

# Aurora Health Care: Extending Core Systems on the Path to e-business

## An IDC e-business Case Study

### THE SUBJECT

Based in Milwaukee, Aurora Health Care is a community-owned, not-for-profit provider of healthcare services serving communities throughout eastern Wisconsin. Employing 23,000, Aurora offers a full-range of services through a tightly linked network of hospitals, clinics, pharmacies and other facilities.

### THE GOAL

To replace telephone and fax-based supply ordering processes with a Web-based procurement portal that extends the functionality of Aurora's legacy purchasing applications. Also, to create an interactive, Web-based bed management platform that fully leverages the e-business infrastructure put into place as part of the procurement project.

### THE SOLUTION

Aurora's e-procurement solution, known as IREQ, enables Web-based ordering, catalog searches, realtime order status lookup and Web-based document management. Running on IBM WebSphere Application Server, IREQ also enables users to create customized ordering templates that can be shared across departments in hospitals or clinics. Aurora's Web-based bed management platform, known as e-Board, provides hospital staff with a detailed, unified view of a hospital's current and near-term occupancy status.

### WHY IBM

*"We were looking to develop something truly cutting edge, and IBM was the only vendor that had both the skills and the technology to make it happen."*

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## Executive Summary

### Innovation Spotlight

In addition to the internal integration with Aurora's legacy material management system, the IREQ solution is integrated with Aurora's external distributors via XML linkages.

Milwaukee-based Aurora Health Care is a fast-growing provider of healthcare services through an integrated delivery network that includes hospitals, clinics, pharmacies and other facilities. As its organization has grown larger and more complex, Aurora saw the need to put into place a common platform for centralizing its procurement process. Aurora deemed it crucial to extend the functionality of its existing, mainframe-based materials management platform, thus preserving its investment. Aurora selected IBM Global Services to assist in the development of an infrastructure for IREQ, its Web-based procurement platform. Aurora developed the IBM WebSphere-based application itself.

By virtue of the e-business infrastructure it built as part of the IREQ project, Aurora was able to build a powerful bed management application (known as e-Board) in less than three months at minimal cost. Both applications are seamlessly integrated with Aurora's legacy applications. The IREQ solution exchanges transactional data with third party e-commerce platforms via XML.

## Aurora's Solution at a Glance

<b>e-business Stage</b>	Integrating
<b>Core Functionality</b>	Aurora's IREQ solution is a B2E e-procurement platform that provides a common portal for all of Aurora's supply purchasing activities. Key functionality of the IREQ platform includes Web-based ordering, catalog searches, realtime order status lookup, and Web-based document management. The e-Board solution provides browser-based access to a hospital's bed and patient data via integration with Aurora's legacy admissions-discharge-transfer (ADT) system. The e-Board system allows Aurora's clinical and admitting staff to make better informed admitting decisions, thus reducing the incidence of patient diversion.
<b>Software</b>	IBM WebSphere Application Server, IBM DB2 Universal Database, IBM VisualAge for Java
<b>Servers</b>	IBM eServer zSeries, IBM RS/6000
<b>Services</b>	IBM Global Services
<b>Key Benefits</b>	<ul style="list-style-type: none"><li>• Aurora garnered approximately \$500,000 in cost savings in the first six months of IREQ's deployment, enabling the organization to achieve 100 percent payback.</li><li>• When fully rolled out, IREQ is expected to produce savings of between \$4 million and \$6 million annually in contract compliance alone.</li><li>• IREQ has streamlined purchasing-related communications, resulting in a major reduction in costs and data processing errors.</li><li>• With the e-Board solution, hospital admitting staff not only have faster access to data, but also higher levels of accuracy. Aurora can predict its occupancy levels within a 5 percent variance.</li><li>• By optimizing its admission-discharge-transfer processes, Aurora estimates a potential revenue increase of \$15 million annually.</li></ul>

The types of information critical to the operation of an Integrated Delivery Network (IDN) like Aurora range from clinical or patient-related data, to financial, administrative, and logistical data—a testament to the complexity of its operations.

### Background

Based in Milwaukee, Aurora Health Care is a community-owned, not-for-profit provider of health care services serving communities throughout eastern Wisconsin. Within the healthcare services industry, Aurora is an “integrated delivery network” (IDN), offering a full-range of services through a tightly linked network of hospitals, clinics, pharmacies and other facilities. The \$2 billion-per-year IDN employs more than 23,000, including a staff of 560 primary and specialty care physicians. One of the key goals of the IDN service delivery model is to provide the maximum quality healthcare services at minimum cost by coordinating resources, operations and, perhaps most importantly, the management of information. The types of information critical to the operation of an IDN like Aurora range from clinical or patient-related data, to financial, administrative, and logistical data—a testament to the complexity of its operations.

