of the data being stored in a third party data warehouse. This model also presents unique security and privacy concerns as well as raising data ownership and control questions.

The distributed, “peer-to-peer” data sharing model is one in which the data remains stored on servers at the source, or near-source, locations. Logic within the network’s data management protocol provides record locator services and tracks the location of data, as well as the latest version, for sharing through the RHIO. The record locator “points” to the location of the data and facilitates the retrieval of the data query.

Regardless of the underlying data storage method, most RHIOs will utilize a “portal” to access and view the data. The portal is an Internet browser-based presentation protocol that supports a “low-technology” access approach and presentation similar to a web page.

Linking Patient Information

A unique patient identifier is critical and perilous. Although linking patient data with a national identification method may be inevitable, it is not likely that a national identifier, whether voluntary or mandatory, will be agreed upon, created, and deployed any time soon. As a result, some type of probabilistic matching routine will be necessary. Agreement on the highest level of certainty is also required. Probabilistic matching will require a manual intervention by “someone” to resolve uncertain matches.

Standards

Interoperability standards, i.e. standards governing how independent information systems will seamlessly share information, both transactional and semantic, are required to keep down costs and to assure meaningful content. Standards are important because they make systems easy to use and lower costs by not requiring custom data sets and content.

Standards are eventually going to be agreed upon, but not in the short term, i.e. one to two years. One of the directives set for the Office of the National Coordinator for Health Information Technology (ONCHIT) is to develop interoperability standards for health information exchange. The Certification Commission for Healthcare Information Technology (CCHIT) was established to create a mechanism for certifying HIT products for interoperability that will reduce risk of HIT investments by purchasers. Subsequently, HHS issued a RFP for a process to certify product compliance with interoperability and functionality standards.

RHIOs and Technology Evolution

Technology to support RHIOs will follow a similar evolutionary track as the general world of computer, network, and Internet technology. It is important to utilize proven technologies, but certainly not a requirement to do so. More importantly, technology should complement the existing technologies of the RHIO partners and build upon existing technology, such as networks and the Internet, rather than replace it.

Certain core features need to be addressed in any healthcare data sharing model, regardless of its sponsorship or configuration.

- **Connectivity** is required to permit scheduled and on-demand updates using data from disparate locations. The ideal vision of healthcare data sharing relies on periodic updating and refreshing of personal health information, as well as flexible access from a variety of locations.
- Policies and processes are required to ensure **security** and to facilitate and authorize provider receipt and transmission of data. **Authentication** is required to validate users, and the system needs to know who is accessing a given individual's information and that person's authorization level. Procedures for ensuring security need to be embedded in the community-wide technology supporting the information exchange architecture.
- **Data integrity** processes are necessary to ensure that the information transmitted and stored for a given individual is accurate. Systems and processes are also required to ensure **privacy** of patient's health information is maintained and access audits can be completed.
- **Data models** and **transaction services** are required to support aggregation and analysis of information for a given individual. There is a need to incorporate services that can translate and format disparate data from various sources into information that people can use to manage their health and health care.

Taking these principles and features into account, there are several community architecture models in existence today that could support the implementation of a health care data sharing model. In the July, 2003 Final Report of the Personal Health Working Group discussed three community architecture models:

Model 1: Individual Integration- This model assumes that individuals make direct requests for data from health care providers and other sources, that electronic information is captured in a standardized form across the Web into a home computer application and the individual remains responsible for establishing and maintaining their own information. Ideally, an

individual's information would be automatically updated with new data supplied by various provider organizations on a scheduled basis or on demand.

While this model would offer the most individual control, it poses significant challenges: the diversity of provider and payer systems that would need to contribute and receive data, reports would be of limited value, data would be difficult to share with healthcare providers. Additional resources would be needed, such as some form of authentication and security in systems that transmit data between the individual and provider systems. We do not view this as a viable model for most RHIOs.

Model 2: Independent Vendor Integration/Data Pointers- This model assumes that an intermediary helps collect and organize individual's health care information. This model allows exchange into and out of the individual's record.

One approach utilized to implement this model is to establish a central database through which individuals' data is transmitted from data sources (doctor's offices, pharmacy, lab) to the individual's record and vice versa. This model makes it easy to collect data from a variety of sources on behalf of the individual, but concerns could exist about the physical security of the data since it all resides in one central location. Questions regarding "ownership" of the data in the central database need to be resolved.

An alternative approach to the independent vendor model is to establish a repository of identifying information about an individual, rather than a centralized database, and a system to map the identifiers to all of the associated data sources in the community (data pointers). This model has similar advantages of the independent vendor integration model in terms of access and use. Provider systems requirements are minimized since data is retrieved in whatever forms it currently exists. The application of decision support tools and real-time analytical protocols across this distributed data environment could be cumbersome. There also needs to be a data version control protocol that assures that the most current source of the individual elements is identified.

Model 3: Integrated Health System- In this model the individual's health record is the direct by-product of an integrated information system established for a "closed" healthcare delivery system. It provides a formal structure that facilitates clinical integration and care coordination for individual users within the "closed" system. Since members of such systems often utilize services and providers that are not part of the system, additional steps would be necessary to ensure that both clinical and personal health information is complete. This model could support a longitudinal record, but it would only be valid and complete as long as the individual maintains their affiliation with the system in which it was created. We do not view this as a viable model for most RHIOs.

Section VI: Conclusions

By considering the information gathered from the various research sources, a number of trends emerge. It becomes clear what common characteristics successful RHIO efforts exhibit. It also becomes apparent that a number of challenges must be overcome to be successful in forming a RHIO and successfully deploying it among the various stakeholders in the geographic subdivision.

Stages of RHIO Development

The stages of development for a RHIO within a geographic subdivision follow a similar pattern as those of most IT-related initiatives. The primary difference in RHIO development is that there is the need throughout the process to build and keep consensus and buy-in among the stakeholder participants and communities in which the RHIO exists. Most successful RHIOs will follow a development process with the following stages.

Needs Assessment. As concerned stakeholders begin “thinking about thinking about developing a RHIO” in a community, a needs assessment usually starts the formal development process. This assessment can also be called a “feasibility study.” It can be carried out by any one, or a group, representing a geographic subdivision. These “concerned stakeholders” can be any combination of providers, payers, employers, consumer groups, government representatives, hospital association, or medical society. It is a good starting point to establish a “commission” or other ad hoc neutral group that is representative of the community.

During this stage, it is important to identify the potential benefits for the community, patients, payers, and providers. While it will be necessary to quantify these benefits during later stages of development, at this stage it is more important to identify that there are benefits that accrue to the community as a whole that would justify continuing the process.

Consensus Building/Stakeholder Buy-in. This stage may be the most critical in the continued success of the RHIO development. As described in other sections of this document, a broad-based collaborative environment is critical to the success of a RHIO. During this stage, which typically does not have an end, the creation of the neutral, collaborative group representative of the health care market takes place. This is more of a journey rather than a destination, and it requires diligence throughout the development process.

It is important that trust is built among the stakeholders and this requires time to take hold. Typically in a community forming a RHIO there are a number of competitive organizations that must come together in a way that is contrary to the usual market dynamics. Further,

government and consumer groups must also be considered as concerned, but non-professional, stakeholders within a market which also requires an open, collaborative environment. In short, parties that are not accustomed to sitting at the table must collaborate. This collaboration becomes more plausible when the focus is on the benefits to the community and to the patients specifically. It is important, too, to identify the specific benefits that will accrue to each stakeholder group. Everyone must feel there is “something in it for them” in addition to the shared objective of creating a RHIO for the “greater good”.

Ongoing efforts at building trust and collaboration are necessary as the RHIO development progresses. There will be issues that arise along the way in the ongoing RHIO development that will require the continued need to refocus the group on the benefits and the need to collaborate. Also, as new stakeholder groups appear these must be integrated into the organization. In short, consensus, trust, and collaboration are vitally important and need to be worked on and nurtured continually.

Planning. The formal planning stage of development begins with the governance structure. It is important to find, or create if necessary, a neutral organization to be the sponsor of the RHIO. Options that RHIOs use for creating the governance structure are discussed in other sections of this document. It is important that the stakeholders agree upon the structure, by-laws, and other governance processes early in the planning process since these will determine the future direction of other planning steps.

An overall business plan for the RHIO should be defined. Funding sources and an ongoing, sustainable funding model must be agreed upon. In addition to the possibility of seeking grants for start-up funding sustaining the RHIO from a business perspective must also be considered. The parties should look for ways to establish equitable means to fund the operation of the RHIO.

Based upon the local environment and benefits that the parties want to realize, technology decisions must be made. As stated elsewhere in this document, organizers must first agree upon the benefits focus of the RHIO and let these decisions drive the technology requirements. A technology roll-out plan should also be part of the planning at this stage as well as a plan to integrate existing technology within the community.

Planning for legal and regulatory requirements including creation of privacy policies, disclosures and consent agreements must be completed. Finally, a plan to stage the implementation and deployment of the RHIO functions is a part of this phase.

