



The LEWIN GROUP

**HEALTH INFORMATION
TECHNOLOGY
LEADERSHIP PANEL**

FINAL REPORT

Prepared by:

The Lewin Group, Inc.

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EXECUTIVE SUMMARY

The growing cost of health care in the United States continues to place an increasing burden on Americans, taking a larger amount of their income each year, with some losing access to care altogether. Steep increases in the cost of employer-based health insurance affect the financial outlook and global competitiveness of U.S. companies in particular. Employers who must shift resources to spending on health care have fewer resources to invest in the growth of their companies. When higher health care costs are passed on to consumers, U.S. employers are placed at a competitive disadvantage compared to employers in other industrialized countries with lower health care costs.¹ The increasing cost of government-financed health care, including Medicare and Medicaid, continues to burden federal and state governments, consuming resources that could be used for other purposes.

Recognizing the impact of increasing health care costs and the well-documented need to improve health care quality, the federal government and leadership of the private sector have set the stage for transforming health care through widespread adoption of health information technology. One of the primary goals of this transformation is to realize higher quality health care at a lower cost. On April 27, 2004, President Bush signed an Executive Order establishing the position of the National Coordinator for Health Information Technology, charged with the development, maintenance, and oversight of a strategic plan for nationwide adoption of health information technology.² On July 21, 2004, David J. Brailer M.D., Ph.D., the National Coordinator, delivered a *Framework for Strategic Action*, which outlined four goals and twelve strategies for national adoption of health information technology.³

Health Information Technology

Health information technology (HIT) refers to “The application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of health care information, data, and knowledge for communication and decision-making.”⁴ This includes such applications as telemedicine and use of the Internet. A central component of HIT is the electronic health record (EHR), a patient’s medical file, which is stored electronically and maintained by a health care provider. The EHR supports ordering prescriptions and tests, informing clinical decisions, and developing a longitudinal record of events, decisions, and information pertaining to a patient’s care. EHR systems include such capabilities as viewing, ordering, messaging, documenting, care management, and analysis and reporting.⁵ Currently, EHR functions vary by software vendor, although efforts are underway in the public and private sectors to standardize EHR functionality.

The Health Information Technology Leadership Panel

There are multiple options and policies for financing adoption of HIT. One of the key action items included in the *Framework for Strategic Action* was to establish and convene a Health Information Technology Leadership Panel (HIT Leadership Panel) to examine the importance of investing in HIT, particularly regarding the respective major roles of government and the private sector in its widespread implementation. HIT Leadership Panel members were drawn from executives in widely recognized companies that purchase substantial levels of health care for their employees. Companies with little or no direct involvement in the health care or information technology (IT) industry sectors were selected with the intention of learning how IT has been successfully adopted and used by other sectors. In August 2004, The Lewin Group, a

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health care policy consulting firm, was retained by the National Coordinator for Health Information Technology to convene the HIT Leadership Panel and report on its findings. The HIT Leadership Panel met in Washington, DC, on November 29, 2004. Panelists reviewed and commented upon drafts of this report of their deliberations and approved the final report.

HIT Leadership Panel Findings and Recommendations

The HIT Leadership Panel recognized HIT implementation as an essential, high priority for health care. As business leaders, Panel members also recognized that considerable investment in HIT is required to realize its potential benefits. They noted that there are competing demands for available resources, especially the increasing demands for health care, including the challenge of inadequate or no health insurance for a growing number of Americans. Nevertheless, they emphasized that sustained investment in HIT is essential for achieving improvements in health care quality, efficiency, and costs. They were confident that unanticipated health, social, and economic benefits will emerge from widespread HIT adoption, as has occurred with adoption of IT in other industries. Indeed, the HIT Leadership Panel expressed concerns that under-investing in HIT could prolong existing problems or enable them to worsen.

The HIT Leadership Panel identified three key imperatives for HIT:

1. Widespread adoption of interoperable HIT should be a top priority for the U.S. health care system.
2. The federal government should use its leverage as the nation's largest health care payer and provider to drive adoption of HIT.
3. Private sector purchasers and health care organizations can and should collaborate alongside the federal government to drive adoption of HIT.

In support of these three imperatives, the HIT Leadership Panel reached six conclusions that should guide HIT adoption on the part of the federal government and private sector.

1. Potential benefits of HIT far outweigh manageable costs.
2. HIT needs a clear, broadly motivating vision and practical adoption strategy.
3. The federal government should provide leadership, and industry will engage and follow.
4. Lessons of adoption and success of IT in other industries should inform and enhance adoption of HIT.
5. Stakeholder incentives must be aligned to foster HIT adoption.
6. Among its multiple stakeholders, the consumer – including individual beneficiaries, patients, family members, and the public at large – is key to adoption of HIT and realizing its benefits.

During the Panel discussion, participants agreed that the benefits of HIT will far exceed its manageable costs. HIT Leadership Panel members identified certain themes regarding the relative benefits and costs of HIT implementation. First, investment in HIT is urgent and vital to rising health care demands, business interests, and the broader U.S. economy. Despite the initial costs of adopting HIT, it will become an essential means, among others, for managing health care costs. Second, in order to mobilize the critical mass of participation and investment, the potential benefits and costs of HIT must be clearly perceived by its stakeholders. A primary benefit of investing in

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HIT will be to increase health and clinical knowledge yielding improved patient safety and outcomes. Investments in HIT must be justified by an ongoing assessment of its benefits and costs, evaluation of subsequent project implementation, and feedback to inform the course of future investments. Panelists offered that the benefits of HIT are likely to well exceed the additional investments necessary to realize them, and current estimates of net savings are likely conservative.

HIT Leadership Panel members generally agreed that the urgency of adopting HIT should take precedence over waiting to craft a perfect plan. Even so, rather than attempting to implement HIT all at once through a “big bang,” implementation should occur through a well-planned sequence of steps and incentives to promote widespread HIT adoption.

Drawing from early experience in other industries, Panelists noted that the needs of a more efficient and effective health care system should drive design and implementation of the necessary hardware, software, and networking capacity for HIT; not the other way around. Readily attainable opportunities that offer “quick wins” to demonstrate tangible HIT benefits designed to sustain stakeholders’ commitment to further investment and participation will provide momentum. Progress in achieving the vision and mechanisms of HIT should be charted with ambitious, yet realistic benchmarks.

The HIT Leadership Panel developed several recommendations for federal government activity. Among these, the federal government should strengthen efforts to coordinate adoption and use of HIT and develop policies to achieve this objective across federal health care providers and payers. This federal role would build upon considerable HIT-related successes in the Departments of Veterans Affairs and Defense, in addition to the Centers for Medicare and Medicaid Services. In particular, federal purchasing power should be used to accelerate adoption of HIT among health care providers. The federal government should continue to promote adoption of well-founded HIT standards.

The HIT Leadership Panel emphasized that federal leverage as purchaser and provider would be needed – and welcomed by the private sector – to reach a “tipping point” in HIT adoption. HIT Leadership Panel members were confident that, if the federal government provides direction, leads by example, and exerts its broad market leverage as purchaser and provider, the private sector will engage and follow suit. HIT Leadership Panel members concurred that, in the absence of this explicit, strong federal role, private sector efforts would be insufficient to achieve widespread adoption and appropriate use of HIT.

HIT Leadership Panel members recommended that, in addition to its own efforts, the federal government should enlist the aid of key private sector organizations and expertise. Specifically, the HIT Leadership Panel recommended that the federal government learn from and involve the private sector in advancing the vision, strategies, and means for widespread adoption of HIT. This includes development and adoption of HIT standards as well as other avenues, such as drawing upon the private sector’s experience to assist health care organizations to reengineer business processes using HIT.

Recognizing the highly fragmented efforts to date in the public and private sectors to develop, adopt, and integrate HIT systems into health care, the HIT Leadership Panel emphasized that incentives must be aligned to drive HIT adoption. The HIT Leadership Panel observed that both carrots (i.e., incentives) and, when necessary, sticks (i.e., mandates, other requirements) should be used to promote the widespread adoption of HIT. The HIT Leadership Panel also suggested that mechanisms be created to incentivize or otherwise assist providers to install HIT and

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reengineer health care processes to take full advantage of its potential benefits.

HIT Leadership Panel members were emphatic that consumer buy-in is essential for successful adoption and implementation of HIT. While health care provider institutions, clinicians, and payers will comprise the bulk of direct users of HIT systems, widespread adoption may not succeed without buy-in from the public as health care consumer, including health plan beneficiaries, patients, and family members. Panelists suggested that the national HIT vision must be communicated clearly and directly to enlist consumer support for the widespread adoption of HIT, including the necessary investment to achieve this vision. This vision should convey how the American consumer has the most to gain from adoption of HIT, including more safe and effective health care in a more efficient, personalized, and secure system. The federal government and other HIT proponents must specifically address the protections to privacy and confidentiality afforded by the Health Insurance Portability and Accountability Act (HIPAA) and continue to promote and enforce related standards and safeguards accordingly. Finally, the federal government should monitor progress and impact of widespread HIT adoption to ensure that no population group is left out or disadvantaged by this transition in HIT.

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I. INTRODUCTION

Health Information Technology (HIT) is a key element for meeting the challenges of steeply increasing health care costs and shortfalls in health care quality. Within the last few years, the federal government and leadership of the private sector have made progress in setting the stage for transforming health care through improved HIT. During the Presidential debate in October 2004, President Bush cited electronic health records as an essential means “to cut down on error as well as to reduce costs.”⁶ In his State of the Union Address on February 2, 2005, President Bush called for “improved information technology to prevent medical error and needless costs.”⁷

On April 27, 2004, President Bush signed an Executive Order establishing the position of the National Coordinator for Health Information Technology, charged with the development, maintenance, and oversight of a strategic plan for nationwide adoption of HIT.⁸ On July 21, 2004, David J. Brailer M.D., Ph.D., the National Coordinator for Health Information Technology, delivered a *Framework for Strategic Action* that outlined four goals and twelve strategies for adoption of HIT.⁹

One of the key action items included in the *Framework for Strategic Action* was to establish and convene a Health Information Technology Leadership Panel (HIT Leadership Panel) to evaluate the urgency of investment in HIT, such as electronic health records (EHRs), health information exchange, computerized physician order entry (CPOE), personal health records (PHRs) and e-prescribing. A primary goal of the HIT Leadership Panel was for members to apply their experience with information technology (IT) adoption in their own non-health care industries to identify key cross-cutting lessons and recommendations for health care. In August 2004, The Lewin Group, a health care policy consulting firm, was retained by the National Coordinator for Health Information Technology to convene the HIT Leadership Panel and report on its findings. This document serves as the report on the findings of that meeting and is divided into the following sections:

- Convening the HIT Leadership Panel;
- HIT Leadership Panel Findings; and
- Background Information on HIT.

