CONNECTING FOR HEALTH[SM]

MARKLE FOUNDATION   *A Public-Private Collaborative*

FINANCIAL, LEGAL AND ORGANIZATIONAL APPROACHES TO ACHIEVING ELECTRONIC CONNECTIVITY IN HEALTHCARE

Working Group on Financial, Organizational, and Legal Sustainability of Health Information Exchange

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Executive Summary

The U.S. healthcare system faces numerous well-documented challenges, including rapidly rising costs, a high number of avoidable medical errors, and industry-wide productivity losses resulting from inefficiencies. Many policy and industry leaders have begun to recognize the importance of information technology (IT) in addressing these problems. IT systems can help to provide greater transparency to purchasers and consumers as they attempt to select and reward high-quality plans and providers. Much has been written about their ability to also improve quality and cost-effectiveness of care by assisting patients and providers in making informed, cost-conscious, evidence-based decisions across the continuum of care. Collaboration between the public and private sectors will be essential to promoting IT adoption by the industry. Strategies will have to be carefully coordinated to ensure that electronic health records (EHRs) and supporting technologies are successfully adopted and implemented. To achieve these objectives information tools must be in place at the point of care together with the necessary level of connectivity to allow timely information exchange across healthcare settings.   That is, the ability to access health information from across healthcare settings is critical to realizing the full quality, safety and efficiency benefits of IT.

In an effort to stimulate the adoption of much-needed IT systems in healthcare, the Connecting for Health Working Group on Financial, Organizational and Legal Sustainability of Health Information Exchange worked from February to July 2004 on two key tasks: an analysis of the legal and organizational issues and barriers related to health information exchange, and a high-level qualitative financial analysis of the business case for adoption of clinical information systems from the providers' perspective. This work focused primarily on health information exchange within the ambulatory care physician practice setting, especially small and medium-sized practices that are home to half of the nation's physicians. The goal was to develop an in-depth understanding of the barriers faced by ambulatory care providers in adopting health information technology (including technologies that allow for information exchange across settings), and then to use this new-found knowledge to identify potential starting points and near-term opportunities for physician practices to adopt healthcare information technology (IT).

The analysis had two major components. The first examined the financial incentives and other supporting mechanisms that would be necessary to significantly increase adoption of an EHR by small and medium-sized practices. This analysis focused on whether the business case is sufficiently strong to support adoption of clinical information systems by providers. Widespread adoption of EHR by this segment of the industry (which accounts for more than 50% of all physicians) is critical to achieving extensive regional and national interconnectivity that will allow for information exchange across healthcare settings. The second component evaluated the legal and organizational barriers that need to be addressed to further regional and national interconnectivity. This analysis is critical because even if EHR is widely adopted, these barriers can inhibit the ability to exchange clinical data across providers.

High-level recommendations and key findings are listed below and also summarized in greater detail at the end of the document.

Recommendations and Key Findings Related to Financial Incentives and the Business Case for IT Adoption

1. Financial incentives will be necessary to encourage healthcare providers to adopt IT that allows for connectivity and information exchange that can improve the quality of care. Technical requirements for interoperability and information exchange should be based on a "Common Framework" as articulated in the Connecting for Health publication Achieving Electronic Connectivity in Healthcare: A Roadmap from the Nation's Public and Private-Sector Healthcare Leaders.

2. Financial incentives, regardless of the way in which they are derived (e.g. pay for performance or another incentive structure) for small and medium-sized practices will need to cover most of the initial costs of the EHR. Incentives in the range of $12,000 to $24,000 per full-time physician per year should achieve broad adoption of EHR on an accelerated timetable based on early empirical data. For a primary care physician, these incentives translate into roughly $3 to $6 per patient visit or $0.50 to $1.00 per member per month.

3. The qualitative analysis supports a business case that is better for some "incremental applications" than others. These incremental applications can be implemented as steps toward the full implementation of an EHR, but do not necessarily need to include all of the functions of a full application.

Recommendations and Key Findings Related to Organizational and Legal Barriers to IT Adoption

1. Communities should assess their readiness for local and regional data sharing by conducting a rigorous review of the technical, clinical, and organizational capacity and capabilities, as well as the level of community commitment and the availability of local leadership to spearhead the effort. Each of these is a critical success factor in building and managing a local health information infrastructure.

2. Communities will require a source of activation to catalyze or enforce convening of the organizations that would participate in a health information exchange infrastructure.

3. While small and medium-sized practices have greater potential to benefit from interoperability, they need to receive greater attention and support if they are to adopt clinical IT applications and participate in health information exchange on a lasting basis.

4. Most management and legal issues related to the establishment of a secure, confidential health information infrastructure can be addressed in the context of existing law and through use of contracts. Nonetheless, there is a need to guide regional efforts by providing access to examples of legal agreements and to the experiences of others.

5. Changes to current policy and market-based actions can provide greater protections and opportunities for individuals and healthcare organizations that engage in information sharing.

6. As the implementation of systems that allow for health information exchange matures, policy and regulatory changes may be necessary to ensure that adoption is sustainable. These changes will likely be necessary to deal with issues that are not yet fully understood, including security and privacy, medical malpractice, and practice transformation.

Achieving widespread adoption of EHRs and full interconnectivity across healthcare settings will require a coordinated effort of the government and private sector. However, the enormous public good that is at stake requires that government play a critical role in driving change within the industry.

Financial Incentives for IT Adoption and Interoperability

Background: How the Incentive Package Was Developed and Cautionary Notes

Ambulatory care practices are on the front line for the treatment of patients in the United States today, specifically the chronically ill, the populations most in need of the type of coordinated care that good IT systems can facilitate. Yet physicians who practice in these settings have the lowest IT adoption rates of all providers in the country, with only an estimated 6% to 13% of these practices having implemented an EHR in 2001.[i] Not surprisingly, adoption is lowest in the small and medium-sized physician practices that

account for more than 50% of the physicians in the country, and tend to exist in greatest proportion in rural areas. Because these practices serve so many patients and have access to so little IT, they became the focus of the analysis. The pattern of low adoption in small practices is not universal among developed countries such as those in the UK, leaving us with little reason to believe that it cannot be overcome.[ii]

The goal in conducting this qualitative financial analysis was to develop an estimate of the level of incentive that would be necessary to encourage a significant increase in EHR adoption among small and medium-sized physician practices. The package of incentives was designed to accelerate adoption of specific clinical applications by providers, not full-fledged interconnectedness, as there is a dearth of data on which to base the cost of a physician practice's participation in a fully interoperable infrastructure.

Achieving care improvements, using interoperable EHRs requires a significant economic investment by the practice and difficult changes in practice operations. For practices to make these investments and effect needed changes, incentives must exist and be of sufficient size. Gains in practice internal efficiencies are often insufficient to lead to interoperate EHR adoption.

The financial analysis was based on the assessment of "use cases". Each "use case" is a real-life scenario where IT could help various stakeholders (e.g., patients, physicians, hospitals) in different situations, such as routine care, ongoing chronic disease management, and emergency care. The use cases analyzed related to the following IT applications: an electronic health record (both for primary and specialty practices, with connectivity across practices), online chronic disease management, and electronic prescribing (or eprescribing).

The analysis evaluates each use case from the perspective of a five-physician primary care practice and a similarly sized cardiology practice. The analysis provides a comprehensive assessment of the costs and benefits of adoption over a three-year period; this period was chosen to account for the need to amortize capital costs over time and the fact that improved efficiencies may not be realized immediately. Although ambulatory care practices vary greatly in their size, specialty, and geographic location, the conclusions from the analysis of this "typical" practice can be broadly extended across most small ambulatory non-specialty practices, since they tend to face a similar set of IT implementation and infrastructure issues.

The recommendations laid out in the section below should be interpreted with the following stipulations:

- Although the financial analyses in this paper are thought to be applicable to a variety of small and medium-sized practices, they should not be interpreted as the exact net benefit for all ambulatory practices. Many factors influence IT costs and benefits, including practice size, specialty and geography. In addition, other factors suggest that caution should be used in applying these general findings, lessons, and recommendations to other ambulatory settings; these factors include cross-practice and cross-market variations in operational efficiency, hospital affiliation, degree of IT support, and existing levels of incentives for IT adoption.

- These estimates should be considered preliminary and in need of improvement through practical application. Because there is a dearth of data to work with concerning the financial impact of IT on the ambulatory practice, we relied heavily on qualitative research and the expertise of the Working Group to develop the basis for the financial analysis framework.

- The financial incentive estimates are starting points only, thought to be sufficient to provide momentum for IT adoption in the market. They do not cover the costs related to a physician practices' participation in full regional and national interconnectivity, as there is a lack of complete data on these costs. In addition, it is important to remember that there are a number of other factors that contribute to the successful, sustainable adoption of healthcare IT. Critical success factors related to successful implementation and achievement of full interconnectivity are discussed below, and they should be considered an essential complement to any financial incentives.

Introduction

Working Group Purpose

In an effort to stimulate the adoption of much-needed IT systems in healthcare, the Working Group on Financial, Organizational and Legal Sustainability of Health Information Exchange worked from February to July 2004 on two key tasks: an analysis of the legal and organizational issues and barriers related to health information exchange, and a high-level qualitative financial analysis of the business case for adoption of clinical information systems from the providers' perspective. This work, conducted within the framework of Phase II of Connecting for Health, focused on health information exchange for the ambulatory care physician practice with the following goals:

- Clarify and improve the understanding of barriers and opportunities to achieving sustainable adoption of health information technology and information exchange.
- Identify starting points, near-term opportunities and success factors for physician practices to adopt healthcare information technology with the goal of health information exchange.
- Create a framework that will help advance the realization of a health information infrastructure deployed on a regional and national level.
- Support policy leaders in understanding possible incentive structures and policy changes that would support clinical information technology adoption and health information exchange.

The analysis had two major components. The first examined the financial incentives and other supporting mechanisms that would be necessary to significantly increase adoption of an electronic health record (EHR) by small and medium-sized practices. This analysis focused on whether the business case is sufficiently strong to support adoption of clinical information systems by providers. Extensive adoption of EHR by this segment of the industry (which accounts for more than 50% of all physicians) is critical to achieving extensive regional and national interoperability[1] that will allow for information exchange across healthcare settings. The second component evaluated the legal and organizational barriers that need to be addressed to further regional and national interconnectedness. This analysis is critical because even if EHR is widely adopted, these barriers can inhibit the ability to exchange clinical data across providers.

Working Group Process

The nine (9) members of the Working Group represented a mix of the nation's leading health services researchers, clinical and financial executives, and legal professionals with extensive experience in issues related to health information exchange.

Working Group members include:
- David J. Brailer, MD, PhD (Original Chair)*, National Health Information Technology Coordinator; U.S. Department of Health and Human Services; formerly Senior Fellow for Information Technology and Quality of Care, Health Technology Center
- John Glaser, PhD, (Current Chair)*, Chief Information Officer, Partners HealthCare Systems Inc
- Peter Basch, MD, Medical Director, eHealth Initiatives, MedStar Health; Co-chair, Physicians EHR Coalition

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[1] The Working Group defines "interoperability" as an attribute of an information system that has the capabilities necessary to make data easily accessible by multiple, different systems via standards or other mechanisms. The Working Group defines "interconnectedness" as the activity of exchanging data between stakeholders in the care process. Interconnectedness can be less expensive and easier to achieve with interoperable systems, but it does not require interoperable systems. A system that supports interoperability may not necessarily be used to support interconnected care delivery.

- David Bates, MD, MSC, Chief of the Division of General Medicine at Brigham and Women's Hospital and Medical Director of Clinical and Quality Analysis for Partners HealthCare System
- Lawrence Casalino, MD, PhD, Department of Health Studies, University of Chicago
- Rich Grossi, MBA, Vice President and Chief Financial Officer, Johns Hopkins Medicine
- Nancy Lorenzi, PhD, Professor of Biomedical Informatics and Assistant Vice Chancellor for Health Affairs Vanderbilt University Medical Center
- Robert Miller, PhD, Associate Professor, Department of Social & Behavioral Sciences, Institute for Health & Aging, and Institute for Health Policy Studies
- Peter Swire, JD, Moritz College of Law, Ohio State University, John Glenn Scholar in Public Policy Research; formerly, Chief Counselor for Privacy in the U.S. Office of Management and Budget
- Lori Evans, MPH, MPP, (Ex Officio member), Office of the National Health Care Information Technology Coordinator, U.S. Department of Health and Human Services; formerly Vice President and Program Director, Foundation for eHealth

    * David Brailer initially chaired this Working Group. However, when HHS Secretary Thompson appointed him the United States' first Health Information Technology Coordinator on May 6, 2004, he was obliged to resign as chair. Leadership of the group was assumed by John Glaser.

Staff included:
- Julie Vaughan Murchinson, MBA, Project Director, Consultant to the Markle Foundation
- Robin Omata, JD, PhD, Legal Staff, Consultant to the Markle Foundation

There is a dearth of data concerning the financial impact of IT on ambulatory practice, and a limited experience base to draw upon related to legal and organizational issues resulting from health information exchange across healthcare organizations. Working Group staff conducted literature reviews, interviewed industry experts, and developed an analytical methodologies and frameworks, with assistance from the Working Group during conference calls, in-person meetings and sub-group working sessions. The Working Group validated the methodology and frameworks and provided expert opinion where research was lacking.

The Working Group also created an Expert Review Panel consisting of leading experts who offered a variety of perspectives on the topic. This panel included representatives from employers, health plans, vendors and the federal government. The Expert Review Panel reviewed the framework and analysis to provide additional depth and clarification on issues and evaluated and assessed the viability of proposed solutions. The Expert Review Panel included the following industry authorities:

- William Bernstein, MA, JD, Esq., Partner, Manatt, Phelps & Phillips LLP
- Francois de Brantes, MBA, Program Leader, Health Care Initiatives, General Electric Corporate Headquarters
- Charles Cutler, MD, MS, National Quality Management Medical Director, Aetna, Inc.
- Bruce Fried, JD, Esq., Partner, Sonnenschein Nath & Rosenthal LLP
- Mark Frisse, MD, MBA, Professor and Director, Regional Health Informatics, Vanderbilt University
- Katie Magill, MBA, Vice President, Operations System Strategy, Health Net, Inc.
- David Masuda, MD, MS, Professor, University of Washington
- Dan Mendelson, MPP, President, Health Strategies Consultancy LLC
- Sheera Rosenfeld, MHS, Senior Analyst, Health Strategies Consultancy LLC
- Joe Scherger, MD, MPH, University of California, San Diego
- Alan Sokolow, MD, Vice President and Chief Medical Officer, Empire Blue Cross Blue Shield
- William Stead, MD, Director of the Informatics Center**,** Associate Vice Chancellor for Health Affairs**,** Vanderbilt University Medical Center
- Thomas Sullivan, MD, President, Massachusetts Medical Society, Women's Health Center Cardiology
- Carl Volpe, PhD, Vice President, Strategic Business Support, Healthcare Quality Assurance Division, WellPoint Health Networks Inc.

- Andrew M. Wiesenthal, MD, SM, Associate Executive Director, The Permanente Federation
- Jon Zimmerman, Vice President, Health Connections, Siemens Health Services

State of the Industry

Healthcare costs are rising and quality of care concerns are growing increasingly worse.

The Institute of Medicine (IOM) has estimated that between 44,000 and 98,000 deaths occur each year as a result of a preventable medical error in hospitals.[iii] Medication errors account for 1 of 131 ambulatory deaths and 1 of 854 inpatient deaths.[iv] Patients are increasingly vulnerable to errors due to lack of complete patient-specific information at the point of care. In addition, the medical community is struggling to incorporate the latest medical evidence into clinical practice. Current estimates indicate that it takes 17 years to translate evidence into practice[v], and that patients receive evidence-based care only about 50% of the time.[vi]

2004 will mark the fifth consecutive year of double-digit increases in healthcare costs, a trend that is causing intense frustration for most stakeholders.[vii] Healthcare purchasers, including public and private sector employers, find that the rising costs of healthcare benefits are increasingly threatening their financial stability. Health plans are feeling increased pressure to control costs for their employer clients through cost-containment and quality management strategies. Consumers, who are being forced to absorb higher out-of-pocket expenses, are also growing increasingly concerned with rising costs.

As medical science advances and as the population grows and ages, the demand for healthcare services--especially new diagnostic tools and treatments--will continue to increase, thus exacerbating both the cost and quality problems that the industry faces today. The IOM asserts that a major way to reduce the high number of errors in the medical system is widespread adoption of information technology, such as electronic medical records, that can collect and share essential health information on patients and their care.[viii] Other studies show that proper use of clinical information systems can improve patient safety, quality, and the management of care across the continuum.[ix]

Adoption of clinical information systems is slow.

Despite the promise of IT, physicians and hospitals are not adopting clinical information systems at a very rapid rate. There are three primary reasons for this slow rate of adoption. First, while these IT systems have been shown to provide financial benefits, little, if any, of these benefits (including avoiding office visits, reduction in acute care, and improved compliance with medications) accrue to the small office providers who pay for the systems. Instead, the benefits are enjoyed by other organizations, including health plans and employers. Second, provider organizations that implement new IT systems often must make difficult modifications to their existing clinical workflow and decision-making processes. Not surprisingly, clinicians who work in these organizations are often reluctant to make such changes, particularly in the absence of any perceived benefits to the organization. Finally, there are barriers to connecting these systems to allow for information sharing among disparate organizations through regional and national interoperability. These barriers include perceived legal limitations on such information sharing and the limited capacity of healthcare organizations to organize regionally.[x] The net result is that very few providers have adopted sophisticated IT systems. Ambulatory care practices have also largely failed to adopt IT systems; an estimated 6% - 13% of practices had an EHR in place in 2001.[xi] Smaller practices, not surprisingly, have lower adoption rates than do larger practices.[xii]

The promise of EHRs and other clinical information technology remains, however. Studies indicate that such systems can advance the quality and efficiency of care, resulting in a variety of potential benefits, including reduced medical errors and utilization, improved ability to manage chronic disease, and increased longevity and health status.[xiii] This disconnect between the potential of clinical information technologies to generate substantial benefits for the healthcare system and the nation as a whole and

providers' relative lack of willingness to adopt them raises the question of whether the market is appropriately supporting the purchase of such technologies.

Infrastructure to support access to patient information is not pervasive.

Recent studies have shown that clinical applications must interconnect if small and medium-size physician practices are to achieve the vast majority of the clinical decision benefit of an EHR. Such interconnectivity provides sufficient sources of data for patient information[xiv] and it supports vital functionality, including advanced decision-support systems. To connect clinical applications, however, the healthcare industry must deploy a common technical framework based on open standards, built on the Internet as a network of networks, and healthcare organizations must work together to share information. Health systems, providers, payers and consumers are engaged in community-level health information exchange projects in several states, although the scope and formality of these efforts vary significantly, as do the expected results. Nonetheless, these projects represent a growing trend nationwide. At the same time, however, many employers and public and private payers have been cautious in helping providers make investments in systems that allow health information exchange—with good reason. First, healthcare has a legacy of failed attempts at achieving community-wide information exchange. Second, to date the technical requirements for achieving interoperability and connectivity are not specified. Payers and purchasers who understand the benefits of "connected IT" and who want to invest worry about realizing the benefits. Funding technology silos in the absence of a common technical framework that would enable information exchange will not result in the expected benefits, and successful adoption and implementation of systems will remain elusive. Thus, the bottom line is that--despite strong interest in regional models--numerous challenges remain in the current environment to the development of successful regional information exchange initiatives.

Technological convergence is making affordable IT and information exchange within healthcare a real possibility.

Investments in EHRs and supporting communications technologies in the United States take place within a broader context of rapid scientific, engineering, and manufacturing advances in core technologies, including computer hardware, software (including "middleware" and information management applications), telephony, and other communications technologies such as Wi-Fi. Traditional healthcare information technology products have been sold in suites and modules that do not always support accessibility of patient-specific information across them. With the existence of interoperability of patient information, the healthcare system can begin to systematically incorporate medical knowledge into personalized treatment decisions via decision-support functionality. At the same time, technological convergence on open architecture and modularity raise questions about the appropriate role of government in regulating the healthcare industry's transition to an advanced technological state to avoid harmful market concentration in spurring standardization of technical components and devices, and in providing oversight for the emerging technical infrastructure or communications "grid".

The business case is often not sufficiently strong to support adoption of clinical information systems.

Some have called the abysmally low EHR adoption rates and lack of infrastructure for interoperability a "market failure". Those who hold this view see a "value imbalance"--that is, the physician who purchases the EHR sees little benefit from it while and the payers and employers stand to make significant gains.[xv] While many believe that the Federal government should step in to create a technical infrastructure and promote incentives for adoption, pervasive adoption and full interoperability will require a coordinated effort of both the public and private sector. Whether and how the health industry effectively invests in health information technology will depend not only on the ability of providers to generate or gain access to capital, but also on actions by industry and government to reduce the structural market and regulatory impediments to adoption.

Comprehensive market- and policy-based actions will have to address the key factors associated with lagging adoption, including: 1) Industry fragmentation and the lack of a financial incentive for providers to invest; 2) Low industry margins combined with a high minimum threshold level of capital investment required for widespread adoption of EHRs; 3) Professional autonomy and resistance to automation and external controls on medical practice; and 4) American exceptionalism (i.e., lower adoption rate in the U.S. as compared to other developed countries).[xvi]

Federal government response

- The enormous public good that is at stake--including the potential for reductions in medical errors, lower healthcare costs, and improved health status for Americans--requires the government to play a critical role in driving change within the public and private sectors of the industry. With President Bush's appointment of the Office of the Coordinator of Health Information Technology (ONHCIT) on May 6, 2004, and the subsequent release of the Framework for Strategic Action on July 21, 2004, the federal government is recognizing the need to promote IT and health information exchange as a means of improving the quality and cost-effectiveness of care, and is developing strategies for achieving that goal.

Problem Definition

Extensive regional and national interoperability will not be possible unless two goals are accomplished—an EHR is widely adopted by healthcare providers and an infrastructure for information sharing is developed. One without the other will not suffice. Ambulatory (non-surgical) practices are on the front line for the treatment of patients in the United States today, specifically the chronically ill who are in most need of the type of ongoing, coordinated care that strong IT systems can facilitate. Ambulatory practices account for more than 50% of the physicians in the US[xvii], yet physicians who practice in these settings have the lowest IT adoption rates of all providers in the country.

This segment of the industry is critical to realizing the vision of interoperability of patient information. Yet until recently, very little work had been done to analyze the financial, legal and organizational barriers that need to be addressed to realize the vision of regional and national interconnectedness among healthcare providers and, specifically, among small and medium-sized practices.

To address this knowledge gap, the Working Group set out to identify the following:

- What financial and support mechanisms are necessary to significantly increase EHR adoption by small and medium-sized physician practices.
- What legal and organizational barriers need to be addressed to further regional and national interconnectedness?

This report presents a set of frameworks for analyzing these issues so that common lessons can be shared.

