

Healthcare Without Boundaries:

Integration Technology for the New Healthcare Economy

February 2003

Abstract

The healthcare industry suffers from a lack of integration among the information technologies that support it. The five key constituents of the healthcare industry — provider organizations and physicians, pharmaceutical and medical device companies, government and private-sector employers, health insurers, and consumers — need to share information. But communication can be difficult because of disparate IT environments, many of which are based on legacy mainframe systems. Microsoft® .NET technology can be used to integrate these disparate systems, without requiring alterations to existing legacy programs. Microsoft technology, including the Microsoft Windows® 2000 operating system, Microsoft SQL Server™ 2000, Microsoft BizTalk® Server 2002, BizTalk HIPAA Accelerator, Microsoft Visual Studio® .NET and the Windows .NET Framework, provides the ideal platform for developing and deploying XML- and Web services-based healthcare solutions.

For more information, press only:

David Lubinski
Microsoft Corp.
(425) 705-6553
davidlu@microsoft.com

Sherold Barr
SS+K
(541) 343-9623
sbarr@ssk.com

© 2003 Microsoft Corp. All rights reserved.

The information contained in this document represents the current view of Microsoft on the issues discussed as of the date of publication. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information presented after the date of publication.

This white paper is for informational purposes only. MICROSOFT MAKES NO WARRANTIES, EXPRESS OR IMPLIED, IN THIS DOCUMENT.

Microsoft, Windows, BizTalk, Visual Studio, bCentral, MSN, SharePoint and Visio are either registered trademarks or trademarks of Microsoft in the United States and/or other countries.

The names of actual companies and products mentioned herein may be the trademarks of their respective owners.

Microsoft Corp. • One Microsoft Way • Redmond, WA 98052-6399 • USA

Contents

Introduction	1
<i>Unifying Disparate Systems.....</i>	<i>1</i>
<i>Creating Legacy-Friendly Solutions.....</i>	<i>2</i>
<i>Great Timing.....</i>	<i>3</i>
Accessing Information.....	3
<i>Cost-Effective.....</i>	<i>3</i>
<i>Flexible and Adaptive.....</i>	<i>3</i>
<i>Available Across Platforms and to a Range of Devices.....</i>	<i>4</i>
<i>Trustworthy.....</i>	<i>5</i>
Building Solutions with Microsoft Technology	5
<i>Microsoft BizTalk Server.....</i>	<i>6</i>
<i>Microsoft BizTalk HIPAA Accelerator.....</i>	<i>7</i>
<i>Microsoft Visual Studio .NET.....</i>	<i>8</i>
<i>Windows .NET Framework.....</i>	<i>8</i>
Creating Solutions for Provider Organizations and Physicians	8
<i>Challenges.....</i>	<i>9</i>
<i>Solutions and Opportunities.....</i>	<i>10</i>
Creating Solutions for Pharmaceutical and Medical Instrument Companies	11
<i>Challenges.....</i>	<i>11</i>
<i>Solutions and Opportunities.....</i>	<i>12</i>
Creating Solutions for Government and Private-Sector Employers	14
<i>Challenge.....</i>	<i>15</i>
<i>Solutions and Opportunities.....</i>	<i>15</i>
Creating Solutions for Health Insurers	16
<i>Challenges.....</i>	<i>16</i>
<i>Solutions and Opportunities.....</i>	<i>17</i>
Creating Solutions for Consumers	17
<i>Challenges.....</i>	<i>18</i>
<i>Solutions and Opportunities.....</i>	<i>18</i>
Summary	18
For More Information	20

Introduction

Healthcare is a vital part of the economy and important to every citizen. Yet the healthcare economy has not benefited from the technology revolution that is fundamentally changing whole industries. Microsoft Corp. believes the time is right for technology to have a dramatic and fundamental impact in improving healthcare delivery, payment and personal health management. Microsoft believes it is time for healthcare without boundaries.

This revolution will be hugely significant. It is relevant to the key problems facing the industry today:

- Improving patient safety
- Reducing costs
- Decreasing the time to develop and release new drugs and medical devices
- Improving the quality of care and outcomes achieved
- Improving the efficiency of processes for coordinating and paying for care

To fully appreciate the existing problems and the magnitude of the potential benefits, it is helpful to consider the five major elements of the “healthcare ecosystem.” The term ecosystem underlines the concept that each of these components is interdependent and must be able to easily interact with the others, which isn’t the case today.

These are the five components of the healthcare ecosystem:

- Provider organizations and physicians — delivering healthcare
- Pharmaceutical and medical device companies — creating drugs and medical devices
- Government and private-sector employers — paying for most healthcare
- Health insurers — managing financial and administrative transactions
- Consumers — receiving, and helping pay for, health services

The problem with the current healthcare ecosystem is that incentives among the five key stakeholders are not aligned, and the processes and information they use do not interoperate very well. Each of the five components of the healthcare ecosystems stands as an isolated silo of information that can’t be easily shared with the other components. The reality is even more complex: Within each silo of data are additional silos of information that can’t be easily shared. For example, one insurer may have a mainframe system for handling Medicaid claims that can’t easily exchange information with another mainframe system used for other claims. On the provider side, a single hospital may have several computing systems that can’t easily share data — one system for radiology, another for lab tests, another for accounts receivables and so on — with none of them able to interact with the systems running a physician’s office. Across the healthcare landscape are hundreds of noncompatible systems, many of them well-entrenched legacy mainframes, that restrict information into isolated silos of data.

Unifying Disparate Systems

State-of-the-art applications are typically multitiered and can be thought of in three tiers: front-end or user interface (UI), middle-tier or business logic, and back-end or database logic. Integration takes place differently at each tier, depending on the kind of systems that are being integrated. Knowledge worker productivity is most often affected by the front end of the solution. In the desktop and laptop environment, the user interface can serve as a portal to information held on the other tiers. But access to this user interface portal needs to be extended to a reconfigurable UI that works on any device, including personal digital assistants (PDAs), and anywhere that the mobile healthcare worker needs to be. Integration of the middle tier requires enterprise application integration (EAI). The ability to communicate with legacy systems is the key to integrating the data tier.

The solution for unifying applications across all three tiers will be found partly in broad industry adoption of open standards such as Extensible Markup Language (XML), Simple Object Access Protocol (SOAP), the Universal Description, Discovery and Integration (UDDI) specification, Web Service Description Language (WSDL), and the emerging Global XML Web Services Architecture (GXA) to support transparent exchange of

data across platforms and applications. These Internet-based standards are revolutionizing how information is exchanged in other industries. Additional benefits will come from healthcare-specific standards such as the Health Insurance Portability and Accountability Act (HIPAA), Health Level Seven (HL7), and other initiatives that seek to standardize the storage and exchange of data.

The benefits will be enormous. Approximately 70 percent of healthcare transactions today are paper-based, resulting in administrative costs of up to 20 percent of each dollar spent. It was the need to reduce these costs that, at least in part, led to HIPAA. In the U.S. marketplace alone, the yearly cost of processing and administering claims is about \$90 billion. The current backdrop of moving paper around and making telephone calls to track and confirm information compares unfavorably with the seamless efficiency of the banking industry's automated teller machine (ATM) system. Some healthcare industry analysts believe the \$90 billion in administrative costs could be slashed to \$5 billion or less by moving from a paper-based system to a coordinated and integrated digital system.

Saving \$85 billion a year will be just one of the benefits that will emerge when industry standards are used to unify healthcare's disparate systems. Other benefits will greatly enhance the ways in which healthcare is delivered. For example, people could have Web access to all their medical records. If they are visiting another state and need to take their child to the doctor and have access to the medications the child is allergic to, they could simply log on to their personal medical record Web site and access the information from their doctor's office.

Physicians in the field could access all their patient information via a simple handheld device that could page them when results of an anticipated lab report were ready. If the password-protected device were lost, they would simply activate a new device and download the information protected by an automated backup system. And because the device would be password-protected, the information would be unavailable to whoever found the device.