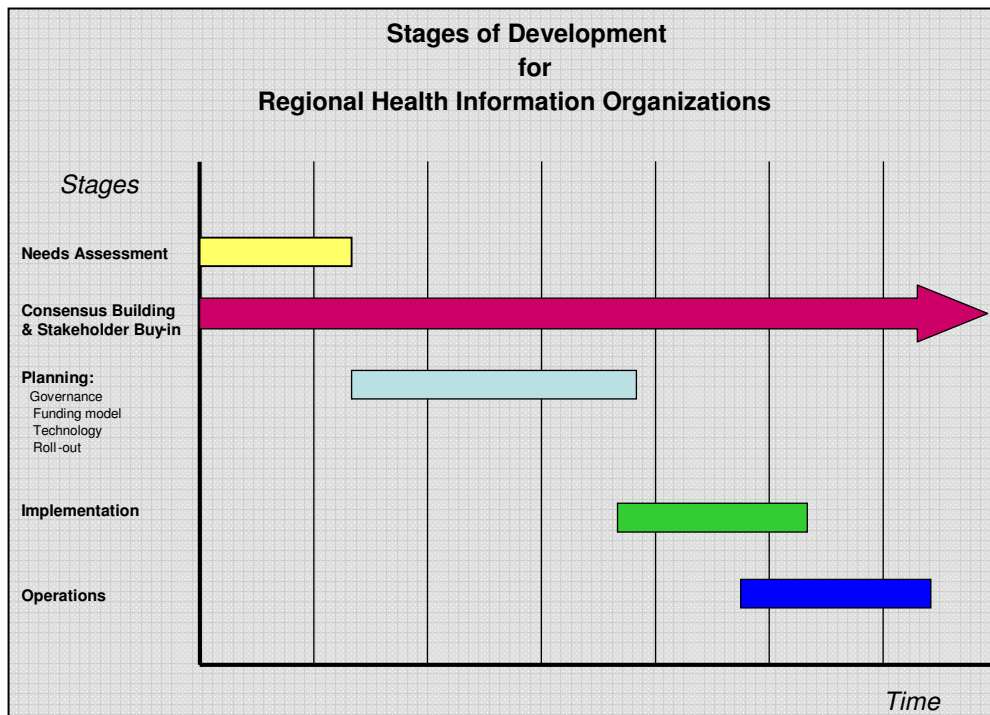
Implementation. The installation of equipment and services, databases, functionality, and networks where needed to support the RHIO are all part of implementation. Consideration should be given to end user support and training as well as a process for problem resolution.

Crucially important is the issue of process re-design and change management. To ensure successful adoption of the information connectivity the RHIO will provide, attention should be paid to supporting the members in how to change processes within their organizations to appropriately take advantage of the provided capabilities. While the RHIO cannot “hands on” work with each member individually to define process changes, there should be some overall support and guidance structure from the RHIO to the members.

Staging the implementation will likely be dependent on the priorities set by the RHIO stakeholders and the availability of funds to support the objectives.

Operations. How will the RHIO operate as a sustainable entity? Development and execution of a business model that will produce a sustainable flow of funds for operation are the primary goals of this phase. Consideration should be given to processes for billing and collections, marketing, human resources, and other business functions. In an ongoing RHIO there should be support processes for the technical side as well. Training, technical and end user support, sourcing options, and disaster avoidance and recovery are some of the technical issues that need addressing.

The figure below indicates the relative timing of each stage of RHIO development and the general sequencing of the phases. Actual timing would be dependent upon the size and complexity of the RHIO within the geographic subdivision.



Characteristics of Successful RHIOs

RHIO efforts across the nation are meeting with growing success. There are some common characteristics among these efforts that should be noted as keys to success.

Broad-based, Independent, and Collaborative. Oversight of the RHIO effort through a board, or organizing committee, is provided by a broad-based, collaborative group representative of the stakeholders in the healthcare market relevant to the geographic subdivision. This collaborative group represents healthcare providers, government and private payers, hospital associations, medical societies, departments of health, quality review organizations, and consumers. This group is independent of a specific government agency or single private entity. The building of trust among this group is absolutely required in the successful launching of the RHIO. Some RHIOs studied spent up to a year building trust and gaining “buy-in” among the stakeholders.

Focused on Benefits. The focus of a collaborative RHIO development initiative is on benefits to the community in general and to the patient in particular. Discussions among traditionally competitive organizations, or stakeholders with disparate interests, reach consensus more easily when the approach is focused on realizing the benefits to the community and patient of improved quality and reduced errors, duplication, and costs.

Benefits Drive Technology. Decisions about the technology platform rarely drive RHIO development. Instead, the stakeholders’ focusing on realizing the benefits tends to drive the technology decisions. In other words, organizers are seeking agreement on the benefits desired and how to realize them, and then finding the technology platform best equipped to deliver them.

Business Model Based on Subscriptions. As the typical RHIO is considered an independent business entity, it must develop a viable business model in order to sustain itself. Although many RHIOs are organized as a not-for-profit entity for tax purposes, it must find a business model that will at least generate the funding required to pay its ongoing expenses and invest in new equipment. The predominant business model deployed by RHIOs is a subscription model. Subscription means that each entity connected to the RHIO, and benefiting from its use, pays a fee for access. This fee may be assessed monthly or annually. The amount of the fee is set forth in the subscription agreement and usually based upon the type of subscriber, i.e. physician office, hospital, reference lab, etc. The calculation of the fee may be based upon a fixed fee by type, or may be based upon a benefit formula agreed upon by the stakeholders.

Need for Start-up Funds. Regardless of business model, every RHIO needs funding for planning, start up, and working capital. Although sources of such funds are varied, the primary source is grants. Grant sources may be private philanthropic organizations, but most come from some type of government source such as the Agency for Healthcare Quality and Research (AHRQ).

Common Challenges

Among the RHIO programs studied, notwithstanding the relative success or failure to this point, there are a set of challenges, or barriers, that have been experienced. Some of these barriers are “deal-breakers” while others such as a need for interoperability standards are just challenges.

Lack of Standards. Interoperability standards are needed to develop the ultimate seamless health information exchange. However, in the short term these standards will not exist. Although ONCHIT has announced an accelerated plan to reach agreement on an interoperability standard, consensus is that it is a few years away. In the meantime, there are still ways to develop methods to exchange health information, even if less seamlessly without a comprehensive set of standards.

Funding. Every organization examined here stated that it needed money. Whether start-up funding or ongoing funds obtained through its business model, every entity needed additional funds. Grants are a common source of planning and start-up funding, but not plentiful or large enough to sustain operations for the long term. Therefore, as stated earlier, a sustainable business model must be designed that is suited to the needs of the geographic subdivision in which the RHIO operates. It is not practical to expect that any single stakeholder group—payers or providers—to pick up the full cost individually or together.

Technology Blueprint. RHIOs are challenged by the need to develop a blueprint for a technology architecture. There are pros and cons for each of the predominant centralized data and distributed data models. In addition, the level of adoption of electronic health record systems in the physician office is low making for a challenging information exchange environment. Further, there is a need to provide a low technology user interface that can be supported on a wide variety of desktop platforms. A typical response to the latter is use of browser-based portal access to view information.

Politics. Working with stakeholders representing disparate interests, unequal economic resources, and divergent competitive pressures requires high “political” skills. It is most important to find a neutral entity, or create a new one, that can sponsor the RHIO. In most successful RHIOs a new, independent entity is created with its own governance structure to be the neutral entity. This new entity then can become the “Switzerland” around which the broad stakeholder community can build a competitively neutral health information exchange. It is wise to do this political “heavy-lifting” early in the development of the RHIO.

Competitive Differences. The challenge identified in the previous paragraph is a formidable one. In some geographic subdivisions there are multiple competitors of some strength. Many of those competitors have invested millions in creating healthcare information systems that can offer perceived competitive advantage. There is simply a lack of trust among the stakeholders

whether it is among providers or between payers and providers. It is overcoming those competitive forces that provide difficulty in organizing a local health information exchange. Many fear loss of the competitive advantage that may have been gained by use of information systems. Others will insist that the technical solution they own offers the solution that should be adopted. Nevertheless, the differences can be overcome with patience and perseverance in taking time to focus discussions on the benefits to the community and patient rather than competition.

Critical Success Factors for an Individual RHIO

While the requirements for overall success of a national network also apply to individual RHIOs, there are other factors that effect whether any one specific RHIO will be successful. In other words, while the national network may be a success overall, there could be instances of attempts to create RHIOs that fail.

These critical success factors build on the points made in why the fourth scenario described above is the most likely framework for ultimate success. A successful RHIO must be built on a solid foundation of shared vision and mutual responsibility. The effort to bring together the diverse array of stakeholders – including consumers – should not be underestimated. Many of the organizations at the table may be fierce competitors (e.g., health systems) or exist in an adversarial business relationship (e.g., providers and payers). Others may not understand why they need to be involved or why a RHIO is needed (e.g., consumers, employers). But to be successful, all the varied stakeholders need to learn to trust one another (within the context of the RHIO), build a plan together and make decisions on how to implement a regionally-based connected healthcare delivery network.

In the following list Healthlink has identified the critical success factors underlying a successful RHIO. Surprisingly to some, absent from this list is any direct reference to technology. We believe that, while certainly non-trivial, the technical challenges that RHIOs face will all be solved by the many smart people involved in our industry. These are the kinds of problems that our scientists and engineers solved when challenged by President Kennedy to “put a man on the moon by the end of the decade”. While Sec. Thompson used the mission to the moon as an analogous challenge to transforming healthcare through the use of IT, the cultural and political challenges involved in the moon mission pale in comparison to those that RHIOs face. For the technology to enable more effective and efficient healthcare, a number of “people challenges” must first be addressed.

