



Enterprise Information Portals in Health Care: Why Now?

White Paper

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“Health care leaders need to design a new chassis to support the coming technology.”

Ian Morrison, Leading Health care Futurist

- The US health care industry is the largest information business in the world.
- Over \$350 billion annually is spent generating new information, from clinical research to patient records and testing.
- E-health, the convergence of health care and the Internet, is revolutionizing all segments of the health care market—pharmaceutical suppliers, medical suppliers, drug product development, disease diagnoses and therapies, and the payers and providers of medical care.
- Key drivers toward e-Health include the continued rapid spread of Internet use, increasing influence of consumers, and downward cost pressures created by managed care.

We now live in the "knowledge economy." The competitiveness of health care providers depends on the use of information technology to streamline clinical and business operations. Web-based enterprise information portals provide a solution to many of the information management complexities of the health care industry.

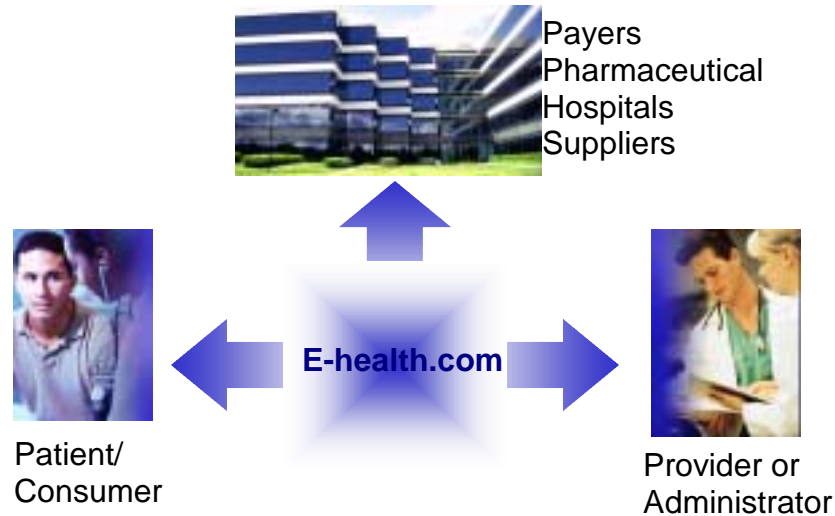
What is a Web Enterprise Information Portal (EIP)?

A Web-based enterprise portal is a user-centric framework which enables efficient and effective information management by an organization.

A portal provides an infrastructure for tightly integrated and fully functional components. Portals apply Internet technology and a standard Web browser interface, to allow users from across and outside the enterprise access to information. The portal framework allows legacy systems to integrate with "best of breed" applications to meet the specific needs of all the stakeholders in an organization.

The portal is the entry point for different stakeholders to access critical data and information based on different business rules and privileges. For example, a provider portal might allow physicians to obtain results of patient tests and communicate with payers, but allow office staff access to only patient schedules and billing information. Portals differ from the usual medical information technology in that patients may retrieve and send information as well as providers.

The E-health Medical Portal



Why Consider a Web Portal for your Enterprise?

A portal provides a strategic infrastructure for your organization's current and future information technology initiatives.

Web based architecture provides:

- ✓ Flexibility: add additional applications as necessary, phase in deployment as required
- ✓ Scalability: health care business IT needs will continue to grow; a portal environment grows with your organization
- ✓ Security: a portal solution offers state-of-the-art encryption and access control, with the capability to easily implement more advanced solutions in the future
- ✓ Integration: a portal enables your systems to "talk to each other", leveraging existing system investment
- ✓ Interoperability: hardware independence, true collaboration, and the ability to quickly add or change new collection sites and data types.

A multi-hospital system, such as an integrated delivery system (IDS), where all users log on to a single URL (universal resource locator), can utilize a portal for users to then pick their specific online areas of interest. For provider organizations with a disease management focus, separate disease sites can be integrated via a portal.

E-Health Stages: Content, Commerce, And Community

How could you use the Internet to better serve your customers?

The Internet has the capability to solve many of the informational challenges facing health care. The paper-intensive health care industry is ripe for electronic data interchange (EDI) through connectivity vendors who are rapidly moving to Internet technology. Macro trends in the U.S. (growing use of managed care, government/ consumer pressure, payer/ provider concerns about profitability) are driving the impetus for health care industry change.