Pharmaceutical companies needing to contact consumers who use a particular medication could digitally notify physicians who have prescribed the medication and the pharmacists who have dispensed it, and these healthcare professionals, accessing their patient database, could then notify the consumers via e-mail, portals, pagers or telephone calls. This individualized communication is far more efficient than the current reliance on media announcements and advertisements.

Health insurers could enjoy a significant reduction in the cost of processing and adjudicating claims with a system that automated acceptance of uncontested items and used business logic to automate resolution of others. Such a system retains human intervention needed for the most complex decisions while providing immense savings by automating the mundane.

This new integrated environment also will help physicians by providing exacting information, such as patient history, current medications lists, and which generic drugs are on the insurer's formulary.

Uniting the five components of the healthcare ecosystem will create a more efficient, user-friendly information environment, something that could be termed *Healthcare Without Boundaries*.

Creating Legacy-Friendly Solutions

The technology to create healthcare without boundaries already exists. Microsoft .NET services are based on support for Extensible Markup Language (XML), SOAP and other open industry standards that allow a legacy-friendly way of uniting disparate systems. The huge benefits of uniting information flow from the five components of the healthcare world can be achieved without the operational disruptions and expense of replacing legacy systems.

And Microsoft BizTalk Server can orchestrate information from disparate systems to create automated business processes. BizTalk HIPAA Accelerator was created specifically for orchestrating electronic transactions for the healthcare industry.

Microsoft .NET technology can also be used to create Web services, which can be used to build a powerful new kind of application that can gather and act on information from across the spectrum of data sources. For example, a Web service could be used to securely gather patient information from insurers, healthcare providers and employers to create a one-stop information portal accessible by the customer from any device with Internet access.

Great Timing

The healthcare ecosystem benefits from great timing — a confluence of advancements in Internet technology and the ever-growing power of hardware across the spectrum ranging from servers to PDAs to wireless devices. Open Internet standards such as XML, SOAP and those supporting Web services open the door for a new generation of value-added products and services that can be easily integrated with existing legacy systems. In addition, HIPAA is moving the industry from the planning phase to actual adoption of standardized ways of exchanging transaction information.

The opportunities go beyond uniting data through the use of standards. They include serving needs and markets that don't yet exist, but should and will. For example, a common pacemaker has the computing power of a Pentium II processor. The device could include applications that provide life-enhancing and life-saving features, such as the ability to relay information to a wireless device so doctors could monitor a patient's condition 24x7.

The Microsoft platform, with its native support of open standards, and with its family of servers including BizTalk Server 2002 for business process orchestration, and SQL Server 2000 for database management, and with its powerful Microsoft Visual Basic® .NET and Windows .NET Framework development environment for creating applications powered by Web services, is ideally suited for creating the next-generation information environment that will enable healthcare without boundaries.

Accessing Information

Integrating the disparate data stores across the healthcare industry will empower providers, pharmaceutical and medical device companies, government and private-sector employers, health insurers, and consumers. But to fully realize these benefits, the new information environment must have these attributes:

- Cost-effective
- Flexible and adaptive
- Available across platforms and to a range of devices
- Trustworthy

Cost-Effective

HIPAA serves as an important catalyst in one simple but incredibly powerful way: By standardizing key transactions that emanate from the point of care, caregivers can now communicate in a common language that is supportable with cost-effective technology they can purchase and manage. The critical tools that have so long eluded the healthcare industry, and for which insurers and providers have not been able, or had the incentive, to provide will be acquired in the same way physicians now purchase cell phone service. An inexpensive monthly subscription could provide a physician with bookkeeping services, an insurer billing interface, patient files, medical libraries and other resources on a secure anytime, anywhere basis.

And Microsoft .NET technology can support creation of new applications that gather data from disparate sources and create value-added solutions. Microsoft Visual Studio .NET and the Windows .NET Framework allow developers to work with unprecedented ease and efficiency to create high-value applications with a faster time to market.

Web services, which can run from computing devices ranging from servers to cell phones, are inherently more cost-effective than traditional applications built around proprietary application programming interfaces (APIs) to run on expensive specialized hardware.

Additional savings are allowed because of the dramatic improvement in computer processor power and the proliferation of "smart" devices. The clinical caregiver can choose from off-the-shelf devices, including cell phones that function like a computer, computers that have the features of a cell phone and Tablet PCs that weigh less than 2.5 pounds. The price/performance of these devices puts incredible computing power and wireless network capability within the reach of most physicians' office budgets. With storage capacity exceeding 2 GB in a handheld wireless computer, the need for constant connectivity to large servers is reduced. With redundant local storage and Internet connectivity, even remote office locations can have access to rich Web-based data stores while maintaining records close to the point of care.

Flexible and Adaptive

The new information framework must be flexible and adaptive because change throughout healthcare will be constant. New systems must be able to adapt quickly and easily while integrating with legacy systems, proprietary formats and protocols.

One of the major challenges facing commercial developers of applications is creating great software and continually providing ongoing enhancements and new features that users want. Web services allow for full exploitation of powerful smart devices while leveraging the Web to serve up applications that are refreshed as often as they need to be to deliver enhancements and new features. Once physicians and consumers are able to re-establish the physician-patient relationship enabled with a digital medical record that both can use to manage care, it is hard to predict what either user will want next. This new framework will deliver rapid innovations in application features and services that can respond to these new requirements.

Converging with the availability of computing platforms and digital charting applications are new business models that look more like cell phone subscriptions than traditional IT investments. These business models allow users to benefit from large capital investments made in Internet connectivity and hosted Web services that can spread these capital costs across large groups of business users, thus lowering the individual burden to a monthly service fee. The telecommunication model serves as a useful framework. Many people now use voice mail that is hosted by their local carrier. In addition many small and medium-sized businesses pay a monthly fee to a service such as the bCentral™ small-business service from MSN® for core business applications, e-mail and Web services. Applications focused on the caregiver are following this model, reducing or eliminating the need for large capital investment.

Web-based services can be much more adaptable to the needs of users. The concept of self-provisioning is now being enabled through powerful customer relationship management (CRM) tools where users decide what and how much they want to purchase. In this model users decide if they want to extend or expand the services they receive. For example, a physician may subscribe to instant notification delivered to a Web phone, wireless PDA or office Tablet PC for those patients for whom critical lab results are pending. What makes this capability incredibly powerful is that individual providers can purchase these systems independent of provider organizations and health insurers. This lets physicians maintain a sense of control and autonomy that allows them to practice medicine how they want.

Available Across Platforms and to a Range of Devices

Web services can be used to gather and act upon data from across the healthcare industry, and to make the information securely available to a variety of devices ranging from servers to desktop computers to PDAs and cell phones.

This technology also can bring the physician's office into the information age. Many attempts have been made over the past 15 years to define and deliver an electronic patient record. Yet today the most common record system at the physician's office is the handwritten paper chart. The data necessary to support clinical decision-making are often the most recent data elements. Applications using standard development tools that provide for digital data capture are now reaching the market. Tools used to capture data are often mouse, keyboard or stylus, but applications now support direct dictation capture as well as data capture from digital blood pressure cuffs, weight scales, and other common measuring and recording instruments.

Physicians who can gather their office information along with other relevant data from hospitals, insurers, pharmaceutical companies and other points are never away from their office — or the laboratory, imaging library or patients. Web services can gather and present data from all relevant data stores. This means a doctor can have access to patient records and drug formularies and get instant notification and delivery of critical lab reports through a password-protected wireless device that can be carried in a pocket and immediately replaced through automated online backups should it be damaged or lost.

The consumer can benefit from this same availability. This technology can provide the cornerstone of consumer empowerment by recording medical encounter information in an easy-to-present and -understand form. These tools allow data to be submitted by caregivers such as pharmacists and physicians as well as consumers. Each data entry is logged by source so professional record information is distinct from consumer-entered information. The key enabler is a record system that uses the Internet and Web services to create and store information. A key attribute of this type of system is that it enables consumers to maintain access to their records. In this way, the system will allow users to grant access to a specific set of data only, or allow access on a one-time or limited-time basis or until access is revoked. Another key attribute is that the service of a consumer-controlled medical record will likely be a monthly subscription service model. Current models have a cost per user of less than \$4 per month. Both insurers and employers are sponsoring these systems because

the value of having a core consumer medical record is incredibly high when the beneficial effect on medical costs is considered.