The critical success factors we identified for an individual RHIO are:

1. Stakeholder buy-in

Enlist broad industry representation of the local market, ensuring everyone has a seat at the table from the start of the project. Even though some stakeholders may only be marginally affected from the start of the effort it is easier to convince them to participate from the beginning than to try and bring them “into the loop” once the program is up and running.

Ensure that all stakeholders understand how they can benefit from the implementation of the RHIO, and what they will need to contribute to achieve those benefits. Make sure that the broad objective of the RHIO (i.e., better healthcare for the community) is understood but that everyone also understands their place in that objective.

It is critical that all stakeholders understand why the initiative to create a RHIO is important. Extensive education should be provided to all the stakeholders so they understand the national momentum around creating a connected healthcare delivery system. Both national and local goals should be clearly defined – and they should, again, be tied back to each individual stakeholder.

2. Ownership & governance

In some instances the creation of a RHIO is legislated at the state level. In many instances, however, the impetus to create a RHIO comes from some loose affiliation of stakeholders within a state or metropolitan area. Regardless of the spark that starts the RHIO initiative, it seems to be almost universal that the creation of an independent third party entity to actually run the RHIO is called for. Some have described this as “finding Switzerland”.

Since some of the stakeholders may be competitors or business adversaries, the RHIO itself needs to be a neutral place these otherwise warring factions can come to work on the challenge of transforming healthcare. It also needs to be a place where the smaller players in the market place can effectively contribute without being overshadowed by a dominant health system, medical group, payer or employer.

Clear roles and responsibilities need to be laid out. Decisions need to be made on the form of governance (e.g., one organization one vote ala the Senate, or representational voting ala the House of Representatives). Further, work groups and committees should

be formed that focus on specific areas of concern, such as privacy, technology, marketing & communication, funding & business model, etc.

Many RHIOs incorporate as a Limited Liability Corporation and as 503(c)(3) not-for-profit organizations.

Getting the governance and ownership issues settled at the beginning is critical to establishing a firm foundation on which the rest of the RHIO can be built. There are many other issues that need to be addressed, but unless these first two critical success factors are effectively implemented, other aspects of the RHIO will not produce the desired results.

3. Privacy / security

Consumer concerns about the privacy of their health information are real and significant. At least half of Americans believe that the benefits of a connected healthcare system are not worth the risk to the privacy of their health information. Since little is understood by the general consumer regarding the “swiss cheese” nature of current paper-based health information management, the average consumer is not equipped to understand the benefits that an electronic system can provide. Further, most consumers really don’t understand the mechanisms that can be deployed to ensure that privacy is better protected in an electronic world than in a paper one. Just as the airline industry, in its early days, had to overcome concerns about safety, the healthcare community needs to make a similar case to “it’s safer to fly than drive” – and have the data to prove it.

Consumers will need to understand how security works and what their options are for including or excluding aspects of their health information from being accessible from within the RHIO. They need to understand how access is authorized and what steps are in place to prevent unauthorized access.

For consumers to understand and be convinced that the confidentiality of their health information will not be compromised, the RHIO itself must agree on the mechanisms of security and privacy needed to warrant that trust. While it is hoped that guidance will come from the federal government on this particular issue, it will still be up to the RHIO to make detailed decisions on how to implement the guidelines. The issue of privacy will, in all likelihood, be tightly coupled with the issue of patient identification (see number 6, below).

4. Funding

There are two types of funding streams that need to be identified – start up costs and ongoing operations. Most RHIOs in start up mode today rely on a combination of government and private grants, in kind donations from stakeholders (e.g., assigning staff from stakeholder organizations to the project), some outright cash contributions from stakeholders and pro bono or cost-only work from vendors, consultants and lawyers. While funding remains a top concern, for those RHIOs committed to the startup phase, the resources (albeit patched together from a number of sources) seem to be available to support it.

While there is likely to be additional government grants available for start up costs, with the current budget projections, there will not be enough for every RHIO and the grants that are awarded are unlikely to cover all start up expenses. To be successful, every RHIO will need to define a business model that provides sustainable funding as rapidly as possible.

While no RHIO today is self-sustaining, preliminary analysis by some RHIOs indicates that some combination of subscription pricing (monthly or annual) and transaction fees per type of function is a viable model. Many RHIOs have expressed an interest in moving to an incentive-based approach to fees, but have not yet identified the mechanism. In addition, both Bridges to Excellence (B2E) and the Center for Medicare and Medicaid (CMS) have indicated that future pay-for-performance (P4P) projects will include incentive-based payments for RHIO participation. While specifics for these initiatives are not yet available, it is encouraging that the major P4P efforts plan to include RHIO participation as part of the value-based equation for provider reimbursement. It is thought that some of those incremental funds could then flow to the RHIOs themselves, contributing to a sustainable funding model.

As with any project that looks to IT-enable key processes, a clear understanding of the potential benefits is essential. Not only must the benefits and associated costs be delineated, but the decisions and actions that need to be made to enable the benefits must also be specified. Through this process, the RHIO can identify the appropriate timing and sequencing of the many functions and capabilities the RHIO will ultimately support. In doing this, “early wins” (i.e., those functions that benefit a fairly broad array of stakeholders yet are relatively simple to implement) can be identified. Implementing these “early wins” can begin the sustainable funding cycle. For example, a RHIO may elect to implement the brokering capabilities to fully support e-prescribing. Pharmacies and PBMs may each pay a transaction fee that is less than their current costs for

processing paper prescriptions. This funding can then help springboard to the next function of e-enabling access to lab results, and so on.

Ultimately, while some dollars may be made available through P4P programs, both government and private, RHIOs will need to figure out a business model that is largely sustained by the stakeholders. Going back to the first critical success factor, if the stakeholders believe the benefits outweigh the costs, then a sustainable business model is possible. That is the best approach to funding for the vast majority of RHIOs.

5. Implementation plan

A sound implementation plan is crucial for any successful project – IT or otherwise. The same is true for RHIOs. Building on the need to balance benefits and costs over the life of the implementation, careful planning of the timing and sequencing of the implementation of the various RHIO functions is critical. Big bang implementations are not recommended. Rather, a phased approach that introduces a capability, and then incrementally adds users of that capability, is recommended. As stated previously, rolling out early wins that deliver visible benefits to the community is a wise approach to building trust, gaining supporters and creating a sustainable funding model.

An unanswered question, with the potential to significantly affect the rapidity with which stakeholders adopt RHIO capabilities, is how can process changes be managed through the implementation cycle? Since it is unlikely that RHIO staff will be able to work with each stakeholder in rolling out a function, some mechanism to provide process change support should be determined. Whether this is a set of recommendations, change management seminars, “manage the change managers” or some combination, failure to recognize that simply making a function available isn’t enough will likely lead to a higher failure rate.

6. Patient identification

The mechanism to uniquely and positively identify each patient is probably the most contentious issue associated with RHIOs (and the national network). It ties closely to privacy, but also profoundly effects patient care.

On the privacy front, many individuals fear that a nationally-assigned patient identifier will compromise their privacy with respect to their health information. This is such a politically-charged issue that provisions for a national patient identifier were dropped from the original HIPAA legislation. In fact, under current law it is illegal to assign a national number. Social security number, cell phone numbers and other identifiers are also unsuitable, for a host of reasons. (For a thorough analysis of this issue, see the

Connecting for Health report “Linking Health Care Information: Proposed Methods for Improving Care and Protecting Privacy” available at www.connectingforhealth.org.)

None the less, some mechanisms for accurately linking patient information is essential. Some suggestions for ensuring privacy is that patients will “opt in” to the RHIO – establishing their identity on the network directly with their physician and specifying which kind of information will be available on the network to authorized users. Following this model, a patient might allow inclusion of information related to their immunizations, allergies and routine physicals while dis-allowing inclusion of their reproductive history, HIV status, mental health status or other information deemed too sensitive to be shared. So linked with patient identification is a catalogue of linked patient information – with no reference that any of the non-linked information exists. The patient has control. Of course, the overhead of managing this model may be huge, but it is one that is being tried by some RHIOs. Other models are “opt in – all” or “opt out – all” – meaning your information is either there in its entirety or you don’t exist in the network at all. (Of course, if you don’t want to exist in the network of all, a record of the fact you do exist but opted out of the network must still be maintained.)

Privacy aside, the issues around patient identification are huge. There are physicians who absolutely refuse to participate in a RHIO until a unique identifier is assigned to every patient. Since this is unlikely to happen, these physicians will never be participants. They do have a justifiable concern, however. They want assurance that the information linked to a particular patient does indeed belong to that patient. The safety issue of making a clinical decision on the wrong data is huge.

