The Business Benefits of iSeries Application Modernization

How Companies Are Realizing Value by Transforming Their Solutions

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Executive Summary

When IBM eServer iSeries customers and independent software vendors (ISVs) consider whether they should modernize their applications, they may decide against such projects because they are unsure of the benefits that they will realize. However, our recent study indicates that such companies may be missing significant opportunities. The study demonstrates that iSeries application modernization can enable customers to reduce business expenses and improve the flow of information between customers, business partners, and employees. Software vendors can attract more sales prospects, win more business, and improve their competitive standing.

To arrive at these conclusions, Andrews Consulting Group conducted in-depth studies of six iSeries software vendors and one iSeries customer. Each of the organizations had completed one or more development projects that fit our definition of application modernization: the enhancement, conversion, or rewriting of iSeries applications to include new technological capabilities that did not exist when the applications were originally developed. Our studies of these organizations, as well as our experience from dozens of consulting engagements with iSeries customers and ISVs, have led us to the following conclusions.

First, organizations that modernize their iSeries applications are highly likely to achieve several types of business benefits. Among the companies that we studied, the following benefits were the most prominent ones.

- *Improved integration levels.* Nearly all of the firms reported greater integration between their iSeries applications and other software systems. This enabled these firms to streamline their business processes, reduce costs, and extend their applications to customers and partners via the Internet. The software vendors who reported this benefit also noted that it made their applications more attractive to potential customers.

- *Increased sales opportunities.* Most of the ISVs who took part in the study reported that they experienced increased opportunities to acquire new customers. Prospective customers took a greater interest in their products, made more sales inquiries, and sent more requests for proposal.

- *Improved sales performance.* In addition, most of the ISVs reported greater sales effectiveness. This manifested itself either as an increase in sales of the modernized applications or as the maintenance of sales levels that were in danger of declining if the vendor did not modernize its products.

- *Reduced training and support costs.* Several of the study participants reported reduced costs to train and support users. They partly attributed this to the fact that they replaced their character-based 5250 screens with graphical interfaces that were easier for the users to understand.

- *Many unintended benefits.* While the above benefits were the ones that the study participants frequently intended to achieve, the group realized other benefits that they had not adopted as objectives during their projects. These included greater ease in recruiting new developers, improvements in code maintainability, and increased developer productivity on selected tasks. In addition, some of the ISVs in the study have begun their own modernization services after being approached by other firms about modernizing their applications.

Second, the study demonstrated that while it may take several months to realize some of the business benefits from application modernization, many organizations realize certain benefits almost instantly. For instance, benefits that arise from improved application integration levels, such as reduced operational costs, may often be realized immediately after the deployment of modernized applications. In addition, the ISVs who modernized their user interfaces saw rapid improvements in the number of sales inquiries and requests for proposal that they received from prospects. By contrast, benefits such as reduced training and support costs, greater ease in recruiting developers, and increased developer productivity may take 6 to 18 months to realize.

Finally, while the business benefits of application modernization are real, most companies will need to overcome some challenges to reap those benefits. To modernize their applications, development teams need to negotiate a transition from the single, highly integrated development environment that they originally learned to one that is heterogeneous and loosely integrated. This makes it necessary for developers not only to learn new tools and programming methodologies, but also to learn how to solve more complex problems with multiple sources of technical support. These challenges are not trivial, but they are manageable with the right approach and with guidance from IBM and its partners. Indeed, IBM has done much over the last two to three years to make application modernization significantly easier for iSeries developers.

In short, the companies in our study realized significant business benefits by modernizing their applications, and they did so within time frames that were shorter than many industry observers might anticipate. The study participants also stated that the time and expenses associated with modernization were well worth the business benefits that they achieved. This reflects our experiences in helping our own clients. It is one more reason why we strongly recommend that eServer iSeries users should consider modernizing their applications. The benefits of doing so are tangible and achievable.