II. CONVENING THE HIT LEADERSHIP PANEL

The purpose of the HIT Leadership Panel was to engage business leaders from companies that are large purchasers of health care to discuss HIT. Criteria for participation of corporate executives on the HIT Leadership Panel included:

- Limited involvement in providing health services;
- IT not a primary line of business;
- Demonstrated innovative use of IT in their business practices; and
- Strong understanding of health care purchasing and a keen interest in improving the health care system overall.

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Lewin proceeded to solicit participation from companies that met these criteria, requesting that the participants be limited to CEOs. After the solicitation process was completed, nine company representatives agreed to participate on the HIT Leadership Panel, all of whom are listed in Exhibit 1.

Exhibit 1: Health Information Technology Leadership Panel Participants

- 1 **FedEx Corporation** - Frederick Smith, CEO
- 2 **General Motors** - Rick Wagoner, CEO (Ralph Szygenda, Group Vice President and Chief Information Officer)*
- 3 **International Paper** - John Faraci, CEO (Jerry Carter, Senior Vice President of Human Resources)*
- 4 **Johnson Controls** - John Barth, CEO (Dennis Archer, Chairman Dickinson Wright, PLLC)*
- 5 **Target Corporation** - Robert J. Ulrich, CEO (Jerry Storch, Vice Chairman)*
- 6 **Pepsico** - Steve Reinemund, CEO (Dave Scherb, VP Compensation and Benefits)**
- 7 **Procter & Gamble** - Alan G. Lafley, CEO (Stephen N. David, Chief Business to Business Officer)*
- 8 **Wells Fargo** - Richard Kovacevich, CEO
- 9 **Wal-Mart Stores, Inc.** - David Glass, former CEO (M. Susan Chambers, Executive Vice President Risk Management, Benefits Administration, Aviation and Travel)*

* = Names in parenthesis signify the executive designated to attend Panel meeting on behalf of CEO

** = Mr. Reinemund and Mr. Scherb attended Panel meeting

When the HIT Leadership Panel convened, Panel members were asked to consider several topics pertaining to HIT, including:

- Their own experience with implementing IT and lessons learned for HIT;
- The costs and benefits of HIT;
- The responsibility for investment in HIT (both public and private); and
- The challenges necessary to overcome to achieve adoption of HIT.

Section III of this report describes the HIT Leadership Panel's findings from the meeting. Section IV includes the background information provided to HIT Leadership Panel members prior to their meeting.

III. HIT LEADERSHIP PANEL FINDINGS

The HIT Leadership Panel met on November 29, 2004, to examine the importance of investing in HIT, particularly regarding the major roles of government and the private sector in its widespread implementation. Prior to this meeting, members of the HIT Leadership Panel were given background information on the U.S. health care system and IT (see Section IV). During the course of discussion, Panel members reviewed highlights of this background information, shared their experiences with IT and how this might apply to HIT in the evolving U.S. health care environment, and offered their observations and findings regarding successful implementation of HIT. Panelists reviewed and commented upon drafts of this report of their deliberations and approved the final report.

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The HIT Leadership Panel viewed HIT implementation as a major and necessary priority for health care. As business leaders, HIT Leadership Panel members recognized that considerable investment in HIT is necessary to realize its benefits. They noted that there are competing demands on available resources, especially in health care. They also noted shortcomings in the health care system, ranging from various inefficiencies to concerns about quality and patient safety to the growing number of Americans with no health insurance. The HIT Leadership Panel maintained that sustained investment in HIT is essential, though not sufficient, for addressing these and other health care challenges. Indeed, the HIT Leadership Panel expressed concerns that under-investing in HIT could prolong or enable worsening of existing problems in the U.S. health care system.

The HIT Leadership Panel identified three key imperatives for HIT:

1. Widespread adoption of interoperable HIT should be a top priority for the U.S. health care system.
2. The federal government should use its leverage as the nation's largest health care payer and provider to drive adoption of HIT.
3. Private sector purchasers and health care organizations can and should collaborate alongside the federal government to drive adoption of HIT.

In support of these three imperatives, the HIT Leadership Panel reached six conclusions that should guide HIT adoption on the part of the federal government and private sector:

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3. The federal government should provide leadership, and industry will engage and follow.
4. Lessons of adoption and success of IT in other industries should inform and enhance adoption of HIT.
5. Stakeholder incentives must be aligned to foster HIT adoption.
6. Among its multiple stakeholders, the consumer – including individual beneficiaries, patients, family members, and the public at large – is key to adoption of HIT and realizing its benefits.

Each of these conclusions is discussed in the following sections, including recommendations for the public and private sectors' consideration.

A. Benefits of HIT Will Outweigh Its Manageable Costs

The U.S. business sector is widely and acutely concerned about managing health care costs. The U.S. spends nearly 16% of its GDP on health care, almost twice the average among European Union countries. Employers' health benefit costs continue to increase at or near double-digit rates. While General Motors now spends more than \$1,400 per vehicle on health care costs,^{10,11} non U.S.-based competitors spend as much as \$1,000 less. Aside from the implications of passing these costs along to consumers, the considerable difference burdens U.S. competitiveness in that industry, exemplifying the impact of high health care costs on the nation's international competitiveness.

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Pointing to their recent experience with IT's transformational impact on their respective industries, the HIT Leadership Panel envisions the great potential of HIT to improve patient safety, quality, and efficiency of the U.S. health care system. Some HIT Leadership Panel members suggested that efficiencies and savings realized through HIT will help bring the uninsured and other underserved populations into the mainstream of health care. Noting their own experiences with adoption of IT, Panelists concurred that the technical aspects of HIT will not be the factor limiting its widespread adoption. Rather, in order to mobilize the critical mass of participation and investment, the potential benefits and costs of HIT must be clearly outlined to HIT stakeholders, including not only major users, such as health care providers, clinicians, and payers, but individual patients and the public at large. Investments in HIT must be justified by ongoing assessment of benefits and costs, evaluation of HIT implementation, and feedback to inform the course of future investments.

To date, most studies of the benefits and costs of HIT adoption have focused on specific health care settings, including individual hospitals, clinics, and physicians' offices, providing a limited knowledge base regarding potential benefits and costs at the national level. Health care organizations spend an estimated \$17 billion to \$42 billion per year on HIT.^{12,13,14,15} Spending figures include expenditures on maintenance, upgrading existing installations, and installation of new systems. Growth estimates generally range from 5-7% to 10-15% per year, with some as high as 18% per year.^{16,17,18,19}

Although evidence remains limited and estimates vary, the HIT Leadership Panel's outlook for economic benefits of HIT are consistent with certain recent and ongoing analyses indicating that the potential benefits of HIT will significantly outweigh conservative estimates of the costs. Areas in which HIT investment are expected to realize the greatest savings are as follows. In this context, "savings" means achieving current results using fewer resources.²⁰

- Studies in ambulatory care settings estimate that EHRs would save \$112 billion per year (7.5% of health care spending), including \$34 billion annually for in-office reduction and \$78 billion annually from interoperability of those EHRs.²¹
- The Office of the National Coordinator for Health Information Technology estimates that the annual savings attributable to widespread EHR adoption are likely to lie between 7.5% and 30% of annual health care spending.²²

The HIT Leadership Panel offered the following perspectives and observations regarding the benefits and costs associated with HIT adoption and implementation.

- Investment in HIT is urgent and vital to rising health care demands, business interests, and the broader U.S. economy. It is an essential, though certainly not sufficient, means for managing health care costs.
- In order to mobilize the critical mass of participation and investment, the potential benefits and costs of HIT must be clearly presented to the stakeholders. These messages should include and document, in particular, how improved health care knowledge and information management will improve patient safety and clinical outcomes.
- Investments in HIT must be justified by an ongoing assessment of benefits and costs, evaluation of subsequent project implementations, and feedback to inform the course of future investments.
- Many benefits of HIT will start to accrue immediately. The overall benefits of HIT ultimately will greatly exceed the investments necessary to realize them. Including

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anticipated and unanticipated economic benefits of HIT, current estimates of net savings are likely conservative.

B. HIT Needs a Motivating Vision and Practical Strategy

Acknowledging the need for HIT and its potential, the HIT Leadership Panel recognized the importance of a clear and motivating vision of what HIT will accomplish, as well as a practical strategy to achieve widespread HIT adoption.

The prospect of adopting a complex HIT system, whether for a large health care network, third-party payer, physician practice, or individual patient, may be daunting. Potential users may have concerns about multiple economic, organizational, and personal implications of adopting these systems. Each stakeholder must perceive benefit from HIT. For example, clinicians may gain new electronic support tools and patient information to help guide medical decisions, and thereby realize the increased efficiency that comes with electronic claims processing and the elimination of paper medical records. Employers and government may realize productivity improvements and greater control over costs. Patients may benefit from a safer health care system with fewer unnecessary treatments and more attention to preventive care. Absent such perceived benefits, potential users and consumers could become obstacles or opponents to HIT adoption.

The HIT Leadership Panel recognized that the U.S. health care system has shifted from predominantly episodic, acute care to prevention and management of chronic diseases, where widespread HIT deployment, including EHRs, offers important advantages. While modern medicine uses advanced technology in the diagnosis and treatment of disease, incorporating these advances into effective, ongoing health care management for individual patients requires information linkages across multiple care sites and administrative functions. The HIT Leadership Panel agreed that appropriate application of HIT could produce not only more efficient delivery of health care, but better health outcomes and quality of life. As such, the HIT Leadership Panel noted certain factors to consider as the *Framework for Strategic Action* of the National Coordinator for HIT is further developed and pursued, including the following.

- Transforming health care through HIT involves more than acquiring information technology and inserting it into existing health care systems. It will require reengineering health care processes and changing resource allocations. Unless processes are changed to optimize the contributions of HIT, the end-result will simply be added cost.
- Current knowledge deficits in making such changes should be addressed by focused research and ongoing evaluation of HIT implementation.
- Technical solutions should follow, not lead, determinations of health care system needs. HIT planners must first work with health care providers and gain direct input from other stakeholders to establish the required functions of these systems, and then engage IT consultants and vendors to develop responsive technical solutions.
- HIT planning and implementation should be coordinated to avoid “random acts of technology.” Absent a compelling national vision and federal leadership, local or “vertical” solutions will continue to be adopted. This will only delay the standardization and interoperability required to realize the great potential benefits of system-wide HIT.

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The HIT Leadership Panel offered the following perspectives and observations regarding the practical strategy for HIT implementation and adoption.