Many industries have found Internet to be a key enabler in developing more efficient operations. Health care will be no exception – the industry has just been slower to implement advanced IT solutions because of the fear of rapid technologic obsolescence of purchased systems and the capital outlay required. With Web-based portal technology and pay-as-you-go application service provider (ASP) pricing, the health care industry will rapidly move onto the Internet.

Health care organizations need:

- ✓ Rapid access to health care and business information,
- ✓ More efficient purchasing of health-related products or services,
- ✓ Applications for typical business functions, including practice management, accounting, and image storage,
- ✓ Open or closed networks to transmit electronic transactions between multiple parties.

The “killer applications” in E-health will use Internet technology to eliminate administrative costs, increase efficiency and speed-up reimbursement. The manual process for RACER (referrals, authorizations, claims, eligibility, etc.) is extremely inefficient. The return on investment of automating payer functions can be significant, with claims automation an easy early target for electronic processes.

In addition, replacing paper-bound supply purchasing should be part of any E-health strategy. It is estimated that it costs from \$75 to as high as \$140 to process paper purchase orders, compared to \$6-10 online. With this differential, an online procurement system could pay for itself in as little as one to three years.

HealthCIO.com conducted an online survey of 212 health care and IT department managers. Only 38% of those surveyed indicated that their health care organization had an E-health program. Of those with an E-health program, 57% said that they planned or had developed a Web portal for business partners or other providers. 39% planned a Web portal for patients or members to communicate with providers. This large E-health gap between the most-wired

health care organizations and the less-wired organizations will have significant strategic and competitive implications.

In 2000 and beyond, an E-health strategy is a critical part of an organization's strategy for growth. Health care organizations which seize the opportunity to move forward will gain significant competitive advantage. This is already the case with payer organizations.

Health care organizations can usually be categorized into one of five distinct stages in E-health evolution.

| Five Stages of E-health Strategy | | | | | |
|---|-----------------------------|----------------------------|-----------------------------|--|-------------------------------|
| | One | Two | Three | Four | Five |
| Type | "Brochure ware" Infomercial | Basic Community | Basic Provider Portal | Transactional Website | Virtual Ecosystem |
| Features | "Not sticky" | Service Locators | Consumer Health Tools | Self-service Portal (Example: online scheduling) | Personalized Portal |
| | Basic Website | Search Engine Tools | Community Building | EDI (claims online) | Integrated Disease Management |
| | Basic Website Information | "Contact us" Form or Email | Business Process Automation | RACER (referrals, authorization eligibility, etc.) | Integrated Demand Management |

- Stage One is a basic web site without any interactivity, featuring directions to a facility and other brochure type information.
- Stage Two is the formation of a basic community around similar interests or other psychographics. Stage Two allows limited interactivity through a contact form or email.
- Stage Three is the beginnings of a true Web portal and provides a glimpse of the promise of E-health. In Stage Three, some business processes are "Web-enabled" and interactive tools are available to build community.
- Stage Four is a transactional oriented website with features expected of other business ecommerce sites. Four features more business processes online, elimination of paper-based processes in favor of Web-enabled ones, and self-service instead of phone calling.

- Stage Five is a *virtual health care ecosystem* that empowers the patient, and fulfills the workflow and information needs of staff within the health care organization. In this personalized portal for the patient, disease and demand management are fully integrated with the patient's record and health history. Patient can retrieve their own information and take an active part in their own health care choices and decision. In this personalized portal for the staff, providers and managers receive specific information as requested and as required by their roles.

Stage One or “infomercial” sites are the currently norm and represent the first attempt of health care organizations to have a Web presence. As the organization's Web strategy and comfort level evolve, a natural progression may be a Stage Two site with extensive offline marketing of the Web site.

At this stage, health care Web sites can expect to be barraged by consumer emails. A large, prominent mid-Western health care organization received nearly 10,000 emails a year, some that included confidential medical documentation. *Email is not secure and can be intercepted or mis-directed.* Therefore, secure messaging between those outside the organization and the health care organization is an absolute necessity. This level of system security can be best implemented on an enterprise wide basis.

Stage Three and Four sites provide additional levels of interactivity for patients and providers. A Stage Three Web site might include a health calculator and interactive guidelines for preventive health. Personalization is active, that is, driven by the patient, rather than the portal. Stage Four sites might remind the patient about recommended immunizations or scheduling a next mammogram. Patient interactivity in Stage Four sites is personalized actively by the portal and its applications. Only patients who need to schedule mammograms, based on their age, sex and perhaps other demographic data, will receive reminders.