Introduction

Today, IBM eServer iSeries users are facing critical decisions about their core business applications. Among these decisions, one of the most critical is whether they should modernize their iSeries applications so that they offer features such as graphical user interfaces, Internet enablement, and integration with both iSeries and non-iSeries software. Some companies doubt that the business benefits of iSeries application modernization are worth the time and expense that they require. This report—and the study upon which it is based—demonstrates that the returns on modernization investments make them well worth the effort.

Application modernization is not a new topic for the iSeries community. For years, iSeries software vendors and customers have modernized their software to realize certain benefits. Unfortunately, little work has been done to document the business value that iSeries sites—be they ISVs or corporate development teams—are realizing from modernization projects.

To address this lack of information, Andrews Consulting Group joined with IBM to study ISVs and corporations that have modernized their iSeries applications. The primary goal of the study was to determine if iSeries development organizations are realizing significant business benefits by modernizing their software and, if so, what benefits they are realizing. We also wanted to identify the challenges that developers face during modernization projects and determine whether the resulting business benefits outweigh the time and expenses incurred during the projects.

The following report documents what Andrews Consulting Group learned from its study of development organizations. Besides presenting the study results, the report discusses the current state of iSeries application modernization and the reasons why modernization is a critical issue for developers. This discussion provides a context for understanding the study results themselves. The report finishes by discussing the consequences of the study for iSeries developers and offering recommendations for organizations that want to modernize their applications. The report also includes case studies of the organizations that participated in the study along with the observations of the study participants.

This report is only a first step in addressing the needs of iSeries developers for solid information about the benefits of modernization. As a first step, however, it demonstrates that application modernization projects can deliver significant business value and should be given serious consideration by iSeries development teams and customers.

Understanding iSeries Application Modernization

Application modernization has become a critical issue for IBM eServer iSeries developers for a very simple reason. Today, hundreds of millions of lines of application code are running on AS/400 and iSeries servers around the world. While this code works perfectly well, it was written using programming tools that were originally designed over 15 years ago. This limits its ability to support the new technological capabilities that users have come to expect without some effort to modernize it.

In this context, we define modernization as the enhancement, conversion, or rewriting of iSeries applications to include new technological capabilities that did not exist when the applications were originally developed. Modernization can take many forms. It may involve adding graphical interfaces to character-based applications, breaking up monolithic RPG applications into more flexible modules, or converting programs to other languages that offer new capabilities. Depending on their needs, development teams can undertake some forms of modernization while skipping others. They can also use a variety of modernization tools, techniques, and services. More often than not, however, they will probably use open standards and technologies that include Java, XML, and Web services. In almost all

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Why Is Application Modernization Necessary?

When IBM shipped the predecessor to the iSeries product family—the AS/400 server—in 1988, computer users had very different needs than they do today. At the time, technologies that everyone takes for granted today such as the Internet, graphical user interfaces, and desktop productivity applications did not exist or were just emerging from laboratories. For users of that era, computers were seen as repositories for operational data and generators of reports. This led companies to choose IT systems that provided these services at the lowest cost and with the greatest ease and efficiency.

The AS/400 servers of the late 1980s had unique advantages that enabled them to meet these requirements in a superior manner. They came with a highly integrated, native programming environment that included procedural languages such as RPG, a comprehensive toolset for designing and testing applications, a runtime engine, and a robust database management system. The integration between these components enabled developers to create applications quickly. It also let them do so without having to deal with non-development issues, such as memory and storage management, that programmers on other systems normally have to consider. These advantages made the native programming environment highly popular among developers. In response, IBM continued to support and enhance the environment not only on AS/400 servers, but also on its iSeries servers and the new eServer i5 platform.

For more than 15 years, commercial and corporate developers have used the native programming environment to create hundreds of thousands of applications. They continue to do so because the platform remains a highly productive one that is well suited for many functions. Over the last several years, however, customer requirements for all applications have changed dramatically. Among those requirements, the following ones are mentioned most frequently.

EUR Systems
A Modernization Case Study

For over 40 years, EUR Systems has provided innovative billing solutions and business process outsourcing services to its clients. Its solutions portfolio includes Aptis™, a comprehensive suite of iSeries applications for end-user billing and revenue management.