Trustworthy

Computer systems supporting the collection and distribution of information in the healthcare field must be trustworthy. This term, trustworthy, goes beyond traditional concepts of security (which are essential) to include high availability of services and ease of secure access. Availability means that the servers which store information are deployed in clusters or as redundant arrays of inexpensive devices (RAIDs) for failover reliability, and can recover from a hardware or software problem seamlessly. Availability also means the information can be accessed any time from any place, protected with security enhancements. An American family traveling in Europe, for example, should be able to access their complete medical records via the Internet using a PDA, cell phone or desktop computer.

Microsoft builds security features into all its operating systems, from the very core. Security features include the following:

- Authentication and access control. Authentication is a fundamental aspect of system security. It is used to confirm the identity of any user trying to log on to a domain or access network resources. The Windows 2000 authentication process is part of what enables single sign-on to all network resources. With single sign-on, a user can log on to the domain once, using a single password or smart card, and authenticate to any computer in the domain.
- Kerberos authentication process. Windows 2000 uses the Internet standard Kerberos V5 protocol (RFC 1510) as the primary method for authenticating users. The Kerberos protocol provides a mechanism for mutual authentication between a client and a server before a network connection is opened between them. This approach is ideal for a network that includes open communications, such as those conducted over the Internet. With the Kerberos protocol, both clients and servers are registered with a Kerberos authentication server. Clients using Kerberos authentication send encrypted information derived from the user's password to the Kerberos server, which uses it to verify the user's identity. Likewise, the server sends information on the client to the Kerberos software, which can then verify the identity of the server. This mutual authentication process protects both the client and the server from being impersonated by a malicious user.
- Public key infrastructure. Public key cryptography is used to enhance security when data crosses open networks, such as the Internet. It lets users encrypt data, sign it and verify the identity of clients and servers by using certificates. The challenge with this technology is tracking the certificates. A public key infrastructure (PKI) provides the capability to use, manage and find public key certificates. PKI is an industry-standard system of digital certificates, certification authorities (CAs) and other registration authorities that verify and authenticate the validity of each party involved in an electronic transaction.
- CryptoAPI. Microsoft CryptoAPI 2.0 is a Windows 2000 API that provides cryptographic services for Windows and Windows-based applications. It provides a set of functions that allow applications to encrypt or digitally sign data flexibly while providing protection for private keys. Independent modules known as cryptographic service providers (CSPs) perform the cryptographic functions. Developers can use the CryptoAPI to integrate certificate services with existing databases and third-party directory services. Common uses for CryptoAPI include support for customized processes to protect electronic documents.

The combination of high availability; anywhere, anytime access; and security enhancements built into all Microsoft systems; will enable a new generation of trustworthy computing to support the healthcare industry.

Building Solutions with Microsoft Technology

Using Microsoft .NET technology, businesses will be able to turn key processes into Web services. From the schedule for a doctor's office, to the cataloging of medical images, to tracking participants in new drug trials, Web services created and hosted by one company or individual can be used by millions of others in varied combinations to produce highly personal, intelligent computing experiences.

Web services allow applications to communicate and share data over the Internet, regardless of operating system or programming language. Building on this standards-based platform, developers will be able to take advantage of services exposed by third parties and use them as building blocks or components of a much richer consumer portal, thus reducing the costs and time required for implementation and allowing them to focus on their primary business: providing an integrated experience to their customers.

The Microsoft .NET Enterprise Servers, Windows 2000 Server family and the upcoming Windows Server 2003 family, with their built-in security, support for XML and ability to quickly scale out to meet increased demands, provide the best solutions to host and deploy Web services and .NET technology.

The .NET Enterprise Server family accelerates the integration of systems, applications and partners using Web services through the servers' deep-level support of XML. This deep support of XML allows enterprises to build on legacy systems rather than replace them. For example, Microsoft Host Integration Server provides simple access to mainframes, and Microsoft BizTalk Server offers automatic conversions of existing data formats into XML.

The .NET Enterprise Server family includes the following:

- Microsoft Application Center to deploy and manage highly available and scalable Web applications.
- Microsoft BizTalk Server to build XML-based business processes across applications and organizations. When coupled with BizTalk Server, Microsoft Accelerator for HIPAA gives healthcare organizations the ability to quickly implement and continually maintain the new transaction standards set by HIPAA.
- Microsoft Commerce Server for quickly building scalable e-commerce solutions.
- Microsoft Content Management Server to manage content for dynamic e-business Web sites across an organization.
- Microsoft Exchange Server to enable messaging and collaboration any time, any place.
- Microsoft Host Integration Server for bridging to data and applications on mainframe legacy systems.
- Microsoft Internet Security and Acceleration Server for secure, fast Internet connectivity.
- Microsoft Mobile Information Server to enable application support by mobile devices such as cell phones.
- Microsoft Operations Manager to provide enterprise-class solutions for operations management of Windows 2000, the Microsoft Active Directory® and other Microsoft .NET Enterprise Server applications.
- Microsoft Project Server to securely develop and successfully deploy best practices for project management across an organization.
- Microsoft SharePoint™ Portal Server to share information within an organization and with outside key suppliers, partners, and clients.
- Microsoft SQL Server to store, retrieve and analyze structured XML data.
- Microsoft Systems Management Server to provide cost-effective, scalable change and configuration management for Microsoft Windows-based desktop and server systems.

To help readers understand the power of Microsoft technology, this document will take a closer look at some of the technology that will be helpful in creating healthcare solutions:

- Microsoft BizTalk Server
- Microsoft BizTalk Server HIPAA Accelerator
- Microsoft Visual Studio .NET
- Windows .NET Framework

Microsoft BizTalk Server

BizTalk Server 2002 serves as a business process orchestration hub. Data from disparate systems, including legacy mainframes, can be imported to BizTalk Server, translated, acted upon, and exported as XML to other processes and Web services.

BizTalk Server has a comprehensive library of adapters and proven scalability to help users dramatically reduce the cost, resources and time required to implement complex integration projects. Enterprise application integration will be at the heart of many of the new value-added services that will emerge from the unity of data in the healthcare industry. BizTalk Server 2002 makes EAI easy by doing the following:

- Lowering the cost of integration projects. BizTalk Server 2002 integrates with Microsoft Application Center to decrease development costs and timelines by streamlining the deployment of integration projects and making it easier to scale them to meet capacity demands.
- Integrating with virtually any product or technology. A comprehensive library of more than 300 adapters helps ensure that users can easily integrate their products and technologies.
- Push-button application deployment and replication. Tight integration with Microsoft Application Center makes it as simple as pushing a button to deploy BizTalk Server applications throughout the development life cycle and scale them across production server farms.
- Industry-leading support for standards. Standards such as XML, SOAP, Secure/Multipurpose Internet Mail Extensions (S/MIME) and PKI enables users to integrate their systems with their business partners regardless of their choice of application, platform, or transport. This reduces the complications of users having to connect with as many disparate technologies as they have business partners.

Microsoft BizTalk HIPAA Accelerator

BizTalk HIPAA Accelerator gives healthcare organizations the ability to quickly implement and continually maintain the new transaction standards set by HIPAA. A complete operating environment combined with a rapidly deployable and continuously updatable product set, the BizTalk HIPAA Accelerator provides healthcare organizations with the freedom they need to concentrate on their core business.

The industry expertise of Washington Publishing Company (WPC), the implementation expertise of global systems integrators, and the product expertise of Microsoft have produced a product that can reduce the time and risk associated with HIPAA compliance.

Like all Microsoft solutions, BizTalk HIPAA Accelerator includes integrated and tested software, prescriptive documentation, implementation service from experienced Microsoft partners, and ongoing premier support.