Analytic Approach

To perform the financial, legal and organizational analyses, the Working Group utilized its own expertise and the support of two analytical tools:

- **Use Cases** - real-life scenarios that depict problems that could be addressed with clinical information technology in place

- **Alternative Futures** - hypothetical future environments that collectively provide a structured way of imagining various possible future scenarios, thus helping to better understand how environmental factors could influence recommended actions

To develop the legal and organizational analysis framework, the Working Group established four alternative futures that served as a guide for understanding how EHR might be used in the future. Each of these potential future uses for EHR was examined to identify any issues that might arise, along with strategies for resolving these issues. For the qualitative financial analysis, the Working Group analyzed the impact of the degree of interoperability and the strength of financial incentives in each of the alternative futures. The use cases were analyzed to identify and evaluate potential catalysts for accelerating adoption.

Use Case Scenarios

Use cases reflect real-life scenarios that state a business problem that could be addressed through use of clinical information technology. The scenarios typically involve a variety of stakeholders (e.g., patients, physicians, hospitals) in a variety of situations (e.g., routine care, emergency care) that highlight how technology and policy might have an impact on real people and organizations. The use cases analyzed are the following:

- Use Case #1 – EHR for primary care practice with connectivity among physician practices
- Use Case #2 – Online chronic disease management system
- Use Case #3 – E-prescribing system
- Use Case #4 – EHR for specialty practice with connectivity among physician practices

What follows is a summary of the use cases along with a description of the importance of clinical information systems in addressing the problems raised in these scenarios:

Use Case #1 - Electronic Health Record for primary care practice with connectivity among physician practices	
Scenario	Samantha, her husband and her one-year-old son live in San Francisco. After Samantha's employer changed health plans, she discovered that her new plan did not include her current obstetrician/gynecologist (ob/gyn) in its provider network. Soon afterwards Samantha learned that she was pregnant again. She chose and then visited her new ob/gyn and found herself completing the same health history and medical forms that were in her file at her former doctor's office. Unfortunately, she could not remember the name of the medication she was prescribed after her son's birth, and she also forgot to indicate her drug allergies. She spent so much time during her first appointment with her new provider recounting the problems she had experienced during her last pregnancy and birth that there was no time left for her to discuss how she wanted to approach this pregnancy or for her to learn anything about her new ob/gyn.
How electronic connectivity can help	If an EHR had been in place at the office of Samantha's previous ob/gyn, it would have included all of the information she recounted during her initial visit with her new ob/gyn, including medication and allergy lists and personal and family health histories. If her new doctor had an EHR that interconnected with that of her old doctor, information from Samantha's previous record could have been integrated into a new record. Her new doctor could have reviewed the EHR prior to Samantha's appointment or they could have reviewed it together during the exam. If Samantha had a personal health record (PHR) with information from all of the doctors, insurance providers, clinics and hospitals used during her last pregnancy and birth, she could give her new doctor permission to access that comprehensive set of information Alternatively, Samantha could simply bring the PHR with her to the appointment. Since Samantha's PHR might contain information not included in her former doctor's EHR, she would be able to offer a more complete picture of her health history to her new physician.

Use Case #2 - Online Chronic Disease Management system	
Scenario	Paul, who lives in New Orleans, was recently diagnosed with Type 2 (adult onset) diabetes. His doctor gave him a glucometer to measure his blood sugar so as to help him keep track of his insulin needs. In addition, Paul is visiting a Certified Diabetes Educator (CDE) in order to learn how to improve his diet and activity level to better control his blood sugar. Before being diagnosed with Type 2 diabetes, Paul had little knowledge regarding healthy eating habits and the benefits of exercise. Since being diagnosed, he has made significant changes in his lifestyle to better manage his condition, and he needs to see how his diet and exercise habits influence his blood sugar levels. Like many newly diagnosed diabetes patients, Paul has found it difficult to manage his blood glucose levels. As a result, his doctor and CDE need to monitor his condition closely, especially in these early stages, to avoid any serious issues from manifesting. More specifically, they need to monitor his medications (including insulin doses), diet and exercise regime on a weekly, if not daily, basis. The goal is to coordinate their treatment plans in a way that maximizes Paul's ability to adhere to the plans and thereby manage his diabetes. To that end, both the doctor and CDE would like to add Paul's medical records to EHRs that are kept at their individual offices.
How electronic connectivity can help	An online chronic disease management tool can help Paul monitor his diabetes at home. He would be able to download his glucometer readings onto his computer and add his diet and exercise habits throughout the day. Paul could then graph the relationships between his diet/activity levels, blood sugar readings, and insulin needs to see how each affects the other. He could also see if his blood sugar levels got dangerously high or low based on predetermined levels set by his healthcare team. The results from this chronic disease management tool could be sent to his doctor and CDE to enable them to better monitor the success of his treatment plan. Alternatively, the doctor and CDE could be given permission to log into Paul's system and see the records for themselves. Both could send Paul comments on his progress through e-mail or directly through the system, pointing out their views on how his diet and exercise habits influence his blood sugar levels and need for insulin.

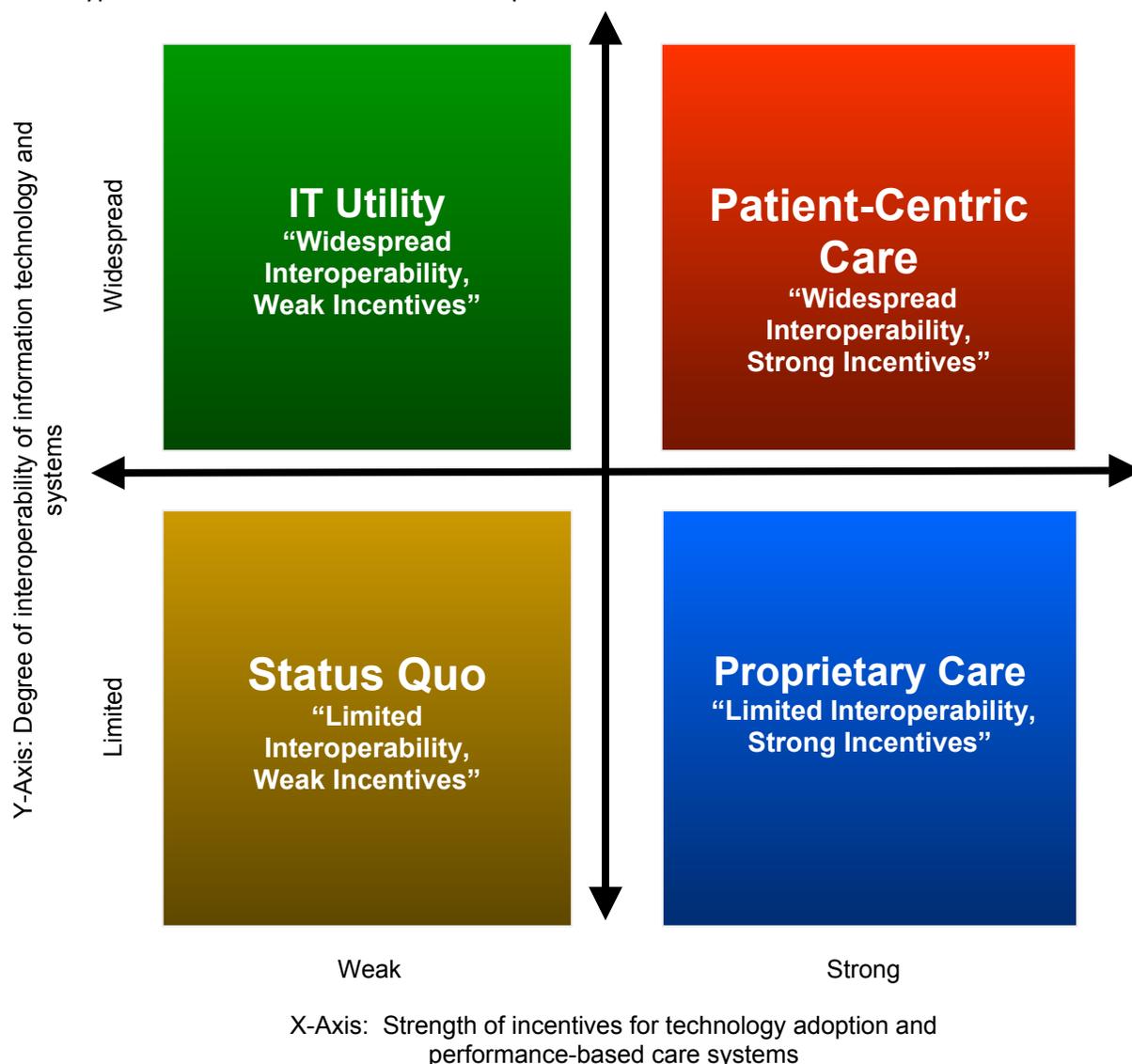| Use Case #3 – E-prescribing system	
Scenario	Dr. Jones is an internist in Boston. Many of the patients he sees have at least one chronic health condition for which they take medication, such as diabetes, asthma or GERD. He spends a significant amount of time during most appointments discussing his patients' medications with them. Appointments often end with him writing a new prescription either to replace a medication or to help with a new problem. Some of his patients take more than one medication, and he is often concerned that they may not be taking the medication properly or even filling their prescriptions on a regular basis. He also knows that many medications can interfere with one another, including drugs that he may be unaware his patients are taking, such as over-the-counter medications or drugs prescribed by other doctors. Unfortunately Dr. Jones only knows about the medications he prescribes and what patients tell him they are taking. Often patients don't view aspirin, Tylenol, or vitamins as medications, so they neglect to report they are taking them. Or patients simply may forget which medications Dr. Jones knows about and which he does not. Once the patient takes Dr. Jones' prescription to the pharmacy, he often faces even more demands on his time. He frequently receives phone calls from pharmacists who need to verify what he has written about the drug or dosage, or who want to talk about potential interaction issues, problems with the patient's insurance coverage for a particular drug, or a patient's unwillingness or inability to pay for a medication that is included on one of the higher tiers of a health plan's co-payment scheme.
How electronic connectivity can help	An e-prescribing system would allow Dr. Jones quick and easy access to all the medications he has prescribed for any patient. By reviewing these before or during appointments, Dr. Jones could discuss with the patient any medication-related concerns. When prescribing a new medication using the e-prescribing system, Dr. Jones would be alerted to any potential adverse interactions with other medications he had prescribed previously. He could also use the system to quickly look up common over-the-counter medications to see if they might interact with the medications he prescribed. Integration with an EHR would allow patients to send secure messages to Dr. Jones if they were having problems with their medications or with their health in general. He could make modifications to their drug regimens without having to ask patients to come in for an appointment. Dr. Jones's patients could use a PHR to track the medications prescribed by other providers as well as over-the-counter drugs. Dr. Jones could request access to these medication lists and match them against his own to look for potential adverse reactions or allergies. His patients could also allow their pharmacists to access their records to check for adverse interactions and indicate that a prescription had been filled.

Use Case #4 – Electronic Health Record for specialty practice with connectivity among physician practices	
Scenario	Dr. Bednarek has been Jane's primary care physician for over 20 years, so it both concerned and saddened her when she and Jane discovered a heart abnormality. Dr. Bednarek referred Jane to a cardiologist for more tests and advice on treatment. Dr. Bednarek would like to stay informed as to how Jane's treatment is going. The cardiologist, meanwhile, needs a number of records form Dr. Bednarek and other ancillary providers to prepare to see Jane and to oversee her treatment.
How electronic connectivity can help	Electronic access to Jane's record via EHR (or some form of clinical communication such as a Clinical Care Record or CCR) would help the cardiologist have the necessary records for Jane in hand before her first visit. With Jane's permission, her diagnosis and treatment regimen could also be made available to Dr. Bednarek, enabling her to stay up-to-date on Jane's progress without having to schedule extra appointments with her patient or having time-consuming conversations with the cardiologist. Jane could benefit from access to the EHR so that she can better recall the treatment regimen. An EHR could also send a reminder to Jane to get her proper screenings.

No one can know for certain what the healthcare environment will look like in a few years. But educated guesses about the future can be helpful in choosing pathways that are most likely to accelerate private-sector and governmental support of rapid adoption of clinical IT.

The "hypothetical future environments" that follow are statements of possible realities that allow examination of the relationship between the healthcare system and its environment, as well as focused thinking about the potential impact of various actions. The Working Group chose to isolate and examine two dimensions of environmental change—the level and kinds of incentives available to accelerate the adoption of IT and improved health outcomes in the healthcare system, and the level of interoperability of information and systems (which is often referred to as patient data exchange). These areas are important because fundamental change in healthcare will require progress in both dimensions; many of the Working Group's proposed recommendations, moreover, are desired to accelerate progress in each. The hypothetical future environments are expressed in the 2x2 matrix that follows.

Y-Axis: Degree of interoperability of information technology and systems

Widespread

IT Utility
"Widespread Interoperability, Weak Incentives"

Patient-Centric Care
"Widespread Interoperability, Strong Incentives"

Limited

Status Quo
"Limited Interoperability, Weak Incentives"

Proprietary Care
"Limited Interoperability, Strong Incentives"

Weak   Strong

X-Axis: Strength of incentives for technology adoption and performance-based care systems

Figure 1. Alternative Futures Matrix

The X-axis represents the strength of the incentives for IT adoption and performance-based care. The left side of the X-axis represents scenarios where there are very weak incentives for the use of IT to improve patient care. This is similar to today's situation, where payment models rewards care based on volume, not health outcomes or the extent to which providers use information about patients or procedures to tailor their care to individuals' needs. The right side of the X-axis represents scenarios where there are strong financial and other incentives to stimulate IT adoption to improve processes and outcomes via information management.

The Y-axis represents degree of interoperability. The bottom part of the Y-axis reflects a state of limited interoperability of information and systems. This state, which is reflective of the current situation in most markets, is characterized by varying interpretation and limited adoption of standards, little available infrastructure for information exchange, and limited ability to connect disparate information systems, in large part due to the high costs of such integration. The top half of the Y-axis represents a state of widespread interoperability of information and systems. This state is characterized by broad-based, uniform adoption of standards and a robust infrastructure for the interchange of health information. In other words, in this state interoperability can be achieved "out of the box" with low cost and few hassles. (For detailed information on the requirements for interoperability, please see Connecting for Health's report titled Achieving Electronic Connectivity in Healthcare: A Roadmap from the Nation's Public and Private-Sector Healthcare Leaders at www.connectingforhealth.org.)

The combination of these two axes creates four possible future states.

- **The Status Quo (limited interoperability, weak incentives):** This state presumes no significant changes to the current healthcare IT environment. Some data standards, IT adoption and interoperability exist but adoption is voluntary and unrewarded and interoperability is highly experimental and rare. Providers are paid for episodes of clinical service without incentives for quality, outcomes, or patient-centeredness. The result is that the rate of IT adoption and interoperability remains highly inconsistent. Adoption is concentrated primarily among large integrated systems, with sharing of electronic clinical data being almost non-existent outside of these systems. Quality and outcomes measurement remains inadequate and consumers have limited ability to access their personal healthcare information or to provide information to providers in a convenient way.

- **The IT Utility (widespread interoperability, weak incentives):** This state of widespread interoperability and weak incentives would be achieved if governments mandated adoption of uniform systems and standards but current payment systems remained unchanged, providing neither explicit nor implicit support for IT acquisition and standardization. This state would result in greater potential for care coordination via IT, but without economic incentives to encourage practice changes and use of information management to improve health outcomes. In other words, this state may be a success from an IT perspective, but care delivery remains unchanged.

- **Proprietary Care (limited interoperability, strong incentives):** In this state, payment promotes IT adoption but the degree of interoperability of information and systems remains very limited. Pay-for-performance and outcomes-based payment systems exist, but there is no change in use of standards, the level of data exchange, or the degree of interconnectedness. As a result, IT vendors compete without data standards and healthcare data becomes institution-based and compartmentalized. In fact, providers treat patient information as a highly proprietary asset that serves as a means of differentiation from the competition. The net effect is to prevent patients/consumers from integrating their personal health information as they move about the healthcare system. Providers will also find that exchanging information with other providers is costly, thus undermining their ability to deliver high-quality, outcomes-based care.

- **Patient-Centric Care (widespread interoperability, strong incentives):** In this state, strong incentives exist to reward the use of IT to manage care, while widespread interoperability allows for a high degree of interconnectedness, thus creating a new care environment where patients become true partners in their care. Data standards and interoperability are basic features of applications and other information tools. The public expects and receives routine access to personal health information, while other authorized users enjoy point-of-care access to patient data. IT vendors compete on implementation, features, cost, and service excellence. This state is predicated on public and professional confidence in the privacy and security of the network.

While it would be ideal to transition smoothly from the status quo at the bottom left quadrant (weak incentives, limited interoperability) to the patient-centric environment at the top right (strong incentives, widespread interoperability), the Working Group recognizes that actions meant to help the industry get to this idealized state could create problems if they are not carefully considered. The idea is that increased electronic connectivity in healthcare will occur slowly and in isolated, hard-to-predict spurts without carefully considered and coordinated actions on the part of the private and public sectors.

The top left (widespread interoperability, weak incentives) and bottom right (limited interoperability, strong incentives) boxes serve two purposes. First, they are a warning about what is likely to happen if one axis is changed while the other is held constant. Second, they are useful for analytical purposes. The top left quadrant is labeled "IT Utility" to capture the idea that, like some government-subsidized utility services, inappropriate policies could lead to the development of an expensive but underutilized technological infrastructure. If government were to mandate adoption of uniform data standards and systems, but existing payment mechanisms remained unchanged, there would be little demand to use the resulting interoperable infrastructure. As is the case now, the volume of patients treated and other factors would determine the payment of doctors and hospitals rather than their use of IT systems to coordinate care or practice medicine based on evidence-based guidelines. Financial incentives are critical to persuading providers to make optimum use of any technologies available to them.

If, on the other hand, incentives were provided for technology use alone without a parallel focus on interconnectedness and health outcomes (the bottom right quadrant), an equally unappealing situation could ensue. Under this scenario there could be pervasive use of information systems that added little value to patient care due to limited interoperability of information and systems. Absent data standards, individuals and organizations could not easily exchange information and would therefore realize only a small subset of the benefits that would accrue from a highly connected system operating in an environment with appropriate financial incentives. Patient data would not necessarily migrate from one provider to another to bridge information gaps caused by geography or time, and patients would not be able to easily use IT to take on greater responsibility for their care. Providers would remain the central actors in the healthcare sector, except now they would compete based on sophisticated but silo-ed information systems.

Using the alternative futures and use cases as a foundation, the Working Group developed analyses and recommendations for developing financial incentives and for overcoming organizational and legal barriers. The next section summarizes the work related to financial incentives, while the section that follows that combines the legal and organizational assessment.

Financial Analysis

Financial incentives to increase adoption of clinical information systems

With over half of physicians practicing in small and medium-sized practices and the majority of care being provided to consumers in these settings, ambulatory care practices represent a critical component of the health sector for automation with full interoperability that allows for the timely exchange of health information. Not surprisingly, small and medium-sized practices have lower EHR adoption rates than do large practices. [xviii] The Working Group performed a qualitative financial analysis of the business case for purchasing, implementing, and using a variety of clinical information systems from the perspective of the small and medium-sized group practice. The goal was to understand what financial and other support mechanisms are necessary to significantly increase EHR adoption by these practices. More specifically, the analysis aimed to do the following:

- Assist healthcare leaders with understanding the benefits, costs, and risks associated with using the clinical information technology applications that were identified in each use case.
- Assist policy leaders with understanding the impact of alternative futures on the adoption and use of the clinical information system applications identified in each use case.
- Evaluate the various use cases in each alternative future to determine the relative strength of the business case.
- Determine whether an incremental roadmap toward full EHR adoption exists and what that road map might look like.
- Develop a financial incentive that would accelerate adoption of interoperable EHRs by this specific subset of the industry, and develop an understanding of what other support mechanisms would support sustainability of implementation.

Approach

The financial analysis is based on a qualitative assessment of the use cases, two of which relate to EHR, one to eprescribing and one to an on-line chronic disease management tool. The use cases were analyzed primarily from the perspective of the physician practice; the societal or other stakeholder benefits related to health information sharing were not considered. The analysis considers a comprehensive list of the costs of adoption as well as the potential benefits to the practice over a three-year period. The analysis accounts for both the capital costs and improved efficiencies to determine an approximate order of magnitude net benefit for each use case under each alternative future. Based on the magnitude of the net benefit and other factors associated with a clinical information system's functional strategy, the Working Group evaluated whether a migration from one type of technology to the next might make sense. The Working Group has not studied the incentives necessary to promote adoption of other clinical information systems, such as inpatient computerized physician order entry (CPOE) or to promote adoption of clinical IT applications by other stakeholders, such as public health departments.

The analysis is modeled for a "typical" outpatient physician practice of five physicians in a primary care practice and a cardiology practice. Although ambulatory care practices vary greatly in their size, specialty, and geographic location, the Working Group believes that the conclusions from the analysis of this "typical" practice can be broadly extended across most small and medium-sized ambulatory practices, since they tend to face a similar set of IT implementation and infrastructure issues. However, many other factors influence IT costs and benefits including variations in the following: operational efficiency, hospital affiliation, degree of IT support, and the incentive mechanisms in the market.

Because there is a dearth of data related to the financial impact of IT on ambulatory practice, the

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analysis is qualitative in nature - that is, existing research and the expertise of the Working Group (Delphi approach) served as the basis for the development of a financial analysis framework; no primary research was conducted nor was an extensive financial model built. As a result, this effort should be considered as an initial, non-primary research-based analysis that needs to be improved upon for practical application.

Adoption challenges of clinical information systems need to be overcome

The gap between the potential benefits of clinical information technologies and the willingness of providers to adopt them raises the question of whether the market appropriately supports would-be purchasers of these technologies. It is important to remember that adoption of clinical information technologies involves more than just purchasing and implementing a technology; it requires modifications in clinical practice that come about as a result of the technology. Given the challenges inherent in transforming physician practice, it is no surprise that even implemented applications are often underutilized and in some cases not used at all. Some large ambulatory care practices have been early to recognize the value of IT adoption as a way of streamlining their complex (and often inefficient) operations. These larger practices have also been able to leverage existing IT infrastructure and staff and take advantage of the financial resources of their organizations in financing IT purchases. But small and medium-sized ambulatory care practices have significantly fewer opportunities to achieve financial gain through IT, and thus adoption rates are lower than for large practices.

Several recent studies have examined the value of--and barriers to--adopting EHR, eprescribing, and online chronic disease management tools. The following sections summarize the evidence related to the value of these systems, while the tables included within each section summarize the current barriers noted in the literature.