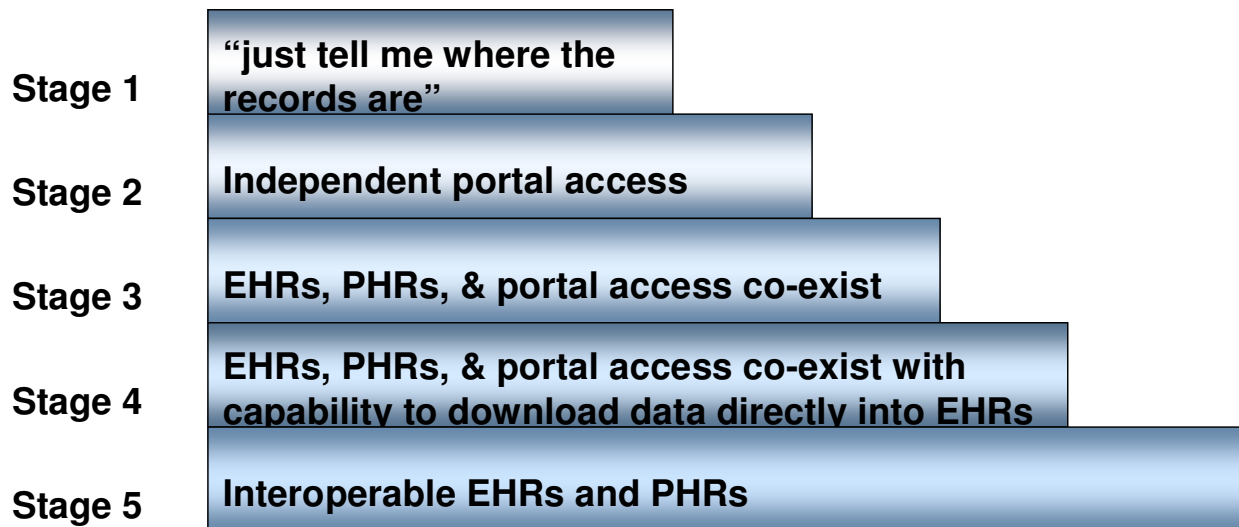
Even if a national identifier were instantly assigned to every person in the country over night, we would still need a way to map all the existing data for each person to their unique identifier. This will take time to cycle through the data and have it matched. In addition, the vendors need to “make room” for the national identifier in their databases. While some have anticipated this for years and are ready, many are not. Further, a “double check” must also be created to insure that the number does indeed relate to the right person, since numbers can be keyed incorrectly.

What all this is saying is that some mechanism of probabilistic matching will need to be a part of patient identification. One of the leading methods right now is the Record Locator Service developed by the New England Health Information Network (NEHIN). Many questions still remain regarding the viability of probabilistic matching – but in the near term it is likely the only way we will be able to begin the process of linking patient information in a RHIO. Operational issues must be addressed, such as who and how will resolve incomplete matches. The largest issue, however, may well be convincing both providers and consumers that the matching is accurate and can be trusted.

Functionality Generations

While the end-state vision is a completely IT-enabled and connected healthcare delivery system, the road from where we are to there is long. Current estimates for physicians using EHRs range from 10-20%. The adoption rate for hospitals was estimated at 25% at the end of 2002.⁴ There are no fully functional RHIOs in operation today. This situation is not bleak, however. There are two significant factors that can help drive RHIO adoption.

The first factor is the definition of an incremental functionality approach to participation in a RHIO. Any RHIO that requires that a physician office have a fully functional EHR to participate will be waiting awhile to get most of the physicians (and hospitals!) connected. Rather, offering a staged approach – all of which can be supported simultaneously by the RHIO – is preferable. We have identified the following five stages of RHIO participation:



Stage One – “just tell me where the records are”

A starting point for any RHIO may simply be to catalogue the locations where health information exists for a patient. A physician or other provider (given the proper authorization) would ask the RHIO, through a simple Internet-based query tool, where there

⁴ These references are all from the HHS report “Health Information Technology Leadership Panel – Final Report”. Original sources may be found in this report.

are health records for the patient. The physician's office can then call those locations and ask that the records be faxed.

While this is a decidedly low-tech solution, it is an improvement over the current state of not knowing where the information is at all. It is not recommended that a RHIO as a whole or individual participating physician stay at this stage for long, but it offers a starting point with benefits to all concerned.

Stage Two – independent portal access

While many physician offices do not currently have EHRs, there is a significant amount of digitized clinical information that already exists (e.g., lab results, prescriptions). Stage Two offers access to this information through a portal supplied by the RHIO. This could essentially grant authorized users access to what ever digital data exists for the patient – from hospitalizations, reference labs, commercial pharmacies, PBMs, etc. As the body of digital information increases, so does what is available through the portal. So the physician office itself does not need to yet have an EHR, yet can still benefit from the digital data available. The workflow changes are somewhat significant, however, since the physician and other staff will need to learn a new way to access information to factor into the patient evaluation.

Stage Three – EHRs, PHRs and portal access co-exist

For those physician offices that are using an EHR but that EHR technology is not yet “interoperability enabled”, the independent portal and EHR could exist side by side, connected for patient context utilizing the CCOW standard. This would allow the physician to readily toggle between the EHR view of the patient's information and the broader RHIO view of the information. This is relatively painless change in office workflow. This stage would also support patient access via a Personal Health Record (PHR) in the same manner as a the EHR.

Stage Four – EHRs, PHRs and portal access co-exist, with the ability to download data directly to the EHRs

Some RHIOs are offering the option to download patient data from the RHIO directly into the physician office EHR. There are a number of issues around data synchronization (i.e., ensuring that the downloaded data isn't stale or hasn't been updated by the source system) but this may be an attractive option to some physicians who would like to view the data in

the context of the EHR application they use in their daily practice. It will require a certain maturity of the interoperability standards to ensure that the data flows into the EHR correctly, and therefore is likely not a viable option for a few years.

Stage Five – Interoperable EHRs and PHRs

The final stage of RHIO functionality is the ability for a physician to automatically and seamlessly view the information about the patient obtained through the RHIO within the context of the office EHR. In other words, the EHR implemented in the office operates on both the locally stored data and the data available through the RHIO – creating a virtual database for use by the physician. Of course, the data that is not native to the physician's legal medical record for the patient will need to be identified as such, but this offers full access to information for the physician without having to move the data wholesale yet still using the native EHR capabilities. This stage would also support seamless access for patients to the data via a PHR.

This state of interoperability will require several years to achieve – not only for the development of the standards themselves but for those standards to be incorporated into the EHR technology available from vendors. From a work flow perspective, once the physician office or other provider has adopted and adapted to an EHR, there is really no change in this stage.

Funding Model

The sustainable funding model for a RHIO is critical to its long term viability. There are a number of sources of funds in the form of grants, donations, and in-kind services that can be tapped by a RHIO to obtain funding for operations. However, an ongoing, sustainable business model for operations as a source of operating capital must be implemented for the RHIO to insure its survival.

Start up funds can be obtained through grants, in-kind or cost-only goods and services, donations, and government subsidies. Start-up needs for RHIOs include funds to pay for planning services, staff resources, marketing, technical infrastructure (servers and networks), and software. There are many sources both public sources and private philanthropic organizations that are available for grants, loans, and subsidies.

Although grants and contributions from various sources may be available, it is doubtful that enough sources or funds will be available in sufficient supply to sustain ongoing operations. Analysis of funding options shows that some combination of subscription fees and pay-for-use

charges is a viable funding model. As the planning for a RHIO progresses it will be important to develop an equitable pricing model for the participants. Analysis of RHIO efforts underway today indicates that an equitable fee-based model can be structured around the benefits accruing to participants from use of the RHIO. The equitable funding model would be based upon the premise that a participant's fee would be less than, or equal to, the value realized through savings created by using the data and processes resident in the RHIO's IT-enabled functions. Therefore, a participant can expect at least a break-even scenario on the cost versus benefits from being a member of the RHIO.

Section VII: Recommendations

Based upon the findings and conclusions contained herein, the following recommendations are offered.

1. RHIO development should not wait until Electronic Health Record (EHR) systems are adopted in all provider settings.

Although this would be the ultimate goal, benefits can be realized in significant ways without a full and broad implementation of EHRs in physician and institutional provider settings. There are significant safety, quality, and cost reduction benefits that accrue to the population even if some provider locations cannot electronically create and share clinical information between providers. Other means may need to be employed to make shared data available such as until EHRs are fully adopted.

2. RHIO development should not wait until interoperability standards are defined and adopted.

While interoperability standards will ease the technical challenge of exchanging information, their definition and adoption are in the future. This should not prevent RHIOs from forming now. As has been described in this report, there is much work to be done to build governance, buy-in and a sustainable business model to ensure a successful RHIO.

3. The statewide healthcare advisory board (e.g., SHCC) should take the lead in creating an environment, specifying governance guidelines, identifying funding sources, encouraging EHR adoption, and assisting in negotiating purchase agreements.

The statewide advisory board has a unique role as an officially created and sanctioned entity to act as a neutral body to promote RHIO adoption within Texas. In this capacity it can create an environment in which the various geographic subdivisions can operate that promotes cooperation, collaboration, and technology adoption. The advisory board can act as a purchasing cooperative to assist smaller regional networks in negotiating pricing and obtaining grant funding.

4. The state should encourage the creation of advisory board or committees to set state-specific guidelines and to help interpret national standards.

In order to encourage investment and adoption of technology supporting RHIOs, the state could foster the creation of a technology advisory board to set specific guidelines. The board could also act to assist in uniform interpretation of national standards for data and system interoperability that would help assure regional networks of a uniform and sound technology platform.