BizTalk HIPAA Accelerator offers the following:

- Speed to implementation. HIPAA affects the entire healthcare industry, speed to compliance is critical. BizTalk HIPAA Accelerator significantly reduces the time needed for immediate and ongoing compliance.
- Reduced risks. Although major benefits are likely, achieving compliance with HIPAA transaction requirements also poses risks to healthcare organizations. Issues include the importance of transaction accuracy, achieving ongoing maintenance for future rule changes and the possibility of governmental auditing. BizTalk HIPAA Accelerator provides a solution that delivers compliance while minimizing these risks.
- Return on investment. BizTalk HIPAA Accelerator helps ensure that organizations will reap the intended benefits of HIPAA-transaction-compliance investment by integrating and automating systems to reduce inefficiencies and build new functionality that can lead to additional cost savings.
- Enterprise-class management. Simple wizard-driven management tools reduce the time needed to assemble the BizTalk HIPAA Accelerator and simplify the ongoing maintenance process.
- A document-driven approach. Transactions are managed as XML documents. This lets organizations treat transactions as documents that can be split and searched, for example, and makes it easy to integrate information from data providers and consumers. This also enables healthcare companies to extract and concentrate on the information that meets their specific business needs.
- Powerful business automation. The Orchestration Designer in BizTalk HIPAA Accelerator uses tools in Microsoft Visio[®] drawing and diagramming software to diagram and implement automated business processes for easy customization.
- Templates. Business process templates and prescriptive architectures provide a great starting place for development and help reduce deployment time.
- Accurate schemas. Schemas are provided by WPC, the exclusive publisher of the HIPAA Implementation Guides. Other solutions interpret the implementation guide, leaving open the possibility of error.

- Accurate tracking. Flexible document tracking provides accurate records of both total transactions and specific fields, enabling healthcare companies to respond quickly and easily to government audits, in addition to providing better business management.
- Sustainability. HIPAA transaction requirements will change and evolve. Through its relationship with WPC, Microsoft will make new schemas available as the new implementation guides are published, giving healthcare organizations extra time to meet new implementation deadlines.
- Support for industry standards. BizTalk HIPAA Accelerator supports multiple document types and formats, providing seamless access to data no matter where it is stored or how it is used. The accelerator enables healthcare companies to integrate current operating environments and products while preparing for the future by implementing XML, SOAP and other important industry standards.
- Great adaptability. No matter how HIPAA evolves or what requirements are put in place, XML will serve as the foundation for the way healthcare organizations exchange, manage and distribute information. BizTalk HIPAA Accelerator was designed with XML at its core, providing the agility needed to adapt to new regulations and realize the benefits of greater efficiency in the future.
- Efficiency. With BizTalk HIPAA Accelerator, organizations can reduce staffing needs and lower costs by implementing automated processes that offer real-time electronic patient referrals and eligibility verification, the ability to balance the books and create cost-benefit analyses by following claims from creation to fulfillment, and much more.

Microsoft Visual Studio .NET

Visual Studio .NET is the comprehensive development tool for rapidly building and integrating Web services and applications. Visual Studio .NET offers a highly productive environment in which to develop a broad range of applications that run on Microsoft .NET technology. Using the secure and high-performance Windows .NET Framework runtime environment, Visual Studio .NET provides powerful tools for designing, building, testing and deploying Web services and applications as well as sharing best practices and guidelines in a team environment.

Visual Studio .NET is the only development environment built from the ground up for Web services. By allowing applications to share data over the Internet, Web services enable developers to assemble applications from new and existing code, regardless of platform, programming language or object model. This spares software developers from the seemingly countless hours otherwise required for making different programs communicate — a task made more difficult when they are written in different languages and use different standards and protocols.

Windows .NET Framework

The Windows .NET Framework is the programming model for building, deploying and running Web services and applications. It provides a highly productive, standards-based environment for integrating existing investments with next-generation applications and services, and the agility to solve the challenges of deployment and operation of Internet-scale applications. The Windows .NET Framework consists of two main parts: the Common Language Runtime and a unified set of class libraries including ASP.NET for Web applications and Web services, Windows Forms for smart client applications, and ADO.NET for loosely coupled data access.

The Windows .NET Framework allows disparate programs written in any number of programming languages to seamlessly interoperate, enabling a renaissance for software development.

While there has been a strong push within the industry to find a single-language solution, the business and technology challenges have proved daunting. Microsoft .NET technology provides a common foundation upon which tools can be built no matter what languages they are created in.

In addition to uniting programming languages, and easing the complex details developers must manage, the Windows .NET Framework automatically turns every application into a reusable, interoperable Web service. Web-based services can be used to build tomorrow's software applications, much as components are used to build them today.

Creating Solutions for Provider Organizations and Physicians

The core of the current healthcare delivery system in the United States are the approximately 5,000 organizations that own and manage hospitals, clinics and delivery services. In addition, there are approximately 55,000 retail pharmacies, standalone clinics and long-term-care facilities. These organizations have been the foundation of what is now considered the healthcare industry. They have been historically public-sector entities in the case of city- and county-owned facilities or not-for-profit organizations. Although there is a small element of for-profit organizations that secure capital in the commercial capital markets, the vast majority of the healthcare system funds investment through earnings and long-term bonds. The business model for provider organizations is based on the payment for services delivered when a person enters the system. Revenue is generated when inpatient beds are filled and outpatient surgery centers and clinics are booked with appointments.

In the United States there are about 600,000 physicians, many of whom practice medicine in small groups or in solo practices. The business model for physicians is still based on payment for services delivered, but this can and does include the delivery of services that are preventative and provide early diagnosis to avoid more serious intervention for health conditions.

Challenges

Provider organizations and physicians face a set of challenges that include these:

- Limited IT infrastructure
- Multiple billing systems
- Cost structures
- Lack of complete and easily accessible patient information

Limited IT Infrastructure

The nonprofit origin of many provider organizations has historically resulted in little emphasis on their IT infrastructure. Investments in information systems technology have rarely exceeded 3 percent of total annual spending. Systems that have been purchased tend to be treatment-oriented. And because systems are often purchased for specific purposes, provider organizations can have multiple noncompatible information systems within the same facility. There has been relatively little investment in IT systems that improve the prevention, diagnosis and early intervention of medical conditions with the intent to avoid or minimize inpatient care and outpatient surgery.

The story for physicians is even more problematic. Physicians' offices are still very much paper-based, and many physicians complain that processing paperwork limits the time they can spend with patients.

Multiple Billing Systems

Although information systems to support important areas of healthcare are often lacking, there are frequently too many systems required for interfacing with insurers. Provider organizations and physicians must support multiple noncompatible systems for insurance reimbursement — a waste of computational resources, administrative time, and systems training.

Cost Structures

As the business model of capitation, the uniform payment of fees, emerged over the past two decades, provider organizations made several attempts to better model what fixed fees for service should be. Few of these attempts have been successful because of the lack of information needed to determine true costs for health delivery and to anticipate consumption rates.

Better patient and clinical cost information also could be used to justify reimbursement for new services that stress prevention. For example, medical literature shows that elevated cholesterol levels can be managed preventatively to avoid cardiac events that will require expensive surgery and interventions. Yet few provider organizations offer preventative programs for those with high cholesterol simply because there isn't a reimbursement system in place for them to get paid for such programs. On the other hand, reimbursement for cardiac surgery programs is one of the most profitable programs in the healthcare delivery system.

This leaves provider organizations and physicians knowing what should be done to help people avoid serious cardiac conditions, yet not having a way to be reimbursed for providing preventative programs. The result can

be a long-term decrease in patient quality of life and an increase in medical expenditures due to more expensive interventions.

Lack of Complete and Easily Accessible Patient Information

Physicians need complete and easily accessible patient information because they directly affect the delivery of 80 percent of healthcare services through making diagnoses, ordering tests and treating patients. The key to increasing the quality of healthcare while reducing the cost is to provide physicians with the information they need at the time of a patient's visit. A common complaint of physicians is that they don't have patient-specific information when providing healthcare services. Oftentimes basic information on medications a patient is taking, laboratory results, allergies and family history is not available during the first visit.

