

National Digital Medical Archive, Inc. provides tools to enable sharing of digital medical images.

Overview

■ Business Challenge

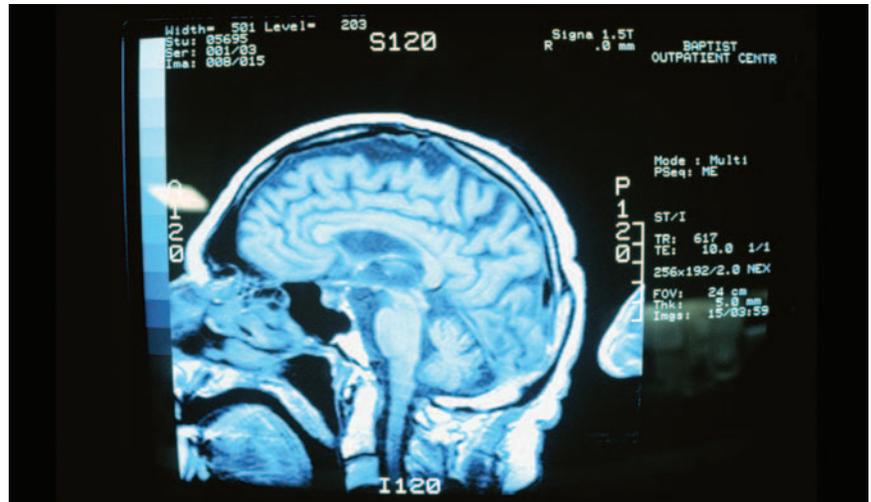
National Digital Medical Archive (NDMA) needed to give health-care providers a means of managing and transporting digital medical images that fit seamlessly into their operations and, at the same time, provide them with flexible, cost-effective solutions.

■ Solution

Using grid technology, NDMA created a system that enables providers and researchers to “plug in” to its base of over ten million images for more accurate testing and diagnosis.

■ Key Benefits

Fifty percent reduction in a hospital’s overall medical imaging transport costs, resulting in savings of up to US\$1M annually for larger hospitals.



NDMA enables healthcare providers to store, manage, access and distribute digital medical imaging files in a federated repository known as the National Digital Medical Archive. A separate business, myNDMA.com, enables patients to proactively manage their digital health information in collaboration with the NDMA services. There are currently over 50 customers using the NDMA Clinical Services, representing over 1,500 care providers, including physicians, technologists and related care providers.

In recent years, the healthcare industry has witnessed a dramatic growth in its information technology investments. Driven by necessity and enabled by innovative new technologies and approaches, health-care institutions are increasingly looking to IT as the cornerstone of a new way of delivering healthcare services. Clinicians and researchers see powerful processing resources combined with sophisticated analytical tools as a way to uncover better ways of diagnosing and treating illnesses.

“Hospitals are yearning for more on demand services so they can focus less on IT and more on healthcare... With IBM’s help and technology, we’re giving them the services and information they need to change the way they provide care.”

– Derek Danois, President, National Digital Medical Archive, Inc.

Business Benefits

- Fifty percent reduction in a hospital's overall medical imaging transport costs, resulting in savings of up to US\$1 million annually for larger hospitals
- Reduction in time to deliver medical files to physicians' offices from days to minutes
- Improved diagnostic accuracy
- Faster FDA approval of imaging devices by leveraging NDMA data
- Ability of patients to access personal health information on demand and the inherent cost savings associated with self-management
- More efficient allocation of investment resources by hospitals through the avoidance of IT expenditures and support costs

This infusion of IT into clinical activities has already produced a surge of dramatic results and even higher expectations for the future. Put simply, the tools are within reach for clinicians and researchers to find and understand the underlying patterns of disease like they never could before.

Learning to share

Despite their widening embrace of technology, healthcare institutions—perhaps more than ever—don't want to be in the information technology business. Despite a clear need for advanced IT capabilities, hospitals and clinics have been compelled by rapidly rising healthcare costs to focus their resources on their core mission. As a result, hospital executives are under growing pressure to avoid investments in costly IT infrastructure and the staff required to support it.

However, this presents a paradox and a challenge for healthcare providers seeking to achieve the vision of information-based medicine outlined above. In the effort to glean insights from patterns within clinical data, the biggest payoff naturally comes from aggregating the same type of data (e.g., test results) from different sources (e.g., hospitals). With clinicians and researchers trying to discern the subtle patterns within the “big picture,” the more data points—or “pixels”—they can add to the picture, the better their chances of finding these patterns. Medical imaging illustrates this well. While many hospitals are embracing digital imaging technology (including the PACS, or picture archiving and communication systems, that enable them to share imaging files within a given hospital), most hospitals lack the ability to share their medical imaging data with other hospitals. This means the power of pooled data goes largely untapped. With few if any hospitals ready to face the technical and economic challenges that bridging this gulf entailed, innovation was needed to fundamentally change the equation for hospitals. That's just what NDMA did.

“What we're doing fits into a trend of hospitals wanting to get out of the IT business. If you talk to hospital CFOs and CEOs, they will tell you the thing they don't want to be doing is spending lots of money to build up their own IT infrastructures.”