5. Use the Institute's reputation as an "honest broker" to convene discussions with individual stakeholders who are interested in Texas-based RHIO development.

Based on the findings in this report, the need is clear for a neutral entity to convene and facilitate discussions for RHIO formation. TIHPR can act to convene a broad-based group of stakeholders within the state capitalizing on its position and reputation to facilitate and strengthen RHIO movement within Texas.

6. It is recommended that multiple RHIOs be deployed within Texas as opposed to a single statewide RHIO.

With its size, geographic and population diversity, and multiple centers of large populations, Texas should consider multiple RHIOs as opposed to a single one. The health care needs of the various population centers versus more rural settings as well as the diversity of health care providers across the state can create difficulties in meeting unique needs in the respective settings. There is justification for seeking to meet the population health care needs and business needs of diverse regions by regionalizing the approach.

These RHIOs may center around a major metropolitan area, a geographic or political subdivision, or may be set according to population. The need for collaboration and consensus-building makes regional formation around optimizing those factors an important consideration.

7. The state should act to facilitate the connection of individual RHIOs within the state. Facilitation may take the form of standard setting, grant and funding assistance, regulations, and promoting a collaborative environment.

The vision for a national health information network is one based upon connecting regional networks and sharing information across this national infrastructure. The federal government role will then be to establish standards, assist in funding or incentives, and promote an environment for collaboration in creating regional networks. On a smaller scale, assuming multiple RHIO within Texas, the role of state government in Texas parallels that of the federal government.

8. Create a forum within which the various RHIO initiatives within Texas can exchange ideas, successes, lessons learned, and other valuable information.

It will be of the utmost importance to provide a way to capitalize on the inevitable successes and lessons learned across the state. A formal forum should be created, or made part of another setting, designed to allow sharing of information among the RHIOs.

Section VIII: Definitions and Acronyms

- AHIC** American Health Information Community. Announced by HHS Secretary Michael Leavitt in June, 2005. Chaired by Sec. Leavitt and will include up to 17 commissioners representing a broad spectrum of the healthcare community from consumers to clinicians to employers to payers. The role of the AHIC will be to facilitate collaboration in the definition and adoption of interoperability standards and to advise the federal government on issues of healthcare IT policy (www.hhs.gov/healthit).
- AHRQ** Agency for Healthcare Research and Quality. Its mission is to improve the quality, safety, efficiency, and effectiveness of health care for all Americans. Among its functions is to award grants for research for health care issues. Information from this research assists in making more informed decisions and improves the quality of health care services (www.ahrq.gov). Previously known as the Agency for Health Care Policy and Research.
- CCOW** Clinical Context Object Workgroup, a reference to the standards committee within the HL7 group that developed the standard. The standard applies to the techniques that allow clinical applications to share information at the point of care. By utilizing the standard for “context management”, it provides the clinician with a unified view on the information held in separate and disparate healthcare applications referring to the same patient, encounter or user. This means that when a clinician signs onto one application within the group of disparate applications within the CCOW environment, and selects a patient, the same patient is selected in all the applications. CCOW then builds a combined view of the patient on one screen.
- CITL** Center for Information Technology Leadership (www.citl.org)
- EHR** Electronic Medical Record
- HIT** Health Information Technology
- HL7** Health Level Seven. Health Level Seven is an application-level protocol for electronic exchange of data in the health care environment. Via standards, or specifications, it allows the exchange, management, and integration of clinical and administrative data that facilitate interoperability between healthcare information systems (www.hl7.org)

ONCHIT Office of the National Coordinator for Health Information Technology. Created by Presidential Executive Order, the mission of ONCHIT is to implement the vision for widespread adoption of interoperable electronic health records (EHRs) within 10 years. The director is David Brailer, M.D., Ph.D (www.hhs.gov/healthit).

Appendix A: RHIO Study Subjects

RHIO Study Subject	Location	Development Stage
Rhode Island Quality Institute	Providence, RI	Operation
Indiana Health Information Exchange	Indianapolis, IN	Implementation
Dallas-Fort Worth health information network	Dallas, TX	Planning & Formation
Maine Health Information Exchange	Brewer, ME	Planning & Formation
Taconic Healthcare Community Network	Fishkill, NY	Operation
North Carolina Healthcare Information and Communications Alliance	Raleigh, NC	Implementation
Santa Barbara County Data Exchange	Santa Barbara, CA	Operation
Massachusetts Technology Collaborative	Waltham, MA	Operation
Maryland/D.C. Collaborative for Health	Baltimore, MD	Planning & Formation
Delaware Health Information Network	Wilmington, DE	Implementation
MedVirginia	Richmond, VA	Implementation
Wisconsin Health Information Exchange	Milwaukee, WI	Implementation
New Mexico Health Information Network	Albuquerque, NM	Planning & Formation
Pennsylvania eHealth Technology Consortium	Philadelphia, PA	Planning & Formation
Central Florida health information exchange	Orlando, FL	Feasibility Study
Greater Houston Partnership	Houston, TX	Planning & Formation
CareSpark	Kingsport, TN	Implementation
Access Medica	Tyler, TX	Planning & Formation

Appendix B: Interview Guide Questionnaire

1. Considering this definition, does your (city, county, state, region, private organization) have in place a Regional Health Information Network?
2. If not in place now, are there plans to begin a RHIO? (If no to both 1 & 2, go to Question 15.)
3. How did (will) this network begin? What was the initial impetus for beginning this effort? What is (will be) the sponsoring entity?
4. Is (Will) this network initiative (be) sponsored, or supported, by legislative action or executive order from a government entity? Or is (will) it (be) sponsored by quasi-public organization, private sector payers, or hospital/physician collaboration?
5. What governance structure is in place (or planned), and how will disputes between stakeholders/participants be resolved?
6. What is the current (planned) scope -- in terms of geographic coverage, data exchanged, functions supported, and population covered -- of the RHIO? What is the planned scope?
7. What is the current state of deployment of the RHIO?
8. Who are considered the primary stakeholders (sponsors, beneficiaries, or drivers), e.g. physicians/hospitals, payers, patients?
9. What benefits have been realized by each stakeholder group?
10. What is your tactical plan and timing for implementation?
11. What is the technical approach to the RHIO? What is the technical architecture from a database, network, and server standpoint?
12. What is your experience in terms of initial costs? Ongoing costs?

13. Has (will) a grant been (be) applied for, or received, to provide funding for either initial or on-going costs? What is the source of the grant – government, private foundation?
14. What funding model is in place (or planned)? Will there be incentives for use of the RHIO by clinical providers (physicians & hospitals)?
15. What are the critical success factors of your RHIO?
16. What are the lessons learned? Risks? What would you do differently?
17. The literature states that a RHIO could improve quality of care and outcomes, help avoid duplicate tests and treatments, reduce care errors, reduce the cost of care delivery, and reduce administrative costs. What are your thoughts about these potential benefits?
18. It is possible that in the short term a RHIO could increase healthcare costs due to current “under-treatment” of some patients, or diseases. Do you agree with that premise? How can the creation of a RHIO be worth incurring short-term cost increases in order to provide the long-term benefits to patients, providers, and payers?
19. Is there an interest in your (city, county, state, region, organization) in implementing a RHIO in the near future? If so, whom do you think would be the primary sponsor(s) in your community?

(Note: Questions 1, 2, 17, 18, and 19 are asked of each Texas participant.)

Formal Interview Participants:

Laura Adams, President & CEO, Rhode Island Quality Institute

Betty Eads, Director, Physician Services, Community Health Network, Indiana

Carole King, Eastern Maine Health System, Maine Health Information Center

Victor Plavner, M.D., Chairman, Maryland/D.C. Collaborative for Healthcare Information Technology

Ed Ewen, M.D., Director, Clinical Informatics, Christiana Care, Delaware Health Information Network

Michael Matthews, CEO, MedVirginia, Richmond, VA

Seth Foldy, M.D., Wisconsin Health Information Exchange

Rick Schooler, CIO, Orlando Regional

Jay Srin, Pennsylvania e-Health Technology Consortium

Jeff Blair, Consultant, New Mexico Health Information Network

Tom Flanagan, Vice President, Memorial Hermann Health System, Houston, Texas

Ron Cookston, Director, Gateway To Care, Houston, Texas

David Buck, M. D. President, Houston Healthcare for the Homeless, Houston, Texas

Liesa Jenkins, Project Director, CareSpark, Kingsport, Tennessee

Rhelinda McFadden, R.N., Arkansas Foundation for Medical Care, Little Rock, Arkansas