In 1999, EUR Systems decided to create a browser-based graphical user interface for Aptis that would provide all of the rich functions found in the solution's 5250 screens. As Bryan Baxter, Associate Vice President of Development, explains, "We knew that if we modernized our interfaces, we could sell our solution to companies that would not consider a 'green screen' product. That gave us the impetus we needed to go forward." In addition, the development team wanted to make Aptis easier to integrate with the many customer service and order management solutions that its clients use.

To achieve both objectives, EUR Systems developed a presentation layer for Aptis that uses JavaScript, JavaBeans, JavaServer Pages, and servlets to create highly dynamic browser interfaces. The company also hired a human factors consultant to ensure that the interfaces were intuitive and easy to navigate. The new interfaces communicate with the back-end RPG business logic via a controller program composed of Java servlets and JavaBeans. As Baxter points out, "The architecture provides a consistent set of programming interfaces that our clients' other systems can easily invoke."

Now that is has modernized Aptis, EUR Systems is realizing the benefits that it sought back in 1999. "When we delivered the first graphical interfaces, our prospect list immediately became thicker and our sales teams found it easier to convert those prospects into clients," states Baxter. "We also reduced the average time that it took to integrate Aptis with other applications from one year—which is typical for integration projects in our industry—to around three months." In addition, the company discovered that users of its graphical interfaces required less training and help desk support than users of its 5250 screens.

Taken together, these benefits have provided EUR Systems with a solid return on its modernization investment. As Baxter says, "While we ran into some roadblocks along the way, the effort was well worth it. We now have a competitive advantage that allows us to expand our client base and rapidly deliver innovative new services." ◆

- *Modern methods of user access.* Today, organizations expect their applications not only to offer graphical user interfaces, but also to be accessible from different interfaces and devices. Applications often must provide access via Web browsers, Web portals, and desktop productivity applications such as Microsoft Office. In addition, they may need to be accessible via mobile and pervasive clients such as cell phones and personal digital assistants. To meet such diverse access requirements, applications must be constructed so that the presentation logic is separate from the back-end business logic. While current releases of the iSeries' native programming environment support such separation, many older applications still keep these logic layers together as a single entity. These applications are usually accessed via character-based 5250 screens rather than graphical interfaces. Developers must use newer tools and technologies to add graphical presentation layers to such applications.

- *Seamless integration with non-iSeries applications.* In today's global electronic economy, it has become increasingly necessary for business applications to communicate with software running not only on other servers and other operating systems, but also at other companies. This explosion of application-to-application communication has spurred the creation of development technologies such as Java and XML that are optimized for computing across networks. These technologies have become industry standards that most organizations use to integrate their applications with those of other companies. Unfortunately, many organizations do not know how to integrate traditional iSeries applications with non-iSeries applications. Indeed, integration is often only possible if the iSeries applications include programming interfaces written in commonly used languages. Many iSeries applications lack such programming interfaces.

- *Flexible hosting options.* In addition, growing numbers of ISVs want their applications to be portable to multiple hardware platforms and operating environments. They seek portability because it makes it easier for them to sell their solutions to both iSeries and non-iSeries customers. Since traditional iSeries applications lack portability, conversion to another language is necessary to achieve this quality.

In short, while IBM has done much to enhance the native programming environment over the years, that environment cannot support all of the technologies that are needed to meet requirements such as those listed above. However, this does not mean that the iSeries itself does not support these technologies. It does, as IBM has integrated these technologies into the iSeries architecture. IBM has also provided the means for developers to integrate these technologies into applications that were developed via the native programming environment. This is why application modernization is a viable option for iSeries users.

What IBM is Doing to Support Application Modernization

Over the last two to three years, IBM has done much to make application modernization easier for developers. Perhaps most importantly, the company has integrated its WebSphere middleware and development tools with the iSeries' native programming environment. As part of the effort, IBM created tools that automate many aspects of the modernization process, such as the conversion of 5250 screens into graphical interfaces. As a result, iSeries developers can now use WebSphere products not only to create new code, but also to modernize existing code.