Of the strategic issues faced by providers of healthcare services, few exceed the importance of supply procurement practices. This view is manifested by the near-ubiquitous use of group purchasing organizations (GPOs), which enable healthcare providers to pool their purchasing clout in order to secure the most favorable terms from suppliers. As the need to contain healthcare costs has become more acute, the focus on optimizing the procurement process has continued to grow. And as the organizations delivering healthcare services have grown larger and more complex, so has the challenge of coordinating enterprise-wide procurement. It was against this backdrop that Aurora began an initiative designed to develop a common Web-based platform for centralizing its procurement process.

### The Need: A Common Platform for Supply Requisitioning

The roots of Aurora’s procurement initiative can be traced to the first half of 2000, when a number of medical supply distributors (including Owens and Minor, Cardinal, Allegiance) invited Aurora to order supplies through their Web-based order-entry portals. While Aurora viewed the value of Web-based ordering as beyond dispute, it nonetheless balked at the prospect of directing employees to multiple sites based on the type of products they were buying. A major reason for Aurora’s reluctance towards the multi-site procurement approach was its potential for confusing employees, which could in turn result in a surge of higher-cost “maverick” purchasing. Still, by identifying the shortcomings of this approach, Aurora was able to distill what it saw as the essential requirements needed to make Web-based procurement work in its enterprise. The question wasn’t whether to do Web-based procurement—but how.

While its suppliers’ proposals served as a catalyst to Aurora’s Web-based procurement initiative, the value of building such a system had long been known. The key benefits centered around streamlining and simplifying access to the Materials Management Information System (MMIS), the mainframe-

based platform that handled Aurora's supply requisitioning and purchasing functions. At the time, roughly 3,000 employees across the organization purchased supplies through the MMIS using 3270 terminals running specialized client software. The move to a browser-based procurement platform eliminated the need to license and distribute this client software—saving time, IT staff resources and money. Duane Wesenberg, Aurora's I/S Manager of Enterprise Applications, also saw Web procurement as yielding an array of process-related benefits. "At a very basic level, the Web platform's easy-to-use interface substantially reduces the need to train new hires—from colleges, nursing schools and other companies—on how to use the system," says Wesenberg. "For a fast-growing organization like ours, that's a major benefit."

But the real payoff for Aurora building its own Web-based platform was a far stronger ability to enforce contract compliance in its internal purchasing. Because Aurora buys on contract (with pricing negotiated on volume-based discounts), employees purchasing outside of these contracts were likely to pay far more for supplies. "We determined that building our own Web-based procurement portal would greatly reduce out-of-contract purchasing, yielding savings of between \$4 million and \$6 million annually," explains Wesenberg. "The business case was very strong."

## Action Plan and Decision Process

### First Steps

The idea for an e-procurement initiative was first proposed by Wesenberg to Aurora's director of purchasing. From the outset, the key challenge was in putting together a solution that could fully leverage the organization's existing materials management solution, while at the same time provide all the advantages of a Web-based solution. As Wesenberg points out, the stability and reliability of the existing MMIS system—running on an IBM eServer zSeries (formerly S/390)—needed to remain at the core of the new solution. "Over the years, we achieved strong operational efficiencies in areas like backup and recovery, storage, networking, and access," notes Wesenberg. "We saw a strategy based on preserving and extending our investment as the ideal approach."

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I/S Manager of Enterprise  
Applications, Aurora  
Health Care

Given the strategic importance of the e-procurement initiative, Aurora conducted an exhaustive review of alternative technology and vendor options—even going so far as to look at all-new "bottom-up" solutions. One such option was the total replacement of its MMIS with an off-the-shelf ERP solution at a cost of \$16 million, spread over three "painful" years of implementation. In addition to its cost, this off-the-shelf solution would have required Aurora to deploy an entirely new set of processes and underlying architecture. Aurora also considered a solution built on Windows NT (which it has deployed in various department-level solutions), but ultimately found its scalability and reliability wanting. "For an enterprise-level deployment like our procurement solution, scalability is of paramount importance," says Wesenberg. "In addition to NT's problems with scaling in the enterprise, we were also reluctant to