Ken Haygood, M.D., Physician Leader, Access Medica, Tyler, Texas

Appendix C: Overview of State Legislative Activities

State	Bill	Title	Description	Status
CA	HB354	Telemedicine		Re-referred to Appropriations with recommend to pass as amended; scheduled for 5/11 Appropriations meeting
CA	HB1046	Health facility and clinics data; elements; report card		
CA	HB1672	Electronic recordkeeping systems	This bill would require, before January 1, 2010, health facilities, health insurers, and health care service plans to record all health care information in an electronic record keeping system.	Amended and passed by committee; recommend passage as amended
CO	SB169	State healthcare reform assembly		VETOED BY GOVERNOR
CT	HB6557	An act concerning electronic prescriptions and electronic medical records	To require the electronic generation of all prescriptions by October 1, 2007, and to authorize health care facilities and institutions to use electronic medical records systems.	Legislative commissioner's office public act 05-168
GA	SB204	Health Records; provide electronic format; conditions; legal rights; copies	To amend Chapter 33 of Title 31 of the Official Code of Georgia Annotated, relating to health records, so as to provide that any provider may create, maintain, transmit, receive, and store records in an electronic format; to provide conditions; to provide for legal rights and responsibilities; to provide for tangible copies of records; to repeal conflicting laws; and for other purposes.	Adopted
HI	HB964	Relating to the implementation of qualifying medical information technology	Provides a general excise tax exemption for qualifying medical information technology costs to physicians.	Referred to committee
HI	SR41	REQUESTING THE COLLABORATIVE DEVELOPMENT OF STANDARDS FOR ELECTRONIC HEALTH AND MEDICAL RECORDS MANAGEMENT		Committee on Health recommends passage with amendments

State	Bill	Title	Description	Status
HI	SCR78	REQUESTING THE COLLABORATIVE DEVELOPMENT OF STANDARDS FOR ELECTRONIC HEALTH AND MEDICAL RECORDS MANAGEMENT.		Committee on Health recommends passage
HI	HR88	REQUESTING THE COLLABORATIVE DEVELOPMENT OF STANDARDS FOR ELECTRONIC HEALTH AND MEDICAL RECORDS MANAGEMENT.		Reported from Committed on Consumer Protection and referred to Finance Committee
HI	HCR114	REQUESTING THE COLLABORATIVE DEVELOPMENT OF STANDARDS FOR ELECTRONIC HEALTH AND MEDICAL RECORDS MANAGEMENT.		Reported from Committed on Consumer Protection and referred to Finance Committee
IL	HB252	Medical error reporting law		
IL	HB2202	Health care cost and quality information	Requires a uniform code for the electronic submission of charges and quality information.	
IL	HB2345	Electronic medical records task force	Creates the Electronic Medical Records Taskforce Act. Establishes the Electronic Medical Records Taskforce to create a plan for the development and utilization of electronic medical records (EMR) in the State in order to improve the quality of patient care, increase the efficiency of medical practice, improve safety, and reduce medical errors.	Passed both Houses
IN	SB330	Electronic health care transactions	Authorizes the use of electronic signature authentication and identification with respect to individually identifiable health information. Establishes permitted features of an electronic signature authentication and identification system that is used for certain transactions involving individually identifiable health information.	Signed by the Governor on 4/25/05; effective 7/1/05

State	Bill	Title	Description	Status
IN	SB566	Medical informatics commission	Establishes the medical informatics commission. Requires the commission to conduct a study or contract for a study to be conducted on health care information and communication technology. Requires the commission to provide two progress reports and a final report to the general assembly concerning a plan and recommendations on the creation, implementation, and maintenance of a health care information and communication technology system.	Signed by the Governor on 4/26/05; effective 7/1/05
KY	SB2	AN ACT relating to health information and declaring an emergency	Create various sections of KRS 216 to define terms, create the Kentucky Health Care Infrastructure Authority jointly by the University of Kentucky and the University of Louisville; identify responsibilities of the authority which include conducting research on health information electronic applications, conducting pilot projects, and serving as a forum for the exchange of ideas and consensus building related to the advancement of the health information infrastructure and health care applications...	Signed by the Governor on 3/8/05
MD	SB251	Task force to study electronic health records	Establishing a Task Force to Study Electronic Health Records; providing for the composition of the Task Force; prohibiting members from receiving compensation but entitling members to reimbursement of specified expenses; requiring the Task Force to study electronic health records and the current and potential expansion of electronic health record utilization in the State; requiring the Task Force to submit a specified report on or before December 31, 2006; providing for the termination of the Act; etc	Signed by the Governor
MA	SB278	Reducing administrative burdens in the delivery of health care through the use of new technology		Referred to joint committee on Economic Development and Emerging Technologies

State	Bill	Title	Description	Status
MA	SB280	Requiring medical assistance incentive payments to hospitals, clinics and doctor's offices that utilize a computerized order entry record system		Referred to joint committee on Economic Development and Emerging Technologies
MA	SB717	Providing for capital outlays for the acquisition, upgrading, development and implementation of health care technology in the Commonwealth		Referred to joint committee on Health Care Financing
MA	SB1276	Relating to the safe administration of medications and legible prescriptions		Referred to joint committee on Public Health
MA	SB1283	Providing for the payment of a one-time bonus to health care providers for the implementation of medical error reduction technology		Referred to joint committee on Public Health
MA	SB1289	Performance standards for physicians		Referred to joint committee on Public Health
MA	SD2178	An act providing for health care access, affordability and accountability		Introduced
MA	SD2179	Supplemental appropriations related to healthcare		Introduced
MN	SB65	Health care cost containment provisions; electronic medical record system; health professionals loan forgiveness and medical assistance, general assistance medical care and MinnesotaCare programs provisions modifications		Committee recommends passage as amended; re-refer to Commerce
MN	SB1639	Electronic medical record system loan program and fund	Program to help fund EMR adoption in physician practices	Introduced
MN	SB1933	Health improvement projects; universal health care coverage and purchasing information evidenced based health care guidelines; electronic medical record systems loans		Referred to Health and Family Security
MN	HB1733	Adverse Healthcare Events Reporting Act		Introduced

State	Bill	Title	Description	Status
MN	HB1863	EMR system loan program fund established, bonds issued, and money appropriated		Referred to Health Policy and Finance
MO	HB626	Requires certain health care data collection and reporting by hospitals to assist Missourians in their health care provider choices.		Public hearing held
MO	SB359	Provides for price and performance comparisons of health care facilities to be posted on a state website		
NH	HB514	establishing the New Hampshire health care quality assurance commission		Signed by the Governor - effective 8/10/05
NJ	HB398	Pharmacy Quality Assurance and Error Prevention Act		Sent to Senate
NJ	HB2214	Patient Safety Act"; establishes medical error reporting system		
NJ	HB2787	Establishes Task Force on Hospital Technology to recommend incentives to encourage hospitals to integrate technology to improve patient care and safety	Identical to SB1559	Referred to committee
NJ	SB1559	Establishes Task Force on Hospital Technology to recommend incentives to encourage hospitals to integrate technology to improve patient care and safety		Committee hearings
NM	HB780	Healthcare electronic information system study	AN ACT RELATING TO HEALTH; DIRECTING THE NEW MEXICO HEALTH POLICY COMMISSION TO LEAD A STUDY TO PREPARE FOR A STATEWIDE HEALTH CARE ELECTRONIC INFORMATION SYSTEM FOR USE BY PATIENTS, PROVIDERS AND ALL PARTIES TO THE HEALTH CARE SYSTEM; MAKING AN APPROPRIATION	Committee report adopted

State	Bill	Title	Description	Status
NY	HB2073	Establishes a statewide telemedicine/telehealth task force to study and report to governor and legislature on telemedicine and telehealth systems.		Introduced and referred to committee
NY	HB3679	Provides that a study be done by the commissioners of health and education on telemedicine; defines such term; repealer.		Introduced and referred to committee
NY	SB4360	Authorizes the use of electronic medical records system when dispensing certain controlled substances.		Introduced and referred to committee
NY	SB4864	Enacts the 'telemedicine access act'; authorizes utilization of telemedicine in the treatment of patients.	Enacts the "telemedicine access act"; authorizes the practice of health care delivery, diagnosis, consultation, treatment, transfer of medical data and education using audio, video or data communications; requires informed consent prior to delivery of such health care and confidentiality of information derived there from; requires insurers to provide coverage for telemedicine; authorizes the education department to license the practice of telemedicine by physicians licensed in other states.	Introduced and referred to committee
NY	SB4944	Establishes New York health care electronic infrastructure board within the department of health to improve the quality of health care and reduce the cost thereof	Establishes the New York health care electronic infrastructure board within the department of health to improve the quality of health care and reduce the cost thereof; such board shall remain in existence for 3 years, seeking to redesign the health care system using information technology	Senate Health Committee meeting
NY	SB5037	Establishes a statewide taskforce to make recommendations on the development of telemedicine and telehealth systems.	a statewide telemedicine/telehealth taskforce to make recommendations on the development of telemedicine and telehealth systems to the governor and the legislature; establishes a telemedicine and telehealth demonstration program.	Introduced and referred to committee
OH	SB94	Telemedicine services		Introduced

State	Bill	Title	Description	Status
OR	SB541	Relating to Task Force on Electronic Medical Records; declaring an emergency	Creates Task Force on Electronic Medical Records. Directs task force to study and make recommendations for standards for transfer and exchange of electronic medical records and health-related data.	Referred to Budget
TX	HB794	Relating to the establishment of an advisory committee on health care information technology	Same as SB45	See SB 45
TX	HB916	Relating to creating the Governor's Health Care Coordinating Council		Signed - effective immediately
TX	SB45	Relating to the establishment of an advisory committee on health care information technology		Signed - effective 9/1/05
TX	SB1328	Relating to the privacy of protected health information		Referred to Health and Human Services
VA	HB2236	Patient records; protection of health data by hospitals	Hospitals sharing patient health data. Requires the Board of Health to implement regulations that require hospitals to have interoperability and sharing of patient health data through common data reporting formats and standardized methods of transmission while maintaining protections for the privacy of personal health information.	Adopted
VA	HB2430	Health care services; safety and quality by physicians	Health care provider data services. Requires the Commissioner to negotiate and contract with a nonprofit organization (Virginia Health Information) for compiling, storing, and making available to consumers data collected on physicians about safety and quality of health care. The nonprofit organization shall assist the Board of Health in developing a quality of care or performance information set for physicians, along with a mechanism to measure patient satisfaction, and in determining the process for collecting, compiling, and storing the information. The nonprofit organization shall assist the Commissioner in developing a centralized electronic clearinghouse for distributing quality of care, safety, and patient satisfaction information on health care providers to consumers.	Adopted
VT	HB446	The use of SSNs		Introduced