Solutions and Opportunities

Microsoft .NET technology provides solutions and opportunities for the challenges faced by provider organizations and physicians.

Working With a Limited IT Infrastructure

The need for a big iron IT infrastructure, and the heavy costs of operating it, fades with the new era of Web services and value-added applications that can be created swiftly and inexpensively using the powerful integrated development environment of Visual Studio .NET and the Windows .NET Framework. Because these solutions interact smoothly with existing legacy systems, new services can be added at will, without having to alter existing applications.

Eliminating the Need for Multiple Billing Systems

HIPAA brings much-needed standardization to healthcare billing, in which currently more than 400 transmission formats for healthcare claims exist, each with different content. Going forward, all health insurers must accept one content set in one format.

Additional benefits can be gained by providing a user-friendly Windows-based environment for the billing process.

Cost Structures: Mississippi Valley Surgery Center Case Study

Microsoft technology can be used to gather and analyze data to provide a better picture of cost structures. For example, the physician-owned outpatient clinic Mississippi Valley Surgery Center needed a powerful yet flexible database that supported exacting cost analysis to help it reduce its fees while retaining profitability. Using Microsoft Windows 2000 Advanced Server, SQL Server 2000 and the Windows-based AdvantX surgical center management tool from HealthIS, Mississippi Valley Surgery Center created a win-win solution for patients, insurers and itself.

"To keep our costs under control, we do what I call 'micro case-costing' on every case that goes through our surgery center," said David Dooley, information manager for Mississippi Valley Surgery Center. "This case-costing is vital to successfully contracting with health insurance companies and health maintenance organizations that increasingly want to establish a set fee for a procedure.

"Our center performs a lot of orthopedic implant surgeries, and, depending on the case and the surgeon, different implants will be used," Dooley said. "The implant choice can create a pricing difference of perhaps \$5,000. Typically a hospital will set the price according to the most expensive case option, and then some. We use case-costing to provide a more exacting, and competitive, fee."

But the center's database didn't provide the openness and flexibility required for sophisticated case-costing. In addition, patient information had to be re-entered each time a new billing unit was used.

"Our old system wouldn't support the transfer of patient and insurance data from one billing unit to another," Dooley said. "This meant that patients' information that had been entered during their first visit with a surgeon would have to be typed in again if they saw an anesthesiologist, typed in again if they had a lab test, and entered again if they visited a physical therapist. The patient information had to be typed into every individual billing system."

Dooley found that the HealthIS AdvantX system provided an exceptionally well-integrated suite of modules to simplify management of a surgical center. And he found that the Windows 2000 platform with SQL Server 2000 provided the powerful and robust platform he needed. Patient data is now entered just once and is accessible

across the system. And with SQL Server 2000 as the database, the AdvantX system can be used to perform extensive case-costing analysis. Dooley has seen other gains.

“The stability of Windows 2000 has been unbelievable,” Dooley said. “And SQL Server has given us speed increases of 50 to 60 percent over our previous database.”

Enhancing Completeness and Accessibility of Patient Information

Microsoft .NET technology enables practice management systems that will give physicians the information they need, when they need it. Using a combination of Internet standards (e.g., HTTP, XML, SOAP and UDDI) and industry standards (e.g., ASC X12N, HIPAA and HL7), applications could allow a physician to track patients' lab and clinical data, submit claims to health insurers and check their status, input data and review exam results, and offer consumers services such as appointment scheduling and remote consultations.

The technology could extend into the patient's home as well, where a monitoring system built on the Microsoft platform could integrate devices such as a glucose meter or peak flow meter and upload data to the practice server, which would notify a doctor if warranted. Physicians and nurses could take proactive intervention for patients who need it while other consumers could avoid bothersome office checkups.

Creating Solutions for Pharmaceutical and Medical Instrument Companies

The companies that make pharmaceutical products and medical instruments have long been a source of medical innovation. Anything that can be done through information technology to make these participants more efficient will produce benefits for all other components of the medical ecosystem. Any development that helps patient care can benefit consumers, physicians, employers and insurers.

Challenges

Pharmaceutical and medical instrument companies are highly dependent on information technology and face a daunting set of hurdles in bringing a new product to market. The discovery-to-market ratio is estimated to be 5,000 to 1, which means that for every 5,000 drug candidates, only one will be brought to market. And it will cost, on average, \$700 million to \$800 million to do so.

These companies face a range of challenges:

- Analyzing data for research and development
- Recruiting for clinical trials
- Administering clinical trials
- Tracking who uses each product for post-market notifications
- Keeping physicians up to date on product usage
- Integrating medical devices into clinical workflow

Analyzing Data for R&D

Pharmaceutical products begin with research and development (R&D). Any systems that can assist in processing data during the R&D process have a significant impact on the development of life-enhancing and life-saving products, and on reducing the time it takes to bring new products to market.

Recruiting for Clinical Trials

A significant cost in a clinical trial is the process of recruiting trial candidates — finding patients who meet a strict set of criteria and who are willing to take part in a study. Recruiting involves working with physicians and placing advertisements in newspapers and other media seeking qualified volunteers. It is expensive, time-consuming work that requires a screening process to ensure that volunteers actually meet criteria for the study.

Administering Clinical Trials

At any time, there are approximately 40,000 clinical data trials in progress. The clinical trial process generally lasts from six to 12 years. There is a huge demand on the IT and personnel infrastructure during trial administration, which must be precise, to protect the integrity of the trials, and efficient, to avoid prolonging the trials.

Daunting as the process is, the rewards can be substantial. A blockbuster drug can generate sales of \$6 million to more than \$12 million a day. Each day a pharmaceutical company eliminates from the trial process through greater efficiencies can result in millions of dollars in sales.

But clinical trials are administered with a paper-based system, which results in a large amount of redundancy in data collection and significant delays in collecting and checking the information.

Tracking User Information

There have been instances of the Food and Drug Administration (FDA) approving the sale of a pharmaceutical drug or medical device, only to discover years later that there was a hazard for some users. Pharmaceutical companies face a difficult challenge in contacting current and past users of their products because most prescription records are paper documents sitting in file cabinets in doctors' offices and pharmacies. Current strategies for notifying users include communicating with doctors in the field, making announcements through the media, and paying for advertisements.

Keeping Providers Updated

A tight relationship is required between physicians and the makers of pharmaceuticals and instruments. As recommended usage of pharmaceuticals change, or as combinational effects with other agents — either good or bad — are discovered, physicians must be updated. Currently this is done via sales representatives and online databases, but unless a physician specifically looks for updates online, or asks a representative, new information might go unnoticed.

Integrating Medical Devices

Medical device manufacturers must choose from a spectrum of integration strategies ranging from simply providing a software development kit (SDK) for point-to-point connectivity, to taking the more forward-thinking approach of implementing Web services.

Without operating system and interfacing standards, medical device manufacturers are spending resources creating machines that do not integrate easily. Medical device manufacturers are spending time developing systems and launching products that require additional integration work to connect with synergistic devices. Without standards, there is little exchange of ideas and product concepts, little interoperability, higher cost of development, longer time to market, and more maintenance expenditure than is necessary.

The challenge for the healthcare industry is to integrate the clinical data generated by medical devices into the electronic medical record (EMR). This challenge is solvable with open interface technology.

Solutions and Opportunities

Microsoft .NET technology provides solutions and opportunities for the challenges faced by pharmaceutical and medical instrument makers.

Analyzing Data for R&D: A Rosetta Genomics Case Study

Rosetta Genomics, used Microsoft SQL Server 2000 Enterprise Edition to create the tools required to analyze the massive amounts of data being produced by the human-genome-sequencing project. These tools have produced amazing performance statistics. The cost of the SQL Server 2000 solution is just one-fifth the cost of comparable supercomputing solutions and provides an easy and affordable means to scale up as the genomic database grows.