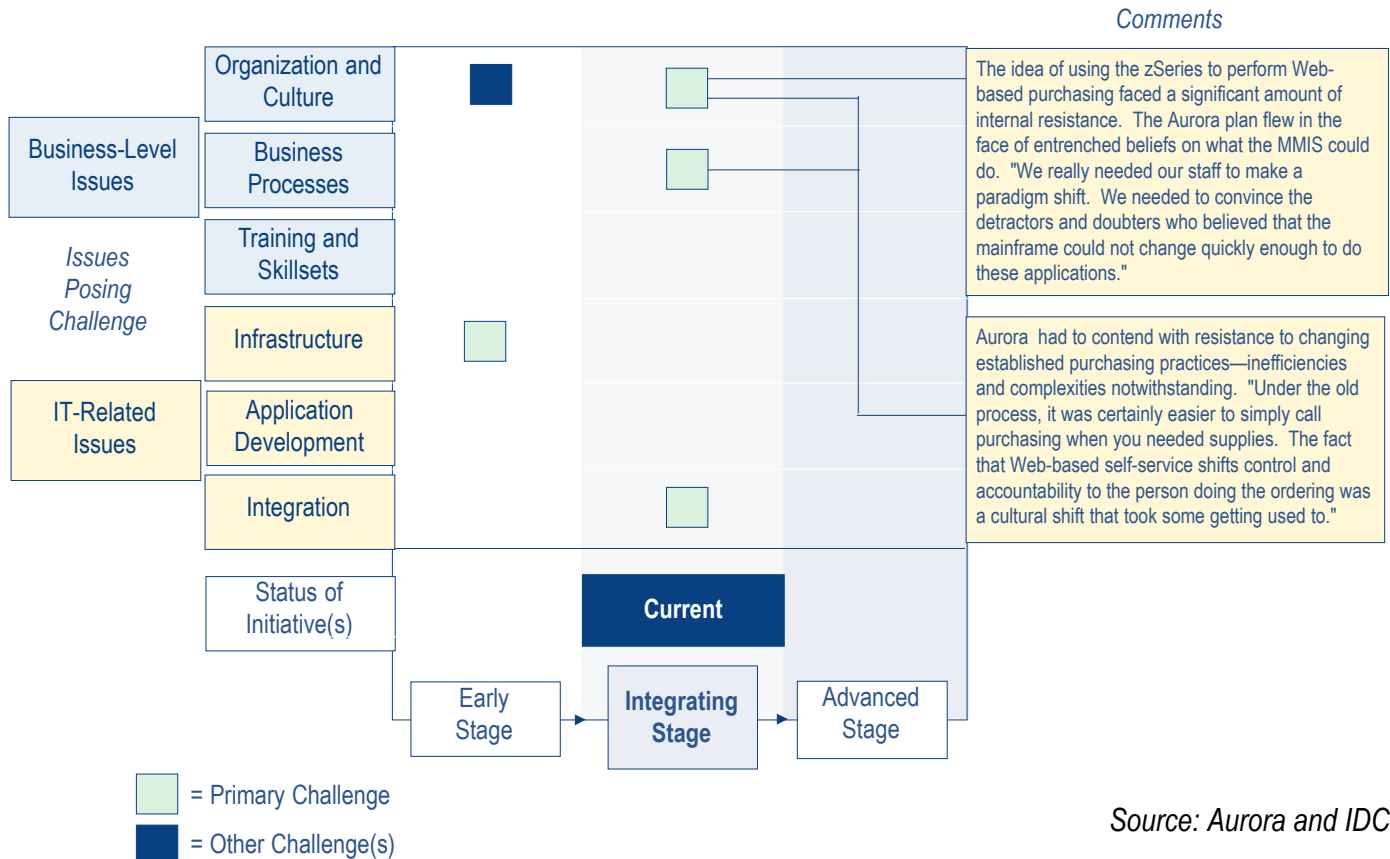
buy 20 Windows NT servers when we already had an IBM mainframe that could more than handle the capacity.”