Over the last two to three years, IBM has done much to make application modernization easier for developers.

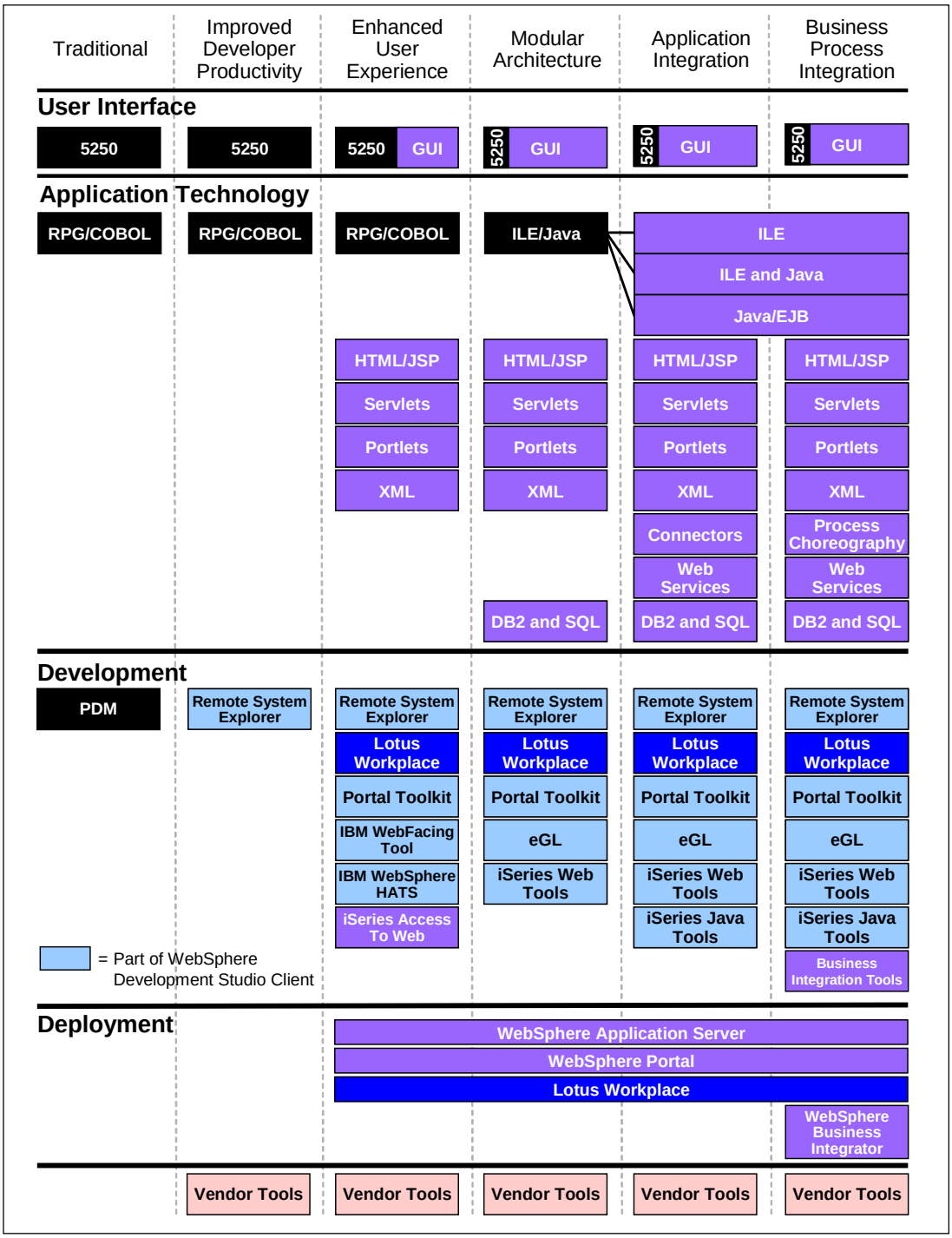
In addition, IBM has created the iSeries Developer Roadmap, which is a framework for modernizing iSeries applications that presents the technology options, development processes, and IBM tools that are available to developers. The diagram on the next page offers a graphical representation of the roadmap and the five stages of modernization that it covers: Improved Developer Productivity, Enhanced User Experience, Modular Architecture, Application Integration, and Business Process Integration.