- Proceed promptly, though continue to elaborate on, the *Framework for Strategic Action* developed by the National Coordinator for HIT.
- When advancing the *Framework for Strategic Action*, prepare to address critical barriers and other concerns that are likely to arise from consumers and other stakeholders, such as protection of privacy and the potential for computer-generated errors.
- Document and present current and unfolding findings regarding the net benefits of HIT to health care provider institutions, clinicians, payers, and other stakeholders in order to obtain their informed support for action.
- The urgency of adopting HIT should take precedence over waiting to craft a perfect plan. However, avoid attempting a “big bang” or all-at-once implementation of HIT. Rather, recognize the need for “tectonic” – large-scale and steady – change with a well-planned sequence of implementation steps and incentives to promote widespread adoption of interoperable systems.
- Ensure that change is driven by the need to make health care more efficient and effective rather than by the hardware, software, and networking capacity.
- Establish ambitious, yet realistic, benchmarks to assess progress in achieving the vision and mechanisms to monitor progress.
- Start by identifying “quick wins” to sustain stakeholders’ commitment to further investments and participation.

C. The Federal Government Should Lead and Industry Will Engage

HIT Leadership Panel members concurred that the federal government must take the lead in promoting the widespread adoption of HIT. This federal role would draw, in part, upon demonstrated HIT successes in the Department of Veterans Affairs (VA) and other HIT-related advances in the Department of Defense (DoD) and the Centers for Medicare and Medicaid Services (CMS).

In particular, the VA is strengthening federal credibility in HIT. The Veterans Health Administration (VHA) is the largest integrated health system in the U.S. Over a decade, the VHA has developed a fully automated health information system that supports the needs of patients, clinicians, and administrators and has become the leader in the use of EHR. The current system, known as the Veterans Health Information Systems and Technology Architecture (VistA), provides clinical, financial and management systems for the VHA. The health record component of VistA, the computerized patient record system (CPRS), is used in outpatient, inpatient, mental health, intensive care unit, emergency department, clinic, home care, nursing home and other settings. CPRS contains all components of a patient’s health record, such as laboratory, test results, medical images, decision support, bar code medication administration, progress notes, and appointments. CPRS permits VHA clinicians to access a patient’s record from anywhere within the health enterprise, at the point of care. The CPRS is fully operational at all medical centers and most other VHA sites of care.²³

While the business sector is prepared to engage in the effort to attain nationwide adoption of HIT, it must have clear evidence of federal commitment and direction. The federal government is by far

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the nation's largest health care payer, accounting for 32.5% of all personal health expenditures, not including the purchase of private insurance coverage for federal employees. The federal government is also the nation's largest employer, and would benefit directly from realizing the efficiencies that would result from widespread HIT adoption.

While current private sector initiatives to spur greater adoption of HIT are important and help to demonstrate the potential of broader adoption of HIT, there are limits to what can be accomplished without federal leadership. The HIT Leadership Panel emphasized that federal leverage as purchaser and provider would be needed – and welcomed by the private sector – to reach a tipping point in HIT adoption. In particular, federal purchasing power should be used to accelerate the adoption of HIT among health care providers. HIT Leadership Panel members were confident that, if the federal government provides direction, leads by example, and exerts its broad market leverage as purchaser and provider, the private sector will engage and follow suit. HIT Leadership Panel members concurred that, in the absence of this explicit, strong role of the federal government, efforts on the part of the private sector would be insufficient to achieve widespread adoption of HIT and foster its appropriate use.

The HIT Leadership Panel offered the following perspectives and observations regarding the need for federal leadership toward widespread HIT adoption:

- Use federal purchasing power to accelerate the adoption of HIT among health care providers. Changes to policies and programs should take the form of incentives and rewards wherever possible rather than creating unfunded mandates, which might slow the adoption of HIT.
- The federal government should strengthen efforts to coordinate the adoption and use of interoperable HIT among federal health care providers and payers, including, but not limited to, the VA, DoD, CMS, Indian Health Service, and the Office of Personnel Management.
- Invest the health systems savings that are eventually generated by HIT into additional HIT development and implementation. This will raise system performance and expectations for the public and private sectors.
- Continue to promote development and adoption of well-founded, consensus-driven HIT standards.
- Develop or encourage the development and enforcement of appropriate mechanisms to ensure the safety and quality of HIT.
- Fund demonstrations and evaluations to learn critical implementation lessons and disseminate best practices.
- Devise ways to help providers adopt HIT and to realize its benefits, including appropriate mechanisms to finance the adoption of HIT.

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Panelists suggested that private sector involvement would be enhanced by enlisting the support of leading business organizations such as the National Business Group on Health and the Business Roundtable. Private sector involvement would result in wider public and political support for the adoption and appropriate use of HIT.

HIT Leadership Panel members agreed that increasing health care costs pose a great and growing challenge to their industries and the broader U.S. economy, and that national adoption of HIT offers a key means of addressing these costs. However, they also concurred that, without federal leadership, neither their individual companies nor the industrial sector as a whole can achieve the breadth of HIT adoption that would be required to realize the needed transformation of health care. Further, federal leadership would diminish any concerns regarding potential anti-competitive practices among industry or pursuing inconsistent or incompatible avenues to HIT adoption. The HIT Leadership Panel generally favored market-based solutions and were thus reluctant to recommend a strict regulatory approach. Even so, they observed that regulation may be needed in some cases, such as to ensure adherence to standards and ensure market access and related opportunities for innovators and vendors.

D. Learn from Information Technology Experience in Other Industries

The HIT Leadership Panel agreed that health care organizations should learn from the IT experience of other industries, while recognizing that health care has special and unique characteristics. Individual Panel members described how IT has transformed their businesses, along with the hurdles they had to overcome to achieve these changes. The CEO of FedEx Corporation observed that, aside from operating its hundreds of aircraft and thousands of trucks, the company is “one giant information system” that tracks 7 million packages, and its Web site receives 10 million visits per day. Current global operations would be impossible without modern IT.

HIT Leadership Panel members described how the Internet has transformed the way that business does business. One leader noted that the Internet has enabled General Motors to operate a worldwide, “just-in-time” inventory system involving purchases of parts totaling \$90 billion annually. Adoption of information technology to transform business operations could take five, seven, or ten years or more of diligent application because of the:

- need to learn how to incorporate IT appropriately in business operations;
- time required to reengineer business operations, retrain staff, etc.;
- need to operate and maintain existing systems while implementing new systems during transition to the new system; and
- varying adoption rates (some organizations will be early adopters and champions, while others will lag and require more market pressure before going electronic).

One Panelist cited the transition in banking from the transport of paper checks to the transmission of electronic images of checks. Electronic imaging is a well-established technology and some banks have been using it in recent years. Cited as an example was a major bank that became committed to adopting the technology only after other leading banks had done so, thereby waiting out the significant “first-mover” disadvantages, a situation that is encountered in health care. Further, the Federal Reserve had to agree to the transmission of images, and legislation (known as “Check-21”) was required to enable banks to use the technology for this purpose. Once it is fully implemented,

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as anticipated in approximately five years, banks expect to reap considerable cost savings. Agreement from regulatory authorities and legislation or other policy changes to remove obstacles to the adoption of HIT or the realization of its benefits are also likely to be necessary in health care.

Another example of IT adoption, cited by leaders of retail companies, was the adoption of barcodes on products through an implementation process that spanned 10 years. In this case, certain antitrust and related legal concerns slowed adoption of an efficient technological solution. It was only when both large retailers and large manufacturers agreed to adopt barcodes, and retailers exerted their market leverage over smaller manufacturers, that barcodes began appearing on virtually all products sold in supermarkets, enabling retailers to pass on cost savings to consumers. HIT Leadership Panel members asserted that the “tipping point” in the adoption of product barcodes, now standard in most of the world, seems to have been attained when 40-50% of manufacturers had adopted them. While the HIT tipping point remains to be seen, it may become more apparent once the government begins to leverage its purchasing power and overcome the considerable fragmentation characterizing current HIT.

Another instance of an emerging IT application in other industries that is relevant to health care is radio frequency identification (RFID). This is an electronic identification technology that uses radio waves to transmit information. The most common method of identification is to store a serial number (identifying a person or object) and other information on a microchip. The chip transmits the information via radio waves that are converted into digital information and read by computers. RFID technology has many potential applications in HIT for improving quality, efficiency, and safety. Among these, patients’ records could be stored on RFID wristbands and enable instant and accurate capture and updating of treatment histories and other patient information throughout the health care system.

The HIT Leadership Panel offered the following suggestions regarding lessons learned from the use of information technology in other industries and how it might be applied to health care.

- Recognize and convey to stakeholders how an efficient, effective, and safe health care system must rely on a large, interoperable information system.
- Anticipate and provide the means to overcome first-mover disadvantages to adopting HIT.
- Do not focus on technological hurdles alone. Anticipate that legal, social, and other non-technological hurdles may constitute even greater challenges to broad implementation of HIT, and plan accordingly.
- Leverage the private sector’s experience to help transform health care and assist health care organizations reengineer business processes using HIT.
- Establish an advisory group, drawn from the business community, to facilitate engagement of the private sector. (Individual HIT Leadership Panel members expressed their willingness to continue to advise the HIT adoption effort and to participate in such efforts).

E. Incentives Must be Aligned to Drive HIT Adoption

Health care often has been characterized by the absence of a true market. Most patients are shielded from the full costs of health care services – costs are primarily shared by employers and the government, while patients remain largely unaware of the actual costs for services rendered. Furthermore, providers (clinicians and health care facilities) are paid for services whose allocation they often control rather than for achieving improvements in output (i.e., health outcomes).

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Indeed, changes in health outcomes are often difficult to attribute to these services, confounding efforts to provide incentives for improving quality and efficiency.

The HIT Leadership Panel recognized that, as in other industries, suppliers (health care clinicians and other providers) need to join with customers, especially health care purchasers (e.g., private employers and the federal government), to accelerate the adoption of HIT. Certainly, providers' knowledge is essential for reengineering health care processes and automating medical information. Purchasers can seek to exert leverage on providers for services, if not outcomes, that meet certain expectations for quality.

In the absence of a true market where traditional supply and demand principles apply, other reimbursement mechanisms that are responsive to the needs of both purchasers and providers are needed. In particular, traditional methods of paying for health care make it very difficult for providers to recoup the cost of installing HIT, while benefits accrue to other agents, including payers, patients, and others. As noted above, providers are reimbursed largely based upon the volume of services they provide. As a result, their income depends in part on inefficiencies inherent in the current system. To the extent that HIT presents high installation costs and maintenance costs, and might even reduce inefficiencies associated with unnecessary services, there are disincentives to adopting HIT. The net result for providers may be a relatively modest – or even a negative – return on investment (ROI). In the current environment of cost control, providers do not anticipate immediate or adequate reimbursement for new “overhead” costs that are not explicitly tied to particular medical and surgical procedures and related services. Exceptions might include large systems, particularly those that are “closed,” such as the VA and Kaiser Permanente. While installing IT is recognized as a necessary cost of staying in business in competitive industries, providers may perceive it as a high and potentially non-reimbursable cost, particularly for individual practitioners and those in small practices.