Very few organizations have moved on to Stage Five of this continuum. In those organizations with a chronic disease site section, few provide nurse triage online, or the ability to report self-administered test results such as blood sugar levels in diabetics or peak flows in asthmatics. Companies in the private sector have pioneered online applications with this level of consumer interactivity. Many of these companies actively seek out partnerships or co-branding opportunities with health care organizations. However, these applications, while often of excellent quality, are focused rather narrowly on a single disease or clinical problem. Coordinating multiple applications and providing them with a coherent infrastructure is time consuming for already stretched thin IT departments. In this situation, a portal infrastructure provider can effectively serve as an outsourced extension of IT personnel.

IT departments in health care organizations are dealing with a host of competing concerns. Y2K preparation and remediation has just ended, and now along comes

HIPAA requirements for compliance. Portal technology is a powerful enabling tool for capitalizing on your organization's strengths and leveraging the use of your internal resources.

Portals Enable Interactivity

In HealthCIO's survey of providers' use of Web portals, the most common planned applications were:

- ① Access to electronic patient records,
- ① Patient and member education,
- ① Prescription renewal, and
- ① Access to lab/test results.

The perceived benefits included the ability to provide customized content to different users of the Web portal and providing a vehicle for patient retention, acquisition, and loyalty.

Applications embedded in portals provide value to a variety of stakeholders. A few examples:

- Chronic disease applications allow members to become part of a medical community, share concerns, resources, and participate in online moderated chats. Site offerings can extend to more formal disease management interactions with health care providers and protocol/reminder systems.
- Clinical trial applications allow patients and their families to search for, and enroll online, in clinical trials. This is an excellent example of a Web application which serves both the consumer market and the pharmaceutical company market.
- Teleradiology represents a tremendous application for portals, where both referring and specialty physicians alike can access reports and images without needing specialized and expensive picture archiving and communication systems (PACS).
- Physician portal connecting providers, patients, pharmacies, and payers. Patients schedule or request appointments online, access patient-provider messaging in a secure portal environment, and can search online “credentialed” health knowledgebases. For providers, staff can verify patient eligibility online, conduct insurance authorizations online, or send prescriptions to the pharmacy. The portal can represent dramatic improvements in physician workflow and can result in improved patient satisfaction.

How will you keep up with the fast and dynamically changing world of E-Health?

Portal Strategic IT Issues to Consider

1. Knowledge Management

Efficient and timely interaction between employees, customers, and business partners provide an organization with a competitive edge in today's health care marketplace.

Knowledge management (KM) capitalizes on your information assets by making the knowledge of clinicians, managers and other professionals more readily accessible throughout the organization. KM plays a key role in many corporate activities in health care, such as, regulatory compliance, risk management, corporate reporting, marketing and business development. KM is particularly critical in clinical and care management functions.

Health care service organizations are knowledge-based organizations. Physicians must exchange information with the nursing staff and managers. Primary care physicians must share information with consulting specialists. All of these must exchange information with the payers. In a study of the UK National Health Service, up to 16 requirements for new clinical data were needed in half a day's time, and 8 clinical decisions a day might have been changed depending on the availability of timely clinical information.

Collaboration and communication among employees is mission-critical. A prime example is best practice multidisciplinary teams which need to collaborate and share information on best clinical practice. A Web portal could include online "best practices" forums as well as contain links and other ways to connect to online resources.

Integrating varied information assets including unstructured text, Web pages, and multimedia is vitally important to any KM strategy. Document management, intranet, or search engine technologies can rarely process all forms of information and deliver them in an accessible format.

A Web portal brings disparate documents and databases together with one accessible interface.

2. Searching the WWW (World Wide Web)

Consumers and medical professionals alike need to be able to find information on the websites by using search engines without entering complex medical jargon. As health care organizations grow in the available amount of digitized information, search engine technology becomes very important. Newer search engines have arrived that understand a search query's word pattern or semantic phrase using natural language processing (NLP). Most people think of NLP as

the "Ask Jeeves" type search engine that powers consumer sites, but there are NLP search engines being developed that are specific to the health industry. Harvesting medical knowledge from textual information requires a medical "domain" based search engine. For example, in a Web search of treatment for stomach cancer, one finds 359,445 pages to review. However, since many of those pages are not relevant, it is very inefficient to conduct searches based on words and not the semantic knowledge contained in those words. Semantic searching significantly boosts knowledge workers' productivity by uncovering the knowledge assets more accurately, thus involving less time to locate the desired or needed information. Because most institutions or industries have their own jargon, linguistic techniques to categorize and uncover the information assets will be a key enabler of any successful KM program.