In late 2000, after a six-month process, Aurora selected IBM Global Services to assist its technical staff in building a solution that extended the functionality of its legacy MMIS platform. A key element of IBM Global Services’ successful proposal was the use of IBM software (WebSphere Application Server and DB2) and servers (RS/6000) to power the solution. But what Wesenberg saw as most compelling was IBM’s demonstrated ability to turn Aurora’s backend system into a powerful data server using WebSphere Application Server. “We were looking to develop something truly cutting edge, and IBM was the only vendor that had both the skills and the technology to make it happen,” adds Wesenberg. “IBM Global Services showed us how they had created an awesome data server by running WebSphere on the mainframe for a major financial services company—and we were firmly sold on the idea.”

### Challenges

Aurora’s decision to build a Web-based purchasing portal on top of its mainframe amounted to a reinvention of the core MMIS system as a flexible, sophisticated e-business platform. While presenting a promising vision, the idea of using the zSeries to perform Web-based purchasing faced a significant

## Challenges Encountered in Aurora’s e-business Evolution



Source: Aurora and IDC



amount of internal resistance. As Wesenberg notes, the Aurora plan flew in the face of entrenched beliefs on what the MMIS could do. “We really needed our staff to make a paradigm shift,” says Wesenberg. “We needed to convince the detractors and doubters who believed that the mainframe could not change quickly enough to do these applications.” To some extent, Aurora also had to contend with resistance to changing established purchasing practices—inefficiencies and complexities notwithstanding. “Under the old process, it was certainly easier to simply call purchasing when you needed supplies,” notes Wesenberg. “The fact that Web-based self-service shifts control and accountability to the person doing the ordering was a cultural shift that took some getting used to.”

## Solution Profile and Implementation Strategy

### The Purchasing Solution

Aurora’s e-procurement initiative, known as IREQ (for intranet requisitioning), provides a common portal for all of Aurora’s supply purchasing activities. Key functionality of the IREQ platform includes Web-based ordering, catalog searches, realtime order status lookup and Web-based document management. In contrast to the “green screen” system it replaces, IREQ features an intuitive and user-friendly order-entry screen that incorporates Aurora’s business rules, contract information (pricing, etc.) and the user’s budget information. One of the most important strengths of the IREQ platform is the ability to create customized ordering templates that reflect a user’s ordering preferences. Enabled by WebSphere Application Server, this template-based approach to customization has a two-fold benefit. First, it saves employees time by automatically populating the ordering template with basic (recurring) information. Second, it enables Aurora to share ordering templates across the organization where it makes sense—such as between departments within a given hospital, across clinics, or between two or more hospitals within the Aurora network that have similar supply purchasing patterns.

Key functionality of the IREQ platform includes Web-based ordering, catalog searches, realtime order status lookup and Web-based document management.

In addition to the core requisitioning functionality, the IREQ solution has also been extended to allow realtime stock checking and inventory replenishment at the department level. Introduced on a pilot basis, this feature allows hospital staff to use Palm Pilots to input data on existing stock levels in supply storage areas. This data is then compared to a central inventory database that contains information of targeted stock levels. Instances where existing stock levels are below targeted levels automatically trigger a replenishment order to that department.

### Development Approach and Timetable for IREQ

Development of the IREQ solution proceeded in two major phases: infrastructure development and application development. The aim of the infrastructure development phase was to reconfigure Aurora’s mainframe environment so that it could support Web applications. As part of this reconfiguration, Aurora’s technical staff upgraded the zSeries’ operating system to IBM MVS 2.8, configured the workload manager, and added transaction server functionality. The team also deployed IBM DB2 Universal Database on the zSeries to store

data generated by the MMIS system. With the assistance of IBM Global Services, the Aurora technical staff also deployed WebSphere Application Server 3.5 (the platform on which the IREQ application was written) and the IBM RS/6000 on which it runs.

The application development phase was led by members of Aurora’s internal IT staff, working in coordination with the IBM Global Services team. The Aurora team employed IBM VisualAge for Java as its primary development environment, using it to build a series of Java servlets. Work on the IREQ solution began in December 2000 with the definition of business rules. The actual development process—which included the integration of IREQ to the MMIS system—was completed in April 2001. After approximately 3 weeks of testing, IREQ went live in May 2001. According to Wesenberg, the collaboration of Aurora’s technical team with IBM Global Services was most valuable in overcoming the technical challenges that come with “pushing the envelope” on functionality. “We needed highly specialized people to help us get through technical ‘hot spots’,” says Wesenberg. “IBM Global Services was able to bring in the right specialists at the right time.”