Electronic Health Record

The Institute of Medicine (IOM) called EHRs the "essential technology for healthcare" and documented their role in addressing threats to patient health status and longevity that arise from process failures that are endemic to the industry.[xix] Several studies show that EHRs can improve health status, operational efficiencies and communication among providers.[xx] Studies also show that the order-entry and decision-support components of the EHR can increase utilization of recommended interventions, thereby reducing medical errors.[xxi] While the technology alone cannot address all quality and efficiency problems, experts believe that the resulting changes to clinical process would catalyze the transformation of healthcare into a more modern, consumer-driven industry.[xxii]

Many healthcare organizations, however, believe that EHRs are a poor investment, and this belief is reflected in their low adoption rates, which were estimated to be between 6% and 13% in 2001.[xxiii] While an increasing number of large medical groups and integrated delivery networks have purchased EHRs, smaller practices with nine (9) or fewer office-based physicians have shown reluctance.[xxiv] A review of several studies shows that barriers to EHR adoption can be categorized as outlined in the table below:

Barrier to Adoption	Explanation and Supporting Research
Cost of adoption	Three major studies suggest that lack of available funding is the biggest barrier to EHR adoption by physician practices, regardless of organization size.[xxv] The Medical Records Institute study found that funding was the biggest barrier, cited by 58.5% of respondents. This rate was similar to that found in a survey by the Medical Group Management Association or MGMA, in which 48.1% respondents cited financing as the biggest barrier. This finding was consistent across all sizes of group practices, with 48.4% of small practices (under 10 full-time equivalent (FTE) physicians) cited funding as the most significant barrier, compared to 46.9% of medium-sized practices (10 to 49 FTE physicians) and 49.4% of large practices

	(50 or more FTE physicians).
Workflow impact	According to several studies, the second biggest barrier to adopting IT is that clinicians resist change in the absence of a perceived benefit from the change. These studies highlight several changes that clinicians resist, including the increased time needed to enter orders and patient histories into EHRs (the most often cited reason for resistance), as well as other workflow changes that have a significant impact on everyday practice. Several studies of CPOE systems have shown that while additional physician time might be required in the initial months after implementation, over time reduction in the amount of time spent on duplicative administrative activities and documentation can yield a net time savings for physicians.[xxvi] Miller's recent study on physician's use of EHRs showed that "most physicians using EHRs spent more time per patient for a period of months or even years after EHR implementation" which translated into less efficiency overall. Although more research needs to be done, it is clear that the perception among physicians is that EHRs result in additional time and costs to physicians while providing little benefit in return.
Early stage of development for commercial products	Although some highly regarded commercial products exist, product development is still in an early stage. Off-the-shelf, easy-to-adopt functionality does not exist, nor do standards for use and performance. Many solutions must be tailored to an organization's specific needs, while evidence of the effectiveness of the technology is often lacking. The Miller study showed that respondents found "even highly-regarded, industry-leading EHRs to be challenging to use because of the multiplicity of screens, options and navigational aids." These issues present a significant barrier, as they increase demands on physicians' time and decrease the chances that systems can be used to improve quality of care. Other industries, however, have already faced and largely overcome the challenges related to designing easy-to-use software for knowledge workers, and there is no reason to believe that the same success cannot be achieved in healthcare as well.[xxvii]
Practice transformation challenges	Practices that implement an EHR must often make changes to their clinical and administrative operations that can be burdensome, especially to physicians practicing in small and medium-sized practices. Changes arise both from how physicians must use the technology to go about their everyday practice and from other opportunities that are created by the EHR to create additional value to the practice. Like other industries, healthcare is finding that the key to realizing value from IT lies in operational modifications.[xxviii]
Low level of electronic data exchange and lack of standards	Another barrier to adoption is the current, low level of electronic data exchange in healthcare, which is driven in part by a lack of standards. A few studies have cited electronic exchange as a significant, but often overlooked component of successful use of clinical information systems. But since not all healthcare organizations utilize clinical information systems, many early adopters are left supporting two systems: electronic and paper-based. This results in slower workflow and greater clinician resistance, thus increasing the chance of failure.[xxix] In addition, access to more patient data from multiple sources is the basis for functional components of EHRs including CPOE and decision support. However, the cost and complexity of building necessary interfaces to maximize EHR functionality is almost prohibitive.

Eprescribing technologies

Recent studies in the ambulatory setting suggest that the problem of ADEs is significant. One study by the Center for Information Technology Leadership found that 3 million of the more than 8.8 million ADEs that occur each year in the ambulatory environment are preventable.[xxx] Another study in an ambulatory clinic found that 21% of patients suffered ADEs with 3% of those leading to hospitalization.[xxxi] eprescribing is thought to improve physician efficiency by reducing the time spent writing prescriptions, communicating with pharmacists, and rewriting prescriptions to adhere with formularies. In one instance,

eprescribing was even shown to reduce drug-related malpractice claims, resulting in a 5% to 10% reduction in insurance costs.[xxxii]

However, surveys show that only 5% to 18% of physicians have adopted eprescribing, a figure that must be considered quite low even though eprescribing is relatively new to the market low.[xxxiii] Five barriers to adoptions have been identified and are described in the table below:

Barrier to Adoption	Explanation and Supporting Research
Cost of adoption related to level of functionality	The cost of eprescribing systems can vary significantly depending upon the system's features; features such as a problem list, messaging, personal digital assistant with wireless capabilities, and medical record interface can add significantly to the cost. While some vendors offer inexpensive systems, many practices are finding these systems to lack desired functionality. The cost of systems that have these important functions remains high, making cost an ongoing barrier to adoption.[xxxiv]
Workflow impact	Clinicians may resist the additional time it takes to load initial patient data into the eprescribing tool and the time it takes to use the tool, which can be longer than it takes to write a prescription by hand.
Lack of interoperability	Most eprescribing systems do not provide access to more global patient information.
Lack of benefits or reimbursement offset	The benefits of automated prescribing often flow through to other stakeholders, such as health plans and employers, and not to the physician practice that purchases the system.
Legal issues	States have various regulations and specifications related to information on prescriptions, electronic communication use for controlled substances, and overall processes for electronic prescribing. Although these barriers have not proven to be insurmountable--and some are being addressed by recent legislation--they can still be perceived as an issue when considering whether to adopt an eprescribing system.

Online disease management tools

As both life expectancy and the incidence of chronic disease increase, chronic disease management approaches that reduce the cost and improve the quality of care are gaining popularity. A variety of studies show that online chronic disease management tools result in improvements in care and reductions in cost. One study noted a significant decrease in emergency room visits and inpatient admissions, resulting in cost savings of $747 per patient per year for diabetics and $7,830 per patient per year for patients with congestive heart failure. In addition, online chronic disease management tools have been shown to improve patient compliance with medication regimens significantly, from compliance rates of 34% to 63% without the tool, compared to 93% to 95% with the tool. Many of these remote technologies are used in conjunction with other chronic disease management initiatives, such as predictive modeling to identify at-risk individuals patient registries and outcomes-based disease management.[xxxv]

However, recent surveys suggest that adoption of these types of technologies is less than 5%.[xxxvi] Barriers to adoption of chronic disease management tools are listed below:

Barrier to Adoption	Explanation and Supporting Research
Misalignment of financial incentives	Use of online chronic disease management technologies is decreasing the average number of visits for patients with some chronic diseases, as physicians are using email and other communication mechanisms to manage treatment regimens and other non-urgent matters because they are less expensive and time-consuming

	than are office visits. However, under today's fee-for-service, episode-based reimbursement, this decline in patient visits reduces physician practice revenues. In addition, payers are reluctant to invest in consumer-specific technologies such as on-line chronic disease management because patients routinely change health plans and employers, thus lowering or even eliminating their return on investment from these programs. Some health plans and insurance companies are beginning to reimburse e-visits (i.e., physician consult with a patient via email or other information technology), paying physicians from $19 - $30 per e-visit and charging patients up to $10 co-payments.[xxxvii] However, these programs are too new to demonstrate whether this type of reimbursement is adequate to align incentives and promote adoption and use of online chronic disease management tools.
Cost of adoption	Although the acquisition cost of these tools is not high, the cost of adopting the tool across a provider-patient community can be significant due to the cost of equipping the volume of patients that would need to adopt the technology.
Patient participation	Patient noncompliance with the treatment regimens that are a part of these tools is significant. Many patients with chronic disease(s) are elderly and may be unfamiliar with online tools in general and also may be concerned about privacy issues related to the transmittal of electronic data transmittal.
Integration with other systems	The lack of integration of these systems with others that contain more comprehensive patient information is a key barrier to the seamless treatment of a patient.

Despite the documented benefits of clinical information systems that exist for a variety of stakeholders (including patients, payers, purchasers and society as a whole), the perceived barriers listed above have led the majority of small and medium-sized practices to question the business case for adopting these technologies. Moreover, the lack of a full understanding of--and a full resolution to--these barriers has caused several organizations to fail completely when implementing these technologies, while others have realized only a fraction of their benefits.

The qualitative financial analysis summarized below evaluates whether the barriers to adoption render the business case for a would-be provider purchaser of these technologies to be a net negative (i.e., the costs of adoption outweigh the benefits), and, if so, what type of financial and other support mechanisms have the potential to make the case for adoption a "net positive," thus encouraging the adoption of EHR and other clinical information systems. The Working Group used the analysis below as well as several other resources to develop its recommendations.

Cost and Benefit Drivers

The Working Group evaluated the net benefit for each of the four use cases in each alternative future. The resulting analysis is a summary of Working Group judgments based on the assumptions outlined in Appendix 1, and thus is not based on rigorous quantitative analysis.

To support the qualitative analysis, the Working Group created a comprehensive list of the drivers of both the costs and benefits that occur as a result of purchasing and using the clinical application. These drivers were categorized into a 2x2 matrix that separates capital expenses (which can be amortized over three years) from ongoing operating costs. Similarly, enterprise or organization-specific costs are separated from those costs that are shared with other organizations (e.g., through use of common or shared infrastructure). Costs are categorized as follows:

Table I: Cost Drivers		
	Enterprise	**Shared**
Capital	• Hardware • Software and software upgrades • Installation and ongoing integration • Change management activities • Conversion activities	• Bandwidth • Hardware – computing power, storage • Software – identification, authentication, security
Operational	• Integration • Project management • Training and roll-out • Productivity impact (short-term interruption) • Application and user support (including updates)	• Connectivity • Installation/Implementation and support • Technical support • Content • Project management

Definitions of each of these cost drivers appear in the table below:

Component	Definition
Hardware	The personal computers, servers, routers, networks, and other physical components needed to establish the application and provide each user with access to it
Connectivity	Cost of high-speed access
Software	Initial purchase of operating system and software with appropriate license fees paid to vendor, along with maintenance and update costs for 3 years, including the necessary security components (identification and authentication)
Installation and ongoing support	Professional services for initial set-up, product roll-out, training, ongoing support and any other services needed related to software use in the clinical setting, ensuring that the system is always available and fully substitutes for paper with the exception of infrequent archival needs.
Integration	Professional services necessary to establish a real-time link between systems
Change Management	Training and other activities needed to prepare staff for necessary change, including change management forums (which can be incorporated into lunch speeches by vendor, management, or external expert), dinners with the vendor; committee meetings; training sessions, and the like. Today not enough money is spent addressing this area as is likely necessary.
Productivity impact	Reductions in revenue due to the additional time burden that initially comes with the new system. This is calculated over six months, although productivity declines can last 12 to 18 months. While practices can try to minimize the reduction in productivity (e.g., by requiring overtime), this estimate assumes that no such efforts are made.

The health services research field is just beginning to produce evidence as to whether and how clinical information systems produce real, demonstrable benefits that exceed the economic costs of purchasing and using the clinical application. Much more research exists on IT's impact on inpatient care than on outpatient care, likely due to the greater penetration of clinical information systems in these settings. The bulk of available research in both the inpatient and outpatient settings focuses on categorizing the operational benefits; these categories, depicted in the table below, are used to calculate the total net benefits.

Table II: Benefit Drivers		
	Inpatient	**Outpatient**
Operational efficiencies	• Reductions in patient delays • Reductions in lab and other result turnaround time and interpretation delays • Reductions in turnaround time for filling drug orders • Reduced delays in accessing information from medical records • Reduced delays in discharge planning	• Increases in patient throughput • Reduction in time for dictation • Reduced need for data entry • Reductions in time for filling medical records requests (e.g., fewer chart pulls) • Change in type, volume and time for patient communication • Decreased time for formulary management • Decreased time for prior authorizations • Reduction in time spent reviewing results
Service usage	• Fewer admissions • Fewer exams • Fewer laboratory and other tests and X-rays • More appropriate drug under use and ADEs • Decreased length of stay	• Fewer visits per patient • More remote-visit communication • Fewer exams per patient visit • Fewer tests per patient visit
Quality Impact	• Fewer ADEs, medication errors and allergic reactions to drugs • Improved drug dose compliance (and fewer days of excessive drug dose) • Fewer medical errors • Decreased LOS • Improved patient outcomes	• Decreased hospitalizations for ADE • Fewer ADEs, medication errors and allergic reactions to drugs • Improved drug dose compliance (and fewer days of excessive drug dose) • Fewer medical errors • Improved level of documentation • Improved patient outcomes
Revenue Impact	• Increase in charge capture (e.g., revenue from more accurate billing) • Improved billing accuracy • Decreased patient visit volume	• Increase in charge capture (e.g., revenue from more accurate billing) • Improved billing accuracy • Decreased patient visit volume

Operational efficiencies or changes in workflow such as reduction in delay, reduced waiting time or decreased bottlenecks can translate into productivity gains and cost reductions by reducing the need for administrative and clinical staff and other resources. Changes in service usage reflect changes in the demand for tests, therapies or visits, which can yield productivity gains and advances in service delivery. The impact on quality relates to reductions in the rate and incidence of mistakes, quality problems, poor outcomes, and/or other impairments to health status; these changes translate into improvements in clinical outcomes.

Net Benefit Analysis

The summary of the business case for a five-physician ambulatory care practice over a three-year period is presented below. The Working Group evaluated the net benefits for the four use cases in each of the four alternative futures, taking into consideration the costs and benefits noted above and the level of challenge (or operational disruption) related to the adoption of each type of clinical information system (as depicted in the four use cases). Since eprescribing and EHR are thought to represent two ends of the spectrum with respect to level of disruption, costs, and benefits (with eprescribing being the least disruptive, least costly, and offering the smallest benefits, and EHR being the most disruptive, most costly, and offering the largest benefits), these two technologies are presented below as a means of illustrating key points from the analysis.

As noted previously, this analysis is a summary of the Working Group's expert opinions based on the assumptions outlined above and is not based on a rigorous quantitative analysis. The analysis represents a starting point for understanding the potential impact of the alternative future scenarios on clinical information technology adoption, and for getting an order-of-magnitude sense of the business case for the adoption of specific clinical applications. However, because the use of and benefits from clinical information technology will vary greatly across different types of non surgical specialties, more rigorous financial analysis is necessary to produce refined estimates for policy makers and for the wide variety of would-be purchasers of IT. Further details for each of the use cases, including those not listed in the table below, are presented in **Appendix 1.**

Table III: Net Benefit by Use Case				
	Status Quo "Limited interoperability, weak incentives"	**IT Utility** "Widespread interoperability, weak incentives"	**Proprietary Care** "Limited interoperability, strong incentives"	**Patient-centric care[2]** "Widespread interoperability, strong incentives"
Use Case #1 EHR for primary care practice with connectivity among physician practices	($$$$)	($$)	0	$$$
Use Case #3 E-prescribing system	($)	$	$	$
-$$$$ = - ($100,000+) -$$$ = -($50,000 - $100,000) -$$ = -($25,000 – 50,000) -$ = - ($1 – 25,000)	$ = $1 – $ 25,000 $$ = $25,000 – $ 50,000 $$$ = $50,000 - $100,000 $$$$ = $100,000+		0 = net neutral	

Note: This table presents a three-year analysis of the net benefits (benefits minus costs) for a "typical" 5-physician ambulatory care practice.

The analysis above clearly illustrates that there is differential value across the four future environments. The analysis also confirms what some recent studies have found[xxxviii]--that the business case for clinical application adoption among most small and medium-sized physician practices in the status quo environment is sorely lacking. That said, the presence of widespread interoperability and strong financial incentives both have a significant positive impact on the business case. The absence of these features places the physician practice that invests in clinical IT at risk of economic loss. The prospect of this loss acts as a significant deterrence to adoption today and will continue to do so in the future. A few general observations related to the four alternative future scenarios appear below:

- **Status Quo** - The analysis shows that the business case for the adoption of clinical information systems in the status quo environment is lacking--that is, such adoption is likely to result in substantial net costs to most physician purchasers. This is particularly true for EHR systems, but also applies for other applications such as e-prescribing. The net cost is the result of the relatively high upfront costs (especially for EHR), productivity losses due to the challenges of adoption, the high cost of creating point-to-point interfaces to enable connectivity, and the negative revenue impact due to reduced patient visit volume as a result of using the tools. While there are significant operational

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[2] The analysis of the Patient-centric care environment assumes significant investment in an underlying, interoperable technology that has not occurred to-date. Assuming that such a technology is developed and adopted, it will still be a number of years until it is fully operational.

benefits (including improved revenue from additional charge capture, decreased billing errors, and efficiency gains realized through FTE reduction/redeployment) these benefits are unlikely to make up for the additional costs of the system.

- **IT Utility** – Net costs under this scenario are estimated to be lower than under the Status-Quo due to the lower costs of system interfaces (these costs are virtually zero due to the presence of an existing utility infrastructure that enables wide-scale interoperability) and the decreased risk of adoption failure (because both vendors and users will have more experience with implementation). In addition, under this scenario there are more "plug-and-play" applications, which, along with the existing infrastructure, helps keep the costs of the technology lower. The downside, however, is that functionality may not mature beyond the most basic level, as there are few financial incentives to use IT systems to improve the quality of care.

  In addition, the IT Utility environment could result in a significant decrease in revenues due to use of EHR, especially for larger practices. This analysis is conducted for a "typical" small practice that is unlikely to be affected by a decrease in laboratory or ancillary test volume as a result of EHR use.[xxxix] But some larger practices do generate revenue from these services, and they stand to lose revenue if these services do not need to be performed due to the increased accessibility to timely patient information offered by EHR. This revenue loss can be critical in an environment like IT Utility where there are no incentives that mitigate the volume-based revenue impact on practices. If the revenue loss is significant compensating incentives will have to be created to align financial incentives for adoption.

- **Proprietary Care** – Net costs are estimated to be slightly lower than the Status Quo due to the presence of meaningful direct and indirect incentives to purchase clinical information systems. The benefits are projected to be higher as a result of increased performance-based care reimbursement. However, the overall cost of the organization's infrastructure to support information availability for the EHR would ultimately increase due to the lack of economies of scale from an interoperable platform. Without such a platform in place, organizations will be forced to spend significant resources to achieve interoperability and to support performance-based care in the absence of standards and incentives for interoperability. One outcome of this could be the consolidation of the market into fewer, larger provider conglomerates that compete on patient information in order to provide comprehensive care within their network of organizations.

- **Patient-centric Care** - The patient-centric scenario offers the largest net benefit from the adoption of clinical information technology. This future combines the best of the IT Utility and Proprietary Care scenarios--that is, it offers the efficiencies of interoperability and the incentives for performance-based care. This environment could fundamentally change patient information and care delivery. Improved communication between patients and physicians would empower patients to play a greater role in their care. The Working Group feels that this transformed healthcare system raises several legal and policy considerations, but agrees that attaining the "portable health record" is critical to improving clinical care decisions at the point of care.

This analysis supports the notion that providers in small ambulatory practices currently bear much if not all of the expense of adopting clinical information systems, but derive little of the total benefit. In fact, most of the value gained (from both improved quality of care and more appropriate utilization of expensive resources) accrues to other organizations and groups. This "value imbalance" leaves the physician with a negative financial incentive to adopt EHR. A positive business case must be in place before physician practices will be more willing to purchase and adopt clinical IT systems.

High degrees of interoperability allow for shared investment in technology infrastructure and thus lower the costs of clinical information systems. In fact, increased levels of interoperability strengthen the business case for the would-be purchaser of IT, including ambulatory care providers. In addition, greater interconnectivity is likely to lead to improved health outcomes. Conversely, adopting piecemeal

technology that cannot support increased levels of connectivity and information sharing will result in systems that are able to generate only a small portion of their potential benefits and would therefore not return the value anticipated.

The bottom line is that incentives that enable progress toward both IT adoption and interoperability appropriate use have a greater impact than those that focus on IT adoption alone. Incentives that promote IT adoption without an emphasis on interconnectivity could result in the adoption of systems that fail to provide the full quality and efficiency gains that IT has to offer, thus weakening the overall business case. A recent study from the Center for Information Technology Leadership showed that the return on investment for IT use is significantly improved when interoperability of structured clinical information is present. More of the operational and clinical gains can be realized with comprehensive access to electronic patient data that enables decision-support functionality.[xl] Thus, financial incentives for both interoperable IT adoption and interconnectivity among healthcare providers are essential to ensuring that the business case for IT adoption and appropriate use is as strong as possible. The stronger the business case is, the more likely the industry is to benefit from the full potential of IT to improve the quality and efficiency of healthcare.

Observations on Incentives

Recently there has been much discussion and analysis of financial incentives for healthcare IT. Four categories of incentives are emerging, representing an evolution in their maturity of use and opportunity to improve care quality and cost:

- Incentives for the adoption of clinical information systems
- Incentives for the use of clinical information systems
- Incentives for interconnectedness among healthcare stakeholders
- Incentives for health outcomes performance

This is not meant to imply that steps along the pathway are mutually exclusive, but that there may be a normative sequence of implementation, value and incentives. Some of the incentive ideas and proposals are reviewed below.

Financial incentives can be direct (e.g., direct payment for EHR or eprescribing use) or indirect (e.g., pay for performance systems that reward strong performance on outcomes measures that are likely to be improved by use of IT; paying extra for providers that use care coordination or chronic care management, each of which is enhanced by IT. Due to the significant upfront cost of the technology and the time, effort and lost productivity related to its adoption, many believe that direct incentives that provide access to low-cost capital should be made available, especially where capital is scarce. This type of access could be set up in a manner similar to funds that have been established to finance transportation and environmental infrastructure development.[xli] However, others believe that cost of capital is already quite low and that simply lowering the purchase price of clinical information systems is not enough. These experts believe that indirect financial incentives will result in more desired behavior because they are targeted at the use of technology to improve care.

In order to support public-private investment in regional data exchange efforts, some believe that direct incentives to purchase clinical information systems should be linked to evidence that the physician practice is participating in a community data exchange network (and therefore that the EHR complies with some common technical framework), or that government-financed incentives should be matched by incentives paid by payers or employers (e.g. Medicare could create a matching program for private payers, employers, Medicaid, etc.). To ensure that incentive payments support community data exchanges and not just stand-alone investments, criteria for standards-based connectivity must be specified and a variety of incentives should be tested. Others note that the incentives should be structured in such a way that they are distinguishable from Medicare and Medicaid receivables so that they can be used as collateral for borrowing to support clinical information system investments.

Potential Pathway to Full Interoperability

Experience has shown that many physicians are often highly resistant to the full-scale practice changes required by implementation of an EHR, especially in light of the fact that most have not recognized the value of health information exchange. As a result, the best path to full-scale EHR adoption may be through incremental adoption of discrete clinical applications. The qualitative financial analysis outlined above found that the business case for some incremental applications is better than for others.