Recognizing the highly fragmented and under-reimbursed efforts to date in the public and private sectors to develop, adopt, and integrate HIT systems into health care, the HIT Leadership Panel emphasized that incentives must be aligned to drive HIT adoption and must be done on a more widespread basis. The HIT Leadership Panel observed that both carrots (i.e., incentives) and, when necessary, sticks (i.e., mandates, other requirements) should be used to promote the widespread adoption of HIT. The HIT Leadership Panel also suggested that mechanisms be created to incentivize or otherwise assist providers to install HIT and reengineer health care processes to take full advantage of its potential benefits.

Given the absence of a true market in health care, HIT presents a prominent means for improving quality and efficiency. It may be in the interest of purchasers to help health care providers finance the switch to HIT because of the benefits that would accrue to them and the people on whose behalf they purchase health care while giving careful consideration to sharing with providers some of the savings yielded from the use of IT. The wider collection and analysis of health care services, costs, and outcomes data enabled by HIT use will likely provide agents in the health care sector with the information necessary to support a more market-driven health care system.

The HIT Leadership Panel offered the following observations regarding incentives for adopting HIT.

- Use consolidated purchasing power in the federal government to compensate for the absence of a true market in health care.

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- Use both incentives and, when necessary, mandates to promote widespread adoption of HIT. Incentives might include explicit means for payers to support adoption of HIT by providers.
- Anticipate how different stakeholders would be affected by widespread adoption of HIT, and develop well-documented positions to counter unwarranted opposition and create incentives as appropriate to engage these stakeholders.
- Evaluate the benefits and costs of mechanisms for accelerating the adoption of HIT to be able to select the best mix of these, evaluate their impact once implemented, and adjust or revise them accordingly.
- Create mechanisms to help providers install HIT and reengineer health care processes to take full advantage of its potential benefits.

F. Consumer is Essential for Adoption and Change

HIT Leadership Panel members were emphatic that consumer awareness and support is essential for adoption and implementation of HIT, and the transformation of the American health care system. While health care provider institutions, clinicians, and payers comprise the bulk of direct consumers of HIT systems, widespread adoption may not succeed without acceptance by the public as health care consumer in the role of health plan beneficiaries, patients, and family members. Likewise, the degree of awareness by the public of the potential for HIT to reduce errors and unnecessary treatments is expected to increase HIT uptake by the industry.

Although these consumers are unlikely to be the direct purchasers of HIT hardware and software, any concerns they have about potential breaches of privacy or security or other improper use of their health care data could dampen the uptake of HIT. Consumers and clinicians remain concerned about privacy and confidentiality of patient records.²⁴ While evidence suggests that electronic health records will likely increase security and privacy if proper policies and best available technologies are in place,²⁵ consumers remain concerned about the possibility of their personal medical details showing up on the Internet.²⁶ The HIT Leadership Panel asserted that consumers will not support EHR use if that security and privacy is not readily apparent. Successful implementation of an HIT system will need to account for privacy regulations specified under HIPAA, as well as a clear demonstration to consumers and clinicians that patient information is adequately safeguarded.

Panelists suggested that the national HIT vision must be communicated clearly and directly to inform consumer support for the widespread adoption of HIT, including the necessary investment. In these communications, the federal government and other HIT proponents must specifically address the protections to privacy and confidentiality afforded by HIPAA and continue to promote and enforce related standards and safeguards accordingly. Finally, the federal government should monitor progress and impact of widespread HIT adoption to ensure that no population group is left out or disadvantaged by this transition.

The American consumer has the most to gain from widespread adoption of HIT. Clearly, consumers would benefit from health care that is safer and more effective. They would also gain from more efficient health care, including greater portability, improved convenience of online appointments, faster test results, and interactive, personalized disease management. Consumers have already embraced the Internet as a source of health information. The HIT Leadership Panel believes they should be further enabled to use HIT effectively, thus exerting pressure on providers

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to follow suit. One CEO reported that his company was providing cash incentives and the means for employees to maintain their own basic e-PHR. HIT Leadership Panel members were mindful of concerns about privacy and confidentiality, and concurred that any actual or perceived threats to these must be addressed thoroughly.

The HIT Leadership Panel made the following observations and suggestions regarding the essential role of the consumer.

- The national HIT vision must be communicated clearly and directly to generate consumer support for the widespread adoption of HIT, including the necessary investment to achieve this vision.
- The federal government and other HIT stakeholders must specifically emphasize to the public the protections to privacy and confidentiality afforded by HIPAA, and continue to promote industry standards and practices and enforce safeguards accordingly.
- Changes to health care financing, such as regulations pertaining to health savings accounts, should be reviewed to account for the impact of HIT and adjusted to ensure that they facilitate, not impede, its widespread adoption.
- The federal government should monitor progress on the impact of the widespread adoption of HIT to ensure that no segment of consumers is left behind or particularly disadvantaged by the transition to e-health care.

G. Conclusion

HIT Leadership Panel members recognize that the U.S. must improve the efficiency of its health care system and that increases in health care spending must yield commensurate value in the form of improved health outcomes and patient safety. The HIT Leadership Panel regards HIT as a critical component for realizing these improvements. The federal government's role in accelerating the adoption of HIT is multifaceted and poses both opportunities and challenges. Among the greatest challenges is achieving sufficient coordination among relevant federal agencies to exert true federal leverage for widespread adoption of HIT. Evidence of such coordination would provide the direction and impetus necessary for private industry to follow suit. Another key challenge for the federal government is to act as a catalyst and driver of HIT as much as possible, and to use the regulatory approach only selectively to foster innovation and fair market access. The HIT Leadership Panel emphasized that federal leverage as purchaser and provider would be needed – and welcomed by the private sector – to reach a tipping point in HIT adoption.

The HIT Leadership Panel contends that consumers are ready for change, as they increasingly seek more health care information and choices. HIT Leadership Panel members are optimistic that, once stakeholders are knowledgeable of the vision, they will support investment in HIT. They recognize that consumers would be the ultimate beneficiaries of the widespread adoption of HIT and the resultant transformation of America's health care system, as they have been for previous technological revolutions.

IV. BACKGROUND INFORMATION ON HIT

Background information on health care and HIT was provided to the HIT Leadership Panel prior to the meeting to enable a more productive discussion of key issues. Included in this section is background information regarding: A) cost, quality, and access to health care in the United States; B) a discussion of IT adoption and economic impact in other industries; C) a brief description and history of HIT, including a description of the British HIT system, as well as the estimated costs and benefits of HIT; D) a list of potential challenges to HIT adoption; and E) a discussion of the three-phase plan for employing HIT incentives, currently under review by the federal government.

While promising in certain important respects, the body of research on the effectiveness, efficiency, and cost of HIT is uneven and not particularly rigorous overall. Therefore, while the following information is useful for understanding HIT, there are a number of areas where further research is needed.

A. Health Care in the U.S.

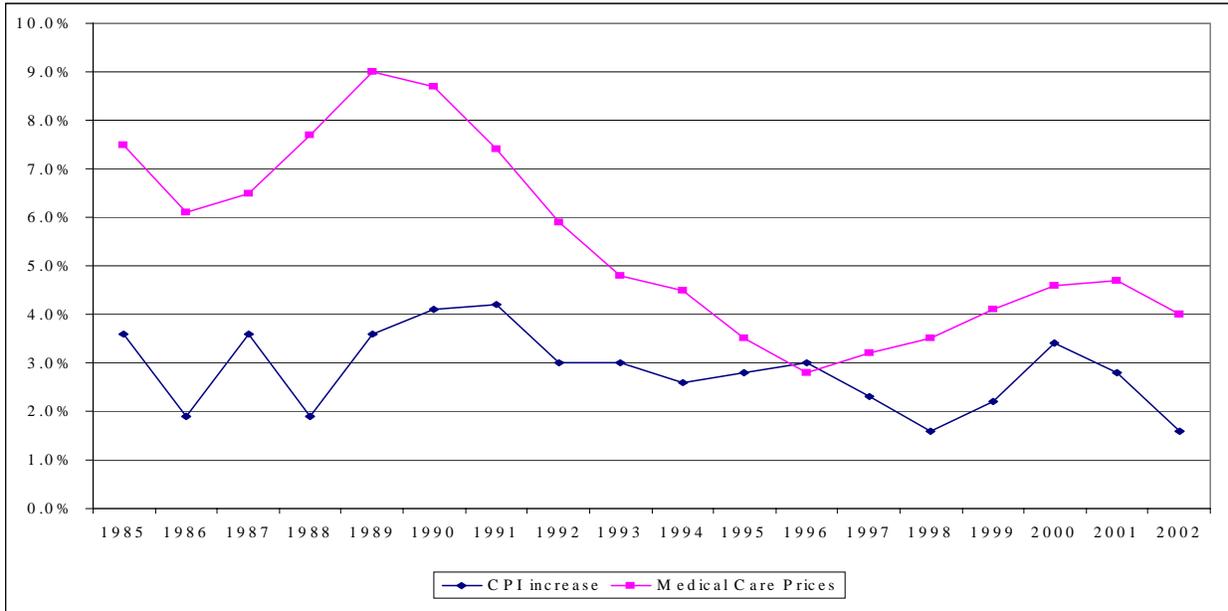
The delivery of health care in any given country is often examined by looking at three broad areas: cost, quality, access. Though the U.S. health care system provides the most advanced health care anywhere, its performance in these three areas is far from optimal, ranking below many other industrialized countries in these and other respects.²⁷ Some of the challenges confronted by the U.S. health care system in these three areas are summarized below. Included in this discussion are challenges faced by employers in particular, who sponsor health care for more than half of all Americans.

1. U.S. Health Care Costs

The U.S. health care system is costly and complex, representing one of the fastest growing sectors of the economy. There is substantial medical cost inflation in the U.S. The index of medical prices (a component of the Consumer Price Index [CPI]) has consistently increased faster than the CPI, as shown in Exhibit 2.