### Web Enablement Leaps from ERP to Patient Management

The successful implementation of the IREQ solution soon created a splash within Aurora. In addition to the numerous benefits of centralized, desktop-based purchasing, the project had also shown that the functionality of Aurora’s

### Development Timetable for Aurora’s IREQ Solution

	1H 2000	3Q2000	Nov. 2000	Dec. 2000	Apr. 2001	May 2001
Aurora approached by some of its larger distributors about using their Web purchasing portals.	■					
Aurora decides to develop its own Web-based e-procurement portal.		■				
IBM Global Services selected as solution provider, begins establishing the infrastructure for the IREQ solution			■			
Aurora IT staff begin development of the IREQ application.				■		
Development of IREQ solution completed, testing begun.					■	
The IREQ solution goes live.						■

Source: Aurora and IDC



mainframe-based systems could be extended to the Web using standards-based technology. And, equally important, it showed how a project of this magnitude and importance could be done affordably with Aurora's internal IT resources. But perhaps the most important legacy of the IREQ project was the robust e-business infrastructure that it created—an infrastructure that laid the groundwork for future e-business initiatives.

It didn't take long for other parts of the Aurora organization to see the potentially huge benefits of Web-enabling their legacy applications. Just months after IREQ went live, Aurora's IT organization was approached by key clinical leaders to discuss the feasibility of creating a similar Web-based interface to its mainframe-based admissions-discharge-transfer (ADT) system. The idea was to create a better way to leverage the ADT system, which provides Aurora's clinicians and administrators with the data needed to manage its beds across its 14 hospitals.

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Like most healthcare service providers, the issue of bed management has continued to grow in importance for Aurora as the aging of the baby boomer segment increases demand for inpatient services. Driving this is a projected bulge in the population in the 55-to-60 age segment, which as a group is more likely to be hospitalized. These trends will be complicated by the anticipated 40 percent shortfall in acute care beds by 2010. Apart from the clear public health implications of the impending bed crunch, there are also potential repercussions for Aurora's operational efficiency. For example, a lack of available beds can force hospitals to turn away patients for other types of revenue-generating services, such as surgery and emergency room services. This phenomenon—known as diversion—inhibits the overall efficiency of a hospital's operation. Thus, as hospital bed occupancy rates inevitably rise, healthcare providers such as Aurora will be under increasing pressure to proactively manage inpatient capacity.

### Enabling "Predictive" Bed Management

After early meetings on the feasibility of the project, Aurora's design team conferred with key administrative and clinical stakeholders in October 2001 to discuss the solution's most important needs. Key players included hospital administrators, department heads, and the directors of nursing. The major outcome of these discussions was a consensus on the need to create a predictive bed management tool that would allow Aurora's hospitals to be less reactive and more proactive in how they managed their beds. Under Aurora's plan, the key to proactive bed management lies in tracking the "life cycle" of a bed—specifically, having in-depth, realtime information on the patient (e.g., attending physician, prognosis, length of stay) and the bed (e.g., whether it's occupied, features). This vision stood in contrast to Aurora's existing process for ascertaining a hospital's bed status, which involved a daily flurry of telephone calls and meetings throughout the hospital.

As Wesenberg points out, one of the key challenges of the planning process was in *raising* the clinical staff's expectations as to the solution's ultimate functionality. "Because there were such pervasive doubts about what the

hospital's systems could do, we needed to really push to get them to tell us what they wanted and needed," explains Wesenberg. "So the actual definition of the solution's core functionality was an iterative process."

### Leveraging Infrastructure for Speedy Deployment

Aurora's development team began work on the bed management platform—dubbed e-Board—immediately after these discussion (mid-October 2001). As with the IREQ solution, Aurora sought to extend the functionality of an established, custom-developed mainframe application (the ADT system)—while preserving its core functionality. Developed in the late 1980s, the ADT system stores patient and bed-related data in a proprietary database, which users would then access via 3270 "green screen" terminals. For Aurora's development staff, the key to leveraging the legacy ADT application was to build a bridge between it and the newly added Web infrastructure (i.e., DB2 and WebSphere).

"By leveraging the IREQ infrastructure, we were able to cut the e-Board development time in half—to just 3 months. Also, because we had all of our infrastructure ready to go, there was no additional hardware or licensing issues."