The Working Group assessed the utility and issues related to starting with incremental applications and evolving to a full EHR. This assessment concluded that certain applications could be used as starting points that attract some clinicians to IT adoption and information sharing. However, these applications must support the workflow and infrastructure in order to enable migration to a full EHR. Applications that require a relatively small initial investment and/or those with a very high net beneficial business case could be considered as candidates. Assuming a positive business case, applications that show a demonstrable net reduction on the demands for the physician's time will likely be more widely adopted applications.

The Working Group's analysis shows that eprescribing and on-line tools for chronic disease management may be good starting points for building an information sharing pathway toward wide-scale EHR adoption. They can be implemented at relatively low cost and little disruption to the physician practice. (It is important to note, however, some task force members believe that remote care delivered through clinical information systems (often referred to as "non-visit based care") should not be done out of the full context of EHR.) Although the business case for other incremental applications was not specifically analyzed, applications such as disease registries and cross-organization information access might also provide strong starting points toward EHR adoption. (For more information, please see Connecting for Health's report titled Achieving Electronic Connectivity in Healthcare: A Roadmap from the Nation's Public and Private-Sector Healthcare Leaders at www.connectingforhealth.org, which provides details on other applications and data-exchange technologies that hold promise as incremental opportunities.) However, further analysis is needed before these applications can be recommended for implementation in a specific physician practice.

On the other hand, some experts believe that the incremental approach might be more difficult than deploying all of the major functions at once. For example, eprescribing is typically deployed with a personal digital assistant ("PDA"). Once physicians are accustomed to using the PDA, it may be more difficult to get them to transition to a fuller functioning EHR requiring a workstation or laptop. These experts believe that while the initial financial requirements and learning curve may be greater with full-fledged EHR adoption, the payoff may be quicker and greater.

Incentive specifics are likely to be very local in character, e.g., some regions have payer contracts that reward providers for certain behaviors (e.g., formulary compliance) while other regions do not. eprescribing may have diminished physician acceptance if there are not fiscal incentives involved.

If adopted, incremental applications must not be a dead-end to other, highly important clinical applications. They should both support practice workflow and provide the IT infrastructure necessary to accommodate more comprehensive solution integration along the road to full interoperability. This is critical to ensure that any incentives that are developed ultimately result in adoption of more comprehensive, EHR-like functionality.

The implementation and support of an EHR represents a significant expense for the physician practice. While several studies have demonstrated a return on these investments, most of the return accrues to organizations other than the practice, such as health plans and employers, and it is often realized over a longer-than expected timeline. Financial incentives to physician practices will be necessary to bring the cost-benefit equation for EHR more into balance. These incentives need not capture all of the costs of an EHR to the practice; they must cover enough costs to spur adoption.

For the purposes of this analysis, the Working Group assumed that the capital costs (amortized over three years) and the ongoing expenses of an EHR cost a physician approximately $12,000 - 24,000 per year. This estimate covers most of the costs for most small physician practices, including upfront acquisition of the system, implementation assistance, ongoing personnel necessary to support the application, and an initial decline in overall productivity related to adoption (productivity decreases can be significant and can last for several months). Some practices will experience lower or higher costs depending upon their prior experience with IT. In addition, this estimate may not reflect all costs across all practices. For example, it does not include full-scale interoperability or advanced EHR functions.

Based on our analysis and some empirical evidence available to the Working Group, an incentive totaling $12,000 - $24,000 per full-time physician per year would accelerate wide-scale adoption of basic EHR technologies by small and medium-sized ambulatory practices, with the range reflecting the variability in the costs of implementation and operation (as outlined above). For a primary care physician with 4,000 patient visits per year or a 2,000 patient panel, this level of incentive works out to $3 - $6 per patient visit or $0.50 - $1.00 PMPM. The incentive could be structured in a variety of ways, such as a pay-for-performance system that ties payments to outcomes or processes that will be improved by EHR or a direct subsidy based on the implementation or use of EHR.

In aggregate over three years, this level of incentive would entail a total investment of approximately $21.6 to $43.2 billion.[3] While the rate of adoption of EHRs that would be driven by this level of incentives is difficult to predict, 7 to 10 years to achieve wide-scale adoption is reasonable. Should adoption occur over a 7-year period, the total incentive would be equivalent to $3.1 to $6.2 billion per year, or 0.54% to 1.1% of the total amount spent on ambulatory care in 2003.[4] If wide-scale adoption took 10 years, the cost would be $2.2 or $4.3 billion per year, or 0.38% to 0.76% of total ambulatory care costs in 2003.

There is very limited empirical data on which to base an incentive estimate. In this analysis, the Working Group factored in data from several sources including the cost of EHRs in the small and medium-sized practice, research on the incentive experiences of others, the results of the qualitative financial analysis and the expertise and consensus of the Working Group. While anecdotal information suggests that smaller levels of incentives can result in increased adoption of IT, large-scale adoption on an accelerated timetablemay require the magnitude of incentive described above. Nonetheless, given the paucity of experience with such incentives, more work is clearly necessary to further understand the appropriate size, mix and phasing of incentives.

Supporting the belief in a large financial incentive is work that has been conducted by the noted experts in the field. The Bridges to Excellence (BTE) program conducted an extensive literature search on incentives for practice re-engineering. The findings, published in a 2003 article in the *Journal of Clinical Outcomes Management*[xlii], along with subsequent focus groups and work on incentives conducted by Bailit, has led to a consensus view that rewards and incentives have to be meaningful enough to compensate for the added cost associated with data collection and measurement of care processes. This

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[3] In 2004 dollars. This estimate is not a scientifically-derived nor should it be used for practical application.
[4] $578B projected spending on ambulatory care in 2003. Heffler, S., et al. "Health Spending Projections for 2002-2012." *Health Affairs* Web Exclusive 7 February 2003.

"meaningful level" of incentive was determined to be equivalent to 5% to 10% of a physician's income, which translates into approximately $10,000 to $20,000 per year.[xliii]

Health plans interviewed as part of this process have expressed concern about the size and effectiveness of this level of incentive. Many payers and providers are still experimenting with different types of incentives, and the utility of these approaches is still being evaluated. While payers and employers recognize that the small physician practice needs support in selecting and implementing EHR, many are struggling with their own margin pressures and are hesitant to devote significant dollars to incentives until the evidence that they can work is clearer. They are also justifiably concerned that today the requirements for interoperability and connectivity are poorly defined and without this requirement for their investment, the data suggest that adoption of EHR alone will not yield the anticipated returns. As a result of all of these factors, any near-term increases in financial incentives by payers and employers are likely to be incremental in nature. An increasing number of industry forums are forming to enable employers and health plans to share ideas and learn from their experiences. From the plan perspective, incentives must include enhanced system utilization so that agreed upon metrics and concrete outcomes can be generated and evaluated. To ensure credible outcomes data, objective parties must be involved.

Widespread adoption of incentives by payers will require national standards for EHR technical capabilities and features as well as metrics for EHR use (e.g., the percentage of prescriptions entered using the EHR) and for outcomes. These standards and metrics can help ensure that payers have reasonable assurance that they are "buying" an acceptable EHR that is compliant with a broader technical common framework that will assure interoperability. Some experts believe that all governmental and private investments should be contingent on the clinical application being "certified" or deemed "compliant with" these national standards by an industry-respected authority or through a process of audit and self-attestation. This approach would tie individual organizational decision-making to the broader collaborative strategy and therefore promote the advancement of health information exchange.

In addition, the incentive system outlined above cannot work unless it is adopted broadly by payers so that it covers a majority of a physician practices patient panel or patient visits. Without broad adoption by most payers, the incentive will not be large enough for physicians to act. But because individual private sector payers face a first-mover disadvantage in financing incentives for IT adoption (i.e., private purchasers that finance such incentives will be competitively disadvantaged against those who choose not to do so), some experts believe that the Federal government will need to play a critical role in being a catalyst for the adoption of such incentives by the purchaser community. If the Federal government does not participate, private purchasers will likely balk at participating as well. In addition, as the largest purchaser of healthcare in the country, the Federal government's incentive will be critical to providing physicians with an adequate level of funding to make the purchase and implementation of an EHR feasible.

Finally, as the industry continues to experiment with different types of incentive models, and, over time, current direct incentives based on EHR adoption may be replaced by indirect incentives that pay practices based on performance, level of care coordination, and/or degree of orientation towards chronic disease management. More rapid movement toward pay-for-performance and away from visit or panel-based incentives will provide more assurance that the physician is using the system to produce value. EHR adoption alone will not be sufficient to ensure that these practices participate in an interconnected health information exchange infrastructure or that they use it to improve the quality of care. Over time, the incentive must transition to performance-based and other incentives that encourage ambulatory care practices and other providers to participate in health information exchange and to depend on data from other sources for high quality care.

Recommendations

Providers indicate that the primary barriers and risks to adoption of clinical applications that are critical to full interoperability are financial in nature. To overcome these barriers, the following recommendations are made, based on qualitative financial analysis and the Working Group's expertise.

Recommendation #1
Financial incentives will be necessary to encourage healthcare providers to adopt IT systems that allow for connectivity and information exchange, thereby offering the potential to significantly improve the quality of care.

Recommendation #2
Financial incentives for small and medium-sized practices will need to cover most of the costs of the EHR—a total of $12,000 to $24,000 per full-time physician per year. For a primary care physician, these incentives translate into roughly $3 to $6 per patient visit or $0.50 to $1.00 per member per month.

Recommendation #3
The qualitative analysis supports a business case that is better for some "incremental applications" than for others. These incremental applications can be implemented as steps toward the full implementation of an EHR. Applications that require a small upfront investment and/or that produce high net benefits could be considered as candidates for initial implementation for some clinicians, as long as they are not dead-end applications that cannot be transitioned to full-scale EHR.

Legal and Organizational Analysis

Risks and barriers to adoption and sustainability of health information exchange

Effectively addressing organizational, legal and governance issues is critical to ensuring sustained information sharing on a local, regional and national basis. Information sharing should be done subject to the architecture for the linkage of health records, which are discussed separately in the recommendations of the Linking of Records Working Group of Connecting for Health. That architecture uses a "network of networks" approach where holders of records would control the criteria for when records would be shared.

Academic research and the initial evaluation of demonstration projects related to the sharing of healthcare information reveal that establishing a clear vision, organizational principles, and governance structures within and across organizations is critical to ensuring sustainable adoption. Because developing information sharing infrastructure and cross-organizational relationships will be challenging in even the most mature markets, a high priority should be placed on assessing organizational readiness to determine whether there is a reasonable prospect of regional success in achieving comprehensive interoperability while still providing appropriate safeguards to ensure privacy and security.

The approach to information sharing will be different depending upon local marketplace factors, including its competitiveness, geographical characteristics and the extent to which local providers have already adopted IT systems. Much remains to be learned about the most successful ways to achieve sustainability and the most appropriate roles and responsibilities for both healthcare entities and government organizations.

This section reviews key legal and organizational risks and barriers to adoption of EHRs with the goal of interoperability of patient information across a regional information exchange. It also describes strategies and analyzes opportunities to manage risk and overcome these legal and organizational barriers. Finally, it discusses support mechanisms that will be necessary, in parallel with financial incentives, to assist EHR adoption in small and medium-sized practices

Community Health Information Sharing

Some health systems, providers, payers, and consumers around the country are engaged in experiments to expedite data sharing within and across organizations. The goals of these efforts are to improve patient care and health outcomes, reduce costs, and coordinate administrative tasks. These health information sharing arrangements vary in scope, formality, and expected results, but they nonetheless represent a growing trend nationwide.

These projects expand upon prior attempts to build provider/payer data warehouses and community health information networks (CHINs), as well as efforts to create a national health information infrastructure (NHII) for disease surveillance and bioterrorism defense and response.[xliv]

According to the e-Health Initiative database, community-level health information sharing projects are underway in almost all states, with a concentration of projects in the Northeast and West.[xlv] These initiatives span a continuum from limited to comprehensive data sharing networks. These networks can be differentiated by five (5) factors outlined in Table I, including: type(s) of data shared; provider or system network; patient population(s) targeted; type of technology solution, and; governance of sharing arrangement(s).

Table IV: Characteristics of Community Data Sharing Projects, 2004	
Criteria for Data Sharing	**Elements/Examples**
Type of data	• Administrative—eligibility, coverage, payment, network, public payer • Clinical—hospital, office, laboratory, imaging, pharmacy, mental health, public health, patient • Social—patient, forensic • All of above
Type of provider/system	• Physician Office • Medical Group • Hospital • Hospital System • Integrated Delivery System • Emergency Department • Ambulatory/Community Health Clinic • Laboratory • Pharmacy • Mental health Clinic • Veterans/Military Health System • Indian Health Service • Rural Health System (public/private) • Other Publicly-funded Health System (non-federal)
Patient population	• All patients • Pediatric • Oncology • Cardiology • Alzheimer's • Mental Health • Medicaid • Indian Health Service • Community Health Clinic • Other Publicly-Funded Patients
Technology solutions	• Administrative Service Provider (ASP) • Data Warehouse • Browser-based Indexing System
Administration/governance	• Unincorporated • Incorporated, For-profit • Incorporated, Not-for-profit

These projects document the important role of technology in improving patient care, reducing costs, and breaking down barriers. They also describe a multiplicity of approaches, and highlight the limitations of current technologies, limitations that are compounded by legal and organizational risks. The e-Health Initiative website provides more details on these ongoing community data-sharing efforts.[xlvi]

The wide range of approaches and expected outcomes from these projects provides an opportunity to examine the determinants of success in the complex process of establishing data sharing across multiple organizations. Experience with community information sharing can also inform the development of critical policy and market-based actions to promote adoption and interoperability.

Legal and Organizational Risk and Barriers Analysis

This section provides a summary of the chief legal and organizational risks and barriers to adoption of electronic health records and the infrastructure to support exchange across systems. It is based on a review of the literature, interviews with leaders of community health information sharing projects, and contributions from Working Group members. In order to understand the cumulative effect of these risks on stakeholders, the analysis focuses on organizational issues and concerns in terms of their specific effects on business-related operations and their financial consequences. In addition to a review of risks and a presentation of strategies for addressing them, this section discusses the critical role of change management both within a provider organization and across providers in a region. This discussion centers on an innovative model known as a Local Healthcare Information Infrastructure Success Strategy Model, which is described in more detail later in the section. The fundamental governance and management challenge involves assessing these risks and barriers and developing management and legal structures and mechanisms for addressing or mitigating them.

The risk analysis includes financial and non-financial risks documented by organizations considering investment in standalone or shared electronic health information systems, as well as those that have attempted to share health information through e-business platforms.

Financial risks are events or contingencies that have a direct, quantifiable negative business impact, including revenue losses, and additional operating expenses, capital costs, or other overhead costs. Non-financial risks are events or contingencies that require technical or clinical resolution; they may require labor to be redirected, but may not have direct or quantifiable negative impact.

Barriers and Risks

The chief organizational and legal barriers and risks associated with adoption and interoperability fall into seven (7) general categories, as itemized below and described in Table II:

1. Intellectual Property of Health Information and Information Systems
2. Security and Privacy of Health Information
3. Physician Anti-referral Laws
4. Professional Liability and Medical Malpractice
5. Governance of Data Sharing Arrangements
6. Community and Organizational Leadership
7. Community and Organizational Change Management

In each of these areas, providers, healthcare organizations, health plans, and consumers report business risks associated with adoption of EHRs and with transmitting data electronically to third parties. Adoption and interconnectedness pose additional technical security and privacy risks associated with physical access and control over the multiplicity of users of protected health information.

These risk areas include: the potential interference with or dilution of private property rights in data, systems, and processes; potential new liability for use and misuse of the information due to new, increased vulnerabilities; new or increased vulnerabilities and liability posed by security breaches or inherent weaknesses of the physical infrastructure; business interruption resulting from installation problems, lost data, and/or other technical problems with continuous operations; and other limits on provider financing of information systems.

These categories of legal and organizational risk areas are described in the table below.

Table V: Areas of Legal and Organizational Risk of Adoption and Interconnectedness	
Risk Area	**Description of Risk Area**
Intellectual Property (IP) Of Health Information and Information Systems	• Protection or preservation of rights and income derived from proprietary assets of a business organization, physician practice, hospital, or other concern. • Rights in data, methods of handling data, derivative uses, and information systems, including hardware & software, communications technologies, and methods used to communicate/share data such as processes to format, create views, encrypt, decrypt, de-identify, and store data. • Protections based in federal and state IP laws and regulations and enforced by copyright, trademark, licenses, trade secrets, syndication, and other methods of limiting or extending uses through permission/fee structure.
Security and Privacy of Health Information	• Protection of the physical and logical integrity of data at rest and in transit maintained throughout the healthcare system and by third parties. • Protection of individual privacy rights in data produced in the delivery of healthcare, public health, and research activities. • Protections based in federal and state health information privacy laws, specific medical treatment laws (e.g. HIV/AIDS, substance abuse and mental health protections), and consumer protection laws.
Physician Anti-Referral Laws	• Restrictions on physicians and physician group practices receipt of third party financing for acquiring health information systems. • Restrictions based on federal law (Stark Physician Anti-Referral Laws).
Professional Liability and Medical Malpractice	• Individual tort liability for acts or omissions in the practice of medicine, • Liability based on negligence standards and the responsibility for due care. • Liability based on state law, areas of federal law, including Federal Privacy Rule.
Governance of Data Sharing Arrangements	• Organizational liability for acts or omissions of individuals and organizations related to data sharing activities through formal or informal agreements. • Liability based on state and federal laws of corporations, taxation, contracts, health professions, anti-trust, anti-kickback, and public finance programs.
Community and Organizational Leadership	• Physician leadership in implementing the strategic vision and achieving the goals related to adoption and interconnectedness, and in setting priorities for provider practices, individuals, and the community. • Managing change and ensuring an inclusive culture of collaboration among diverse individuals and organizations. • Ensuring that adequate technical and financial background and information is available to physician leaders for effective decision-making. • Linking information processing changes to clinical process changes to ensure alignment with clinical practice and protocols.
Community and Organizational Change Management	• Organizational learning, negotiation, and collaboration that incorporate and reflect the community vision of data sharing, including the needs of patients/consumers. • Organizational control of adoption and data sharing activities to ensure that an positive ROI and productivity/efficiency gains are achieved. • Resource allocation to each core competency that is adequate to build and operate the data sharing functions and responsibilities. • Training and resource allocation to educational activities that support adoption. • Evaluation of success and feedback to improve processes.

Risk Analysis and Business Impact

The risks are ranked on a scale (low, moderate, high) based on the reported probability or likelihood of occurrence. (The scale does not indicate the severity of the risk.) The business impact is described in relation to the process affected or likely outcome from the risk.

The risks and potential impacts are primarily financial. The initial financial risks are associated with additional staff time diverted to project management and overhead costs required to define, invest in, underwrite, and manage the project and new data sharing activities. This staff time is devoted to developing new contracts or other legal agreements for installation and ongoing use of new systems; management of the project; and ongoing maintenance and oversight.

The cost of installation also includes business process re-engineering, including the planning and change management cycles required to ensure transition from paper systems to the EHRs and related systems. The cost of maintaining dual systems—paper and electronic—is not sustainable, and thus successful adoption entails a transition to new processes (and hence costs) for archiving and retrieval.

Because physician leadership is critical to the entire process, physician time may be diverted from clinical, administrative, and research activities to educational, technical, and managerial tasks related to the project. New systems also require specific and highly technical expertise for installation, system migration, support, and ongoing maintenance. Finding the right technical staff to perform these functions adds costs as well. In addition, ongoing management of the project and system functions usually requires a full-time staff person be available or on-call around the clock to ensure system performance and availability.

Other potential costs that should be considered include staff training time (which reduces time spent on clinical care and other business operations) and time spent communicating with and educating vendors and partners who may also be required to change routines and business processes to align with the new information systems. During the period immediately following system installation, productivity decreases are typically reported due to inadequate training and a lack of familiarity with the new system. However, over a period of six months to one year, productivity increases are reported throughout adopting organizations.[xlvii] Finally, the costs of potential, unplanned business interruption also must be considered as a major financial risk. Business interruption may result from technical problems related to system installation or system failures—including data recovery.

Providers that share data with multiple organizations must also put in place additional infrastructure (i.e., physical and technical systems) and business processes to institute and manage the data-sharing activities. The business processes and structures refer to organizational entities and routines that assure soundness of the business model for data sharing; assure integrity of the data and systems; provide security and privacy of the data; and provide ongoing management support to monitor and upgrade technical support to the data sharing efforts.

Adequate financing of the data-sharing activities, including the governance functions across organizations and systems, is critical to sustainability. To date, research suggests that the costs and benefits of adoption vary significantly across organizations (especially by size of organization); some subsidies or scaling of fees for smaller providers may be necessary to encourage and ensure ongoing community-wide participation by both large and small community providers and other stakeholders.[xlviii]

Finally, the risks and potential costs associated with future liability are difficult to quantify, but are reported as important barriers to adoption by physicians. These future risks are based on expected changes in patterns of medical practice resulting from greater and more immediate access to critical clinical information via EHRs and an increase in internet-based communications among physicians, patients, and other providers. Mitigating these risks may require the purchase of additional malpractice

insurance. However, because the risk is difficult to quantify at this time, it appears more of a theoretical risk.

Some providers report that they find the financial risk related to the total cost of investment in EHRs and data sharing to be too high, and thus they may look to outside partners as investors. These providers report that because federal anti-referral and anti-kickback laws prohibit financing of information systems by third parties who would have a financial interest in the relationship with the provider (e.g. drug companies, labs), they may be precluded from seeking investment from these interested parties.[xlix]

Finally, some have identified concerns about anti-trust as a risk that is sometimes raised early in efforts to develop community-wide information exchange. The experience of those who have successfully overcome this concern indicates that anti-trust issues can easily be addressed via existing law.