A portal can integrate the latest in vertical search engine technology to optimize locating structured, unstructured and multimedia information. Since the Web is adding 1.5 million pages a day to its estimated 1 billion existing pages, no search tool will find everything on the Web and, at best, may cover only 16% of the Web. A portal must be nimble and flexible for combining various "best of breed" applications into a coherent system, allowing integration of new and useful technologies such as advanced search as they become available.

3. Business Intelligence (BI)

The purpose of BI is to make more information available on a self-service basis within an organization. When users have access to current information, they can react faster to potential problems and capitalize on market opportunities. On line analytical processing (OLAP) can be used to allow users to "slice and dice" corporate data. However, OLAP can only build data cubes for analysis based on structured data, while most of the useful information is stored in unstructured form (web pages, PDF files, emails, etc.).

Executive information systems were developed to allow selected individuals to obtain customized views of the data. These software systems were expensive and never gave a *balanced* view across the whole health care enterprise. New Web based reporting tools allow rapid information access across the health care enterprise by a variety of individuals. For instance, hospital managers may need access to both clinical and financial data for managed care reporting. An example of the use of Web based enterprise-wide reporting in health care may be preparation for JCAHO (JOINT COMMISSION ON ACCREDITATION OF HEALTHCARE ORGANIZATIONS) review or development of a Balanced Scorecard. A Balanced Scorecard is used to benchmark an organization's operational, financial, and clinical performance against internal and external benchmarks. In the case of managed care, HEDIS (Health Employer Data and Information Set) reporting for the NCQA (National Committee For Quality

Assurance) relies on accessing data across the organization. From 10 to 100 data systems need to be accessed, depending on the data requested.

A large pharmacy benefit manager, manages the prescription drug benefit programs for health insurers and HMOs serving more than 56 million Americans. A Web-based interface allows everyone (with security clearance) to access reports through a browser over the Internet. Users include internal managers as well as major insurance companies and HMOs that are linked into the company's wide area network. Portal technology can provide seamless access to the large, and ever growing, information assets that are critical to any health care enterprise.

4. Systems Integration

“46% of those surveyed indicated a top business priority as online based programs linking patients, providers, and health plans.”

HealthCIO 2000 ASP Survey

One of the biggest challenges facing health care organizations in any E-health program is integrating the vast amounts of data and systems. A prestigious health insurer which faced insolvency blamed its financial problems on the lack of integration of its information and reporting systems. In the flight path to the Web, many legacy HIS (hospital information systems) vendors are in the process of “Web-enabling” their products. As the Web offers a platform to share data and information across provider networks, the portal becomes a focal point. In the most recent HealthCIO survey, 47% of those providers surveyed indicated EMRs (electronic medical records) as a top IT priority in the next 1 to 2 years. In the same survey, 46% of those surveyed indicated a top business priority as implementing online based programs linking patients, providers, and health plans.

Enterprise-wide data warehouses were expensive and laborious projects that attempted to address the data integration needs of health care organizations. These projects often resulted in failure, because of inability to integrate multiple data types and sources as well as the complexity of extracting the data.

Advances in portal technology have allowed proprietary systems and open source systems to be viewed as one large database by users within the organization. A portal should be able to accommodate multiple HIS including Mumps-based systems. With the movement to provide access to physicians’ clinical results, portals should also provide access to CDR’s (clinical data repositories) and interface with EMRs (electronic medical records).

5. Internet Security

“51% of providers indicated HIPAA Compliance as one of their top three business priorities, whereas only 29% indicated Web based security and authentication as one of their top three IT priorities.”

HealthCIO 2000 ASP Survey

The universality of the Internet simplifies communication, sharing of data, and transactions. The Internet offers tremendous potential for provider-to-provider communication (e.g., physician-to-hospital, physician-to-pharmacy) and consumer-to-health care provider communication. It is now common for consumers to access health-related web sites for health information or enter chat rooms connecting individuals in health-related support groups and health experts. HCFA, DHHS (US Department of Health and Human Services) and other government agencies are especially concerned with the security and integrity of information shared on the Internet.

HIPAA (Health Insurance Portability and Accountability Act) will have important implications for all health care providers, payers, patients, and other stakeholders. The regulation establishes standard code sets and data formats for the transmission of electronic claims and other administrative and health-related transactions between and among 'covered entities', including hospitals, providers, health plans, and claims clearinghouses. The federal law mandates explicit rules for the standardization of patient identifiable information as well as medical claims, EDI, medical records, coding, etc. HIPAA is intended through the imposition of data standards to reduce administrative costs.