The iSeries Developer Roadmap does not dictate that all applications should or need to achieve the Business Process Integration stage of modernization. It is offered with the understanding that developers will begin at the Improved Developer Productivity stage and then take their applications through any of the remaining stages that are relevant for them. Many applications may only require an improved user interface; others may require further modernization. The roadmap can support a variety of development choices.

The iSeries Developer Roadmap functions not only as a framework for developers, but also as a framework for IBM's educational and support offerings for modernization. IBM has identified sources for the appropriate documentation, Web-based courseware, and face-to-face training sessions for every

stage and tool within the roadmap. The company also offers technical support through its developerWorks Web site, its PartnerWorld for Developers program for commercial developers, and its Innovation Centers for in-depth modernization assistance. Taken together, these offerings provide much if not all of the help that iSeries developers need to succeed in their modernization projects.

IBM's iSeries Developer Roadmap



A Study of iSeries Application Modernization

While IBM offers considerable support for iSeries application modernization, many software vendors and iSeries customers question whether modernization provides adequate business benefits to justify the effort. With this question in mind, IBM asked Andrews Consulting Group to study organizations that have modernized their applications and to document the levels of success they achieved by modernizing their applications.

To recruit organizations for the study, Andrews Consulting Group and IBM contacted iSeries software vendors and customers that have modernized their applications and asked them if they would be willing to take part in the study. Those who volunteered were asked to provide at least one senior manager to take part in an extensive interview.

The following pages provide findings from the seven organizations—six iSeries software vendors and one iSeries customer—that agreed to participate in the study. While the responses of seven study subjects do not constitute a sample that has strict statistical validity, Andrews Consulting Group believes their experiences are representative of most firms that have modernized. We base this belief on dozens of engagements in which we have helped other iSeries development organizations modernize their applications. Much of what we learned in those projects confirms the reports of the study participants.

Business Benefits Realized

When the study participants decided to modernize their iSeries applications, they did so for two main reasons. First, most of the study participants (six out of seven) wanted to improve the integration of their software with other applications and with new technologies, especially those running on Windows and Unix systems. Second most of the software vendors (five out of six) modernized to make their applications more attractive to customers and to expand into new markets.

The Fashion Institute of Design & Merchandising
A Modernization Case Study

For over 30 years, the California-based Fashion Institute of Design & Merchandising (FIDM) has prepared thousands of students for careers in the apparel, retail, and product design industries. For most of those years, the college has relied on the iSeries and its predecessors to support its operational systems. That included a student registration system made up of 300 RPG programs and dozens of 5250 interfaces that only FIDM's staff could navigate.

While the registration system was a perfectly good one, FIDM knew that it needed improvement. As Roxanne Reynolds-Lair, the college's CIO, explains, "Every quarter, our students had to wait in long lines to register for classes with the help of our staff. By Web-enabling the system and letting students register themselves, we could eliminate those lines and free up our employees for more important work." The college also had a vision for extending other services to students via the Web such as payment processing and e-learning.

After evaluating several options for modernizing the student registration system, FIDM decided to replace its 5250 screens with Web interfaces based on HTML, XML, and Java. Each browser session communicates with the systems' RPG modules via a controller program that utilizes Java Struts servlets. Many of the technologies for the modernization project came from IBM's Toolbox for Java and WebSphere Development Studio for iSeries.

When the student registration Web site went live for the fall quarter of 2003, the benefits of the modernization effort became rapidly apparent. "We saw an immediate boost in student satisfaction with the entire registration process," states Reynolds-Lair. "We also saved five person-days of staff time per quarter. Moreover, we realized other benefits that we had not anticipated. For instance, we found it easier to hire and retain developers because we offered an environment where they could expand their skills by working on interesting projects."