The specific risks, risk levels, and business impacts (financial and non-financial) are summarized in the table below:

Table VI: Legal/Organizational Risk, Risk Level, and Business Impact of Adoption and Interconnectedness		
Legal/Organizational Risk	**Risk Level**	**Business Impact**
Intellectual Property (IP) • Dilution of ownership rights in health information • Expanded uses/derivative uses of EHRs • Licensing of IP for third-party systems and connectivity • Permissions/licensing of data within/outside sharing arrangements • Management of new/restricted IP	High	• Potential revenue loss through dilution • Potential IP piracy/infringement • Increase underwriting costs for added liability, litigation, insurance risk • Increase in operating costs related to legal/management modification of contracts, licenses, syndication rights, other IP protections • Increase in operating costs for imposing new financial controls over primary and secondary uses of data and audit controls
Security and Privacy • Expansion of physical network • Increased technical complexity of systems • Connectivity to non-conforming networks • Management of external and internal users • Alignment of security and privacy practices with data-sharing practices and possible restrictions/limitations based on gaps in policies/legal protections	High	• Business interruption due to security breaches • Business costs associated with higher volume, specificity of data recovery, corruption costs • Increase liability, litigation, insurance risk/costs • Increase labor costs for technical requirements/expertise • Increase hardware costs for system/infrastructure
Physician Anti-referral • Restrictions on financing of provider-based information systems by third parties.	Moderate	• Restrictions on access to capital from third parties

Professional Liability • Potential expanded liability/duty of due care for information received from third parties • Potential interference with patient/provider relationship by third parties • Business interruption from technical problems and dependence on electronic information systems	Moderate to High	• Increase in liability, business interruptions, litigation, insurance risk/costs • Increase in operating costs for technical staff, clinical changes, and administrative controls • Increase in data recovery costs • One-time conversion and ongoing archiving/retrieval costs for paper records
Governance • Complex, multi-party agreements to share protected health information and other proprietary assets • Technology-dependent administration of infrastructure; high level of technical expertise • Administrative and financial expense allocation and revenue recoupment • Management of new/restricted IP	High	• Increase in operating costs—one-time and ongoing • Diffuse revenue recouping options • Intrinsic high-cost technical support costs • Legal and administrative costs for contractual agreements and governance activities • Insurance for separate administrative/governance body
Community and Organizational Leadership • Physician resistance to leading adoption and interconnectedness at practice and community levels	High	• Initial decrease in clinical productivity; revenue reduction over time • Increased education and training costs to overcome resistance • Higher opportunity costs associated with non-participation with champions and industry leaders
Community and Organizational Change Management • Insufficient buy-in by critical providers • Inadequate resource allocation to adoption/interconnectedness processes • Misalignment of adoption and clinical change processes • Insufficient communication/education of participants in change processes	High	• Business interruption costs • High opportunity costs associated with partial or incomplete installation and use • Maintenance of dual or competing systems; results in higher operating costs • Misuse or non-use of systems leads to errors, incomplete records, and unreliability of data and systems—leading to disinvestment in one or more components

Community readiness and strategic planning

Communities developing health information exchanges must address critical success factors including the following:

- **Leadership**: Leadership among physicians and other clinical leaders is mandatory to achieve successful adoption of clinical IT systems and information exchange. Physician buy-in and leadership at the institutional level have been determined essential to achieve organizational buy-in and commitment to the long process of converting to daily use of EHRs and business-to-business connectivity across and within physician practices and hospital systems. Success depends on strong and continuous leadership by clinicians who, as individuals or representatives of provider organizations, accept responsibility for change management and motivation of others.

- **Activation**: An objective, well-respected, authoritative source will be needed to convene the

community and begin the discussions and activities needed to address legal issues, establish governance mechanisms, determine the business case, and develop approaches that address the range of stakeholder needs.

- **Vision:** Establishing a strong vision is critical to maintaining focus and momentum, and helps prevent potential derailment by individual organizations that may have proprietary priorities.

- **Governance and management:** An inclusive structure with commitment by key leaders is necessary to develop and manage the appropriate governance mechanism. Governance must establish clear responsibilities and processes for executing organizational and community plans as well as for determining how fees will be structured and benefits distributed.

- **Technical interoperability:** Organizations must understand and incorporate the technical standards requirements for interoperability. Physician and hospital adoption of EHRs is a precondition to connectivity and interoperability.

- **Practice transformation activities:** Clear definitions of the functional requirements and resulting workflow changes are essential to sustainable adoption. Important components of this transformation include thoughtful organizational restructuring, appropriate resource allocation, clear work plans, and well-developed training programs.

- **Organizational Capacity:** Qualified, consistent and dedicated staff is critical to successful implementation.

- **Training:** General and targeted training are critical components of the overall infrastructure that is needed to support the transformation and adoption of the complete health information exchange infrastructure within the required time frame.

Riley and Lorenzi outline models of organizational change and modalities of technology adoption based on characteristics and predisposition of adopters.[l] Because the adoption of clinical IT has proven to be extremely challenging to providers (especially small and medium-sized practices), each target of adoption may require specific clinical, technical, social and material aid that encourages and rewards change.[li] Reliance on clinical champions and peer assistance, particularly for individuals who harbor resistance based on unfamiliarity with technology, can help smooth uneven adoption and reduce physician resistance.

To build sustainable, regional sharing of health information, Lorenzi proposes a Local Health Information Infrastructure[5] (LHII) Success Strategy Model.[lii] This three-dimensional model of group mobilization and organizational change is based on decentralization of health information ownership and control, with communication achieved via Internet/browser-based technologies. The technologies and rules for connectivity require group investment and decision-making, along with ongoing maintenance and support.

Further, the *Roadmap* from Connecting for Health recommends incremental development of a health information network based on a locally driven strategy. This community- or regionally-led strategy must allow variation but at the same time establish a minimum set of common technical and policy requirements that will enable the growth of a nationally interoperable network.[liii]

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[5] The concept of regional groups collaborating to share information is not a new concept to the healthcare industry. The CHINs (Community Health Information Networks) were prominent in the 1990's as noted in Lorenzi's paper. Over the last few years, the terms "National Health Information Infrastructure" ("NHII") and "Local Health Information Infrastructure" ("LHII") have become accepted terms and are widely used in many industry reports, articles, conferences, etc. Lorenzi's model uses the term LHII, but since the industry is continuing to evolve its nomenclature to refer health information exchange, this paper uses the generic term health information exchange ("HIE").
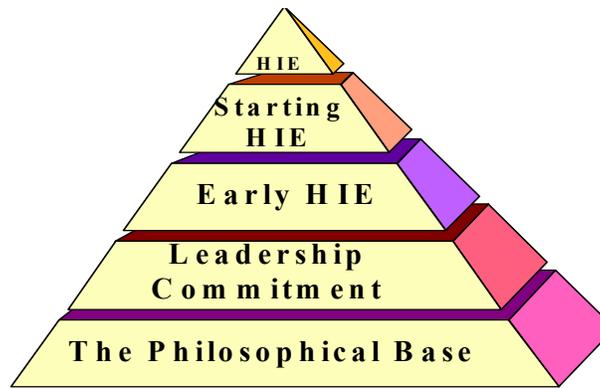
Figure 2. Health Information Exchange Pyramid

This model of group decision-making and action consists of five stages—depicted above as a pyramid. At the base are the core philosophical values, followed e by leadership commitment, early HIE implementation, initiation of HIE functions, and finally crowned by mature, fully functioning HIE.

Emphasis on organizational learning, aided by an approach that values people before technology and process, links individuals and groups to appropriate resources, tools, and information to implement the change processes. According to Lorenzi and other practitioner-theorists, extending adoption of EHRs beyond the individual physician practice or hospital system constitutes a "mega-change,"--that is, a fundamental alteration in the orientation of the organization implementing the change.

This mega-change requires a fundamental commitment by leadership to achieving the stated goals. An added layer of complexity involves the ongoing coordination of organizations, including administrative, technical, and financial functions inherent in the data-sharing enterprise.

The following table displays the principles and strategies for organizations and individuals interested in building an HIE. The tables itemize the requirements to establishing common values at the start, confirming the need and vision for the HIE; gaining leadership commitment through explicit agreements and actions; designing and developing core competencies to operate the HIE; starting the HIE; and maintaining ongoing functions and processes to support community-wide data exchange.

Table VII: Health Information Exchange (HIE)--Development Principles and Strategy	
HIE Development Phase	**Principles and Strategy**
Philosophical Base	• Building HIE is more of a political process than a technological one. • Collaboration within and across organizations is achieved through consensus built on sharing and trusting relationships. • HIE must be structured so that participation does not mean the loss of power, control, or status by participating individuals and organizations. • Being the champion for HIE requires risk-taking behavior. • Participant acceptance comes in phases and requires knowledge of participants' needs. • Creating HIE will take time, both in the initial phases and during time it takes to evolve to the "new" way of working and doing business.

Leadership Commitment	• There is a community consensus on the need for HIE. • There is a clear agreement on what participation in HIE means. There is a shared vision and mission for HIE, and there are shared benefits from participation in HIE. • There is a strong sense of excitement and commitment by community leaders. • A coordinator is selected who functions as an independent, neutral, trusted party. • There is a strong sense of ownership and participation in the process. • Appropriate attention is paid to financing the HIE system—both initially and into the future—to ensure continuity and success. • There is local government support and/or involvement. • Appropriate champions are identified in each participating organization. • Comprehensive and effective communication strategies are in place.

Early HIE	• Develop the structure, processes, and tools to support data sharing among participants in HIE and across core areas of competency:
	  • Organizational
	  • Technical
	  • Implementation and Project Management Process
	  • Educational
	  • Communications
	  • Financial
	  • Legal
	  • Political Process

Starting HIE	• Prepare the staff within participating organizations to adopt and use the new system. • Inform patients about the benefits of the new system and any responsibilities or uses that are available to (or required of) them. • Establish communication mechanisms and share information with everyone. • Develop appropriate education and training for those involved in the system, and implement that effort as close to the "go-live" date as possible. • Have staff available to monitor use of the system and to respond to questions. • Develop feedback mechanisms for all who use and manage HIE.
HIE—Ongoing	• Establish various vehicles for continuous communication. • Establish ongoing programs for continuous education and training. • Halt poor performance by anyone at any level as soon as possible. • Assess the impact of and access to HIE. • Complete regular user satisfaction analyses. • Complete regular utilization analyses. • Establish an appropriate schedule for meetings to address management, clinical, and technical issues.

To get started, regions contemplating establishment of a health information exchange should conduct an organizational and technical diagnostic of community readiness for data sharing, including the following:

• Strength of the business case for adoption and collaboration

• Ability to achieve community-wide participation

- Stakeholder willingness to commit to addressing the financial, technical, clinical, management, and organizational issues, as well as any consumer needs and concerns related to establishing a local or regional health information infrastructure

- The number, complexity and nature of market and regulatory barriers to the establishment of the local or regional health information infrastructure (a short- and long-term policy action plan should be formed to address these barriers).

- Willingness and ability to develop a strategic plan identifying the incremental starting points that can prove the merits of the concept, thus attracting a critical mass of interested participants.

For organizations and communities that have determined that they are prepared to build a health information infrastructure, the following table outlines principles and strategies needed to move from one level to the next of the HIE pyramid. This table displays approaches and practical steps in an iterative process to do the following: implement the vision, build the organization and technology, finance the operations, provide education and communications, supply legal guidance and protections, and gain political support and legitimacy for the HIE throughout the community.

Table VIII: Health Information Exchange (HIE): Community and Organizational Approaches and Tactics	
HIE Development Phase	**Community and Organizational Approaches and Tactics**
Philosophical Base	1. Agree on need for and vision of HIE. 2. Place explicit priority on collaboration within and across organizations. 3. Implement a series of events to begin to build trust and understanding of community needs. 4. Create material incentives for collaboration based on business case for group and member organizations. 5. Commit to building a collective culture of trust, participatory democracy, empowerment, transparency, and interdependence.
Leadership Commitment	1. Develop a concrete, clear, and energizing vision of the HIE for the community. 2. Provide for inclusive participation in collaboration through meetings, memos, and other types of contact and involvement. 3. Based on the vision, outline the strategic goals and tactical objectives for the collaboration, as well as milestones for measuring progress going forward. 4. Conduct a rigorous readiness assessment to clearly identify the strengths and weaknesses for the local effort. 5. Define the structure of the collaboration, including roles and responsibilities of leaders and members. 6. Define convening functions and responsibilities of the group, as well as key financing and related strategies and requirements for support and ongoing maintenance. 7. Select a convener. Communities require a source of activation to catalyze or enforce mobilization of the community, and focus the group on the activities and requirements of organized and systematic data sharing. A convener could be a major provider or payer, business coalition, state government, or objective third party. 8. Develop a legal and organizational framework and contractual agreements to define obligations, rights, remedies, and sanctions. 9. Develop a strategy and plan for external and internal communications and contingencies. 10. Inform public and local government officials of the HIE vision and work

	plan, and assess the need to include them as participants or ex-officio members.
Early HIE	1. Integrate development of organizational structure, processes, tools, and core competencies, including implementation and project management, education, communications, financing, legal issues, and the political process.
	2. Establish the business case, work plan, and metrics for implementation of community-wide data sharing, including how fees will be structured and benefits accrued across the HIE, (Consider how data should be used to support research purposes and recognize the opportunity for pharmaceutical companies, medical products companies, and even physicians to be potential revenue streams for the exchange funding model.)
	3. Define the organizational processes and technical functions for data sharing.
	4. Develop feedback mechanisms to provide regular and focused review of implementation progress.
	5. Define the technical foundations for data standardization, coding, presentation, extraction, storage, merger, interfaces, and security regimen—including access and authentication protocols, data recovery, back-up, continuity, and audit.
	6. Publish the technical and organizational work plans and updates to reflect the timeframe for implementation, including outstanding issues/items and proposed remedies.
	7. Designate clear responsibility for project management and its subparts for execution by area and task/subtask.
	8. Develop processes for project management reporting and issue resolution, including escalation processes to resolve issues.
	9. Develop financial controls linked to project implementation schedule and milestones, including flags and alerts for issues that require immediate resolution.
	10. Develop a training schedule and appropriate modules for staff based on user needs and level of technical ability. Follow-up with periodic testing or queries to determine if materials are being used appropriately.
	11. Develop a communications campaign for external and internal audiences.
	12. Develop course-correction routines to overcome technical, organizational, financial, and political obstacles to implementation.
Starting HIE	1. Develop and publish an installation and migration schedule, indicating work areas and work processes affected, with dates and times. . Include remediation and incorporate parallel workflows where available.
	2. Designate troubleshooting resources and contacts for the installation schedule.
	3. Clearly establish business continuity procedures, data recovery regimes, and related technical controls for worst-case scenarios during installation.
	4. Roll-out training and education modules and resources (e.g. computer-based training guides and knowledge bases).
	5. Roll-out communications campaign for participating organizations and community, and ensure materials and messages are up-to-date, in adequate supply, and synchronized.
	6. Establish on-line feedback capabilities to determine success and failures of implementation by function and workflow.
HIE—Ongoing	1. Develop communications unit/staff for internal and external

	communications related to implementation, organizational issues, community relations, policy, and marketing.
	2. Modify Privacy Notices and Policies to reflect new flow and uses of protected health information and any new obligations of patients.
	3. Refine training modules to take into account feedback from installation and possible changes in workflow/user needs from ongoing use. Make training modules available on-demand and orient them to first-time and current users.
	4. Conduct regular assessment of system performance in meeting financial, organizational, user, and technical goals and objectives.
	5. Review findings from assessments and feedback on regular basis to adjust/refine features, functionality, response time, and other technical performance metrics established to evaluate system performance.

Many communities have pre-existing collaboratives in place to address healthcare or community-wide issues. Interested parties should identify these and determine whether they can be leveraged to advance HIE development. The process outlined above will be helpful for the communities that have already identified an interest in health information exchange. However, many communities will require a source of activation to catalyze or enforce convening of the organizations that would participate in a health information exchange infrastructure. This neutral facilitator will be needed to convene the community and begin the discussions and activities needed to address legal issues, establish governance mechanisms, and evaluate the business case. This role could be played by a government entity or, depending greatly upon market dynamics, a number of different industry members, listed below:

- Major provider
- Major payer
- Business coalition
- Major employer
- Existing collaborative
- State government
- Unrelated third party

Depending upon the degree to which communities identify a natural convener, the Federal government could take steps to encourage the convening of communities, as described in the Action Plan subsection of the section that follows.

Small and medium-size ambulatory care practices will require support mechanisms

Small practices have greater need for interoperability since they are more dependent on patient data from external sources. Thus, for these practices, the availability of patient information via an interoperable platform would be especially beneficial.

Small and medium-sized ambulatory care practices may not have as strong a business case for IT adoption in the absence of incentives. There may be no driving force for change within small and medium-sized practices, as there often is in large groups and among hospital-based physicians. In addition they face a dearth of resources available to dedicate to technical support, change management and implementation.

Small and medium-sized practices have few resources available to dedicate to implementation of new IT systems, change management to encourage use of these systems, or technical support for ongoing maintenance. As a result, these practices will require greater attention and support to facilitate sustainable IT adoption and to support health information exchange. Consideration should be given to the unique adoption-related needs of small and medium-sized practices when creating the value

proposition; assisting with implementation, adoption and support issues; and encouraging participation in health information exchange infrastructures that enable full interoperability.

Similar to other communities that have established local economic development agencies (e.g., housing agencies) to support sectors of the population or economy, healthcare providers could benefit from a state or regional health information technology support organization. This organization could manage financing, technical support and related activities for local initiatives. Experimentation should be done to identify the most successful support models, and these models may need financial support until the market for small practices matures. There should also be financial support for local and regional EHR and health information-sharing collaboratives to ensure sustainability of adoption and health information exchange. These collaboratives should provide technical assistance, including resources describing viable collaboration models, practical implementation considerations, and processes for multi-institutional and practice-level adoption and interconnectedness.

While the small practice is in the greatest need of IT adoption and interoperability, a case can be made that adoption strategies should initially focus on larger providers in the region. These large providers have a natural clinical technology adoption advantage due to their existing infrastructure and business arrangements with physicians, both of which could be a strategic advantage in driving the majority of the market toward health information exchange. As a result, large providers may need fewer incentives to adopt interoperable IT. If several larger providers were to accelerate their adoption of these technologies, smaller providers may be encouraged to follow suit. However, while this strategy has proven to stimulate adoption of IT in other industries, the fragmented nature of the industry may limit the strategy's effectiveness in healthcare.

Long-term implications of high degrees of connectedness

Adoption of EHRs and the sharing of health records across organizations may appear to be a rational and inevitable result of advances in technology as well as the systematic application of processes and management principles from other industries to healthcare. Both steps - taken to their logical conclusions – represent the completion of a cycle of change in medical practice. This stage renders obsolete the craft model of medicine, and permits wider and more immediate sharing of medical information beyond the physician's office.

Using EHRs and available analytic tools, clinical information can be more easily aggregated and used for research purposes. Examples of analytic tools or products include clinical protocols, research tools for drug development, and tools for health services research. Derivative products and tools can also be disseminated more widely and immediately using complementary electronic information and communications systems. Similarly, the derivative or downstream uses of analytic products or byproducts can also be commoditized, repackaged, sold, and marketed for commercial purposes, whether for clinical or research uses.

Physicians and patients lament the impersonal quality of the clinical relationship and resent the intrusion of health plans, drug companies, and other commercial interests into the clinical setting. It is important to note that the adoption of EHRs and data sharing across organizations does not erode the physician-patient relationship or dissolve physician autonomy. In fact, widespread use of EHRs with system interoperability has the potential to enhance the patient-physician relationship and empower physicians by putting sophisticated diagnostic tools into the hands of providers. At the same time, patients are empowered because providers can be held accountable to a wider, more watchful, and better informed peer group of doctors and panel of patients.

Given the limitations of the current reimbursement system (which is based on volume and piece-meal care), many still view interconnectedness as potentially imposing new responsibilities on providers and confusing the care delivery process. They feel that interconnectedness could result in vastly increased

amounts of uncompensated work, driven largely by providers having access to information that was previously not available or too difficult to find, and by the greater liability risks that could arise due to errors or omissions in decision-making and treatment.[liv] From the physician's perspective, this unification of information and practice may appear both threatening and legally boundless.

According to this line of reasoning, the tort liability model for physician conduct and the duty of due care could be greatly expanded. Greater information availability from "push" technologies, patient-entered data, and nearly instantaneous availability of laboratory and other diagnostic test information may place greater obligations on physicians for timely decision-making and action, including action on information generated outside of his/her area of expertise or order.

Physicians may also have new duties to communicate with others who share responsibilities for a patient's care, and to more clearly define and agree upon care coordination responsibilities. Many providers and patients fear the downstream consequences of adoption of EHRs, and want better technical and regulatory controls to ensure the privacy and security of health information, along with assurances that an individual will not be harmed by greater access to information promised by the new technologies.

As a result of the transformation that might be introduced as a result of high degrees of connectedness, changes to the current healthcare regulatory framework may be required to address the systematic gaps in the present patchwork of state and federal protections, particularly regarding oversight of emerging infrastructure, security and privacy of health information, and a changing nature of professional liability for providers.[lv] Possible areas for research and broad policy consideration could include security and privacy, medical liability, and practice transformation issues:

- **Security and privacy**

    - A framework is needed for the incremental development of local, regional, and national health information exchange. The framework must respect local ownership and control and provide the technical requirements to support robust security and privacy.

    - A robust security and privacy regime (that addresses legal, technical, and organizational issues) is needed for interoperable regional and national health information systems.

- **Model professional liability and medical malpractice laws**

    - Laws should reflect changing nature of medical practice in a connected world. Policy-based actions will be needed to appropriately define physician and clinician liability and negligence related to the use of widely interoperable EHRs for medical decision-making.

- **Practice transformation**

    - Assessments should be made of the changes in medical practice and in the relationships between stakeholders that are likely to result from widespread adoption and use of EHRs and health information exchange technologies.

While policy recommendations may be premature and research inconclusive at this point, these issues remain important for ongoing examination.

Risk Mitigation by Stakeholders

Based on the risks, business impacts, and operational barriers of adoption and interconnectedness, the Working Group considered near-term strategies to mitigate and manage risks by physicians, health plans,

and consumers. These strategies reflect current practices and options available to limit the potential negative business impact from adoption or participation in multi-organizational data sharing projects. Risk mitigation strategies fall into three broad categories:

1. Contracts and legal agreements to define and limit risk, including specifying uses of IP under protection or via licensing arrangements.

2. Business or non-profit incorporation to share and/or spread risk, including the development of data sharing structure, processes, protocols and supporting contractual and other legal agreements

3. Policy changes to reduce risk through specific changes to state or federal laws, statutes, and regulations, along with other changes that address the undue risk and negative business impact presently associated with IT adoption or data sharing for patient care purposes.

For the most part, once a decision has been made to invest in EHRs or data sharing with third parties (and thus to accept the financial risks discussed in the "Financial Analysis" section above), the key risks outlined in this section can be effectively managed via contracts, specific licensing and use agreements, and additional insurance policies, such as for business interruption/continuity. These contracts or other legal agreements set the conditions for use and exchange of health information, specify costs or fees, describe authorized users, and establish rules to bound the relationships, including penalties for breach or misconduct.

Managing data-sharing activities across organizations requires an additional level of governance to provide fair and predictable processes that encompass the many clinical, technical, and administrative dimensions of the group enterprise. Early experience with health information exchange shows that this can be an extremely challenging, but nonetheless manageable, process. Establishment of a separate body to administer and adjudicate these processes requires separate agreements, whether by articles of incorporation to form a non-profit or for-profit organization, or by contract to establish processes for sharing in the absence of a separately incorporated organization.

As the complexity of data-sharing increases within and across organizations, the need for clear and predictable processes and protocols for managing the relationships also increases. These include standard protocols and/or triggering mechanisms for the following: administering the data-sharing, problem-solving/dispute resolution, negotiating financing and making payments, initiating system improvements, investigating potential security and privacy violations, and enforcing the data-sharing agreements or imposing sanctions.