—Derek Danois

Based in Berwyn, Pa., NDMA originated as a federally funded research project led by the University of Pennsylvania whose goal was to create an open, secure and nationwide repository for digital medical images and data designed to encourage collaboration among hospitals, clinics and researchers. To succeed, NDMA had to meet stiff challenges on two levels. First, it needed to create a powerful, flexible and resilient infrastructure capable of handling enormous transaction volumes as large numbers of healthcare facilities across the U.S. added and accessed large digital medical image files to and from the system. An even greater challenge was to deliver this industrial-strength processing capability in a way that was available on demand, completely seamless to the clinicians and researchers using it, and imposed no additional infrastructure or support burdens on facilities that adopted it.

The company was able to create an innovative shared-services infrastructure known as the National Digital Medical Archive that puts the power, as well as the management requirement, in the backend. For the front end of the solution, NDMA created an interface it calls the WallPlug™ that enables healthcare facilities to procure NDMA-based services by essentially plugging into the enormous, real-time archive running invisibly in the background. The NDMA currently houses over ten million patient images and is steadily growing every day.

Plugging into information power

For users, one of the biggest values of NDMA's approach is that it offers a fundamental change in the way they access leading-edge technology. Most hospitals would agree that they have enough servers, workstations, monitors and software to support and, if given the choice, would prefer to invest in things that generate revenue—such as a new kind of testing device. NDMA's offering does this by making the NDMA a seamlessly connected service in a hospital's existing clinical information network. The key is its support for DICOM (Digital Imaging and Communications in Medicine), an industry standard for networked imaging devices in the healthcare industry. Accessing the NDMA's services like a utility, clinicians can either upload their patients' medical images such as X-rays, MRIs and CT scans into the NDMA for storage and management, or download select files of patients from around the country in order to perform comparisons and make a more accurate diagnosis. Requests are handled by a highly flexible grid-based infrastructure that dynamically shifts processing to any of 64 nodes distributed across three strategically placed hosting locations. For security, a pair of servers within each hospital acts as a buffer between the hospital's internal systems and the backend grid; encrypted data is passed across this link. To enable the service's key value proposition—that it imposes no support burden on hospital staff or operations—NDMA relied on IBM eServer xSeries servers based on their powerful remote monitoring and management capability. xSeries servers, running IBM DB2 Extended Enterprise Edition to perform high-volume parallel processing and DB2 Content Manager to manage the solution's content, also constitute the core of the grid.

A study in leverage

Having set out to develop a flexible and versatile solution, NDMA has exceeded its own initial expectations. One true hallmark of a solution's flexibility is the ability to leverage it—to use it as a cost-effective base for adding new services or capabilities. Since NDMA launched its core service, examples of such ROI-enhancing leverage have become abundant. A good example is the company's Business Continuity Data Protection offering, which directly leverages the archive and requires no added investments in storage media by hospitals. By creating a mirrored image of their PACS system within the archive, hospitals can use the NDMA for real-time failover if their internal systems go down.

Key Components

Software

- IBM DB2® Extended Enterprise Edition
- IBM DB2 Content Manager

Hardware

- IBM eServer™ xSeries® server
- IBM EXP300 STOR Expansion Units

Services

- IBM Global Services
e-business Hosting™

Time frame

- Upfront development: one year
- Expansion/deployment: ongoing

Why it matters

As a rule, clinicians can do a better job of diagnosing, tracking and treating illness when they have more clinical information at their disposal. However, constraints in both IT budgets and support staff have limited their ability to make the investments necessary to gain easier access to it. NDMA's innovation was to create a shared, on demand service that plugged directly into a hospital's existing medical information networks, thus shielding it from the complexity, costs and support requirements of a new IT infrastructure.

Another example of “pure” leverage is NDMA’s recently introduced communications services. Because the NDMA is an open platform, multiple hospitals can plug into it and use it as a conduit to send digital medical image files to and from their PACS systems. Through this service, one hospital expects to save US\$1 million annually in processing and courier costs. But perhaps the greatest expression of the NDMA’s inherent versatility is its ability to support an entirely new business model. In late 2005, NDMA created a standalone business unit known as myNDMA.com, which gives patients the ability to manage their own digital health records. The portal-based service also enables physicians to access their patients’ records electronically, thus sparing patients the burden of physically retrieving and transporting their files to a new doctor in the event of a referral, second opinion or change in carrier. In addition to the obvious improvement in clinical efficiency, myNDMA gives patients an unprecedented degree of accessibility to their medical records and images, as well as the truly groundbreaking ability to participate in the management and security of their personal health records. Like all of its services, myNDMA was created to meet the concrete demands of hospitals, physicians and patients. The openness and flexibility of the underlying archive enabled NDMA to meet these needs rapidly and cost-effectively.

Finally, there’s the issue of scale. With medical imaging data spread across unconnected islands, seeing the important patterns that can improve care is effectively impossible. In one of its earliest breakthrough applications, NDMA was able to help medical imaging equipment vendors detect subtle gradations in the performance of certain devices over time such as the effect of heat and varying radiation output on image quality—all with existing, real-time archive data. This gave vendors a solid basis to change the way their machines are configured to give more accurate results.

Overall, President Derek Danois sees NDMA as a catalyst to transformation across the healthcare industry. “Hospitals are yearning for more on demand services so they can focus less on IT and more on healthcare, which requires a more efficient IT infrastructure. The NDMA resolves this paradox by delivering state-of-the-art information management services to its customers, built on the reliability and power of IBM technology.”

For more information

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