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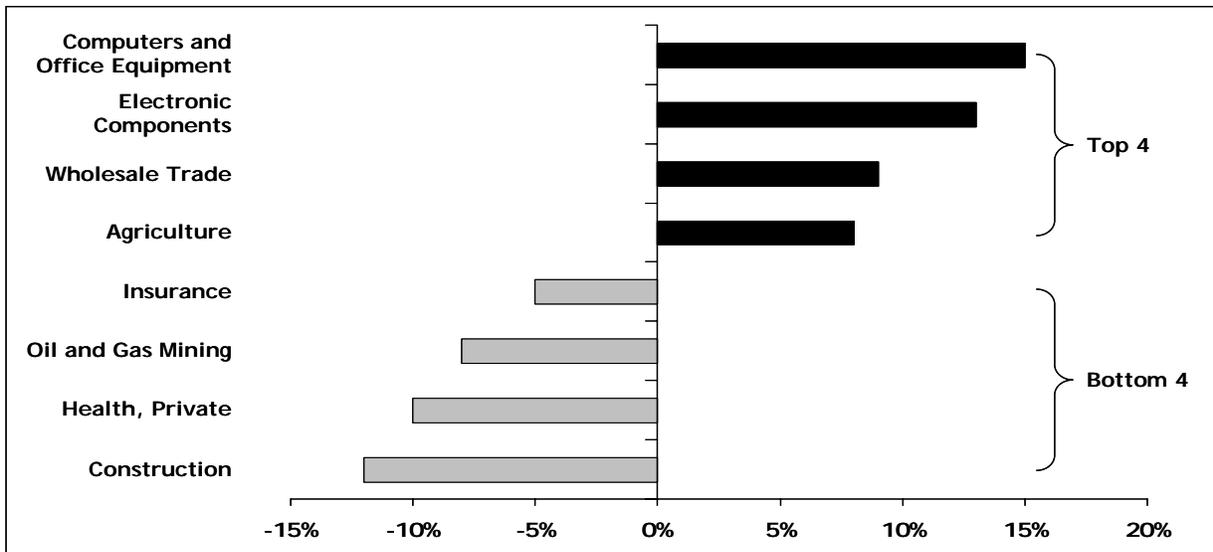
**Exhibit 2:
Increases in Consumer Price Index vs. Medical Care Prices**



Source: Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group

U.S. national health care expenditures (NHEs) have grown every year for the past 60 years. However, the health care sector’s productivity has failed to keep pace with its spending. While health care productivity in the U.S. has improved over the last 10 years, the gains have accrued on a low base, and the sector’s contribution to national productivity remains negative.²⁸ Exhibit 3 compares contributions to productivity for health care with other major industries in the U.S.

**Exhibit 3:
Industry Contributions to Productivity**

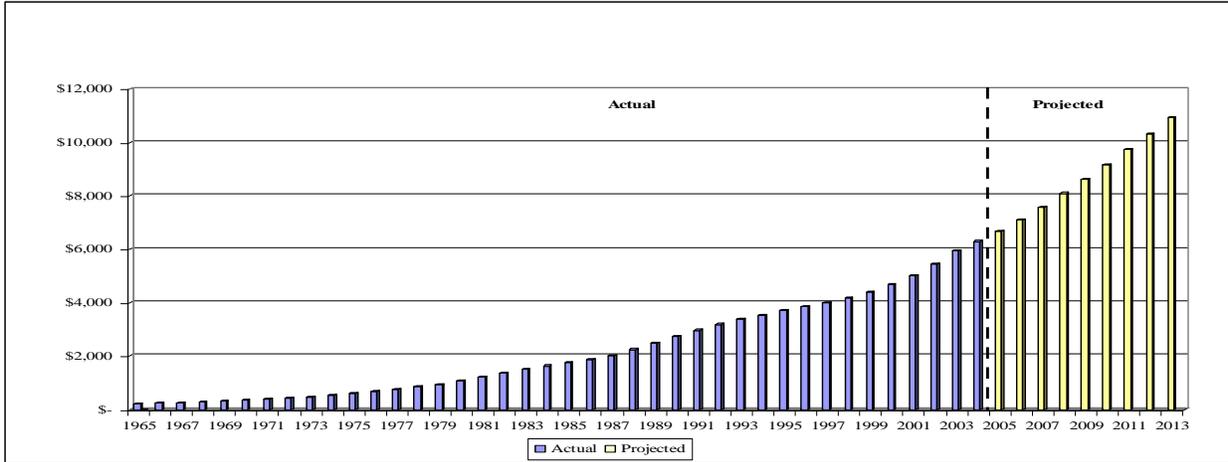


Source: Chambers, J. Driving Productivity and Quality in Healthcare Tipping Point: Market Transitions. Washington, DC: Cisco Systems, 2003.

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In 2004, U.S. NHEs amounted to approximately \$1.8 trillion, or about \$6,300 per person, accounting for 15.8% of gross domestic product (GDP).²⁹ This level far exceeds those in other developed countries; for example, it was 8.5% for the European Union in 2001.³⁰ The Centers for Medicare and Medicaid Services (CMS) estimates that, by 2013, NHEs in the U.S. will reach \$3.4 trillion and account for 18.8% of GDP.³¹ The greater percentage of GDP attributable to health care reflects the disproportionate increase of NHEs relative to the rest of the economy. Exhibit 4 shows past and anticipated NHEs for the U.S.

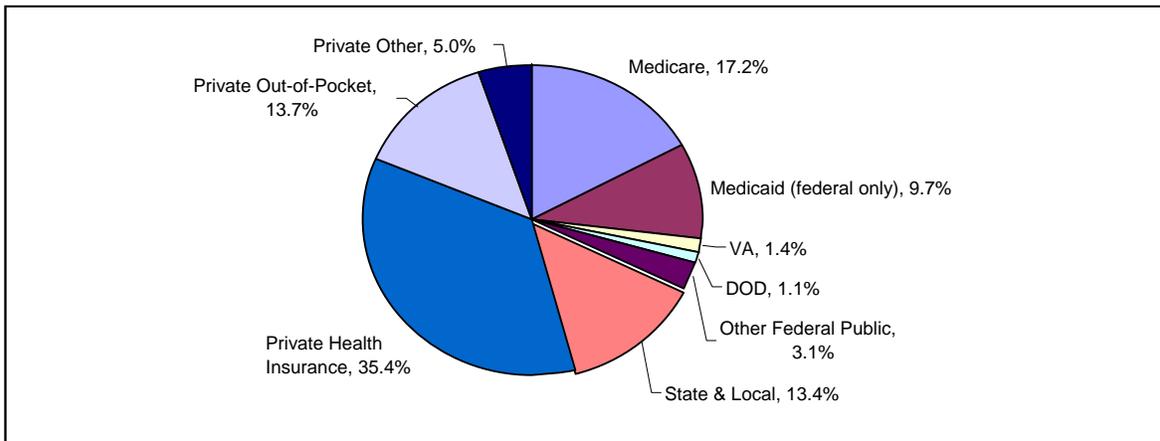
**Exhibit 4:
U.S. Health Expenditures, 1965-2013 (est.) - U.S. (\$ billion)**



Source: CMS, Office of the Actuary, National Health Statistics Group.

A significant portion of the increase in NHEs is due to growth in spending for Medicare and other government health care programs. The breakdown of personal health care expenditures by source between public and private sources is detailed in Exhibit 5.

**Exhibit 5:
2002 Personal Health Care Expenditures by Source**



Source: Center for Medicare and Medicaid Services, Office of Actuary, National Health Statistics Group

Further information about each of the sections detailed in Exhibit 5 can be seen in Appendix 1.

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The recent report of the Medicare Trustees states that total Medicare expenditures will increase from 3.4% of GDP in 2004 to 7.7% of GDP by 2038 and to 13.8% by 2078.³² Certainly, much of the recent growth in health care spending is unavoidable. As the population ages, demand increases for more specialized and intensive services. Also, as medical innovators develop new treatments and diagnostic tools, demand for their use increases.

2. Costs for Employers

Aside from the federal government, which is the nation’s largest employer, private employers account for the majority of private health insurance in the U.S. Rates for employer-based health insurance have increased significantly during the past 5 years, from 8.5% to 13.9% annually.³³ The increasing cost of employer-based health insurance continues to affect the global competitiveness of U.S. companies. Employers who are forced to pay more for health care may have fewer resources to invest in the growth of the company. When higher health care costs are passed off to the consumer, U.S. employers are placed at a competitive disadvantage compared to employers in other industrialized countries with lower health care costs.³⁴

The health care cost burden on employers has increased significantly during the last three decades. As shown in Exhibit 6, individuals’ share of health care expenditures in the U.S. has declined since 1970 from 34% to 13% in 2002, while the share of private insurance expenditure has increased from 21% to 36% during this same time.

**Exhibit 6:
Health Care Expenditure by Source**

Source of Health Care Expenditure	1970	1985	2002
Public Insurance (Medicare, Medicaid, etc.)	38%	41%	46%
Private Insurance (largely employer-based)	21%	30%	36%
Out-of-Pocket	34%	23%	13%
Other	7%	6%	5%

Source: CMS, Office of the Actuary, National Health Statistics Group.

In recent years, health insurance premiums have increased at double-digit rates.³⁵ In 1998, the average health care cost per private-sector employee was \$1 per hour; in 2003, it had increased to \$1.50 per year.³⁶ PriceWaterhouseCoopers examined contributions to health benefit costs for large employers, which rose 13.7% between 2001 and 2002. This increase was broken down as follows.

- 22% - drugs, devices, and medical advances;
- 18% - rising provider expenses (prices);
- 18% - general (CPI) inflation;
- 15% - government mandates and regulations;
- 15% - increased demand (including an aging populations and a movement away from managed care);
- 7% - litigation and risk management; and
- 5% - fraud and abuse and other factors.³⁷

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The Employee Benefit Research Institute, which conducts research on economic security and employee benefits, recently released the results of an annual health confidence survey of 1,400 individuals. Approximately 67% of respondents indicated that their premium contributions for their employer sponsored health insurance had increased during the last year.³⁸ According to the 2005 Towers Perrin Health Care Costs Survey released in early October 2004, while health care costs are only expected to increase by 8.5% in 2005, the dollar increase will still amount to an average annual increase of more than \$580 per employee.³⁹

3. Quality of Care

Thousands of Americans die each year as a result of medical errors caused primarily by systematic problems, and many more experience other unnecessary harms. The estimate from the Institute of Medicine (IOM) that between 44,000 and 98,000 people die from medical errors each year is widely cited.⁴⁰ Between 6% and 10% of all hospitalized patients will experience an adverse drug event (ADE) and the number of serious medication errors resulting in death more than doubled from 1983 to 1993.⁴¹ The Center for Information Technology Leadership (CITL) estimates that, of the 900 million outpatient visits in the U.S., 8.8 million are attributable to ADEs, 3 million of which are preventable, and 2.1 million ambulatory ADEs could be avoided.⁴²

A recent national study by RAND suggests that U.S. adults receive only 55% of recommended care.⁴³ Other recent research indicates that nearly 30% of health care spending in the U.S. is for treatments that may not improve health status, may be redundant, or may be inappropriate for the patient's condition.^{44,45,46,47} In 2004, that translates to \$300 billion per year.⁴⁸

4. Insurance Coverage

In 2003, more than 243 million of the 291 million people in the U.S. had health insurance.⁴⁹ About 60% were covered through employer-based plans. Approximately 14% were covered by Medicare, 11% by Medicaid, and 3% through military programs.⁵⁰ The estimated number of those who were uninsured for all or part of the year continues to increase. Exhibit 7 below details the increase in the uninsured over the past three years.

**Exhibit 7:
Uninsured U.S. Population: 2001-2003**

Year	Number of Uninsured	Percent of U.S. Population Uninsured
2001	41.2 million	14.6%
2002	43.6 million	15.2%
2003	~45 million	15.6%

Source: U.S. Census Bureau

B. IT Adoption and Economic Impact

As the health care sector works toward adoption and integration of IT, it is useful to examine the experience of other industries' use of IT to improve business practices, such as factors that influenced successful transformation and gains in productivity. Below are some examples.