The significant financial risks posed by security and privacy concerns due to poorly configured or incompatible security environments and privacy practices may require adoption of more stringent technical standards and administrative practices by participating organizations. Best practices and strong control regimens are necessary to provide the highest degree of technical security, and they must bring non-compliant systems to the level of the group standard. These technical provisions and requirements should be included in contracts or group by-laws and updated to reflect the technical specifications that support the group standards. Internal audit and enforcement processes must be a part of the control regimen to ensure conformity of practice with policy.

Current federal and state laws regulating the flow of health information are a complex and confusing patchwork. Harmonization and modernization of federal and state laws will require considerable collaboration to create a workable regulatory framework that supports the technical and market realities of the evolving infrastructure.

Risks related to physician anti-referral restrictions on accepting third-party financing for health information systems were partially addressed by new regulations. The Centers for Medicare and Medicaid Services (CMS) of the U.S. Department of Health and Human Services recently published an interim final rule entitled "Medicare Program: Physicians' Referrals to Health Care Entities with Which They Have

Financial Relationships (Phase II)."[lvi] The regulatory exception under Stark II, Phase II (42 CFR Parts 411 and 424; Section 411.357(u)), provides for the provision of information technology items and services by a designated health services entity to a physician to participate in a community-wide health information system, which represents an expansion of permissible third-party financing of community-wide information initiatives. The proposed language in the interim final rule allows a specific, limited exception for physicians to accept payments or contributions to establish community-wide health information sharing. The exception requires that health information sharing take place in a "community-wide health information system" that is available to all providers, practitioners, and residents of the community who desire to participate," and that the "arrangement does not violate the anti-kickback statute (section 1128B(b)) of the Act."[lvii]

The comment period for this rule ended June 24, 2004, and these regulations became effective July 26, 2004. Public and private sector guidance and definitions are needed to clarify how providers can participate in data-sharing pursuant to the Medicare Modernization Act of 2003, specifically through clinical pilots and electronic prescribing programs. Guidance will help to identify opportunities for provider-based connectivity that promotes the expansion of widespread data-sharing initiatives. Additional barriers to compliance may require alignment of Stark II, Phase II with the federal Anti-Kickback Act by creating a safe harbor for providers. Even then, barriers may still exist due to the highly restrictive nature of the exception, which is available to few communities at the present time.

Risks that are more difficult to quantify, such as the potential for increased professional and medical malpractice liability, may require more time and experience to accurately predict. Also, changes to policy and regulations governing tort liability and professional liability insurance coverage may also require organized analysis based on changes in patterns of risk exposure and litigation.

Despite these uncertainties, providers are beginning to include descriptions of how EHRs may change the handling of medical information in the Notices of Privacy Practices that they give to patients. These notices may also include specific disclaimers or notice of how requests for restrictions on the clinical uses of health information will be handled by the provider or institution or are governed by law.

The following table summarizes the risk management strategies available to various stakeholders.

Table IX: Risk Management Strategies by Stakeholder	
Legal/Organizational Risk	**Risk Management Strategy by Stakeholder (Provider; Health Plan; Consumer; Employer)**
Intellectual Property (IP) • Dilution of ownership rights in health information • Expanded uses/derivative uses of EHRs • Licensing of IP for third-party systems and connectivity	All Stakeholders/Data-Sharing Participants: • Contracts that define IP by stakeholder and exclusive rights by data/source, including technologies, service level agreements, and the like. • Delineate permissible uses, fees and protections (e.g. licensing), consistent with state and federal laws. • Define additional fee structure for secondary/derivative uses. • Define processes to enforce contracts, including negotiation and arbitration. • Secure additional insurance to cover litigation/infringement expenses. • Separate insurance/IP protection for IP held jointly by incorporated or unincorporated group that is administering data sharing. (see Governance section for information.) • Monitor separate and joint IP.

Security and Privacy • Expansion of physical network • Increased technical complexity of systems • Connectivity to non-conforming networks • Management of external and internal users	All Stakeholders/Data-Sharing Participants: • Contracts and assurances consistent with IP agreements; careful definitions regarding vendor/contractor responsibilities, obligations and liability, especially where security/privacy functions or parts of infrastructure security (e.g., server/firewall) are outsourced as part of agreement to share data by any or all participants • Specific inclusions/restrictions or limitations spelled out in privacy notice to patients and agents • Data recovery and integrity assurance processes with specified metrics • Remediation and contingency plans • Audit protocols with system performance metrics specified • Additional insurance/stop-loss provisions • Specific restrictions on access/authorization where allowed or recognized • Standardization of security and privacy protocols to best business practice or emerging industry standard • Note: Additional policy changes may be needed depending on the extent of membership in data-sharing activities; these changes would expand protections beyond HIPAA-covered entities where participants are not third-party contractors to HIPAA-covered entities.
Physician Anti-referral • Restrictions on financing of provider-based information systems by third parties.	Providers • Policy changes are underway to Stark anti-referral law to permit third-party financing under more permissive conditions—provider trade associations and other stakeholder groups are working with congressional staff to develop language to amend Stark and Medicare/Medicaid regulations and the Medicare Modernization Act 2003 where needed. • Clarify information transmitted for clinical purposes versus that transmitted strictly for referral purposes. • Clear contracts that delineate purposes and limitations of investment with financing entities; ensure that contract provisions do not violate other regulations such as anti-trust/anti-kickback laws.
Professional Liability • Potential expanded liability/duty of due care for information received from third parties • Potential interference with patient/provider relationship by third parties	Providers: • Provider/patient agreement regarding care coordination and providers/others who are authorized to participate in data-sharing for care coordination • Strategy and plan for external and internal communications and contingencies • Business interruption/data recovery contingency plans; additional insurance • Policy changes to define duty model and standard of care under new technologies/uses, in collaboration with medical associations, and state attorneys general, and national bar association • Notice of Privacy Practices that includes description of EHR systems/processes; may include disclaimers of liability or right to refuse restrictions on clinical uses of information Health Plan/Employers: • Network and contract agreements that define extent of health plan/purchaser information requirements for pay-for-performance or other clinical metric-based payments/incentives

Governance	All Stakeholders and Data-Sharing Participants:
• Complex, multi-party agreements to share protected health information and other proprietary assets • Technology-dependent administration of infrastructure; high level of technical expertise • Administrative and financial expense allocation and revenue recouping • Management of new/restricted IP	• Comprehensive contracts/agreements defining the purposes and processes for exchanging health information • Possible separate incorporation of body to administer data exchange and oversee integration/coordination of clinical, administrative, financial, and technical elements • Establishment of structures and processes to design, manage, and maintain exchange processes and relationships • Clear decision-making procedures/chain of command, including escalation procedures for clinical, administrative, technical, and financial matters for any and all bona fide participants • Adequate training and education and related resources to support adoption and ongoing uses • Plan and strategies for internal and external communications and contingencies • Dispute-resolution procedures Providers: • Clear process for incorporating clinical dimensions of data-sharing processes, including updates, modifications to classification schemes; care coordination protocols; treatment or clinical guidelines; and any and all pertinent medical/clinical matters deemed essential to the data exchange process by provider members and as referenced by data sharing-agreements or established processes Patient/Consumers: • Clear process for information provided by patient/consumers, where such information is incorporated into or accessed through the EHR using associated access/authentication protocols
Community and Organizational Leadership	Physicians:
• Physician resistance to leading adoption and interconnectedness at practice and community levels	• Identification of physician leaders and information needs for decision-making • Clarification of system, participation costs and benefits, and financing options • Clarification of business and down-stream impacts • Clarification of strategies to manage risks
Community and Organizational Change Management	Physicians:
• Insufficient buy-in by critical providers • Inadequate resource allocation to adoption or interconnectedness processes • Misalignment of adoption and clinical change processes • Insufficient communication or education of participants in change processes	• Identification of organizational costs, benefits and financing options • Identification of organizational resources and timeframe for adoption/participation, and scenario planning to assess impact on operations • Development of realistic work plan(s) for adoption/participation • Alignment of clinical/administrative processes for adoption/participation • Timeframe for complete transition from paper processes/records; storage/retrieval processes for archived records • Education and communication strategy for staff, patients, vendors, partners related to adoption, timeframe, and process • Communication campaign to patients/consumers and the community, along with plans for how to respond to contingencies

The legal analysis reveals several measures and steps that purchasers and implementers of EHRs and health information exchange technologies will need to take to address the legal and management risks and issues related to information sharing. This analysis provides a framework of areas that will require legal and contractual attention by communities. Existing law and regulations can be leveraged by organizations entering into information-sharing relationships to provide ample protection of private property, assert privacy rights, and provide protection from professional liability and medical malpractice, while at the same time allowing the sharing of information among multiple organizations. Organizations and individuals can utilize several types of vehicles to mitigate risk, such as corporate law, contracts, licenses, use agreements, service-level agreements, and syndication. Early experience from health information exchange programs suggest that this process can be extremely challenging but is nevertheless quite manageable.

Recommendations

Financial issues and risks represent the primary barriers to widespread adoption of clinical applications that are critical to support full interoperability of patient information. Strategies for mitigating these risks are presented in greater detail in the following chapter. To encourage the public sector and private industry to move forward in developing the legal and regulatory frameworks and tools necessary to sustain the successful adoption of clinical IT infrastructure and applications, the Working Group has developed the following recommendations, which should be viewed as starting points:

Organizational Recommendations

Recommendation #1
Communities should assess their readiness for local and regional data sharing by conducting a rigorous review of the technical, clinical, and organizational capacity and capabilities, as well as the level of community commitment and the availability of local leadership to spearhead the effort. Each of these is a critical success factor in building and managing a local health information infrastructure.

Recommendation #2
Communities will require a source of activation to catalyze or enforce convening of the organizations that would participate in a health information exchange infrastructure. This source will be needed to convene the community and begin the discussions and activities needed to address legal issues, establish governance mechanisms, and evaluate the business case.

Recommendation #3
Small and medium-sized practices have greater potential to benefit from interoperability, but they will require greater attention and support if they are to adopt clinical IT applications and participate in health information exchange on a lasting basis.

Legal Recommendations

Recommendation #4
Most management and legal issues related to the establishment of a secure, confidential health information infrastructure can be addressed in the context of existing law and through use of contracts. Nonetheless, there is a need to guide regional efforts by providing access to examples of legal agreements and to the experiences of others.

Recommendation #5
Changes to current policy and market-based actions can provide greater protections and opportunities for individuals and healthcare organizations that engage in information sharing.

Recommendation #6

As the implementation of systems that allow for health information exchange matures, policy and regulatory changes may be necessary to ensure that adoption is sustainable. These changes will likely be necessary to deal with issues that are not yet fully understood, including security and privacy, medical malpractice, and practice transformation.

Action Plan to Enable Financial, Legal and Organizational Sustainability

The federal government can advance the health information exchange agenda through policy and regulatory actions as well as by exercising its roles as the single largest payer in healthcare and one of the nation's largest employers. As a payer, the government can play a significant role in influencing the uptake of clinical information systems through the use of financial incentives in insurance programs related to FEHBP, VA, and DOD.

Along with the federal government, health plans and self-insured employers must also play a significant role in accelerating provider adoption by participating in complementary incentive strategies. As has been well documented in a variety of publications, the entire healthcare industry faces increased scrutiny due to unacceptable levels of medical errors, rapidly rising costs in both the public and private sector, and industry-wide productivity losses caused by inefficiencies within the system. Many policy and industry leaders have begun to recognize the importance of IT in addressing these problems. Such systems can help to provide greater transparency to purchasers and consumers as they attempt to select and reward high-quality plans and providers. They can also help to improve quality and cost-effectiveness of care by assisting patients and providers in making informed, cost-conscious, evidence-based decisions about the use of healthcare resources across the continuum of care. Collaboration between the public and private sector will be essential to promoting IT adoption by the industry. Strategies will have to be carefully coordinated to ensure that multiple investments in EHRs and supporting technologies are appropriately leveraged to ensure successful adoption and implementation of technologies. These technologies need to provide the necessary level of interconnectedness to allow for timely information exchange across healthcare settings, as such exchange is critical to realizing the full benefits of IT.

Health plans interviewed as part of this process have expressed concern about the size and effectiveness of this level of incentive. Many payers and providers are still experimenting with different types of incentives, and the utility of these approaches is still being evaluated. In addition, while payers and employers recognize that small physician practices need support in selecting and implementing EHRs, many of these organizations are struggling with their own margin pressures and are hesitant to devote significant dollars to incentives until the evidence that they can work is clearer. As a result of all of these factors, any near-term increases in financial incentives by payers and employers are likely to be incremental in nature. The Working Group understands the issues being faced by health plans, but believes that incentives must be sufficient and substantial enough to enable appropriate investments and effective implementation that allows the technology to benefit all stakeholders.

Action Plan

What follows is a summary of strategies that various stakeholders can pursue to support health information exchange. These strategies demonstrate how related stakeholders can play a role in enabling progress toward clinical information system adoption and interconnectedness. The strategies are categorized as follows:

- Financial incentives targeted toward physicians and providers
- Legal strategies targeted at healthcare leaders and policy makers
- Organizational strategies targeted at healthcare leaders, communities and other stakeholders

The financial incentives are further categorized to reflect the industry's consideration of the "normative" steps of technology adoption, use and related outcomes as discussed earlier. Organizations need to recognize that financial and non-financial incentives should be phased in to achieve adoption milestones along the path toward full interoperability. In addition, because different types of incentives can lead to different results in practice, organizations should thoroughly evaluate the strengths and weaknesses of each type of incentive strategy to understand how it aligns with the desired results, thus ensuring that an appropriate mix of incentives is put in place.

Although the majority of incentives are direct and indirect incentives targeted at the physician practice, there are other types of incentives that should be considered when evaluating the participation of related stakeholders. For example, in a consumer-targeted model, incentives can be designed to modify consumer behavior related to physician or provider choice. Use of using variable co-payments and/or tiered deductibles can reward consumers who choose a physician using an EHR or eprescribing application.[lviii] (For more information on various incentive designs available and in practice across the industry, see www.healthstrategies.net.)

Table X: Recommended Strategies for Action								
Recommended Strategies	Federal Government (FG)	State/ Regional Government (SRG)	Health Plans (HP)	Employers (E)	Philanthropy (P)	Professional Societies/Certification Boards/Academic Institutions (PS/CB/AI)	Vendors (V)	Malpractice Insurers/ Pharmaceuticals (MI/PH)
Financial Incentive Realignment								
Incentives for Technology Adoption	FG	SG	HP	E	P	PS CB AI	V	MI PH

Financial Incentives
- Provide reimbursement for implementation of EHR or other incremental applications.
- Fund experimentation with various models of reimbursement.
- Structure incentives so that they are distinguishable from Medicare and Medicaid receivables so they can be leveraged as collateral to purchase technology.
- Provide access to capital for EHR purchase:
  - Provide access to government-backed revolving loan funds.
  - Establish clinical IT group purchasing contracts.
  - Develop a joint regional or national pool of funds to invest in clinical technology adoption by healthcare providers.
  - Establish a matching grant program.
  - Consider creative structuring to allow early transition from adoption-based to performance-based incentives, e.g., forgiving payments based on physicians meeting performance targets.
- Allow investment in EHR as a tax credit rather than a business expense; this would apply to physicians or for-profit hospitals only.
- Create a certification program of technical and functional standards for key clinical information systems; tie all public/private investment to only those products that meet these standards.
- (For health plans) Provide a discount to employers whose employees' primary care provider uses a certified EHR.
- Reduce professional liability insurance premiums for providers who use clinical information technology

Non-financial Incentives								
• Enforce adoption of standards among all relevant federal agencies, including CMS. • If standards-based EHR is used, allow the output to be acceptable for other public sector reports (including school and work physicals, immunization reports, sick slips, and the like). • Simplify or remove plan administrative processes, e.g., if a physician transmits a CCR or CCR-type document with a referral, no administrative referral forms should be necessary. • Include use of specific clinical information technology in Board certification and accreditation criteria. • Create a provider awareness campaign on the value of clinical information systems; develop guides to assist physicians in understanding the tradeoffs and approaches to pursuing a strategy of incremental adoption. • Provide objective product analysis, including product scorecards and best practices • Create information dissemination mechanisms (e.g., conferences) to help payers and employers understand the issues and impact of various reimbursement strategies and levels • Coordinate state bioterrorism funding with clinical IT adoption strategy.								

Incentives for Technology Use	FG	SG	HP	E		AI		
• Provide reimbursement for EHR use, e.g., reimbursement based on percent of patient prescriptions prescribed using EHR. • Create reimbursement for "e-visit" using clinical information system.								

Incentives for Technology Performance	FG	SG	HP	E		PS CB AI		
• Provide reimbursement based on improving processes and outcomes. • Provide reimbursement for care processes that require care coordination and chronic care management. • Reimburse or reward physicians and providers who make quality data available to purchasers. • Forgive loan payments for IT based on a physician meeting performance targets.								

Incentives for Interoperability	FG	SG	HP	E		PS CB AI	V	MI PH
• Develop reimbursement strategies that create incentives for interconnectivity across medical practices, hospitals, labs, pharmacies, and health plans • Provide reimbursement for care processes that require information management across provider organizations (e.g., care coordination, chronic care management). • Require evidence that a physician or practice is participating in a community-based health information exchange to receive funds. • Require that a percent of incentives paid to physicians or practices be spent in direct support of a community-based health information exchange. • Make health information exchange plan development a part of the accreditation process. • Create a compliance program of technical and functional standards for regional interoperable infrastructure (e.g., regional results viewer); tie all public/private investment to products that meet these standards. • Require that incremental applications support migration to a full EHR. • Develop a business model that includes payment for data from network that can be used for quality analysis, clinical trials, etc. • Reduce professional liability insurance premiums for providers who use certified clinical information technology.								

Organizational and Legal Readiness and Sustainability								
Support for community activation, development and management of health information exchanges	FG	SG	HP	E	P	PS CB AI	V	

- Create regional health information technology support organizations that can manage financing, technical support and other needs of regional health information infrastructures.
- Create diagnostic tools to assist communities in assessing readiness.
  - Compile and disseminate strategies for overcoming obstacles to readiness.
- Require state governments to develop an assessment of health information exchange activity or readiness in their state, along with plans to encourage that development. This requirement could be linked to federal funding of Medicaid.
- Provide grants to facilitate community planning for health information exchange.
- Identify common features of successful organizational structures and disseminate findings.
- Compile and disseminate sample documents utilized in other technology adoption and/or health information exchange projects.
- Develop conferences to educate physicians and communities on strategies to address management and legal issues.

Support for small and medium-sized practices that will require greater attention and support in order to achieve sustainable clinical information systems adoption and health information exchange participation	FG	SG	HP	E	P	PS CB AI	V	

- Create regional health information technology support organizations that can manage technical support and other needs of small and medium-size practices to achieve and maintain sustainable EHR adoption.
- Fund comparisons of vendor products and support services to help small and medium-sized practices make better purchasing decisions.

Consider changes to current policy and market-based actions to provide greater protections and opportunities for individuals and healthcare organizations	FG	SG					V	

- Clarify how providers can participate in data sharing pursuant to the Medicare Modernization Act 2003, specifically how they can participate in clinical pilots and pharmacy programs.
- Continue to encourage vendors to incorporate stable, widely accepted interoperability standards in their product offerings.

As health information exchange implementations mature, identify and address areas that may require policy and regulatory changes to enable sustainable adoption	FG	SG			P	PS AI		

- Create legislation that supports a framework for the incremental development of local, regional, and national health information exchange that respects local ownership and control, and provides the technical requirements to support robust security and privacy.
- Identify malpractice liability issues that arise in an inter-connected world.
- Take policy-based actions to appropriately define physician and clinician liability and negligence with respect to the use of widely interoperable electronic health records for medical decision-making.
- Assess the changes in medical practice and in the relationships between stakeholders that are likely to result from widespread adoption and use of clinical IT and regional and national health information exchange.

To ensure sustainability and continued progress, support a wide range of activities, education and information regarding clinical information systems adoption and health information exchange development	FG	SG	HP	E	P	PS CB AI	V	PH

- Fund or encourage development of the following to promote adoption of clinical information systems and health information exchange:
  - Rigorous approaches to financial analyses and the results of the analyses of other communities
  - Implementation methodologies
  - Change management approaches and implications
  - Draft policies and procedures
  - Case studies
  - Product certifications and comparisons with user feedback
  - Collaborative forums to refine practice implications
  - Directories or brokerage services for technical assistance
  - Strategies to educate physician groups about the importance of integrated electronic patient health information and potential approaches to implementation and use in their practices.
  - Conceptual process to implement clinical information systems
- Fund demonstration projects to test the value of models of clinical IT adoption and health information exchange.
- Develop mechanisms to compile, maintain and disseminate the above material to all stakeholders.

Agenda for Future Study

The section outlines areas where further research, understanding and recommendations are deemed to be necessary as the country undertakes efforts to accelerate EHR adoption and to form regional and national health information exchanges.

Financial Incentives

This report recommends financial incentives as a means to accelerate adoption of EHRs by small and medium-sized physician practices. The report also notes that a variety of incentive demonstrations and initiatives are underway. However, these efforts are embryonic. Studies need to be conducted that assess the utility, form, size, evolution and pace of introduction of financial incentives for EHR adoption. In addition, further work is needed to assess the costs and benefits of EHR use and understand the factors that are causing wide variations in the results of existing studies.

There is a striking dearth of practical experience with regional health information exchanges. Similarly, there is little experience with financial and non-financial incentives for regions to form and sustain such exchanges. Studies should be conducted to identify and assess various forms of such incentives. These studies will assist the industry in evolving towards a more mature, tested set of incentives.

Forming and Sustaining Regional Health Information Exchanges

While several notable examples of regional health information exchanges exist, they are few in number and they vary widely in terms of composition, governance and funding sources. An objective inventory and characterization of these efforts is lacking. In short, an experienced-based set of critical success factors for sustainability is lacking. To address this issue, these efforts should be thoughtfully analyzed. Such analysis might address a series of questions related to these efforts, such as:

- What factors led to their formation?
- How do they govern themselves?
- How many major challenges were faced and how were they overcome?
- What projects were undertaken? Was there a normative project sequence?
- How is success measured?

- What are some common factors that drive success?

The answers to these and other questions would provide enormous value to all such efforts.

Supporting EHR Adoption by the Small and Medium-Sized Physician Practice

This report recognizes the critical need to accelerate EHR adoption by the small and medium-sized physician practices. While financial incentives are critical, they must be accompanied by mechanisms that support EHR use by the physician. These mechanisms must assist the selection of systems, management of changes in practice operations, participation in regional integration efforts, and ongoing support of the EHR.

However, the mechanisms to provide such support are unclear. While one can identify existing organizations (such as state medical societies) that could provide some support, it is not clear whether existing organizations will be able to provide all the support that is needed, or whether new organizations must be established. Regardless of who provides the support, it is unclear exactly what support would be most useful, and thus further work in defining the needs of small and medium-sized practices is in order.

To that end, studies should be undertaken that comprehensively focus on defining support needs, determining different types of organizations that can fulfill those needs, assessing what assistance these supporting organizations might need as they assume these roles, and establishing the approaches and techniques for delivering the desired support.