— Duane Wesenberg

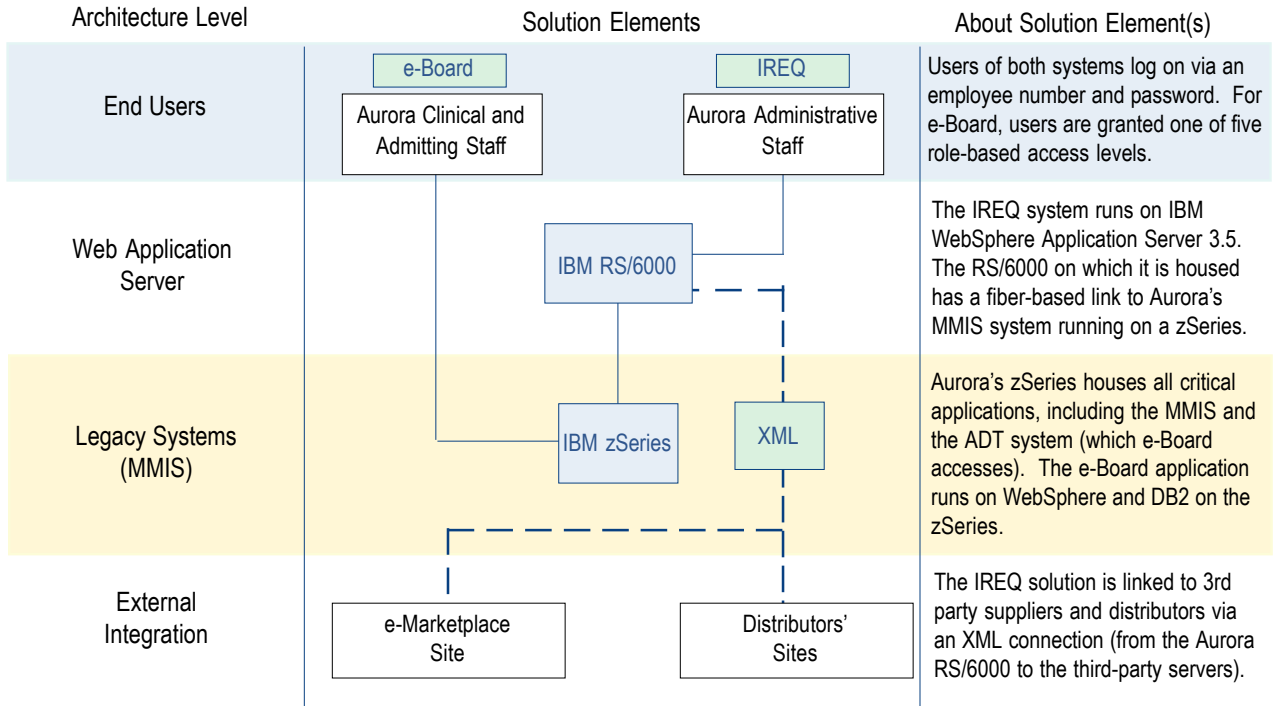
To accomplish this, the team sought to direct the data stream generated by ADT system to the DB2 database already resident on the zSeries. This then limited Aurora's development requirement to building a front-end Web application to access this data. As Wesenberg points out, the ability to reuse its existing e-business infrastructure cut development cycle time substantially. "By leveraging the IREQ infrastructure, we were able to cut the e-Board development time in half—to just 3 months," says Wesenberg. "Also, because we had all of our infrastructure ready to go, there was no additional hardware or licensing issues." The e-Board solution went live on December 27, 2001.

### The Architecture of the IREQ and e-Board Solutions

The IREQ solution runs IBM WebSphere Application Server 3.5 on an IBM RS/6000 server located in Aurora's data center. The solution accesses purchasing data stored in a DB2 database on the mainframe through an ESCON fiber-optic channel, which directly links the zSeries to the RS/6000. The IREQ solution employs Java servlets and JSP (Java Server Pages), through which it makes JDBC (Java database connectivity) calls to the DB2 database. In addition to the internal integration with the MMIS, the IREQ solution is also integrated with its external distributors via XML linkages. Once orders are entered into IREQ, they are converted to XML (via an XML gateway) and sent to the distributor's site. Distributors then send order confirmations and invoices back to Aurora via XML. Aurora plans to eventually deploy XML to the desktop for the IREQ solution.

While the IREQ solution runs on an RS/6000, the e-Board solution runs entirely on the zSeries. While e-Board is similar to IREQ in its use of WebSphere Application Server and DB2, the fact that it runs WebSphere on the mainframe is worthy of attention, believes Wesenberg. "We see the use of WebSphere on the zSeries as huge and entirely uncommon," he proclaims. "It's allowed us to extend our existing system quickly and inexpensively and—in the process—build a powerful solution."