1. Impact of IT Adoption

When technology succeeded in revolutionizing the nation's economy in the past—for example, through textiles production, steam power, railroads and electricity—its effects generally occurred in three overlapping stages: 1) technological change produced productivity growth in the innovating sector; 2) falling prices encouraged increases in capital spending and acquisition; and 3) production eventually was reorganized around the technology. Often, there were long lag times between technological breakthroughs and gains in productivity. While investment in electricity began in 1881, it took businesses 40 years to reorganize production around electrification.⁵¹

IT contributes to economic growth directly through production of IT goods and services and indirectly through the application of IT to business processes. In 2003, IT-producing industries accounted for 8% of GDP and contributed 28% of the 2.9% real gain in economic growth.⁵² The U.S. is also the largest exporter of IT goods and services. In 2002, sales by U.S. IT companies and their overseas affiliates exceeded \$1 trillion.⁵³

In the 1970s and 1980s, the U.S. faced a “productivity paradox” in which industry spent vast sums on IT that did not appear to yield a commensurate gain in productivity.^{54,55} However, the surge of labor productivity that followed in the mid-1990s stemmed mostly from investment in and use of IT.⁵⁶ The contribution of increased IT capital build-up in computer hardware, software and telecommunications equipment generally exceeded the contribution from all other forms of investment in labor productivity growth after 1995.⁵⁷ Indeed, the contributions of IT-intensive industries to productivity growth were much greater than those of less IT-intensive industries, including health care.

The delay in productivity gains from IT investment was due in part to the learning process inherent in the use of any new technology. Companies needed time to learn how to use IT effectively. While some firms benefited, others wasted capital on inadvisable, ill-conceived, or poorly implemented projects. This contributed to the related hurdle of having to overcome redundancy of legacy systems. This reflects the diversified and dynamic process of aggregate productivity: less productive plants go out of business, relatively productive plants continue, and new entrants that survive tend to be more productive than either.⁵⁸

Investing in computers does not automatically boost productivity growth. Changes in business processes that have accompanied new technology implementation also contribute to the recent rise in U.S. productivity.⁵⁹ Businesses must make parallel investments in worker training and revised workplace practices before IT investments yield productivity gains.⁶⁰ Strong productivity growth in finance, retail trade and wholesale trade reflect improvements in the way businesses are organized and how they incorporate the use of technology. At the company level, increased productivity is most often apparent when IT investment is accompanied by organizational change, including changes to processes and the ability of these new systems to interact with existing ones.⁶¹

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2. IT Adoption in the U.S. Economy by Industry Sector

Telecommunications and securities trading are two industries that may hold lessons for health care. Both experienced strong annual productivity gains between 1995-1999 attributable to the introduction of certain technologies and changes in business practices. Key aspects of their IT experiences are summarized in Exhibit 8.

**Exhibit 8:
Productivity Gains Due to IT in Telecommunications and Securities Industries**

Industry	Annual Productivity Gains 1995-1999	Output Measure	Amount Attributed to IT
Telecommunications	8%	Local access lines and call minutes	Substantial, though complementary to other factors
Securities	18.9% (non-portfolio management)	Volume of equity trades and value of underwriting deals	Substantial, though complementary to other factors

Source: McKinsey Global Institute and RAND

The increase in productivity in the telecommunications industry was due in part to enhanced competition following deregulation. Among technical advances, the capacity of a single transmission fiber increased exponentially for six consecutive years. Competition led to price decreases, which induced demand for phone lines. Therefore, competition and IT were complementary factors that drove productivity growth. Securities trading was directly affected by the Internet through the creation of online trading. Similar to the telecommunications industry, an IT infrastructure allowed for more trades at a minimal cost. This increase in productivity coincided with a reduction in brokerage staff and enhanced competition stemming from pressure from discount brokerages and deregulation. Again, competition and IT were complementary factors that drove productivity growth. In both industries, changes in demand and competition resulting from IT investment contributed to productivity growth.⁶²

The factors that contributed to success in specific industries may apply differently in health care. Similar to the financial services industry, health care is a professional services industry that involves complex and secure transactions among numerous parties. Like retail, food, and many other service industries, health care services are delivered locally and are subject to local market forces. As in many service industries, health care output and quality are difficult to measure and reward. An important distinction in health care is that its consumers are largely insulated from the financial consequences of their choices since costs are often shared with insurers. Compared to other industries, government has enormous influence in health care as the major regulator and major payer of services. Further, as noted above, government is a major employer and provider of health care services.

C. Health Information Technology

1. Defining HIT

As defined in the *Framework for Strategic Action*, health information technology refers to “the application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of health care information, data, and knowledge for communication and decision-making.”⁶³ This includes such applications as telemedicine and use of the Internet. A central component of HIT is the electronic health record (EHR), a patient’s medical file, which is stored electronically and maintained by a health care provider to order prescriptions and tests, and to inform clinical decisions. Currently, EHR functions vary by software vendor, although efforts are underway in the public and private sectors to standardize EHR functionality.

Early deployments of IT in health care were largely for financial accounting of medical transactions.⁶⁴ Experiments with computerized medical recordkeeping began in the 1960s.⁶⁵ The first electronic health records were designed and deployed starting in the late 1960s and early 1970s.^{66,67,68} The first systematic assessment of the costs and benefits of this technology started in 1975.^{69,70} By the mid-1970s, about 90% of hospitals used computers for business functions⁷¹ and 174 sites processed electronic data with some medical content.⁷² A very limited number of physicians began adopting EHRs in the 1980s, following the introduction of the personal computer. In 1991, the IOM declared that the EHR is an essential technology for health care,⁷³ a message it has reinforced recently and repeatedly in reports on the urgency of improving national health care quality.⁷⁴

2. Current Status and Projections for HIT Adoption

Estimates of the current number of physicians and hospitals that have adopted an EHR are inconsistent.⁷⁵ An EHR may vary from simple word processing templates to sophisticated systems with such features as automated decision support, which provide electronic reminders to physicians and other clinicians on recommended care based on the specific needs of each patient (e.g., “Did you check the feet of a diabetes patient?”). Also, physicians may be using only one or more tools/components found in an EHR.

According to recent estimates by RAND, only 10-16% of all physicians currently employ some form of an EHR in their offices.⁷⁶ Other estimates put the proportion at 20% or more, although some of these estimates include forms of electronic connectivity other than EHRs as defined here.^{77,78,79,80,81,82} In any case, physicians are increasingly relying on computer-based resources, which may encourage and enable eventual EHR adoption. According to data from a 2002 American Medical Association survey, 99% of practices and 96% of physicians use computers; 84% have a network; 75% have Internet access; and 35% are interconnected with a hospital or laboratory.^{83,84} Even so, many physicians do not anticipate adopting EHRs in the near future. Findings of a 2004 Massachusetts Medical Association survey indicate that 49% of physicians do not intend to use an EHR.⁸⁵

Estimates of the proportion of hospitals with an EHR range from 5% to 15%,^{86,87,88,89,90} about the same as those that use computerized physician order entry (CPOE), a process in which physicians write medical orders for their hospitalized patients using a clinical software application.^{91,92,93,94,95,96} The proportion of hospitals capturing patient demographics

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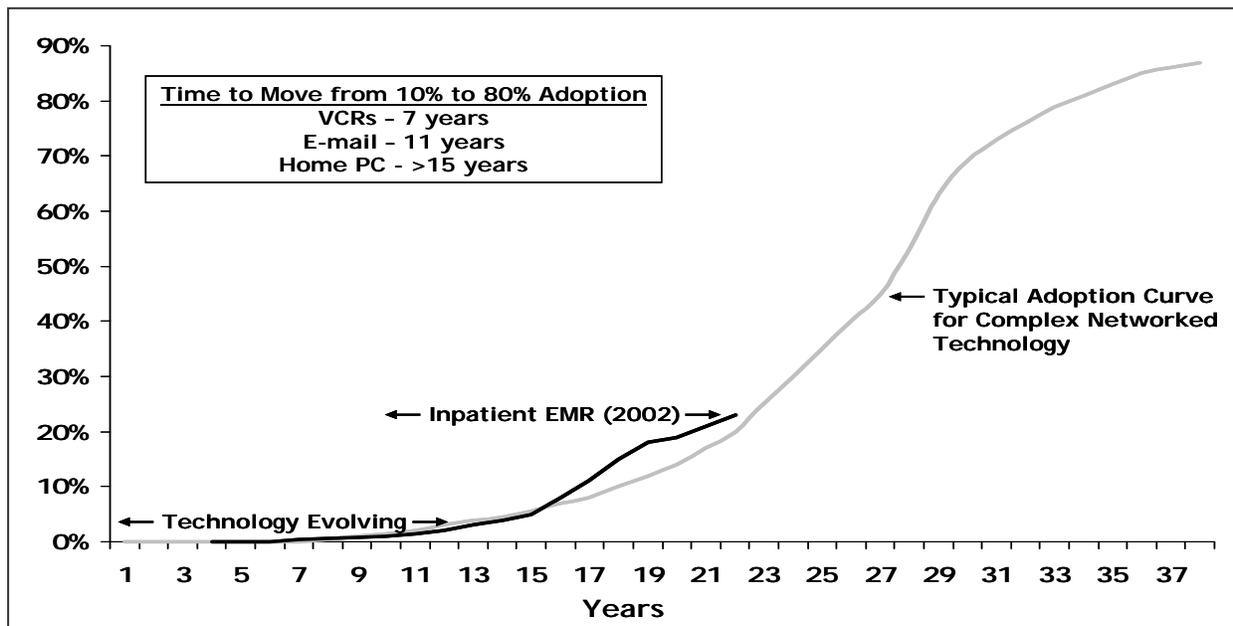
electronically more than doubled between 2000 and 2004, from 28% to 65%.⁹⁷ The EHR penetration rate for hospitals was 25% by the end of 2002.⁹⁸

The health care system lags behind other industries in adopting IT by at least 5-7 years, but perhaps by as much as 10-15 years. Still, HIT expenditures have continued to increase, especially in the last few years. Estimates of expenditures in the U.S. for HIT range from \$11-15 billion in 1997^{99,100} to \$17-42 billion in 2004.^{101,102,103,104} Institutional HIT expenditures as a percentage of revenue seem to have grown from 1-2% in 1998 to 4-5% currently.^{105,106,107,108,109} These figures are far less than those of the IT industry (10% of revenue) and financial services industry (7%).¹¹⁰ HIT expenditures are expected to grow in the next several years. Growth estimates vary from 5-7% to 10-15%, to as high as 18% per year.^{111,112,113,114} Hospitals account for about 60% of the market.¹¹⁵