It is likely that such projects will be a regular part of FIDM's development efforts for some time to come. As Reynolds-Lair describes it, "We have already deployed a Web portal that will extend a growing body of personalized services to our students. This will enable us to support a learning experience that is just as cutting-edge as the fashion and design industries that we serve." ◆

> ***"Prospective customers look at our graphical interfaces and are immediately more receptive to our solution than they were in the past. As a result, we are now receiving four times the number of inquiries from prospects than we received before we modernized."***
>
> Don Savoie, Director of Technology
> Lavender & Wyatt Systems

These two motivations had a definite influence on the business benefits that the study participants reported. The following paragraphs list the reported benefits by order of mention, with the most mentioned benefits appearing first.

- *Improved integration levels with other applications.* Among the six participants who sought this benefit through modernization, all of them reported improved integration levels. This allowed the participants to realize other benefits for their customers or end users, such as streamlined business processes. An example of such streamlining came from Roxanne Reynolds-Lair, CIO of the Fashion Institute of Design and Merchandising, a California-based college. As Reynolds-Lair related, "In the past, prospective students filled out a request for admission on our Web site, but our staff had to print out the request and rekey it into our admissions system. By modernizing our applications, we were able to integrate the Web-based request form with our admissions system. This reduced the time that it took to respond to a request from eight hours to two hours. It has also saved our staff around six hours per day of clerical time spent on inquiry processing."

- *Increased opportunities to acquire new customers and expand markets.* Among the five software vendors who modernized so that they could make their applications more attractive to potential customers, four reported that they had achieved it to some degree. The remaining vendor had not yet shipped its modernized product, but projected that its universe of prospects will expand many times when it does. The participants' reports ranged from increases in requests for proposals to growth in the number of sales engagements. For instance, Don Savoie, Director of Technology for Lavender & Wyatt Systems, reported, "Prospective customers look at our

CommercialWare
A Modernization Case Study

When a shopper calls a catalog retailer to order an item, chances are good that the customer service representative on the other end is placing the order with an iSeries solution from CommercialWare. That solution, CWDirect™, is one of the leading software products for order management and fulfillment among cross-channel retailers.

While CommercialWare is proud to run CWDirect on the iSeries, it works closely with clients who want other hosting options. As Jane Cannon, Vice President of Research and Development, explains, "Many of our customers rely on Unix servers and have little in the way of RPG skills. We could significantly expand the customer base for CWDirect by offering a Java version that runs on Unix platforms such as IBM's pSeries. A move to Java would also make it easier for our clients to customize CWDirect and integrate it with their other systems."

In its quest to convert CWDirect to Java, CommercialWare faced a challenge. Years ago, it used Synon/2E to automate the solution's design and development. Normally, Synon/2E generates RPG code that is extremely difficult for developers to read or modify. However, CommercialWare found ways to make Synon/2E generate code that was easier to understand and rewrite. That enabled the development team to rewrite the solution's application programming interfaces (APIs) in Java, then move on to the back-end business logic.

Though it will take two years to rewrite all of CWDirect in Java, CommercialWare is already reaping benefits from the effort. As Cannon describes it, "By rewriting the APIs in Java, we were able to standardize the integration points between CWDirect and our other solutions, not to mention the way we pass data between applications. That has enabled us to reduce the development and testing hours required for API maintenance by 50 percent. Better yet, we are winning more customers over to CWDirect because they find it easier to integrate it with other applications using the development skills they have." As Cannon looks to the future, she sees even more benefits on the horizon. "Once we have a portable version of CWDirect, we are confident that we can increase our client base by 30 to 40 percent." ◆

graphical interfaces and are immediately more receptive to our solution than they were in the past. As a result, we are now receiving four times the number of inquiries from prospects than we received before we modernized."