## Basic Architecture of the Aurora Solution



Source: Aurora and IDC

### Security Profile

For both the IREQ and e-Board solutions, users are logged in via an employee number and a password. When registering new users, the systems are able to validate the employee's information by running a user's information against Aurora's HR system. The IREQ and e-Board solutions have different encryption requirements. Because IREQ runs on the intranet, it does not employ encryption. By comparison, the mainframe-based e-Board employs 128-bit encryption, using the IBM Cryptographic Coprocessor for the zSeries. Like all healthcare providers, one of Aurora's most significant security concerns relates to the Health Insurance Portability and Accountability Act (HIPAA), which is expected to impose rigid security and privacy requirements on healthcare providers. Aurora believes its existing security framework will more than comply with the emerging security standards.

### The Solution in Action

Users of the IREQ system—numbering approximately 2,000 across Aurora's 14 hospitals and 100 clinics—range from office secretaries, administrative assistants, and receptionists, to nursing staffs at hospitals and clinics. Upon logging in, a user's preferred order template is immediately displayed with all standard data fields pre-populated). The user can then search the IREQ catalog, order via the template, view a shopping cart, and check order status. During the ordering process, the user enters a quantity for line items in the order template. After an order is submitted, the data is sent directly to a DB2 database in the MMIS system.

The screenshot displays the Aurora Health Care E-Board interface. At the top, there is a navigation bar with 'E-Board', 'HELP', 'FEEDBACK', 'E-PORTAL', and 'LOG OUT'. Below this, there are filters for 'Select group to view' (All, Med/Surg, Specialty, Detail, Summary, Bed Mgmt) and 'Select data to view' (Med/Surg Alert, Specialty Alert, ED Alert). A table below shows units like CVCU, CVICU, CVFAR, EADM, LKREH, etc., with columns for room numbers and status indicators.

The function of the e-Board system is to provide summary information to a wide range of users, from clinical staff to housekeeping staff. Because each of these groups employ the e-Board data in different ways, Aurora created five levels of access for the system, which vary in terms of the information they can see and whether or not they can alter e-Board data. These access levels include:

- *housekeeping*, which can see when a room needs cleaning, but cannot see clinical information
- *patient care management*, which needs to know who is in a bed
- *administrative*, which can change access privileges and to some extent makes changes to the database
- *patient placement*, which can change the status of a room
- *ancillary departments* (including clinical staff), which can view clinical information

From a user interface standpoint, the e-Board system is arrayed as a grid, with every floor and unit of the hospital on the vertical axis and each unit's rooms listed horizontally across. At a glance, users (based on access levels) can view patient information (name, medical records, case number, gender, diagnosis, attending physician) and room information (e.g., whether a room has telemetry equipment, housekeeping status). Another key use of e-Board is to provide guidance to admitting staff regarding current and near-term projected occu-

pancy. Through this system, admitting personnel are informed of the hospital's ability to absorb patients via a simple "traffic-light" scheme. For example, a green light indicates no admitting limitations, yellow indicates that the hospital is filling up and red indicates the hospital is at 100 percent capacity.

## Business Results

Since deploying its Web-based procurement solution in May 2001, Aurora has amassed a wide range of business benefits—more than fulfilling the expectations of its sponsors. The most compelling benefit has been on the bottom line. Indeed, the more than \$500,000 in cost savings accumulated in the first six months of IREQ's deployment enabled Aurora to achieve 100 percent payback well within that time frame. A substantial share of this cost reduction resulted from process improvements enabled by the IREQ solution, including a marked increase in the rate of purchasing contract compliance. Indeed, reductions in maverick—or non-contractual—purchasing has helped keep overpayment for supplies (due to unrealized discounts) to a minimum. But IREQ's cost-related benefits have also been seen in the area of administration and communications. For instance, IREQ has allowed Aurora to add several new sites to its network without adding administrative staff to support these sites' purchasing needs (i.e., cost avoidance).