3. Promise of HIT

An ongoing study by The RAND Corporation (RAND) is examining adoption of electronic health records by the health care industry, including inpatient and outpatient settings. Preliminary findings suggest that the industry is moving up an adoption curve spanning approximately 50 years that is comparable to historical new technology adoption cycles in other industries. For example, the study indicates that EHR use in the inpatient setting is approaching the midpoint of the cycle – roughly 23 years since early adoption, with the current penetration rate (i.e., the percentage of inpatient settings using an EHR) estimated at somewhat more than 20%. RAND projects that this will rise to about 40% in a few years. Exhibit 9 depicts the inpatient EHR adoption curve for the U.S.¹¹⁶

Exhibit 9:
Electronic Health Records Adoption Curve



Source: RAND

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There is a critical difference thus far between HIT adoption and other industries' IT adoption cycles. Adoption in health care has not diffused evenly throughout the health care market. Within the U.S., adoption has been concentrated in densely populated areas. The most advanced health record technology has been employed in large urban teaching hospitals and internal medicine practices. Moreover, large gaps in technological sophistication have emerged. This is particularly evident in the disparity between hospitals and smaller institutions, according to RAND. A few studies indicate that health record infrastructure build-outs are occurring most frequently in health care institutions where systems are already highly centralized, or where a small number of networks and technologies serve the bulk of the population.¹¹⁷

In contrast to the U.S., countries with centralized national health programs have been early adopters. For example, Australia, the U.K., New Zealand, Canada, and certain Northern European countries have implemented health record technology to some degree and with varying success.¹¹⁸ According to one study, 12 European countries have a higher percentage of primary care physician use of computer-based patient records.¹¹⁹ Because of their more unified health care systems, these early adopters of HIT have naturally low costs for gathering information and possess efficient means for acquiring capital. That is, their technological systems may already be somewhat harmonized.¹²⁰

4. HIT Adoption in the United Kingdom

The considerable differences in their health care systems notwithstanding, the U.K. experience still offers useful lessons for the U.S. The U.K. has a long record of deploying HIT through the National Health Service (NHS). The NHS is the largest organization in Europe and the third-largest employer in the world, with more than 1.3 million workers. The agency is generally regarded as an efficient provider of high-quality health care to a large population. The state finances the NHS mainly through general taxes, administers the agency and makes executive decisions.¹²¹ Approximately 60% of U.K. primary practitioners use electronic health records, according to the survey organization, Harris Interactive. Recently, the NHS embarked on the world's largest civilian IT project, a plan to spend \$11 billion on a national HIT system to replace existing local systems and paper medical records.¹²² (The IT project applies only to the NHS in England. Scotland, Wales, and Northern Ireland administer their own health systems.)

An earlier plan to develop electronic records fell short of its objectives. Part of an overall information technology strategy in 1998, electronic health records were expected to support the clinical team and to provide statistical information. There was little evidence that these goals were achieved.¹²³ Systems have proven difficult to build and have not been a priority for front-line professionals.¹²⁴ Since 1998, the NHS has undergone a series of initiatives, among them a new approach to provide health information via IT. Included in that initiative is a National electronic Library for Health (NeLH) to keep practitioners up to date on evidence to inform their clinical decisions.

In England, the latest IT project of the NHS calls for a national network for electronic health records to be in place by the end of 2004 and the full capability of such a network to be deployed by 2010.¹²⁵ The core of the system is a database of patient records covering all of England. The project will link about 270 health trusts,^a 18,000 sites, 28,000 hospital doctors,

^a The NHS employs 302 primary care trusts that manage local health services, including those delivered by general practitioners (GPs), dentists, opticians, pharmacists, and other types of primary practitioners, as related services.

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more than 30,000 general practitioners, and 50 million potential patients. The initial contracts have been awarded and will run until 2013.¹²⁶ Inputs and access to the national database and much local IT, including integration of legacy systems if compatible, will be the responsibility of five regional vendors. A separate vendor will supply a national appointment-booking system. Health trusts will have to opt into the system, but may continue to use their own IT systems. Patients have the right to opt out of the electronic record system. The public as well as health care providers will have to be convinced of the system's benefits to ensure its widespread adoption,¹²⁷ highlighting the importance of evaluation.

5. Estimated Costs and Benefits

Despite the growing interest in HIT and its potential to decrease the cost of health care in the U.S., few studies have examined the costs and benefits of HIT implementation. The majority of the studies that have addressed the issue focus on segments of the health care industry or examine the impact of a particular HIT intervention on a more local level. The discussion is a summary overview of currently available findings regarding costs and benefits of broad HIT adoption.

a. Estimated Costs

There are various estimates of the investment necessary to drive widespread adoption of EHRs. A study by the Markle Foundation under the Connecting for Health Initiative found that the ongoing costs to physicians implementing an EHR range on average between \$12,000-\$24,000 over three years, including such impacts as volume-based revenue loss and lost productivity.¹²⁸ Some of this loss is attributable to the economic value of the "first mover" disadvantage. The proportion or critical mass of physicians needed to adopt before the first mover disadvantage dissipates has not been established, and it is not known how the cost structure of the HIT industry shifts as adoption increases and becomes widespread. Shared infrastructure also needs to be developed to foster interoperability.¹²⁹

The same Markle Foundation study estimated that incentives ranging from \$3-\$6 per patient visit or \$0.50 - \$1.00 per member per month would be needed to cover the costs of EHR adoption in small- and medium-size practices. Based on these figures, the study authors estimated that \$21.6 billion to \$43.2 billion over 7 to 10 years would be required to fund these incentives. If achieved over the 10-year period, the costs were estimated at between \$2.2 billion to \$4.3 billion per year.¹³⁰

Interoperability

The Center for Information Technology Leadership (CITL)¹³¹ has published two reports examining the financial costs and benefits of nationwide adoption of various HIT systems. The reports examine the costs and benefits of a fully interoperable HIT system and widespread adoption of Ambulatory Computerized Provider Order Entry (APCOE), respectively. In the first report, CITL projected the financial costs and benefits for nationwide adoption of interoperable HIT systems, including the automation of six types of transactions between health care providers and the following stakeholders: independent laboratories, radiology centers, pharmacies, other providers, public health departments, and payers.¹³²

CITL's estimates for the costs of the interoperable HIT system included software, hardware,

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licenses, interfaces, training, implementation, maintenance and opportunity costs. Total costs for the 10-year implementation period were estimated to be \$275 billion. After the ten-year implementation period, annual costs were estimated at \$16.5 billion every year thereafter. CITL did not estimate the cost of systems for laboratories, radiology centers, pharmacies, payers, or public health departments, some of which would require additional public and private sector investment.¹³³

Ambulatory Computerized Provider Order Entry (ACPOE)

In the second report, CITL examined the costs and benefits of widespread ACPOE adoption. ACPOE is an HIT application that allows for the automated ordering of medications, diagnostics tests, interventions and referrals in the outpatient setting, and is a major component of an EHR. The goal of ACPOE is to reduce problems associated with illegible handwriting and provide information to clinicians at the point of care, thereby enhancing the provider's performance.¹³⁴

Total costs for ACPOE systems to providers were projected over a five-year period. Costs were found to differ significantly based on the number of providers in the group that would be using the system and its degree of sophistication. For a "Basic" system that allowed for the ordering of medications and diagnostic tests, the total cost over a five-year period was estimated to be \$19,570 per provider for a solo practice and \$19,410 per provider for a 50-provider practice. For an "Advanced" ACPOE system, the five-year cost for a solo practice was projected to be \$505,400 per provider and \$35,680 per provider for a 50-provider practice.¹³⁵

b. Estimated Benefits

Studies of EHR use by physicians report substantial improvements in clinical process. The effects of EHRs include reducing lab and radiology test ordering by 9-14%^{136,137,138}; lowering ancillary test charges by up to 8%¹³⁹; reducing hospital admissions, costing an average of \$17,000 each, by 2-3%¹⁴⁰; and reducing excess medication use by 11%.^{141,142} A forthcoming study evaluating the impact of EHRs on resource utilization in two states demonstrates that physician visits decrease by 9% after EHR implementation. There is also evidence that EHRs can reduce administrative inefficiency and paper-handling.¹⁴³ These studies are peer-reviewed, and their findings have been replicated using a variety of methodologies. The two CITL studies cited above show a pattern of clinical efficiency and savings that arise from EHR use. Studies of ambulatory care settings estimate that EHRs would save \$112 billion per year (7.5% of health care spending), comprising \$34 billion annually from savings accrued in physicians' offices¹⁴⁴ and \$78 billion annually from interoperability of those EHRs.¹⁴⁵

There is a considerable and growing body of evidence that a significant proportion of health care in the U.S. is inappropriate.^{146,147,148} By eliminating unnecessary and duplicative procedures, improving quality by eliminating errors, and bringing less efficient hospitals and physicians up to the performance of the most efficient ones, some researchers have suggested that up to 30% of annual Medicare health care spending could be saved.¹⁴⁹ HIT is among certain delivery, financing, and other system-wide interventions that have the potential to achieve savings through more efficient and effective care. In particular, HIT can deliver evidence-based guidance to the point of care, supporting improved clinical decision-making and more efficient use of resources. Given the evidence to date of efficiencies and quality improvements that can be realized through EHR use, the Office of the National Coordinator for

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Health Information Technology estimates annual savings attributable to widespread EHR adoption is likely to lie between 7.5% and 30% of annual health care spending.¹⁵⁰

Interoperability

The CITL analysis found that, after an initial 10-year implementation period, widespread adoption of fully interoperable HIT systems would save the nation approximately \$77.8 billion per year (total savings minus costs),¹⁵¹ or roughly 5% of total health care spending. Benefits during the 10-year implementation period amount to \$337 billion (total savings minus costs). After the initial 10-year implementation period, the estimated annual direct cost savings attributable to provider interoperability with each of the following was:

- Laboratories - \$31.8 billion;
- Radiology centers - \$26.2 billion;
- Payers - \$20 billion;
- Other providers - \$13.2 billion;
- Pharmacies - \$2.7 billion; and
- Public health departments - \$195 million.

Ambulatory Computerized Provider Order Entry

According to the CITL analysis, widespread ACPOE implementation would save the nation anywhere from \$3.5 billion (savings with a Basic system) to \$44.2 billion (savings with an Advanced system) annually. Accruing from such benefits as reduced medication errors and increased compliance with recommended clinical guidelines, the level of these savings would depend on the level of sophistication of the order entry system. The main cost savings are summarized in Exhibit 10.¹⁵²

**Exhibit 10:
Breakdown of ACPOE Benefits by Sophistication Level**

Type of Benefit	Range of Savings (Basic - Advanced Systems)
Improved medication ordering	\$3.3 billion - \$27 billion
Decreased laboratory expenditures	\$97.2 million - \$4.7 billion
Decreased radiology expenditures	\$417 million - \$10.4 billion
Decreased hospitalizations from adverse drug events	\$213 million - \$2 billion

Source: Center for Information Technology Leadership.

c. Return on Investment

CITL found that both individual providers and practices with 50 providers did not realize positive returns on investment for the purchase of basic ACPOE systems. However, they did see returns for “Intermediate” ones. Solo providers were estimated to realize a \$24,385 ROI compared to a practice with 50 providers who were estimated to realize a \$52,595 ROI for the purchase of an “Intermediate” ACPOE system that supported medication and diagnostic test ordering capabilities.¹⁵³

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Wang et al. conducted a cost-benefit analysis of EHRs in primary care based on data from their own sources, as well as other published literature. The researchers examined two categories of costs associated with EHR implementation: system costs (including software, hardware, training, implementation, and ongoing maintenance and support) and induced costs (including transition costs from paper- to electronic-based systems). They divided the benefits into two categories: averted costs (including increased chart-pulling efficiency and reduced transcription costs) and increased revenue (derived from reduction in billing errors). Exhibit 11 details the ROI per provider for EHR implementation over five years.