Genomics is a vital area of research, but powerful search tools are required to assemble raw data into the keys to creating new therapeutic agents. "After all the initial excitement over the huge achievement in mapping the human genome, it became evident that all this information would be meaningless and useless if tools could not be found to process, analyze and understand it," says Dr. Zahon Bentwich, chairman and chief executive officer of Rosetta Genomics.

The genomic database amounts to 20 billion records totaling 2.7 terabytes. Rosetta Genomics recognized the need to make genomic-sequence data analysis and data mining tools available to the greatest number of partners. The company set out to provide a solution as well as a service. It would offer analysis services running on Rosetta's own system, but eventually would offer a solution that would allow customers to affordably build their own systems as well.

"In effect, the challenge was to develop a solution that would enable the analysis of complex genomic information at one-fifth to one-tenth the cost required in a supercomputer environment," Bentwich said. "The

Microsoft platform has allowed us to do this. We estimate that a full-blown mainframe- or supercomputer-based solution, capable of handling extremely heavy genomic data-mining tasks, typically cost up to \$5 million to \$10 million. A comparable SQL Server-based solution offered by Rosetta would cost \$1-2 million.”

The genomic revolution, in which Rosetta Genomics is a key player, is creating a need for massive scalability. As further scientific advancements are made, the potential for growth of data is perhaps unprecedented. Recognizing that their solution must be scalable while containing costs as much as possible, Rosetta is confident that SQL Server 2000 will allow it to scale up at a fraction of the cost of supercomputing and mainframe options.

“For the tools we are developing, the issue of scalability is very important,” Bentwich said. “For those using supercomputers or mainframes, scaling up a system is not only prohibitively expensive, it is impractical: If you want to scale up a mainframe-based system, you simply can’t line up 100 mainframes next to each other. Working with databases, this is quite possible. We therefore knew that we had to offer our customers the SQL Server 2000 platform. In addition to enabling astounding performance on a single machine featuring 8 processors and 8 GB of memory, such as we have here at Rosetta Genomics, the SQL Server 2000 platform also facilitates easy chaining of additional servers to multiply the processing power at a fraction of the cost.”

Automating Recruiting for Clinical Trials

In general, when physicians receive a notice of a clinical trial, they must search through their file cabinets to find patients who would qualify as participants. Microsoft .NET technologies would enable creation of practice-management applications that would let physicians perform an instantaneous search of all their patient records for study candidates. The search could be conducted from a desktop computer or PDA. The same device would allow automated contact of candidate patients by either e-mail or telephone.

Indeed, patients could choose to mark their files for study notifications or could, from their own personal medical information portals, search for studies in which they could participate. Information technology will greatly reduce the time and expense now required to find qualified study participants.

Simplifying Administration of Clinical Trials: A DataLabs Case Study

The efficiency and effectiveness of administration of clinical trials can be significantly enhanced and simplified with .NET technology. At the pharmaceutical sponsor end, new applications can be created to automate various aspects of the clinical trial process. At the investigative site, physicians can use a PDA, Tablet PC or other portable device that allows them to enter relevant data at the time of the examination to ensure timely capture.

DataLabs deploys Web services through the Windows .NET Framework and Visual Studio .NET to enable leading pharmaceutical companies to streamline the clinical trial-management process. Web services — designed, developed and managed by DataLabs developers — form the core of the company’s flagship product, DataLabs CTMS (Clinical Trial Management System). The first fully integrated trial-management product in the biopharmaceutical industry, DataLabs CTMS is designed to lower drug-development costs, reduce time to market, increase efficiencies and enhance the quality of research. The DataLabs system allows pharmaceutical companies to consolidate, analyze, integrate and process data from clinical trials being conducted worldwide.

The scope and complexity of large, multicountry clinical trials, along with the fact that trial data is generated in a variety of formats, presents the most fitting challenge to the versatility of Web services, according to Scott Thompson, vice president of the Enterprise Development at DataLabs. “In the past, studies would proceed for months or years, and then the pharmaceutical sponsors would normalize the data and put it into its cross-trial database. But with the core staging and management capabilities of DataLabs CTMS, the pharmaceutical sponsor can normalize and review cross-trial data while the studies are in progress, so analysts can apply business rules consistently and merge studies easily for extended analysis. This also allows researchers to identify potential safety issues earlier in a study. If the results are unfavorable, the trial can be ended early so patients can be switched to another medication. Additionally, it allows researchers to spot positive results indicating patient benefit while the study is still underway. If the results are highly favorable, a new medication can begin benefiting patients sooner. And the DataLabs system makes the results of studies available more quickly upon completion of the trials.”

As Thompson explained, Web services have offered powerful capabilities for the heavily distributed approach that is characteristic of a global trial-management environment. “Such environments typically have multiple firewalls that must be ‘pierced,’ and Web services provide a highly robust and secure solution for this that does

not require direct access to code or DLLs on the other side of the firewall. For many of the same reasons, Web services are ideal for exposing critical interface activities, such as patient enrollment and delivery of trial data, without the overhead of a data connection or DCOM call.”

“Until DataLabs CTMS, the three components of clinical trials — project, data and document management — were kept in separate software ‘islands’ that couldn’t communicate with each other,” said James Langford, president and CEO of DataLabs. “DataLabs CTMS provides clients with the big picture — a 360-degree view of their project’s status. Microsoft’s technologies and support have been critical elements to developing DataLabs CTMS. We are thrilled to be working with it in this initiative.”

Simplifying the Tracking of User Information

As clinicians increasingly store patient records electronically and use secured electronic transmissions to pharmacists to prescribe medications, it will become much easier for physicians to assemble a database of medications used by patients in their practice. Physicians and pharmacists can work together to deliver higher-quality care by improving patient safety and by enhancing patient therapeutic compliance.

Patient safety can be enhanced, for example, in the event of a major drug recall. The pharmaceutical company recalling the drug can deliver the recall message digitally to pharmacies and physicians, enabling pharmacists and physicians to work together to ensure all patients who have been issued a prescription for the drug are notified about the recall and provided with appropriate instructions.

Helping Providers Remain Updated

Physicians could be updated about medications automatically if they were using a PDA or other computing device when writing a prescription. A combination of Web services could gather information on the drug being prescribed, such as precautions, interactions with other drugs and side effects. Web services also could bring in information from patients’ records about allergies and other drugs they are taking. Another Web service could integrate information on patients’ employers’ formulary. All this would provide greater information at the time of prescribing.

Integrating Medical Devices

Web services allow any protocol to be wrapped in SOAP messages and made Web-serviceable, even if it’s not on the device. A Web Component — accessible as a Web service that essentially translates from SOAP to vendor X’s proprietary protocol — can be written. This allows legacy devices to be kept, but breathes new life into them.

Medical device connectivity is also enhanced by Universal Plug and Play (UPnP), defined as an architectural framework for creating self-configuring, self-describing devices and services. Microsoft’s vision is to enable seamless connectivity and communication among all versions of Windows and intelligent appliances and devices in the home, hospital and everywhere in between.

Microsoft’s vision for integrating medical devices through Web services is that patients’ providers, the patients themselves and/or close family members can quickly assess the patients’ healthcare status from any place, at any time and on a range of devices. The data delivered by a device to the Internet can be diagnostic in nature or directly contribute to patient care. When certain conditions are met, a predetermined set of actions can be triggered via .NET notification service to reach the correct parties on the appropriate information device (e.g., laptop, Tablet PC, Pocket PC or Smartphone).

Creating Solutions for Government and Private-Sector Employers

The cost of healthcare in the United States has been climbing for decades. In 1960 total healthcare expenditures were \$26 billion, or 5.1 percent of the gross domestic product (GDP). By 2000 total healthcare costs had climbed to \$1.5 trillion and represented 15.9 percent of GDP. The real financial burden for this increase in spending has been on employers with health plans in the employee benefits package and on employees asked to contribute more toward the funding.