### Overview of Aurora's Business Results Achieved

Initiative	Nature of Benefit	Description or Metric
IREQ	Administrative Costs Reduction and Avoidance Improved Compliance with Purchasing Contracts	Aurora garnered approximately \$500,000 in cost savings in the first six months of IREQ's deployment, enabling the organization to achieve 100 percent payback.
IREQ	Long Term Cost Savings	When fully rolled out, IREQ is expected to produce savings of between \$4 million and \$6 million annually in contract compliance alone.
IREQ	Fewer Transaction Errors	By streamlining purchasing-related communications, IREQ has lowered costs and reduced data processing errors.
e-Board	Faster and More Accurate Decision-Making	With the e-Board solution, hospital admitting staff not only have faster access to data, but also higher levels of accuracy. Aurora can predict its occupancy levels within a 5 percent variance.
e-Board	Revenue Maximization through Lower Diversion	By optimizing its admission-discharge-transfer processes, Aurora estimates a potential revenue increase of \$15 million annually.

Source: Aurora and IDC

Aurora has also streamlined communications both internally (between ordering employees and administrative purchasing staff) as well as between Aurora and its distributors. The result has been a major reduction in costs and data processing errors. Prior to the deployment of IREQ, most ordering information—including orders and confirmations—was exchanged via hard copy fax. By shifting from fax-based to Web-based communications with distributors, Aurora was able to virtually eliminate invoice discrepancies, as well as the corresponding need for staff to manually key-in billing and credit information. Wesenberg also notes that on the internal front, the shift from fax to Web-based ordering freed up administrative staff to focus on more strategic supplier issues. “The purchasing department was doing a lot of data entry, which meant they could not be involved in supplier management tasks,” says Wesenberg. “By moving control of purchasing out to the owner [of the requisition], IREQ enabled our purchasing staff to assume a more strategic, value-added role.”

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The IREQ solution also delivered a quantum improvement in Aurora’s reporting capabilities by providing both more flexibility and timelier data to support decision-making. These benefits are best exemplified by the Web Management Reporting system deployed as part of the IREQ project. By greatly reducing the need to print and physically distribute purchasing-related reports, Aurora was able to recover the cost of the system in one month.

Since its introduction in December 2001, the e-Board solution has delivered all the operational benefits initially envisioned by its sponsors. Topmost among these is the ability to get fast, convenient access to a detailed snapshot of a hospital’s occupancy levels. Prior to e-Board’s deployment, admitting staff needed to make numerous inquiries across the hospital via telephone calls and meetings to ascertain current and near-term occupancy levels. With the e-Board solution, hospital admitting staff not only have faster access to data, but also have higher levels of accuracy, explains Marne Bonomo, Aurora’s regional director for patient access. “We now have the ability to predict within a five percent variance how many patients to expect on a given day,” says Bonomo. “This gives us a much stronger foundation on which to make decisions.”

While e-Board has driven significant cost and productivity improvements to Aurora’s bottom line, its most significant payback may be most evident on the top line—namely, through revenue optimization. For any hospital, one of the keys to success is to turn away as few potential patients as possible—that is, to keep “diversion” to a minimum—whether it be in the emergency department or for a complex procedure. e-Board’s value in this area is to provide the detailed patient and bed information needed to make optimal admitting and scheduling decisions. For example, e-Board may provide a doctor with a more granular view of bed capacity in a recovery ward, enabling that doctor to give the green light to a surgical procedure that may not at first glance have appeared feasible due to high occupancy. Aurora estimates the potential revenue increase from reducing unnecessary diversion at \$15 million annually.

## Case Epilogue

“IBM Global Services showed us how we could extend our legacy systems without sacrificing their functionality. We're now positioned to quickly and affordably deploy e-business applications across the organization.”

— Duane Wesenberg

Aurora plans to build on the success of IREQ and e-Board through a number of e-business initiatives that also leverage its existing applications infrastructure. For example, Aurora plans to launch a self-service platform targeted to its base of nearly 4,000 staff and independent physicians as well as its patients. For physicians, the system is designed to facilitate referrals to other physicians by providing an easily accessible Web-based profiling capability. The system will also allow patients to research physicians in terms of specialties, credentials, geographic location and insurance coverage. In addition to providing more convenient access to physician data, the system's realtime links to backend databases will guarantee that information is always current—the key shortcoming of printed directories.

As Aurora moves forward with a broader e-business agenda, it faces the challenge of incorporating an ever-larger organization into an integrated infrastructure. Wesenberg sees the success of the IREQ and e-Board solutions as an affirmation of Aurora's choice of IBM Global Services to deliver a scalable, reliable, standards-based solution. “IBM Global Services showed us how we could extend our legacy systems without sacrificing their functionality,” says Wesenberg. “We're now positioned to quickly and affordably deploy e-business applications across the organization.”

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