**Exhibit 11:
Return on Investment for EHR Implementation per Physician**

	Initial Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Total cost	\$13,100	\$13,619	\$2,812	\$8,379	\$2,550	\$2,429	\$42,900
Total benefit	0	5,429	22,041	20,991	41,382	39,411	129,300
Total	(13,100)	(8,190)	19,229	12,612	38,832	36,982	86,400

*All figures are in present value. Source: Wang et al., American Journal of Medicine

The researchers found that the main savings were realized from reduced drug spending, improved use of radiology tests, improved charge capture, and fewer billing errors.¹⁵⁴

Kaiser Permanente reported positive outcomes following an evaluation of the impact of implementing integrated EHR systems on selected ambulatory care utilization and quality indicators. The study examined Kaiser’s Colorado region (367,795 members) and Northwest region (449,728 members), two and four years after implementation, respectively. Although the EHR systems in the two settings were designed separately, they had similar characteristics, including integrated documentation and clinical reporting, CPOE, continuous medical record availability at the point of care, immediate availability for all potential users, and ease of searching. Kaiser conducted a retrospective serial cross-sectional study for each region. Administrative data was used to assess utilization and Health Plan Employer Data and Information Set (HEDIS) data was used to assess quality of care. The study found that the use of EHRs in both settings resulted in a decline in:

- age-adjusted office visit rates by 9%;
- age-adjusted primary care visits by 11%;
- age-adjusted specialty care visits by 5% and 6%; and
- the percentage of members with three or more visits by 10% and 11%.¹⁵⁵

D. Factors Affecting HIT Adoption

HIT has the potential to significantly diminish many current problems in the U.S. health care system. However, HIT remains to be fully developed and embraced by the individual health care communities or the industry as a whole. The slow pace of adoption may result from various shortcomings, including normal market failures, failed strategies of deployment and implementation, the need for stronger incentives to lower risk, and insufficient capacity and resources. Some of the main issues are summarized below.

- **Early adopter experience.** The experiences of those who adopt HIT early have a significant impact on followers considering investing in their own HIT systems. Those

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who are able to incorporate HIT into their practice successfully and see a positive ROI serve as a catalyst for others to pursue investment. In contrast, poor experiences of early HIT adopters may add to the reservations of other providers. A physician group considering introducing an EHR system in their office that is aware of the successful use of a similar system by colleagues may be more inclined to make the investment.

- **Legacy systems.** Health care delivery and the IT that supports it are both fragmented. From doctors' offices and other outpatient settings to the many departments within a hospital, the differences in the clinical, billing and data needs are striking. Over the years, unique data systems were used for each of the many clinical settings and disciplines, often based on widely varying technical foundations and sophistication. Today's providers frequently still use legacy systems implemented decades earlier. These systems typically are entrenched and isolated from each other, and were not designed to work with other systems in a coordinated fashion. These multiple systems and other associated technologies make it difficult to construct the "right" HIT system for a given user, one that would allow adequate electronic data exchange among EHRs and other clinical data systems.
- **Inadequate standards.** Inadequate standards complicate integration. Health care struggles with disparate methods of representing medical terminology, clinical vocabulary and stored data as well as schemes for interconnecting and communicating among different IT systems. Software currently being used by many patient record systems does not transmit clinical records effectively from one vendor's format to another's. Establishing health data standards (e.g., medical terminology, clinical vocabulary) would enable interoperability – the seamless sharing of data and computerized instructions from one computer system to another.¹⁵⁶ Although more detailed standards are in development by industry panels, current standards are not yet specific enough to ensure that compliant systems can communicate substantial volumes of information reliably and accurately.
- **Lack of capital and access to technology.** Lack of capital and implementation resources have limited the realization of IT's potential benefits. HIT requires large investments in technology, human resources and ongoing maintenance and operation costs. Implementation costs vary by the size of the hospital or provider and its readiness to make the conversion, among other factors. This hurdle is compounded by uncertainty about the magnitude and timeframe of financial benefit that may accrue.¹⁵⁷ For large hospitals and health institutions, implementing HIT can cost as much as \$30 million.¹⁵⁸ According to estimates from The Leapfrog Group, a coalition of large employers/purchasers who are active in advancing standards for greater quality of care, a 200-bed hospital can expect to spend \$1 million - \$7 million on IT.¹⁵⁹ The initial ramp-up time is also significant. Hospitals may need at least three years from choosing a new system to integrating it with an existing IT system. At the micro-level at which most practices have been studied, up-front and ongoing costs are reported to range from \$12,000 to \$24,000 per physician.¹⁶⁰ Some practices incur additional early losses from seeing fewer patients during the implementation period. Also, physician office workflow may be slowed initially if manual data entry from external systems is required.¹⁶¹
- **Operating costs.** Ongoing operational costs are significant. Compared to such other major industries as banking and insurance, investments may be more than double or triple in magnitude for operating HIT systems.¹⁶² Access to capital and technology is not

evenly distributed to providers. Some institutions serve disadvantaged populations and geographic areas with less ability to pay for services. Without effective government and private sector cooperation, HIT will remain out of reach for smaller, poorer or rural hospitals and office practices.

- **Lack of incentives/reimbursement.** Incentives and reimbursement for HIT are lacking. The current financing system generally does not compensate for the direct use of HIT. For example, providers are often not reimbursed for e-mail consultations, let alone the use of an EHR system. Another factor impeding the adoption of HIT is providers' concerns about ROI. Unless subsidized, they bear and absorb the cost and risk of IT investments, while many of the benefits accrue to others, including insurers, benefit managers, employers, regulators, patients and the community at large.¹⁶³ Policy initiatives could help to remove the many disincentives and barriers to connectivity, and provide financial rewards for quality improvement for public reporting of multiple measures of quality performance.
- **Risk-reward perception.** Adoption of IT poses risks for providers. Implementing EHRs may involve initial periods of lower productivity as physicians learn and adapt to a new system. Reimbursement levels may not properly account for the opportunity cost of physicians' time to enter data electronically. Providers may perceive lower expected net benefits to the extent that they anticipate a lower probability of successful EHR deployment. Risks include a lack of acceptance by physicians, unanticipated technical problems, and underuse of features that are poorly designed or a bad fit with the needs of the practice. Physicians need substantial support to configure their systems, training for their use, assistance integrating the systems into their workflow, and converting staff to the new way of doing business.¹⁶⁴ A physician's attitude toward implementation and use of HIT is affected by data entry, cost, security and confidentiality of current medical records, and the effort required to reengineer office workflow. For many providers, the economic case for EHR is not readily apparent.¹⁶⁵

E. Promoting HIT Adoption

The federal government is undertaking activities to promote and incentivize the use of HIT. Phase I of the *Framework for Strategic Action* is intended to build mechanisms for cooperation among stakeholders, assist providers with financing of HIT, disseminate information about HIT, and promote the use of standards to ensure that incremental HIT investments yield more advanced interoperable systems. Federal activities will also enhance the broader social benefits of HIT by fostering regional collaborations (Regional Health Information Organizations, or RHIOs) and a mechanism to support widespread, secure data sharing (the National Health Information Network, or NHIN) that ensure interoperability.

The initiatives in Phase I include the Certification Commission for HIT, implementation support mechanisms for physician offices, group purchasing, RHIOs, the NHIN and testing of various EHR adoption incentive programs. These initiatives can improve providers' expected ROI in HIT by providing information through certification and supporting implementation.

Phase II of the *Framework for Strategic Action* will focus on incentives to accelerate the adoption of interoperable EHRs beginning in FY2006. This phase moves from the infrastructure and market institution building of the first phase to adoption and use by clinicians as a means of improving provider capacity to improve their efficiency and clinical performance. This could

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include the rollout of a pay-for-use-and-performance program in coordination with an implementation support program to reduce the risk of investment in EHRs and maximize their value in transforming work flow and the quality of care. Regardless of the specific activities for promoting and encouraging HIT adoption and use, policy options presented by the federal government are expected to promote the business case and stakeholder alignment in a cost-effective manner.

Phase III of the *Framework for Strategic Action* is expected to build on widespread adoption of interoperable EHRs and the NHIN toward streamlining public health surveillance, performance measurement, and health research. A goal of this phase will be to foster competition in clinical performance. This capacity should provide clinicians with better tools and capabilities to manage patients and populations, and to deliver consistently high quality care efficiently. Among these capabilities, clinicians should have the latest evidence available to inform their decisions at the point of care, which should improve health outcomes and system efficiency.

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**Appendix 1
Personal Health Care Expenditure by Source (2002)**

Source	Expenditure (billions of dollars)	Percentage of Total
Private		
Private (Consumer Payments)	\$ 762,082	
Private Out of Pocket	212,510	13.7%
Private Health Insurance (e.g., employer-based, individual)	549,572	35.4
Private Other	77,492	5.0
Industrial inplant	4,653	
Private funded construction	16,053	
Philanthropy	56,803	
Public		
Public (Federal)	713,436	
Medicare	267,105	17.2
Medicaid	150,477	9.7
Medicaid SCHIP Expansion	989	
SCHIP (Title XXI)	2,930	
Medicaid (Title XIX)	146,558	
VA	22,255	1.4
DoD	17,238	1.1
Other Federal Public	47,641	3.1
Maternal/Child Health	626	
Vocational Rehabilitation	641	
Workers Compensation	732	
Construction	835	
Indian Health Services	1,934	
SAMSHA	2,972	
General Hospital	5,441	
Public Health Activity	7,041	
Research	27,419	
State & Local	208,719	13.4
Temporary Disability	49	
Workers' Compensation	29,281	
Medicaid		
Medicaid SCHIP Expansion	399	
SCHIP (Title XXI)	1,286	
General Assistance	4,945	
Medicaid Title XIX	102,489	
Vocational Rehabilitation	202	
Maternal/Child Health	2,185	
Research	4,197	
Construction	4,390	
St/L Hospital + School Health	15,177	
Public Health Activity	44,118	
Personal Health Care Expenditure Total	\$1,553,009	100%

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