Regional Integration at Maturity

Should current efforts bear fruit and adoption of EHR and implementation of regional health information exchanges accelerate, the country will be confronted with what these efforts will look like and what impact they will have once they mature. Key questions include the following:

- How will care be different? Will quality be improved and costs reduced?
- Will the roles of various stakeholders change as information is more broadly shared and transparent?
- Will the consumer become more empowered?
- Will practice change as more providers see the care decisions and actions of other providers?
- How will the definition and experience of malpractice change?
- Will current privacy protections be sufficient?
- Are use and access policies for accessing the system clear?
- Have intellectual property and other legal issues been adequately addressed?

For many proponents, the ultimate objective in promoting significant EHR adoption and regional clinical integration is the transformation of the healthcare system in this country. But what remains unclear is what this transformed system will look like and whether it will result in problems and challenges that are materially different from the ones seen today.

While it may not be possible today to examine a sufficiently large number of transformed care systems to precisely predict the future, analysis should be performed that attempts to more clearly define the "new healthcare system" and determine the potential problems that it might create.

Summary of Recommendations and Findings

1. Financial incentives will be necessary to encourage healthcare providers to adopt IT that allows for connectivity and information exchange that can improve the quality of care.

- The analysis of small physician practices confirms what several recent studies have found; the business case for IT adoption is not sufficient and financial incentives are misaligned, especially for small and medium-sized practices contemplating the purchase of IT.

- Currently, providers must bear the cost of purchasing, implementing, and operating information systems, while a significant portion of the value generated from these systems (e.g., improved quality of care and more appropriate utilization of services) accrues to others. As a result of this "value imbalance", physicians have little financial incentive to adopt these technologies, including EHRs.[lix] In fact, small physician practices that purchase most types of IT are likely to absorb substantial net costs. It is no surprise, therefore, that most physicians are not likely to purchase such systems unless and until there is a stronger "business case" for them to do so.

- Financial incentives for both adopting IT and achieving interconnectivity across healthcare providers are an essential component of establishing this business case. Financial incentives can be designed as either direct (e.g., direct payment for adoption and use of EHR or electronic prescribing) or indirect (e.g., pay-for-performance systems that reward practices for strong outcomes, care coordination, or chronic care management, each of which can be facilitated by IT adoption).

- Incentives that promote IT adoption without an emphasis on interconnectivity may encourage the purchase of "piecemeal" systems that are unable to deliver the full quality and efficiency gains that IT has to offer, thus weakening the overall business case and leading to insufficient progress. Financial incentives should be structured to encourage the adoption of IT systems that support interconnectivity among data sources, including sources from outside the physician practice. A recent study from the Center for Information Technology Leadership showed that the return on investment (ROI) from IT is significantly improved when the systems allow for interoperability of structured clinical information, as much of the operational and clinical gain is dependent upon access to electronic patient data (CITL, 2004). In fact, the greater the interoperability among IT systems, the better the business case becomes.

- The Federal government can advance the health information exchange agenda through policy and regulatory actions as well as by exercising its role as the single largest payer in healthcare. As a payer, the government can play a significant role in influencing the uptake of clinical information systems through the use of financial incentives in its purchasing of healthcare benefits through the Federal Employee Health Benefits Plan (FEHBP), the Veterans Administration (VA), and the Department of Defense (DOD).

- The private sector also has an important role to play in accelerating the adoption of IT systems by providers through its role as a purchaser. Both health plans and self-insured employers should adopt financial incentives (e.g., pay-for-performance systems) that encourage the adoption of IT by providers. As noted earlier, collaboration between the public and private sectors will be critical to ensuring that multiple investments are appropriately leveraged.

2. Financial incentives for small and medium-sized practices will need to cover most of the costs of an EHR. The incentives should total $12,000 to $24,000 per full-time physician per year. For a primary care physician, these incentives will need to be on the order of $3 to $6 per patient visit or $0.50 to $1.00 per member per month.

- The implementation and support of an EHR represents a significant expense for a physician practice. While several studies have demonstrated a financial return on these investments, most of this return accrues to organizations other than the practice and is realized over a longer-than-expected timeline. Financial incentives are needed to ensure that the physician practices that invest in IT will derive adequate benefits from such investment. While these incentives need not capture all of the costs of an EHR to the practice, they must cover enough to spur adoption.

- For the purposes of this analysis, the Working Group assumed that the capital costs (amortized over three years) and the ongoing expenses of an EHR cost a physician approximately $12,000 to $24,000 per year. This estimate is intended to cover most of the costs for most small physician practices, including upfront acquisition of the system, implementation assistance, ongoing personnel necessary to support the application, and an initial decline in overall productivity related to adoption (productivity decreases can be significant and can last for several months). Some practices will experience lower or higher costs depending upon their prior experience with IT.

- An incentive totaling $12,000 to $24,000 per full-time physician per year would accelerate widespread adoption of basic EHR technologies by small and medium-sized ambulatory practices, with the range reflecting the variability in the costs of implementation and operation (as outlined above). For a primary care physician with 4,000 patient visits per year or a 2,000 patient panel, this level of incentive works out to $3 to $6 per patient visit or $0.50 to $1.00 PMPM. The incentive could be structured in a variety of ways, such as a pay-for-performance system that ties payments to outcomes or processes that will be improved by EHR or a direct subsidy based on the implementation or use of EHR.

- In aggregate, this level of incentive would entail a total investment of approximately $21.6 to $43.2 billion. While the rate of adoption of EHRs that would be driven by this level of incentives is difficult to predict, it would probably take 7 to 10 years to achieve wide-scale adoption. Should adoption occur over a 7-year period, the total incentive would be equivalent to $3.1 to $6.2 billion per year, or 0.54% to 1.1% of the total amount spent on ambulatory care in 2003. If wide-scale adoption took 10 years, the cost would be $2.2 or $4.3 billion per year, or 0.38% to 0.76% of total ambulatory care costs in 2003.

- Industry is currently experimenting with different types of incentive models. Over time, direct incentives based on EHR adoption will be replaced by indirect incentives that pay practices based on performance, level of care coordination, and/or degree of orientation towards chronic disease management. In other words, direct incentives that reward the purchase and appropriate use of EHR should be regarded as transitional to incentives based on care processes and outcomes that will be improved by EHR.

- The incentive system outlined above cannot work unless it is adopted broadly by payers so that it covers a majority of a physician practice's patient panel or patient visits. Without broad adoption by most payers, the incentive will not be large enough for physicians to act. But because individual private sector payers face a first-mover disadvantage in financing incentives for IT adoption (i.e., private purchasers that finance such incentives will be competitively disadvantaged against those who choose not to do so), the Federal government will need to

play a critical role in being a catalyst for the adoption of such incentives by the purchaser community. If the Federal government does not participate, private purchasers will likely balk at participating as well. In addition, as the largest purchaser of healthcare in the country, the Federal government's incentive will be critical to providing physicians with an adequate level of funding to make the purchase and implementation of an EHR feasible.

- There is very limited empirical data on which to base an incentive estimate. In the analyses, the Working Group factored in the cost of EHRs in the small and medium-sized practice, research on the incentive experiences of others, and the expertise and consensus of the Working Group. While anecdotal information suggests that smaller levels of incentives can result in increased adoption of IT, the Working Group believes that large-scale adoption will not occur without the magnitude of incentive described above. Nonetheless, given the paucity of experience with such incentives, more work is clearly necessary to further understand the appropriate size, mix and phasing of incentives.

- Supporting the belief in a large financial incentive is work that has been conducted by noted experts in the field. The Bridges to Excellence (BTE) program, led by major purchasers, conducted an extensive literature search on incentives for practice re-engineering. The findings, published in a 2003article in the *Journal of Clinical Outcomes Management*, along with subsequent focus groups and work on incentives conducted by Bailit, has led to a consensus view that rewards and incentives have to be meaningful enough to compensate for the added cost associated with data collection and measurement of care processes. This "meaningful level" of incentive was determined to be equivalent to 5% to 10% of a physician's income, which translates into $10,000 to $20,000 per year.

- Health plans interviewed as part of this process have expressed significant concern about the size and effectiveness of this level of incentive. Many payers and providers are still experimenting with different types of incentives, and the utility of these approaches is still being evaluated. In addition, many payers are struggling with their own margin pressures and are hesitant to devote significant dollars to incentives until the evidence that they can work is clearer. They are also justifiably concerned that today the requirements for interoperability and connectivity are poorly defined and without this requirement for their investment, the data suggest that adoption of EHR alone will not yield the anticipated returns. As a result of all of these factors, any near-term increases in financial incentives by payers and employers are likely to be incremental in nature. The Working Group understands the issues being faced by health plans, but believes that incentives must be sufficient and substantial enough to enable appropriate investments and effective implementation that allows the technology to benefit all stakeholders.

- Widespread adoption of incentives by payers will require national standards for EHR technical capabilities and features as well as metrics for EHR use (e.g., the percentage of prescriptions entered using the EHR) and for outcomes. These standards and metrics can help ensure that payers have reasonable assurance that they are "buying" an acceptable EHR that is being used in an acceptable fashion.

- EHR adoption alone is only a first step and will not be sufficient to ensure that these practices participate in an interconnected health information infrastructure that allows for information exchange across settings. Nonetheless, this initial incentive for EHR can be transitioned over time to other types of on-going incentives that will encourage ambulatory care practices and other providers to participate in full-fledged health information exchange.

3. **The qualitative analysis supports a business case that is better for some "incremental applications" than for others. These incremental applications can be implemented as steps toward the full implementation of an EHR.**

- Experience suggests that many physicians resist the significant changes to their practices that come about as a result of an EHR. In addition, most do not recognize the value of health information exchange that such systems bring. Hence, there is a strong hypothesis that the path to EHR adoption may occur via an incremental approach to technology adoption in which specific applications that are viewed as worthwhile and/or not too disruptive are adopted initially as a step toward full implementation of an EHR.

- Applications that require a relatively small investment and/or those that provide very high net benefits to physicians (i.e., a beneficial business case) could be considered as likely candidates for initial implementation for some clinicians. Applications that show a demonstrable net reduction in the demands for the physician's time represent likely candidates as well.

- Incremental applications, however, must not be a dead end. They must, over time, lead to the adoption of other very important clinical applications. As a result, they should both support practice workflow and provide the IT infrastructure necessary to accommodate more comprehensive solutions that move the practice further down the path to full interoperability.

- The analysis suggests that eprescribing and online tools for chronic disease management may be good starting points. And while the business case for other incremental applications was not analyzed, applications such as disease registries and cross-organization access to information might also provide strong starting points toward EHR adoption. Further analyses of these applications would be required, however, before they could be implemented in a specific physician practice. Some Working Group members believe, however, that remote care delivered via online chronic disease management tools should not be done in the absence of an EHR.

- Specific incentives for the adoption of incremental applications are likely to be local in character. For example, in some regions of the country payers reward providers for using generic medications while payers in other regions do not. Applications such as eprescribing may have little support among physicians in the absence of financial incentives for switching to generics.

Key Recommendations and Findings on Organizational and Legal Issues

Background

Effectively addressing organizational, legal and governance issues is critical to ensuring sustained information sharing on a local, regional and national basis. Information sharing should be considered subject to the architecture for the linkage of health records, which are discussed separately in the Connecting for Health's report titled Achieving Electronic Connectivity in Healthcare: A Roadmap from the Nation's Public and Private-Sector Healthcare Leaders at www.connectingforhealth.org.

Academic research and the initial evaluation of demonstration projects related to the sharing of healthcare information reveal that establishing a clear vision, organizational principles, and governance structures within and across organizations is critical to ensuring sustainable adoption. Because developing

information sharing infrastructure and cross-organizational relationships will be challenging in even the most mature markets, a high priority should be placed on assessing organizational readiness to determine whether there is a reasonable prospect of regional success in achieving comprehensive interoperability while still providing appropriate safeguards to ensure privacy and security.

The approach to information sharing will be different depending upon local marketplace factors, including its competitiveness, geographical characteristics and the extent to which local providers have already adopted IT systems. Much remains to be learned about the most successful ways to achieve sustainability and the most appropriate roles and responsibilities for both healthcare entities and government organizations.

The following recommendations should be viewed as starting points for both the public and private sector to develop the legal and regulatory frameworks and tools necessary to sustain the successful adoption and use of clinical information systems, including the infrastructure necessary to enable cross-organizational information exchange:

1. **Communities should assess their readiness for local and regional data sharing by conducting a rigorous review of the technical, clinical, and organizational capacity and capabilities, as well as the community's commitment and the availability of leaders to spearhead the effort. Each of these is a critical success factor in building and managing a local health information infrastructure.**

    - To get started, regions contemplating establishment of health information exchange should conduct an organizational and technical diagnostic of community readiness for data sharing, including the following:

        - Strength of the business case for adoption and collaboration

        - Ability to achieve community-wide participation

        - Stakeholder willingness to commit to addressing relevant financial, technical, clinical, management, and organizational issues, as well as any consumer needs and concerns related to establishing a local or regional health information infrastructure.

        - The number, complexity and nature of market and regulatory barriers to the establishment of the local or regional health information infrastructure (A short- and long-term policy action plan should be formed to address these barriers.)

        - Willingness and ability to develop a strategic plan that identifies incremental starting points that can be used to prove the merits of the concept and thus achieve the critical mass of users necessary for lasting success.

    - Communities developing health information exchanges must address critical success factors, many of which are very similar to those identified for clinical information system adoption in general. They include the following:

        - *Leadership*: Strong and continuous leadership by physicians and other clinicians is indispensable to the successful adoption of clinical information systems and to achieving interconnectedness across these systems. These leaders, acting either as individuals or representatives of provider organizations, must accept responsibility for change management and for motivating clinicians.

- **_Activation_:** An objective, well-respected, authoritative source will be needed to serve as a catalyst for the community to come together to discuss plans and activities related to the following: addressing legal issues, establishing governance mechanisms, determining the business case, and developing approaches that address the range of stakeholder needs.

- **_Vision:_** Establishing a strong vision is critical to maintaining focus and momentum, and it helps prevent potential derailments that can be caused by individual organizations acting in their own proprietary interests.

- **_Governance and management:_** An inclusive structure with commitment by key leaders will be necessary to develop and manage the appropriate governance mechanisms. Governance must establish clear responsibilities and processes for executing organizational and community plans.

- **_Technical interoperability_:** Organizations must understand and incorporate the technical standards requirements for interoperability.

- **_Practice transformation:_** Clear definitions of the functional requirements and resulting workflow changes are essential to ensure sustainable adoption. Important components of this transformation include thoughtful organizational restructuring, appropriate resource allocations, clear work plans and well-developed training.

- **_Organizational capacity:_** Qualified, consistent and dedicated staff is essential to successful implementation.

- **_Training_:** General and targeted training are critical components of the overall infrastructure that is needed to support the transformation and adoption of the complete health information exchange infrastructure within the required time frame.

2. Communities will require a source of activation to catalyze or enforce the convening of the organizations that would participate in a health information exchange infrastructure.

- The "convener" should be a neutral facilitator, a role that could be played by a government entity or, depending upon market dynamics, a coalition of some or all of the following industry members:

  - Major provider
  - Major payer
  - Business coalition
  - Major employer
  - Existing collaborative
  - State government
  - Unrelated third party

- Large providers have a natural advantage in adopting clinical information technology due to their existing infrastructure and ongoing business arrangements with physicians. These factors could make them a natural entity to drive the majority of the market toward health information exchange. Given the adoption challenges of small and medium-sized practices, it may make sense to focus near-term efforts on larger providers so as to create a critical mass in the market.

- Depending upon the degree to which communities identify a natural convener, the Federal government could take steps to encourage convening within communities, including the following:

  - Provide grants to facilitate community planning for health information exchange.

  - Require state governments to develop an assessment of the readiness for health information exchange within their state, along with plans to encourage such development. This requirement could be linked to Federal funding of the Medicaid program.

  - Encourage accrediting agencies to include planning for the development of health information exchange as a component of the accrediting process.

3. Small and medium-sized practices have greater potential to benefit from interoperability, but they will require greater attention and support if they are to adopt clinical IT applications and participate in health information exchange on a lasting basis.

- Small practices have greater need for interoperability since they are more dependent on patient data from external sources. Thus, for these practices, the availability of patient information via an interoperable platform would be especially beneficial.

- Small and medium-sized ambulatory care practices may not have a strong business case for IT adoption in the absence of incentives. There may be no driving force for change within small and medium-sized practices, as there often is in large groups and among hospital-based physicians. In addition, these practices face a dearth of resources available to dedicate to technical support, change management and implementation.

- Small and medium-sized practices have few resources available to dedicate to implementation of new IT systems, change management to encourage use of these systems, or technical support for ongoing maintenance. As a result, these practices will require greater attention and support to facilitate sustainable IT adoption and to support health information exchange. Consideration should be given to the unique adoption-related needs of small and medium-sized practices when creating the value proposition; assisting with implementation, adoption and support issues; and encouraging participation in health information exchange infrastructures that enable full interoperability.

- Financial and other forms of support should be provided to local and regional EHR and information-sharing collaboratives and/or other organizations that are dedicated to the development of community-wide health information systems. This support should include, among other things, technical assistance, fiduciary responsibility, and assistance with practice transformation. For example, resources could be made available that describe viable collaboration models, practical implementation considerations, and processes for multi-institutional and practice-level adoption and interconnectedness.

- While the small practice is in the greatest need of interoperable IT adoption, a case can be made that interoperable IT adoption strategies should initially focus on larger provider groups and enterprises in the region. These large provider groups and enterprises are more likely to already have IT systems in place, as well as internal IT support mechanisms, and thus are already at a higher state of readiness. Once these larger provider groups and enterprises adopt regional information exchanges, it may be far easier for smaller practices to join in.

4. Most management and legal issues related to the establishment of a

secure, confidential health information infrastructure can be addressed in the context of existing law and through the use of contracts. Nonetheless, there is a need to guide regional efforts by providing access to examples of legal agreements and to the experiences of others.

- Healthcare purchasers and those implementing IT systems will need to implement several measures in order to address the management and legal issues related to information sharing. The analyses provide a framework of areas that require legal and contractual attention by communities.

- Existing laws and regulations can be leveraged by those organizations that enter into information-sharing relationships. They can provide ample protection of private property, assert privacy rights, and provide protection from professional liability and medical malpractice while also allowing the sharing of information across multiple organizations.

- Organizations and individuals can utilize several types of vehicles to mitigate legal risk, including corporate law, contracts, licenses, use agreements, service level agreements, syndication, and other agreements.

5. **Changes to current policy and market-based actions can provide greater protections and opportunities for individuals and healthcare organizations that engage in information sharing**.

- Federal rules recently published under Stark II, Phase II, may have partially addressed concerns regarding third-party financing of health information systems for community-wide data sharing. The proposed language in CMS' interim final rule (entitled "Medicare Program: Physicians' Referrals to Health Care Entities with Which They Have Financial Relationships (Phase II)") provides an expansion of permissible third-party financing of community-wide information initiatives. The comment period for this rule ended June 24, 2004. Public and private sector guidance is needed to clarify the Stark II, Phase II exception for third-party financing of community-wide data sharing initiatives, and a safe harbor under federal Anti-Kickback Act should be created to align with Stark II, Phase II.

- Guidance should address who may qualify under the exception (i.e., definition of "community" and information that may be shared that does not violate Federal Anti-kickback Act) pursuant to the Medicare Modernization Act of 2003, including how they can take part in clinical pilots and electronic prescribing programs. This guidance will help to identify opportunities for provider-based connectivity that promote the expansion of widespread data-sharing initiatives.

6. **As the implementation of systems that allow for health information exchange matures, policy and regulatory changes may be necessary to ensure that adoption is sustainable. These changes will likely be necessary to deal with issues that are not fully understood, including security and privacy, medical malpractice, and practice transformation.**

- With the changing nature of medical practice and new liabilities and duties arising from the use of EHRs, further research and broad policy change could be needed in areas such as security and privacy, medical liability, and practice transformation:

  - **Security and Privacy Issues**

- A framework is needed for the incremental development of local, regional, and national health information exchange that respects local ownership and control, and provides the technical requirements to support robust security and privacy.

- A robust security and privacy regime (that includes legal, technical, organizational safeguards) is needed to support an interoperable regional and national health information system.

- **Professional liability and medical malpractice laws**

  - Laws must reflect the changing nature of medical practice in a connected world. Policy-based actions will be needed to appropriately define physician and clinician liability and negligence related to the use of interoperable electronic health records in medical decision-making.

- **Practice transformation**

  - Assessments must be made of the changes in medical practice and the relationships between stakeholders that are likely to result from the transformative nature of high degrees of IT adoption/use and regional and national interconnectivity.

- While policy recommendations may be premature and research inconclusive given the current stage of maturation, these issues are important for ongoing examination related to health information exchange.

Conclusion

To enable health information exchange on a large scale, it is critical to encourage both the adoption of clinical information systems as well as participation in health information exchange infrastructures. Achieving this goal will require significant public-private collaboration and coordinated strategies to leverage multiple investments appropriately.

There are several steps that healthcare organizations and communities can take to gauge their readiness today while industry continues to experiment with incentive design and infrastructure building. There are several stakeholders with a vested interest in realizing health information exchange as a tool to improve quality and reduce the growth in healthcare costs. What follows are some themes that certain stakeholders should consider as part of their next steps:

- **Healthcare leaders at the regional level**

    - Regional clinical integration provides significant incremental value by leveraging the healthcare information system investments of provider organizations. These efforts should be based on a common framework as articulated in the Connecting for Health publication <u>Achieving Electronic Connectivity in Healthcare: A Roadmap from the Nation's Public and Private-Sector Healthcare Leaders.</u>

    - The creation and management of these regional interchanges is new and complex terrain. However:

        - Most of the legal and governance issues can be addressed through current legal mechanisms.

        - Regions can proceed with incremental applications and implementation, recognizing that national efforts are underway to assess currently available technologies.

    - Regional mechanisms may need to be established to provide IT support for the small to medium-sized physician practice.

    - Adopting clinical information technology applications and participating in health information exchange efforts are feasible but challenging endeavors.

- **Payers, employers, and providers**

    - Financial incentives will be necessary to encourage providers to adopt EHRs; $.50 to $1.00 PMPM would lead to a significant increase in adoption, but different incentive packages may affect local markets differently.

    - The industry is currently experimenting with and evaluating the effectiveness of many different forms of incentives.

    - Requiring interoperability and connectivity is essential to creating incentives for IT capable of delivering full value. A common technical framework for connectivity is necessary to e4nable a coordinated path forward shared by the public and private sectors.

    - Regional providers, payers and employers will need to take leadership roles in convening and sustaining local communities in the development of governance mechanisms and implementation plans related to regional information exchange.

- **Policy makers and federal agencies**

    - Financial incentives will be necessary.

- Small and medium-sized groups will require additional support mechanisms for both IT adoption as well as participation in health information exchange infrastructures based on a common technical framework.

- Mechanisms will need to be established to share the experiences and work products of regional efforts.

- As health information exchange matures, additional areas for study will be required.