State	Bill	Title	Description	Status
VT	HB512	Statewide Hospital Performance Reports		Introduced
WA	HB1243	Increasing patient safety through disclosure and analysis of adverse events		Referred to Rules
WA	SB5064	Studying the use of electronic medical records	AN ACT Relating to electronic medical records and health information technologies; creating new sections; and providing an expiration date	Partial veto by Governor related to Section 3; remainder of bill approved
WA	SB5392	Improving the quality of health care through the use of clinical information technologies	AN ACT Relating to improving the quality of health care through the use of clinical information technologies	Referred to Ways & Means
WA	SB5748	Creating the office of health information and planning	AN ACT Relating to creating the office of health information and planning;	Referred to Ways & Means
WV	HB3039	Providing a tax credit to medical providers in an amount equal to their investment in electronic medical record technology	BILL to amend the Code of West Virginia, 1931, as amended, by adding thereto a new section, designated §11-27-38, relating to providing a tax credit to medical providers in an amount equal to their investment in electronic medical records technology.	Referred to House Finance

Appendix D: Inventory of RHIO Activity

State	Organization Name	RHIOs			RHIO "lite"			
		<1 yr	1-2 yrs	>2 yrs	ED focus	Uninsured focus	Disease-specific	Other
AL	St. Vincents Foundation - DOERS PRO							QM - Medication Errors
AL	Montgomery Community Wellness Coalition		X					
AK	Alaska Native Tribal Health Consortium - ANTHC			X				
AK	ASHNHA Program Services Company - Alaska Health Passport					X		QM - Medication Errors
AZ	Washintgon Regional HealthMedX Health Information Exchange			X				
AZ	Arizona Health Care Cost Containment System (AHCCCS) Health Information Exchange							
AZ	Tele-health Arizona Community Health Centers - CHC Collaborative Ventures, Inc.			X				
CA	Salano Coalition for Better Health - Virtual Clinical Network							
CA	The City of Fontana - Healthy Fontana Online						Diabetes	
CA	Sierra Nevada Community Organization for Improved Health Services							
CA	The City of Long Beach Department of Health and Human Services - Long Beach Networking for Health & Surveillance							
CA	California Association of Physician Groups - Provider-Payor Network clinical data exchange						Diabetes, Asthma, Cardiovascular Disease	
CA	Charles R. Drew University - Virtual Information Highway (VIH) model							
CA	L.A. Care Health Plan - Health-e-LA							
CA	CommerceNet - HealthConnect							

Regional Health Information Organizations

State	Organization Name	<1 yr	1-2 yrs	>2 yrs	ED focus	Uninsured focus	Disease-specific	Other
CA	La Maestra Family Clinic (LMFC) - Circle of Care					X		
CA	Scripps Health - Clinical Information Exchange Improvement Through Direct Patient Data Entry							Physician - Patient Communication
CA	Santa Barbara Regional Health Authority - Santa Barbara County Care Data Exchange (CDE)							
CA	County of Santa Cruz Health Services Agency - Santa Cruz County Health Information Exchange							
CA	Tulare District Hospital (TDH) - Tulare District Hospital Patient Care Collaborative							
CA	Yolo County Health Department - Collaborative Health Information Project (CHIP)							
CO	Roaring Fork Valley Community Health Plan							
CO	Colorado Access - Colorado Access Project to Enhance Provider-Member-Plan Communications							
CO	HRSA - Colorado Health Information Exchange (COHIE)							
CO	University of Colorado, Colorado Health Outcomes Program (COHO) - Connecting Colorado							
CO	Mesa County IPA - Mesa County Health Information Network							
CT	Griffin Health Services - C-VAMS							Women's Health
CT	Yale-New Haven Hospital - Wellness Information Network				X			
DE	Delaware Health Information Network							
DC	Maryland/DC Collaborative for Healthcare Information Technology							
FL	Health Information Advocacy, Inc. - Improving Health and Communication with the Patient Centric Record							
FL	Community Foundation of Central Florida - Healthcare Access Demonstration					X		
GA	Georgia Association for Primary Health Care - Georgia EMR	X						

Regional Health Information Organizations

State	Organization Name	<1 yr	1-2 yrs	>2 yrs	ED focus	Uninsured focus	Disease-specific	Other
GA	MCG Health System - OrderComm							Orders Management
GA	Medical College of Georgia Health System (MCGHS) - Tri-County Plus Rural Health Network (TCPRHN)	X						
GA	Tanner Medical Foundation on behalf of Tanner Health System - West Georgia Health Information Exchange							
HI	Hawaii Health Information Corporation (HHIC) - Hawaii Health Information Exchange							
HI	Hawaii Health Information Exchange - Quality Healthcare Alliance Health Information Exchange							
ID	North Idaho Rural Health Consortium - North Idaho Community Connections (NICC)			X				
IL	American Medical Association - Advancing an HIE for Cardiovascular Care	X					Cardiovascular	
IL	HIMSS - ePrescribing HIE							Medications
IL	College of American Pathologists (CAP) SNOMED International - Electronic Cancer Reporting							Cancer
IN	ScriptNet, Inc. - South-Central Indiana E-prescribing Network	X						Medications
IN	Neighborhood Health Clinics, Inc. - Allen County Connections for Care Network					X		
IN	Regenstrief Institute, Inc. - Indiana Health Information Exchange	X						
IN	Logansport Memorial Hospital (LMH) - Connecting Cass County for Better Health	X						
IN	South Bend Medical Foundation - South Bend Community HealthLinks			X				
IA	Genesis Visiting Nurse Association - Telehealth							Home Health
IA	University of Iowa Hospitals and Clinics - Using Physician-Patient Online Messaging to Improve Outcomes							Physician-Patient Communication
KS	Pratt Regional Medical Center - Jayhawk P.O.C.							

Regional Health Information Organizations

State	Organization Name	<1 yr	1-2 yrs	>2 yrs	ED focus	Uninsured focus	Disease-specific	Other
KY	Appalachian Regional Healthcare, Inc. - Connecting Healthcare in Central Appalachia							
LA	LaSalle General Hospital - Catahoula Consortium on Health Information Exchange					X		
LA	CHRISTUS Health Santa Rosa - Project Overcoming Isolation							Cystic Fibrosis
LA	LaSalle General Hospital - Catahoula Parish Consortium							
ME	Eastern Maine Medical Center - Regional Picture Archiving Communication System for Northern Maine		X					PACS
MD	MD/DC Collaborative for Health Information Technology			X				
MD	Geriatric Foundation - Smart E-Records across Continuum of Health (SERCH)							Geriatrics
MD	Georgia Association for Home Health Agencies, Inc. - HHCC Practice Patterns and Outcomes							Home Health
MA	Boston Medical Center - The Boston Community Health Information for Improvement (CHII) Project			X				
MA	Brigham and Women's Hospital - Statewide EHR Adoption and Health Data Exchange in Massachusetts							
MA	Massachusetts General Physicians Organization - Connecting Consumer Communities to Healthcare Providers	X						
MA	Massachusetts Health Data Consortium, Inc. - MA-SHARE MedsInfo e-Prescribing Initiative							Medications
MA	Fallon Community Health Plan - SAFE Health - Central Massachusetts		X					
MA	UMass Memorial Healthcare - Medication Administration Program							Medications
MI	South Central Michigan Health Alliance - Inter-Plan Guideline Adherence						Disease Mgmt	
MI	MHA Health Trust Applicant Agency - Voices of Detroit Initiative			X		X		

State	Organization Name	<1 yr	1-2 yrs	>2 yrs	ED focus	Uninsured focus	Disease-specific	Other
MI	Michigan State University - Implementing Interorganizational EMR to Improve Care for Disadvantaged Populations					X		
MI	Grand Rapids Medical Education & Research Center - Use of Smart Card Technology to Promote Community-Wide Diabetic Quality Improvement						Diabetes	
MI	Spectrum Health - DeVos Children's Hospital Campus - CLEAN: Communities Leveraging e-Health for Asthma Needs						Pediatric Asthma	
MI	Sparrow Health Center - Picture Archiving and Communications Systems							PACS
MI	The Health Care Interchange of Michigan - The Health Care Interchange of Michigan Care Data Exchange							
MI	Marquette General Health System - Upper Peninsula Health Data Repository			X				
MN	Community Health Information Collaborative - Patient Management System for Emergency Health Preparedness							Public Health Disaster Preparation
MN	Mayo Clinic - MN Collaborative Health Information Exchange System							Eligibility
MN	Central Minnesota Health Information Network							
MT	Deaconess Billings Clinic - Using Health Information Exchange to Reduce Medication Errors in the Rural Healthcare Setting							Medications
MT	Yellowstone City-County Health Department - Community Health Access Partnership			X				
NE	Rural Healthcare Cooperative Network - Nebraska Panhandle Regional Health Record Planning							
NE	Health Partners Initiative - Behavioral Health MIS Integration Project							Behavioral Health
NH	Dartmouth-Hitchcock Clinic - Furthering User-Friendly Systems for Informatics and Patient Online. (FUSION)			X				Physician-Patient Communication