The risks to a health care provider of inadequate computer security include harm to a patient, liability of leaked information, loss of reputation and market share, and fostering public mistrust of the technology. Problem areas include the ease in compromising the front line security (i.e., usernames and passwords), which can result in easy interception of private data--not to mention hackers who can easily impersonate the intended user. In addition, data integrity and cyber-terrorism are real threats as are the tremendous propagation of new malicious computer viruses.

According to the recent HealthCIO ASP survey, 51% of providers surveyed HIPAA Compliance as a top three business priority, whereas only 29% indicated Web based security and authentication as a top three IT priority. Portal technology provides the appropriate levels of security and access control necessary for HIPAA compliance.

Portal Technology Requirements

1. Interoperability

A major IT headache in every health care organization has been the many systems and applications requiring attention by the IT staff. In this environment, the Web portal must support multiple data platforms such as Windows NT, 2000 and Unix systems. With a portal, system wide solutions can be deployed through the common platform of the Web, accessed with a single interface, the common Web browser.

Health care has had a long history of multiple information systems that cannot communicate with each other. The use of XML, a new Web standard endorsed by the World Wide Web Consortium as well as HL7 (Health Level Seven) provides a “better” standard by which providers can share data and communicate. HL7 has approved XML as the standard format for electronic patient records using the HL7 Patient Record Architecture. XML is short for *extensible markup language* which provides a way to create standard structured documents on the Web or an intranet. The use of XML has two significant implications for E-health portals:

- XML can capture the semantic nature of documents on the Web resulting in better more accurate Web searches.
- XML’s ability to facilitate data and document exchange will allow portals to read and interpret multiple documents such as a complete patient record.

2. Personalization

An important and unique attribute of an effective EIP is that it supports personalization. An EIP user is typically assigned a profile, which is based on their role within a functional group, such as provider, administrator, patient, or insurer. Once the user gains access to the portal, he or she then has the ability to determine which applications and data sources are of interest from those that are made available by the system administrator.

In the knowledge economy, workers should be able to tailor their information needs to control information overload. A Web portal must possess the ability for “true” personalization that goes beyond personalizing the weather and stock quotes. In addition to users specifying what they want to see, a portal can insure that the appropriate system users also see what they should see. Patients should receive health maintenance reminders. Providers should receive information about potential adverse drug interactions which send a provider alerts from an order entry system.

3. Content management

Content management refers to the process of developing content, updating and publishing new content. Users in an EIP environment also have the ability to publish and subscribe. Publish refers to the ability of the user to forward documents or objects (such as reports, queries, or alerts) to one or more users. Subscribe refers to the ability of the user to subscribe to channels or groups, and to be automatically notified when new information has been published to the channel or group. Therefore, selecting a portal vendor who can supply tools for content management is essential.

There is no lack of good content for Web sites. Sources include free, co-branded and branded content. Content can include news feeds that are automatically selected from thousands of online publications based on keywords or other criteria. Co-branded content providers offer health care organizations the ability to provide health care content to their providers and their patients. Some of these companies expect revenue sharing with the provider organization in exchange for the co-branding. The advantage of co-branded content is that the health care organization is not responsible for updating fresh content since it is automatically supplied by the content company. The disadvantages include questionable content credibility and usefulness, and whether it can be personalized for your users. Partnering with content companies can be a quick fix to provide a Web presence, but one that is neither unique nor always customized for your needs.

Creating your portal: make versus buy

Few health care organizations have the in-house resources to develop their own portal infrastructure. The most efficient and timely solution is to contract with companies who are in the portal business to develop your portal.

Why outsource?

- ✓ Portal vendors focus on technology. They screen technologies for health care applications for you, as a trusted advisor and resource.
- ✓ Portal vendors are in the business of creating these systems. They know the pitfalls and the most efficient designs.
- ✓ Portal vendors are dedicated to getting the job done. They are not distracted by the myriad additional tasks facing your IT department daily.

There are many companies which offer an integrated solution for developing a robust portal framework. When you evaluate them as potential vendors, consider the issues discussed in this white paper as part of your process.

Conclusion

The market opportunity for Internet health is substantial, as health care is our nation's single-largest industry at over 14% of GDP today. In our view, the end game will be won by those companies that can successfully achieve consolidation and integration to a single point of reference for the needs of either the consumer or the professional market (and ultimately link both). Technology needs to be flexible and robust to grow with the organization. A Web portal can be the just the Internet presence to achieve this convergence.