Appendix 1. Use Case Analysis Support

Using the framework and assumptions outlined below, the Working Group performed an analysis of the costs and benefits to a physician practice from the adoption and use of information technologies as described for each use case in each of the four alternative environments. The use of the alternative futures helped to systematically understand how environmental factors could influence the way in which actors in each of the scenarios make decisions or realize benefits.

- A three-year analysis of costs and benefits was used to account for the amortization of capital costs and the time needed to realize improved efficiencies.
- Costs and benefits are analyzed only from the perspective of the physician practice. Other societal or stakeholder benefits related to health information sharing are not included. And while quality is an important benefit, the purpose of this analysis was to focus solely on economic issues.
- Only first-order effects are considered. Potential secondary effects, such as the additional revenue stream that could be generated from turning what used to be a file room into an exam room, are not a part of the analysis.
- Only existing, useful clinical information system applications are analyzed. Technologies that are not ready for near-term adoption, such as voice recognition software as a replacement for transcription into the EHR, are not analyzed.
- Hardware, software, installation, and integration costs ranged, across all clinical information systems and scenarios analyzed, from $25,000 to $550,000. This range is the total for a five-physician practice over three years. This range was developed based on the compilation of Working Group expertise, vendor interviews, and other industry research. Estimates took into account various product-delivery models and variability in vendor pricing models. See Table I in the body of the document for a breakdown of cost drivers.
- Clinical information systems must have structured data and records presentation with specialty-appropriate templates. The application must support data updating, extraction, search ability, summarization, and (to the extent possible) interoperability with other systems, especially systems for clinical labs and prescription generation and fulfillment.
- The benefits are estimated from use during steady-state adoption (i.e., after any adjustment or transition period tot he new system).
- The analysis of the EHR and online chronic disease management use cases assume receipt of data only, not the sending of data.
- The analysis assumes full-scale conversion from paper to electronic records in all environments. Active use of remaining paper charts for anything other than infrequent reference will result in an increase in costs and other negative benefits. Practices will, however, need to maintain archives/storage or scanned images of paper records for necessary reference.
- Practices are assumed to have sufficient data backup on a duplicate server.
- EHR use cases assume that practices analyzed do not transcribe records, manage revenue-generating ancillary services, or dispense commercial medications.
- Physician availability is defined as time available for care, not administrative duties.
- The level of incentives is held constant in both the Proprietary Care and Patient-centric Care analyses.

The summary of the business case for a five-physician ambulatory care practice over a three-year period is presented below. This analysis is a summary of Working Group judgments based on the assumptions outlined above; it is not based on a rigorous quantitative analysis. The analysis is intended to provide an order-of-magnitude estimate of the strength of the business case for adoption of clinical information technology by these practices under the various alternative futures, and therefore should be considered a starting point that can be built upon by further analyses.

Table XI: Net Benefit by Use Case				
	Status Quo "Limited interoperability, weak incentives"	**IT Utility** "Widespread interoperability, weak incentives"	**Proprietary Care** "Limited interoperability, strong incentives"	**Patient-centric care[6]** "Widespread interoperability, strong incentives"
Use Case #1 EHR for primary care practice with connectivity among physician practices	- -	-	0	+
Use Case #2 Online chronic disease management system	-	-	+	+
Use Case #3 E-prescribing system	-	+	+	+
Use Case #4 EHR for specialty practice with connectivity among physician practices	- -	0	0	+
- - = high net cost - = net cost	+ = net benefit + + = high net benefit		0 = net neutral	

Note: Three-year analysis of costs and benefits for a "typical" five-physician ambulatory care practice.

- **Use Case #1 -** The analysis indicates that adoption of the EHR in the Status Quo results in a significant loss for the 5-physician practice due mostly to two factors: 1) the high cost of creating and supporting point-to-point interfaces, and 2) the high cost of adopting a complex system that will have a significant impact on operations. The net benefit improves in the IT Utility environment with the existence of widespread interoperability, but the costs still outweigh the benefits to the practice, as many of the benefits accrue to other stakeholders. In the Proprietary Care environment shows, the existence of performance-based incentives improves the business case, but the practice still barely breaks even due to the costs of connectivity. The Patient-Centric Care scenario results in the strongest business case as the combination of a technology infrastructure and a reimbursement system that rewards performance yields significant benefits to the practice.

    This analysis does not consider transcription costs incurred by practices, since only 25% to 30% of practices transcribe their notes.[ix] If these costs were taken into consideration, the business case might improve, although not to the extent that the practice would break even in the Status Quo environment.

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[6] The analysis of the Patient-centric care environment assumes significant investment in an underlying, interoperable technology that has not occurred to-date. Assuming that such a technology is developed and adopted, it will still be a number of years until it is fully operational.

- **Use Case #2 -** Although the cost of the online chronic disease management system is lower than the EHR, the resulting business case is significantly negative due to the projected volume of patient visits replaced by un-reimbursed e-visits (also known as e-consults). Citing early evidence from the adoption of similar technologies, some Working Group members feel that the decrease in in-person visits would not be as significant as projected in this analysis. In the Status Quo and IT Utility environments, there is no reimbursement for e-visits and hence there is a loss of revenue to the physician practice. The existence of interoperability in the IT Utility environment has little impact on the net benefit to the practice since the analysis assumes this technology is not integrated with any other application such as EHR. However, if this tool is used as an integrated component of an EHR, interoperability would likely have a more positive impact on the business case. Under the Proprietary Care environment, financial incentive models would provide reimbursement for e-visits, and thus the business case for online chronic disease management becomes positive. The case only becomes stronger, moreover, in the Patient-centric Care environment. Working Group members note that reimbursement for e-visits is in the early stages of experimentation; if instituted on a widespread basis, this type of reimbursement would have a tremendous impact on the business case for online chronic disease management systems.

  It is important to note that this analysis did not consider the potential loss in revenue to physician practices due to a decline in the volume of ancillary tests. Without changes in reimbursement models, this loss could be significant, since consistent use of the application is expected to result in fewer ancillary tests, primarily because they would be run on an exception basis based on an abnormal result popping up instead of a proactive basis at every visit.

- **Use Case #3 -** The business case for eprescribing in the Status Quo environment is a net negative due to current functionality limitations and lack of complete interoperability to support comprehensive access to patient data. Although the cost of adopting the system is not high, the Working Group feels that the lack of complete patient data severely limits the value-added of the functionality, relegating the system to an automated version of the current process. Although eprescribing is thought to save some physician and office staff time, vastly improve the process of prescription writing, and improve the availability of patient data, the majority of these benefits do not accrue to physician practice who purchases the system. However, the business case for eprescribing improves dramatically in the IT Utility environment due to the availability of more complete information and greatly improved functionality. The business case weakens somewhat, however, in the Proprietary Care environment due, again, to the lack of interoperability. However, losses were offset by the presence of financial incentives to use the system. The business case in the Patient-centric Care environment improves slightly over both IT Utility and Proprietary Care, but once again the benefits accrue more to other stakeholders than to the physician practice.

- **Use Case #4 –** The issues considered in this analysis are similar to those in use case #1. However, the benefits and overall value of EHR to a specialty practice are likely to be different than for a primary care practice, due in part to differences in how the system and various functions within it are used. For the same reason, the benefits of EHR are likely to vary even more across different types of specialties. For example, large oncology groups that provide multiple services to patients may benefit greatly from having timely access to up-to-date patient information and improved inter-group communication. On the other hand, surgeons, who have less need to manage patients over time and across care settings, would likely realize far less value from the same functionality.

  Despite the potential variation in benefits and use, this analysis shows that, just as for the primary care physician (use case #1), the business case for EHR is weak in the Status Quo environment. The costs of acquisition are likely to be slightly higher due to the need for extra modules, while the benefits are also likely to be slightly higher due to a reduction in the labor-intensive process of obtaining patient information from external, paper-based sources. In the IT Utility environment, however, the net benefits of--and hence the business case for--EHR to a specialty practice become much more positive, due largely to a decrease in interface costs and significant operational benefits,

including increased patient throughput, from having access to timely patient information. This analysis of the IT Utility environment assumes, however, that the system is used optimally; less optimal use would result in lower benefits. The analysis found that the net benefits are close to zero (i.e., breakeven) in the Propriety Care environment, while the combination of interoperability and financial incentives for performance-based care results in a significantly positive net benefit in the Patient-centric Care environment.

Appendix 2. Industry Financial Incentive Programs

Table XII: Examples of Industry Incentives for Electronic Health Record (EHR) Adoption

Value Proposition	Incentive(s) Description	Industry Examples
Coalition of health plan, IPA and independent community group and/or employer group focus on improving quality through phased-in adoption of EHR. Coalition pays bonuses to individual providers for their performance in meeting community-wide clinical guidelines. Employer group determines the clinical guidelines and performance standards that providers need to meet/exceed.	Coalition or employer group pays $X for internet access, software, PCs, to be phased out over X number of years Coalition or employer group pays incentive bonus to providers for their performances/improved quality stemming from use of health information technology (HIT)	MVP Health Care aligned with Taconic Independent Physician Association (IPA) to create Med Allies. A coalition formed by Blue Cross Blue Shield (BCBS) of Rochester, NY includes the health plan, an IPA and an independent community group.
Health plan rewards hospitals for adoption of HIT standards that improve the safety of care by paying bonuses equal to a percentage of the hospital's claims from employees/patients of the participating employer.	Hospital meeting HIT requirement receives bonus from health plan of X% for 2nd year's claims, X% for 3rd year's claims; health plan negotiates with hospital to determine the amount of bonus payments.	Empire BCBS rewards hospitals raising HIT standards. Trigon awards bonuses to hospitals implementing Leapfrog standards. BCBS in Illinois, Michigan, and Pennsylvania award bonuses in a manner similar to Trigon.
Health plan pays annual bonuses to physicians based on (1) clinical measures, (2) patient satisfaction, and (3) HIT/EHR adoption. The health plan and physician group can award bonuses base on aggregated scores in each of these areas or a percentage of per member, per month (PMPM) capitation payment.	After meeting or exceeding performance standards, health plans award bonus payments ($X) annually to physician groups. After meeting or exceeding performance standards, health plans award bonus payments annually based on X% of the capitated payment per member received.	California health plans (Aetna, BCBS, CIGNA, Health Net and PacifiCare) initiated a "pay-for-performance" program.
Government agency or health plan pays per beneficiary/member bonus to each physician who meets/exceeds specified performance standards. Government agency/health plan and physicians negotiate quality performance standards and determine amount of bonus.	After meeting or exceeding performance standards, government agency or health plan awards bonuses ($X) annually to physicians. After meeting or exceeding performance standards, health plan awards bonuses annually based on X% capitated payment per member.	Under a three-year budget neutral demonstration project of the Medicare Modernization Act (MMA), physicians who treat X number of Medicare beneficiaries and who phase in HIT to manage data regarding clinical quality and outcomes are eligible to receive a bonus.

Employer group or health plan provide annual bonus to physician offices based on their implementation of specific HIT processes to reduce errors and increase quality.	$X paid annually to physician who implements specific HIT processes for each patient covered by a participating employer or plan. In addition, a report card is available to current and prospective patients for each physician that describes the physician's performance on the program measures.	Bridges to Excellence (BTE), a – coalition of physicians, health plans and employers, has implemented several programs, listed below: • Physician Office Link • Diabetes Care Link • Cardiac Care Link BCBS of Maine and Pennsylvania reward physicians who improve health outcomes by adopting technological improvements.
Government agency and/or health plan offers payments to providers for new types of care, such as online consultations between patients and providers. Continuing Medical Education (CME) credits are awarded to physician for using online consultations. Patients pay lower co-payments for HIT-related care, such as online consultations, than for traditional office visits.	Government agency and/or health plan provides payment for the provision of online technology/training / (IT support. For example, reimbursement for an online consultation could cost $X, while co-payments could be capped at $X.	BCBS of California, New Jersey, and Massachusetts have implemented pilot programs, as has First Health of Illinois.
Employer negotiates the elimination or reduction of co-payments with health plans for employees/patients who receive healthcare at hospitals meeting quality standards through HIT improvements.	Health plan waives $X or X% for certain co-payments for patients receiving care from hospitals that meet high quality standards through HIT improvements.	Hannaford Bros., Boeing, and Blue Shield of California have put in place these types of incentive systems.
Large employer group and others implement a program to provide physicians with $X per qualified patient for investments in HIT.	Under the program physicians will receive $X per qualified patient for investments in IT, such as EHR systems.	The BTE program includes industry leaders such as General Electric, Procter & Gamble, Ford Motor, Verizon Communications, and United Parcel Service. It is now available to physicians in Albany, NY; Boston, MA; Louisville, KY; and Cincinnati, OH.
Health plan or self-insured employer RIGHT? provides capital for computer hardware/software and handheld devices for physicians who treat their members.	Health plan or self-insured employer spends $X on HIT hardware/software and handheld devices for X% of its network physicians to support automatic claims submission or electronic prescriptions. Health plan/employer negotiates discount and pays IT hardware and software companies.	WellPoint Health Network, Allscripts Healthcare Solutions, Dell PC, and Microsoft have implemented similar types of programs.
Rising medical malpractice costs reduced for physicians willing to adopt HIT.	Reduction in medical malpractice insurance rates by X% based on provider's adoption of HIT.	No examples are available to date.

Government alters state/federal tax structures to encourage physicians and hospitals to purchase and implement HIT.	A tax benefit in the amount of $X could be implemented, along with reductions in financing costs for IT purchases, low-cost technology loans for small and rural healthcare facilities, and/or other tax write-offs.	Proposals for these kinds of changes are presently being considered by the Wisconsin state legislature.
Private entity or state/federal government provides capital (in the form of loans and/or grants) to hospitals and physicians as an incentive to invest in IT. Investment and to encourage the development of public-private partnerships.	Congress would allocate $X over X number of years to jump-start the program. States could match federal funds at a rate of $X for every $X of federal money. The states award funds to applicants in local communities for adopting EHR in clinical offices or hospitals. X% of the funds would exist in the form of loans and X% in the form of grants. Independent philanthropy provides a grant for $X to a public-private coalition for the purpose of attaining a regional health exchange.	The Hill-Burton Act (enacted in 1946) is a vehicle for these types of grants and loans today. This act was the country's first major health facility construction program, originally designed to modernize hospitals that had become obsolete due to a lack of capital investment. Since 1946, more than $4.6 billion in the grant funds and $1.5 billion in loans have aided approximately 7,000 healthcare facilities. The Santa Barbara County Care Data Exchange also makes these types of loans and grants available.

Source: Center for Healthcare Transformation, July, 2004.

Appendix 3. List of Resources

In addition to the work that the Markle Foundation sponsors through the Connecting for Health program, there are a growing number of government, philanthropic and not-for-profit-driven efforts focusing on clinical information system adoption and health information exchange issues. The following represents a non-exhaustive list of objective sources of information on initiatives and organizations working in these areas:

Organization	Description	Website
Government Resources		
Agency for Healthcare Research and Quality (AHRQ)	In examining what works and does not work in healthcare, AHRQ's mission includes both translating research findings into better patient care and providing policymakers and other healthcare leaders with information needed to make critical healthcare decisions.	www.ahrq.gov
Office of the National Coordinator for Health Information Exchange (ONCHIT)	The National Coordinator for Health Information Technology coordinates programs and policies regarding HIT across the federal government. The National Coordinator is charged with directing HIT programs within HHS and coordinating them with those of other relevant Executive Branch agencies. In fulfillment of this, the National Coordinator has taken responsibility for the National Health Information Infrastructure Initiative (NHII), the FHA, and the Consolidated Health Informatics Initiative (CHI), and is currently assessing other health information technology programs and efforts. In addition, the National Coordinator coordinates outreach and consultation between the federal government and the private sector. As part of this, the National Coordinator coordinates with the National Committee on Vital Health Statistics (NCVHS) and other advisory committees.	www.hhs.gov/onchit
Not-for-Profit Resources		
American Academy of Family Physicians (AAFP)	The AAFP's Center for Health Information Technology is the focal point of the AAFP's technical expertise, advocacy, research and member services associated with medical office automation and computerization. The Center is dedicated to increasing the availability and use of low-cost, standards-based information technology among family physicians, nationally and internationally, through consultative, educational and outreach activities. The Center collaborates with government, industry and other professional organizations to apply health information technology (HIT) to improve patient care and safety, and to increase the efficiency of healthcare delivery. We hope to serve as the "physician voice" about the	www.aafp.org

	information revolution in office-based medical practice -- to make widely known the views of physicians, and their patients, as they relate to empowerment through HIT.	
American Health Information Management Association (AHIMA)	The American Health Information Management Association (AHIMA) represents more than 48,000 specially educated health information management professionals who work throughout the healthcare industry. Health information management professionals serve the healthcare industry and the public by managing, analyzing, and utilizing data vital for patient care -- and making it accessible to healthcare providers when it is needed most.	www.ahima.org
American Medical Information Association (AMIA)	The American Medical Informatics Association is a not-for-profit membership organization of individuals, institutions, and corporations dedicated to developing and using information technologies to improve health care. AMIA was formed in 1990 by the merger of three organizations - the American Association for Medical Systems and Informatics (AAMSI), the American College of Medical Informatics (ACMI), and the Symposium on Computer Applications in Medical Care (SCAMC). The 3,200 members of AMIA include physicians, nurses, computer and information scientists, biomedical engineers, medical librarians, and academic researchers and educators.	www.amia.org
Bridges to Excellence	Bridges to Excellence is a not-for-profit organization with a Board composed of representatives from employers, providers and plans. The Corporation is not formed for pecuniary profit or financial gain. The Corporation is organized to create significant advances in the quality of healthcare by: 1. Providing tools, information and support to consumers of healthcare services, 2. Conducting research with respect to existing healthcare provider reimbursement models, 3. Developing reimbursement models that encourage the recognition of healthcare providers who demonstrate that they have implemented comprehensive solutions in the management of patients and deliver safe, timely, effective, efficient, equitable and patient-centered care which is based on adherence to quality guidelines and outcomes achievement.	www.bridgestoexcellence.org
California HealthCare Foundation (CHCF)	Internet technology is still fairly new and untested in healthcare, making experimentation, analysis and evaluation critically important. CHCF regularly conducts research and commissions surveys and reports on emerging technology trends and related policy and regulatory issues. Most relevant to this topic, CHCF co-funded the Santa	www.chcf.org

	Barbara County Demonstration Project - The Santa Barbara County Care Data Exchange (SBCCDE) is demonstrating how a patient's clinical information can be readily accessible by any authorized person, including the patient, at the place and time it is needed.	
Center for Information Technology Leadership (CITL)	CITL guides IT investments by uncovering and communicating the financial and clinical value delivered by specific technologies and strategies.	www.citl.org
College of Healthcare Information Management Executives (CHIME)	CHIME, a not-for-profit organization for healthcare CIOs, was formed with the dual objective of serving the professional development needs of healthcare CIOs, and advocating the more effective use of information management within healthcare.	http://www.cio-chime.org
Commonwealth Fund	The Commonwealth Fund is a private foundation that supports independent research on health and social issues and makes grants to improve healthcare practice and policy.	www.cmwf.org
eHealth Initiative (eHI) and the Foundation for eHealth	The eHealth Initiative and the Foundation for eHealth Initiative are independent, non-profit affiliated organizations whose missions are the same: to drive improvement in the quality, safety, and efficiency of healthcare through information and information technology. Both organizations are focused on engaging multiple and diverse stakeholders--including hospitals and other healthcare organizations, clinician groups, employers and purchasers, health plans, healthcare information technology organizations, manufacturers, public health agencies, academic and research institutions, and public sector stakeholders--to define and then implement specific actions that will address the quality, safety and efficiency challenges of our healthcare system through the use of interoperable information technology. See links to regional health information exchange projects from the eHI website.	www.ehealthinitiative.org
Health Information and Management Systems Society	HIMSS (Healthcare Information and Management Systems Society) is the healthcare industry's membership organization exclusively focused on providing leadership for the optimal use of healthcare information technology and management systems for the betterment of human health. Founded in 1961 with offices in Chicago, Washington D.C., and other locations across the country, HIMSS represents more than 14,000 individual members and some 220 member corporations that employ more than 1 million people. HIMSS frames and leads healthcare public policy and industry practices through its advocacy, educational and professional development initiatives designed to promote information and management systems' contributions to ensuring	www.himss.org

	quality patient care.	
Massachusetts Health Data Consortium	Massachusetts SHARE (Simplifying Healthcare Among Regional Entities) is a regional collaborative initiative operated by the Massachusetts Health Data Consortium. MA-SHARE seeks to promote the inter-organizational exchange of healthcare data using information technology, standards and administrative simplification, in order to make accurate clinical health information available wherever needed in an efficient, cost-effective and safe manner.	www.mahealthdata.org
Medical Group Management Association (MGMA)	MGMA's mission is to improve the effectiveness of medical group practices and the knowledge and skills of the individuals who manage/lead them. The MGMA Center for Research collaborated with Pfizer Health Solutions Inc to explore market penetration and attitudes towards the use of EMR technologies in ambulatory care settings.	www.mgma.com
National Alliance for Health Information Technology	The National Alliance for Health Information Technology (the "Alliance") is a diverse partnership of leaders from all healthcare sectors working to leverage technology to achieve measurable improvements in patient safety, quality, and efficiency. The Alliance brings together teams of senior healthcare executives within and across organizations to overcome barriers and accumulate critical knowledge, enabling them to optimize technology to realize the highest level of patient care and enhanced financial performances. Collaborating with healthcare and government leaders, the Alliance is working to accelerate the implementation of world-class, standards-based information technology aimed at creating the most effective, safe, unified, and inclusive health system possible.	www.nahit.org
Physicians' Electronic Health Record Coalition (PEHRC)	A coalition of 19 medical specialty societies to assist physicians, particularly those in small and medium sized ambulatory practices, to acquire and use affordable, standards-based electronic health records and other health information technology for the purposes of improving quality, enhancing patient safety, and increasing efficiency.	Co-Chairs: Peter Basch Peter.Basch@Medstar.net David Kibbe kibbedavid@mac.com
Rand Health	Rand's Center for e-Health's goal is to "attract resources and foster interdisciplinary collaboration to capitalize on a growing interest in understanding and developing the potential of the Internet and related technologies to improve the healthcare system."	www.rand.org/health
Robert Wood Johnson Foundation (RWJ)	Co-sponsor of the Connecting for Health program, RWJ supports training, education, research (excluding biomedical research), and projects that demonstrate the effective delivery of healthcare services. Rather than paying for individual care, RWJ concentrate on healthcare systems and the conditions that promote better health.	www.rwjf.org
The Leapfrog Group	Composed of more than 150 public and private organizations that provide healthcare benefits. The	www.leapfroggroup.org

	organizations that provide healthcare benefits, The Leapfrog Group works with medical experts throughout the U.S. to identify problems and propose solutions that it believes will improve hospital systems that could break down and harm patients. Representing more than 34 million healthcare consumers in all 50 states, Leapfrog provides important information and solutions for consumers and healthcare providers.	
	The Leapfrog Group focuses on the quality of certain aspects of care relevant to urban area hospitals. Patients are usually in fragile health when in the hospital and the consequences of preventable medical mistakes can be serious.	

Endnotes

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