Regional Health Information Organizations

State	Organization Name	<1 yr	1-2 yrs	>2 yrs	ED focus	Uninsured focus	Disease-specific	Other
NJ	Bayshore Community Hospital - Medication Information Network Exchange, (MINE)							Medications
NJ	New Jersey Primary Care Association - New Jersey Primary Care Association EMR Project	X						
NM	Consortium of MS Centers (CMSC) - eMS Health						Multiple Sclerosis	
NY	Maimonides Medical Center - HIE							Pediatrics
NY	University at Buffalo (SUNY) / Erie County Medical Center Healthcare Network - Western New York Emergency Department Triage Surveillance Project (WNYEDTSP)				X			
NY	Taconic IPA - Taconic Health Information Network and Community (THINC)			X				
NY	Adirondack Medicine Inc. - AMI Online Network (AMION)							
NY	Beth Israel Medical Center - Continuum Health Partners - MedMined Virtual Surveillance Project							Hospital Acquired Infections
NY	New York City Department of Health and Mental Hygiene - NYC Syndromic Surveillance				X			
NY	New York-Presbyterian Hospital - Anti-Coagulation Lab results through Open standards Technology (ACLOT)							Anti-Coagulation Lab
NY	Parkinson's Disease Foundation - Advancing Therapeutics in Parkinson's (APT)						Parkinson's Disease	
NY	Community Health Center HIE Consortium, Inc.							
NY	Rochester Health Commission - Rochester HealthNet							
NY	University of Rochester - Health-e-Access					X		Childcare
NC	WNC Health Network -			X				
NC	University of North Carolina Hospital System - Perinatal EMR							Prenatal
NC	Gaston Memorial Hospital - Patient Safety Net for Heart Failure Disease Management		X				CHF	

Regional Health Information Organizations

State	Organization Name	<1 yr	1-2 yrs	>2 yrs	ED focus	Uninsured focus	Disease-specific	Other
NC	WakeMed - North Carolina Health Information Exchange Consortium (NCHIEC)		X					
NC	North Carolina Healthcare Information & Communications Alliance, Inc. (NCHICA) - NC Community Medication Management Project							Medications
OH	HealthBridge			X				
OH	Berger Health System CPOE	X						Orders Management
OH	UHHS Richmond Heights Hospital (RHH) - Pathways to Medication Safety	X						Medications
OH	Wright State University, Center for Healthy Communities - HealthLink Miami Valley			X		X		
OH	The Twin City Hospital Corporation - Connecting Rural North East Ohio For Better Health							
OH	EMH Regional Medical Center - Women & Children Data Exchange							Women & Newborns
OH	Selby General Hospital - Rural Health Exchange							
OH	Community Health Alliance of NW Ohio (CHA) - Coordinated Patient Record System							
OH	Clinton Memorial Hospital - Laboratory Information System							Lab Results
OH	Clinton Memorial Hospital - Radiology Information System							Radiology Results, PACS
OK	Saint Francis Health System - Saint Francis Heart Hospital HIE							Cardiovascular
OR	Oregon Health and Sciences University - Portland Emergency Surveillance System				X			
PA	Susquehanna Valley Rural Health Partnership - SVRHP Regional Remote Pharmacy System							Medications
PA	Vision Research and Education Foundation - HIE to Prevent Blindness in four Specific Blinding Disorders, Diabetes, Glaucoma, Macular Degeneration & Retinopathy of Prematurity						Retinopathy of Prematurity	

Regional Health Information Organizations

State	Organization Name	<1 yr	1-2 yrs	>2 yrs	ED focus	Uninsured focus	Disease-specific	Other
PA	Mercy Catholic Medical Center of Southeastern Pennsylvania - Mercy Circle of Care Exchange Model							
PA	HealthRight, Inc. - Service Point							
PA	Pittsburgh Regional Healthcare Initiative (PRHI) - The Pittsburgh Health Information Network (PHIN)							
PA	University of Pittsburgh Medical Center - Patient/Physician Information Exchange (P2P)							Physician-Patient Communication
PA	Scranton Temple Residency Program, Inc. - Scranton Temple HIE (STHIE)						HIV/AIDS	
RI	Rhode Island Quality Institute - Rhode Island/HealthAlliant Project							Medications
SD	Sioux Valley Hospital - Sioux Valley Clinical Information System							
TN	Kingsport Tomorrow - Tri-Cities TN-VA Care Data Exchange Project (CareSpark)							
TN	UT Medical Group (UTMG) - Memphis Metro Area Technology Collaborative for Health (MATCH)			X				
TN	State of Tennessee - Volunteer eHealth Initiative							
TN	Vanderbilt Center for Evidence-based Medicine - Williamson-Wired Health Exchange for Kids							Pediatrics
TX	Texas Children's Hospital - Integrated Clinical Information System							Pediatrics
TX	Patient Safety Institute, Inc. - National Data Source Connectivity							
TX	University Health System - UHS HIE						Diabetes	
VT	Central Vermont Medical Center - Community Electronic Health Record							
VA	CenVaNet							
WA	St. Joseph Hospital Foundation - e-Prescribing: Strengthening County-wide Health Information Exchange							Medications
WA	Inland Northwest Health Services (INHS) - Community-Based Diabetes Health Information Exchange Project						Diabetes	
DC	MedStar Health, Inc. - Connecting Visiting Nurses, Patients and Physicians							

Regional Health Information Organizations

State	Organization Name	<1 yr	1-2 yrs	>2 yrs	ED focus	Uninsured focus	Disease-specific	Other
DC	Society of General Internal Medicine (SGIM) - Evidence-Based Medicine (EBM) Online							Education/ Workshops
WV	West Virginia Medical Institute - West Virginia Patient Safety Project							Patient Safety
WI	South East Wisconsin Bioterrorism Preparedness Group, Inc. - Wisconsin Health Informaton Exchange							

Appendix E: Other Sources of Information

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4. Connecting Communities For Better Health, Washington, D.C., (<http://ccbh.ehealthinitiative.org>).
5. eHealth Initiatives, Washington, D.C., (www.ehealthinitiative.org).
6. Office of the National Coordinator for Health Information Technology (ONCHIT), Washington, D.C., (www.hhs.gov/healthit/).
7. "The Health IT Strategic Framework Report: The Decade of Health Information Technology: Delivering Consumer-centric and Information-rich Health Care", ONCHIT, July, 2004.
8. "Revolutionizing Health Care Through Information Technology", The President's Information Technology Advisory Committee (PITAC), June, 2004.
9. Transcript of ONCHIT technical assistance call, 2004.
10. "Health Information Technology Leadership Panel: Final Report", U.S. Department of Health and Human Services, May, 2005.
11. "Linking Health Care Information: Proposed Methods for Improving Care and Protecting Privacy", 2005, Connecting for Health (www.connectingforhealth.org), The Markle Foundation.
12. Executive Summary, U.S. Department of Health and Human Services, Office of National Coordinator for Health Information Technology, 2004.
13. "Achieving Electronic Connectivity in Healthcare: A Preliminary Roadmap from the Nation's Public and Private-Sector Healthcare Leaders", Connecting For Health, The Markle Foundation, 2004.
14. Final Report, Connecting for Health, The Personal Health Working Group, July, 2004.
15. "State and Regional Demonstrations in Health Information Technology", The Agency for Healthcare Research and Quality (AHRQ), October, 2004.
16. American Health Quality Association (AHQA), Washington, D.C., (www.ahqa.org).

17. Healthcare Information and Management Systems Society, Chicago, IL, (www.himss.org).
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19. “Health Information Technology Legal Analysis: Structuring Regional Health Information Organizations (RHIOs) to Limit the Risk of Self-Referral and Anti-kickback Law Violations”, Robert G. Homchick, Esq., Davis Wright Tremaine, LLP, Seattle, WA.
20. “Model Approaches to Financing, Aligning Incentives, Public and Private Sector Payers”, Health Technology Strategies, May, 2005.
21. “Design and Implementation of the Indianapolis Network for Patient Care and Research”, Overhage, M., Tierney, W., and McDonald, C., Bulletin of the Medical Library Association, 83(1), 1995.
22. “Strategies for Creating Successful Local Health Information Infrastructure Initiatives”, Lorenzi, N., Department of Biomedical Informatics, Vanderbilt University, December, 2003.
23. “Advanced Technologies to Lower Health Care Costs and Improve Quality: Executive Summary”, Massachusetts Technology Collaborative, October, 2003.
24. “Summary of Nationwide Health Information Network (NHIN) Request for Information Responses”, U.S. Department of Health and Human Services, Office of National Coordinator for Health Information Technology, June, 2005.
25. “Get Connected Knowledge Forum, 2005”, Sponsored by eHealth Initiative, HealthVision, Inc., and Voluntary Hospitals of America, Dallas, TX, June, 2005.