The real tax burden for healthcare services paid by the public sector is increasing dramatically and often is cited as a top statewide budgetary concern. For private-sector employers, the cost of health plan benefits is one of the largest components of employee benefits. Health benefits have become a staple of employee benefits packages, and employers are increasingly looking for ways to maintain high levels of benefits and manage the cost of these benefits while maintaining high employee satisfaction. Previous efforts to work with health insurers and providers, while yielding some positive results, have not effectively improved quality and cost management.

In addition to providing technological solutions, Microsoft is a member of the Leapfrog Group for Patient Safety, which was founded by the Business Roundtable, an association of CEOs committed to improving public policy, with support from the National Health Care Purchasing Institute. The Leapfrog Group works with medical experts throughout the United States to identify problems and propose solutions that it believes will prevent hospital systems from breaking down and harming patients. Representing more than 31 million healthcare consumers in all 50 states, Leapfrog provides important information and solutions for consumers and health care providers.

Challenge

The government and private-sector employers face the problem of dealing with the continual increase in the cost of providing medical care. Some of the challenges they face are these:

- Disparate systems make it difficult to analyze expenditures.
- Medication costs are ever increasing.

Disparate Systems Make It Difficult to Analyze Expenditures

Governments especially face a problem of multiple legacy information systems that don't easily share information. A study of Massachusetts Health and Human Services found that 15 agencies each had their own mainframes and proprietary databases, with no way to talk to each other. This problem can be found throughout local, state and federal governments. Until the separate silos of data can be united, it will be difficult to develop the kind of consolidated data required to make better decisions on healthcare spending.

Medication Costs Are Ever Increasing

Prescription drugs represent a significant part of the healthcare spending by governments and private-sector employers. Such costs can be reduced, but only when physicians have access to complete information at the point of prescribing, to allow them to make more-informed decisions.

Solutions and Opportunities

Open standards and Microsoft .NET technology provide a range of solutions and opportunities for governments and private-sector employers.

Integrating Disparate Systems to Analyze Expenditures: A MassCARES Case Study

BizTalk Server provides a great point of orchestration in uniting data from disparate systems. BizTalk Server understands legacy data in a variety of formats and can translate data to XML format for export to other processes or Web services. In the case of Massachusetts Health and Human Services, data from the 15 agencies was brought into a centralized secure repository residing on Microsoft SQL Server 2000 databases to create what was called the MassCARES system. An analytical layer, powered by online analytical processing (OLAP), enables analysis of anonymous client data by authorized staff, and a public layer gives access to preformatted reports on client population, services, performance and such. Microsoft technology allowed this unification of data to occur without altering legacy systems.

"We couldn't rip and replace," said Alan Day, president of Systems Engineering Inc. (SEI), a Massachusetts development house and Microsoft Gold Certified eCommerce Solution Provider with expertise in state government. Day said, "We couldn't modify every legacy system to accommodate the data of every other legacy system. We couldn't demand that everyone change their applications. The only way to do it was to link to the legacy databases by providing a Web additive. We had to find a technology that everybody had on their desktop, that everybody was familiar with, that allowed us to add value and give universal fully understood access to fairly complicated capabilities. For this, Microsoft tool sets were really the only choice."

The MassCARES unification of 15 disparate legacy systems provides a model of what can be done throughout the healthcare field.

Gaining Better Control of the Cost of Medications: A Temple University Health System Case Study

In many cases physicians are not aware of the preferred drugs covered by their patients' insurance benefits. In addition, there is a lack of integrated information at the point of care that integrates laboratory results with

known allergies, other medications and recent bulletins from drug companies and regulatory authorities that could affect the medication prescribed or additional patient education.

The Temple University Health System, which comprises seven academic and community hospitals, primary care and specialty clinics, nursing homes, and a medical school, provides a good example of how just a bit of technology applied at the right place can significantly reduce drug costs and malpractice rates.

Temple, which takes care of 600,000 active patients in university-based and community clinics, is financially responsible for the medical needs of 75,000 of those patients, through capitation agreements with three health plans. Drug costs had risen 20 percent a year since 1999, presenting a worrisome spot in the agreements. Temple's efforts to educate physicians about generic drugs did not affect prescribing patterns.

So Temple introduced a 6-ounce powerhouse: a wireless Compaq iPAQ loaded with TouchWorks, a suite of point-of-care applications from Allscripts Healthcare Solutions, based outside Chicago. Temple implemented the solution for 90 specialists in nine specialty areas practicing at 28 offices. Deployment took less than three months. Forty primary care physicians — half of Temple's community-based primary care staff — launched the Allscripts system, replacing prescription pads, formulary guides and reference books with functions available in the wireless Compaq iPAQ Pocket PC.

Temple's Allscripts system is loaded with two TouchWorks modules: TouchWorks Rx+ for prescribing and medication management, and Pocket Library, a clinical reference guide that includes two tools: Drug Guide, with detailed drug information, and Pocket Anatomy, with medical illustrations to aid patient education.

In the first six months using the wireless Pocket PCs, Temple physicians increased their outpatient use of generic drugs from 40 percent to 52 percent of prescriptions. For the 75,000 patients for whom Temple assumes risk in capitated plans, each new generic prescription saves an average of about \$60 over branded drugs. That adds up to an expected \$500,000 in formulary savings in the second year and breaks a pattern of annual 20 percent jumps in pharmacy costs. An additional benefit was that the safety of e-prescribing contributed to a 10 percent reduction in Temple's malpractice rates.

Temple physicians also report that patients appreciate legible prescriptions, the note-taking function that helps doctors remember to make follow-up calls, and the Pocket Anatomy tool that turns the handheld into an on-the-spot resource for patient education.

"The Pocket PC is a mobile library for me," said Andrea McCoy, Temple pediatrician and associate professor of pediatrics at Temple University School of Medicine. "It connects me to a network of information that helps me educate my patients regarding their illnesses. It helps me identify medications and their side effects, and drugs that may interact with each other. The Pocket PC will also identify medications that are in the patient's insurance formulary. Because I see a large number of patients in a day, the last thing I need to do is walk back to a desk to look through a book. I have information at my fingertips that will help me with patient care."

Creating Solutions for Health Insurers

There are more than 600 organizations in the United States that are in the business of writing healthcare insurance policies and managing those policies and the payment for services that are covered by those policies. In the case of the growing number of companies that are self-insured, they provide administrative services to manage the payment for services and contract with providers to secure preferred pricing. The business model for health insurers is to preserve as much capital generated by premium dollars or administrative fees as possible by managing the authorization and payment for services.

Challenges

Companies that manage the payment process as well as accept the risk to pay for services of a defined population for a set premium are critically dependent on the providers of services. This dependency focuses on the care decisions made and the cost, effectiveness and safety of those decisions. As these companies have tried to improve their ability to control costs by influencing clinical decisions, they have been challenged by the lack of accuracy and timeliness of information. In addition, as they have sought to increase their influence they have become, according to many providers of healthcare, too intrusive, causing disruption in care delivery. One of the consequences is the additional financial burden that providers bear to hire staff to attend to the requirements and processes insurance companies impose to ensure providers will get paid for services rendered.

Solutions and Opportunities

Microsoft .NET technology provides solutions and opportunities for the challenges faced by health insurers. BizTalk HIPAA Accelerator provides especially strong opportunities for insurers to optimize and refine business processes, without requiring modifications of existing mainframe applications.

Using Microsoft Technology to Become HIPAA-Compliant: A MEGA Life and Health Insurance Co. Case Study

The MEGA Life and Health Insurance Co., a wholly owned subsidiary of UICI, a holding company providing insurance (primarily health) to niche consumer and institutional markets, turned to Microsoft technology to become HIPAA-compliant and greatly streamline its operations.

For many insurance companies, becoming HIPAA-compliant will require modifying existing electronic data interchange (EDI)-based systems to comply with these new standards — a significant undertaking itself in an industry still heavily reliant on mainframe applications. MEGA had farther to go because it employed a manual, paper-based process combined with eiSTREAM (formerly the Kodak imaging and workflow system) imaging technology for entering claims into its legacy systems.

“Even before the HIPAA deadline began to draw near, we were looking to EDI as a driver for automation and cost savings,” said Sharon Dickson, vice president of Claims and EDI for MEGA. “We originally had all this in our strategic plan as an 18-month project, to be completed in two phases: first becoming EDI-enabled, followed by an additional effort to achieve full HIPAA-transaction compliance.”

To meet these challenges, MEGA elected to build upon a Microsoft centric solution. Using Microsoft Windows 2000 Server, SQL Server 2000, BizTalk Server 2000 and the BizTalk HIPAA Accelerator, MEGA built a solution in just 70 days that bolts onto MEGA’s existing systems, automating MEGA’s claim-processing environment and making MEGA compliant with respect to three of the 12 HIPAA-mandated Electronic Health Transactions Standards in a single step.

“The BizTalk HIPAA Accelerator, which supports all 12 transaction sets, enabled us to bring MEGA from paper-based processing to significant HIPAA-transaction compliance in only 10 weeks, and without any modifications to MEGA’s existing mainframe claims processing systems,” said Chet Niemczyk, senior vice president of Information Technology for MEGA’s Insurance Center. “As part of the project, MEGA’s IT staff was trained on the powerful visual mapping and workflow orchestration tools provided in BizTalk Server 2000, leaving the company well positioned to support the other nine transactions as well as any future requirements.”

Using the Microsoft platform, MEGA met its business needs much faster than the company had planned. “We originally estimated 18 months to realize EDI capabilities and HIPAA-transaction compliance, and the Microsoft platform enabled us to attain a significant part of this goal in only 70 days,” Dickson said. “It’s a tremendous relief to know we’re now well positioned to meet the deadline, and can react to any further changes in HIPAA-transaction requirements quickly and painlessly.”

MEGA believes that its new capabilities will yield a very favorable return on investment for the company. “I expect our Microsoft-based solution, when fully utilized by EDI-capable providers, will reduce claims processing costs by a minimum of 20 percent, returning our initial investment within a three-month period and tripling it within a year,” Dickson said. “We’ve benchmarked it at 30,000 claims in four hours — three times our current daily volume — so we’ll have plenty of room to grow without incurring additional platform costs.”

To company president, Phil Myhra, MEGA’s new capabilities represent a significant step forward in its ability to compete and prosper. “The Microsoft platform provides the agility to refine and optimize our internal business processes to a level far greater than I ever imagined possible. Moving forward, we’re now in a much better position to be proactive and set our own direction, rather than waiting for the future and simply reacting to it. I firmly believe that our new capabilities, as enabled by the Microsoft platform, will go a long way toward ensuring that MEGA remains an industry leader and a step ahead of the competition.”

Creating Solutions for Consumers

Patients have the most at stake regarding the treatment decisions made, medications prescribed and the quality of the education on their condition and treatment. The area where patients have been least affected until now is in the cost of care. Because most care has been paid for by the government or employers, patients have been unable to behave like true consumers and have had to make trade-offs based on price, quality convenience and effectiveness. But given the impact of cost increases on employers and governments, there is

a movement underway to increase the role of patients in paying for more of the care they receive and to present them with choices.

Challenges

Challenges for consumers revolve around maximizing their access to their own medical information, as well as general healthcare information. Currently consumers have no practical way of transporting their medical history and vital information. Consumers would benefit from having access to their medical information while traveling.

Solutions and Opportunities

The technology exists to provide consumers with a Web-based, password-protected portal to their medical records. People traveling or simply wanting to go to another doctor could carry access to their full medical records with them. Those being prescribed a drug would be able to immediately download for the prescribing physician a complete list of other medications they are currently using, as well as a list of drugs tried unsuccessfully in the past for the same problem, and a list of allergic responses.

The consumer record will, in time, get quite sophisticated. For example, people suffering from migraines could go to their personal health portal and perform a search for clinical trials involving migraines. They could also post a message to the system that would act as a flag to pharmaceutical companies looking for people with migraines who are interested in participating in clinical trials.

The same portal also could provide consumers with a complete picture of what is happening with their insurer. They could check their policy for exact coverage information. They also could use the portal to check on the payment status for past services.

The portal also could be used as a reminder system. Consumers wanting to be reminded to take medications, go to an appointment, or even to exercise could choose to be alerted via automated e-mail messages, telephone calls or their pagers.

All this combines to make for a better-informed, and empowered, consumer.

Summary

Microsoft Windows, with its .NET technology is exceptionally well positioned for providing the best platform upon which to create new services and enterprise application integration because the Microsoft platform is based on support for XML, SOAP and other open industry standards that allow a legacy-friendly means for uniting disparate systems. The huge benefits of uniting information flow from the five components of the healthcare world can be achieved without the operational disruptions and expense of replacing legacy systems.

Microsoft .NET technology can support a wide variety of communication protocols and formats to facilitate exchange of data among disparate systems. And Microsoft BizTalk Server can be used to orchestrate information from these exchanges to create automated business processes. BizTalk HIPAA Accelerator was created specifically for orchestrating electronic transactions.

Using the Microsoft platform, businesses will be able to turn key processes into Web services. These Web services will bring benefits across the healthcare world. For tasks including scheduling patients, cataloging medical images, tracking participants in new drug trials, and giving consumers anytime, anywhere access to their own medical records, Web services (whether created by an individual or a corporation) can be used by millions of others in varied combinations to produce highly personal, intelligent computing experiences.

The ability to use Microsoft technology and Microsoft partner solutions to integrate disparate systems, without requiring alterations to existing legacy programs, means empowering the healthcare information worker, giving them the information they need, when they need it.

For providers this can mean bringing data to the point of care where physicians can see the latest lab reports, access electronic medical records, and electronically enter prescriptions from a handheld device such as a Pocket PC or Tablet PC.

For pharmaceutical and biotechnology companies Microsoft technology can mean optimizing the capacity and asset value of legacy systems, and unifying disparate systems, applications and platforms, to improve the overall effectiveness of information management. The rewards for integrated systems can include enhanced drug discovery efforts, shortened clinical trials, accelerated approval, increased enterprise operational efficiency, improved sales and marketing, and the ability to seamlessly link with contract research organizations, regulatory agencies, clinical study sites, and other business partners.

For health insurers Microsoft technology can mean achieving the dataflow they need between employers, providers, and consumers -- handling both administrative and clinical information from many disparate systems distributed across large geographic regions. They can manage and act on data flows to and from multiple sources to feed multiple processes: claims payment, rate setting, pricing, marketing, care management, prescription benefits, eligibility verification, clearinghouse transactions, and referral management.

For the government and private-sector employers, Microsoft technology can connect what can otherwise be a maze of disparate systems, helping organizations to analyze expenditures and find ways to deal with the continual increase in the cost of providing medical care.

Microsoft provides the flexible, cost-effective platform for quickly building, expanding and integrating healthcare applications that help close the gaps in the healthcare continuum. The result will be *Healthcare Without Boundaries*.

For More Information

To learn more about Microsoft's healthcare industry solutions, visit <http://www.microsoft.com/healthcare/> or call (800) 426-9400.

To see Microsoft case studies about the companies mentioned in this paper, as well as the stories of other organizations benefiting from Microsoft solutions, please go to: www.microsoft.com/casestudies.

Customers Highlighted in this White Paper

To learn more about MassCARES, visit <http://www.masscares.org/>.

To learn more about Temple University Health System, visit <http://www.health.temple.edu>

To learn more about Mississippi Valley Surgery Center, call 563-344-6600.

To learn more about Rosetta Genomics, visit <http://www.rosettagenomics.com/>.

Microsoft Industry Solution Partners Highlighted in this White Paper

To learn more about Allscripts Healthcare Solutions, visit <http://www.allscripts.com/>.

To learn more about MEGA Life and Health Insurance Co., visit <http://www.megainsurance.com>

To learn more about DataLabs, visit <http://www.datalabs.com/>.

To learn more about HealthIS, visit <http://www.healthis.com/>.

To learn more about Systems Engineering Inc., visit <http://www.sengi.com/>.

#####