- *Increased sales effectiveness.* There was a consensus among four of the software vendors in the study that modernization had improved their sales effectiveness. This manifested itself either as an increase in sales of the modernized applications or as the maintenance of sales levels that were in danger of declining if the vendor did not modernize its products. One study participant that reported sales growth was L.D. Consulting, a Belgium-based firm whose founder Ludo Dierckx stated, "By modernizing our software and creating an architecture for modernizing our client's applications, our active client base has tripled in the last two years." On a similar note, Lane Nelson, President of HarrisData, asserted, "We have found that it is easier to sell our modernized applications to customers because we can demonstrate how our solutions integrate with other Web-based applications and with Microsoft Office. Indeed, I estimate that 90 percent of our sales for the last year would never have closed were it not for our modernization effort."

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> L.D. Consulting

- *An improved competitive standing versus alternative solutions.* Three of the software vendors also reported that modernization had improved their competitive edge versus other products. Part of this improvement was due to the addition of graphical interfaces. This not only improved the "look and feel" of the applications, but also allowed some vendors to offer their solutions at a lower overall cost. This occurred because the applications could run on the iSeries without requiring the added expense of 5250 workload support. As Bryan Baxter, Associate Vice President at EUR Systems, explained, "Our modernization effort enabled us to offer Aptis on the iSeries Standard Edition servers rather than the Enterprise Edition models. That significantly reduces the prices that we can quote in our proposals to prospective customers."

- *Reduced costs to train and support users.* By migrating from 5250 screens to graphical interfaces, three of the software vendors reported that either they or their customers realized reduced user training and support costs. Much of this was due to the fact that the graphical interfaces were easier for the users to understand. For instance, Savoie at Lavender & Wyatt Systems reported, "Our customers often had to do follow-up trainings with end users to make sure that they understood our software. Now, they can train users in half the time that was required on the 5250 screens." Reduced training costs can translate into lower service charges to customers and increased customer satisfaction, as HarrisData's Nelson noted. "By modernizing our user interfaces, we have reduced the time that we spend training our customers, and that translates into reduced service charges for them. Indeed, we have reduced service charges to just 10 percent of our revenues in an industry where services can easily amount to half of all revenues."

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>
> Lane Nelson, President
> HarrisData

While the study participants achieved many of the benefits that they sought through modernization, they also realized other benefits that were not part of their original objectives. The following paragraphs describe these ancillary benefits and list them by order of mention.

- *Reductions in the time or expenses required to recruit developers.* Since they modernized, four of the study participants have found it easier to recruit developers. The participants realized this benefit because they could hire from growing communities of younger developers with skills in Java and other modern languages. As Reynolds-Lair of FIDM noted, "Before we modernized, we had to hire employment agencies to find and recruit RPG developers. Those firms typically charged us as much as a quarter of the programmer's annual salary for the service. Now, we simply post ads for Java developers on the Web and get responses in a few days. Over the last year, I estimate that we have saved $100,000 in recruitment charges alone."

- *Increased developer productivity and code maintainability.* Four of the study participants reported that while their developers' overall productivity did not necessarily increase, it did improve in selected areas. Among those areas, the one that stood out was the development and maintenance of application programming interfaces (APIs). This is understandable, as many modernization projects lead organizations to consolidate and standardize their APIs. Once they complete this process, they often find it easier to integrate and customize their applications. Jane Cannon, Vice President of Research and Development at CommercialWare, made this point when she commented, "By rewriting the APIs in Java, we were able to standardize the integration points between CWDirect and our other solutions, not to mention the way we pass data between applications. That has enabled us to reduce the development and testing hours required for API maintenance by 50 percent."

- *Increased revenues and reduced expenses.* IBM has long contended that when companies let their customers, business partners, and employees access applications via the Web, they may realize additional revenues and cut operational expenses. Two of the study participants said that by Web-enabling their applications as part of a modernization project, they or their customers realized this benefit. Among them was HarrisData's Nelson who related, "One of our customers extended our applications via the Web to its preferred suppliers so that they could collaborate on sales forecasts and inventory levels. By doing this with just one of its biggest suppliers, our customer was able to reduce its raw material inventories by 35 percent and defer breaking ground on a new warehouse. That netted huge savings and made them one very satisfied customer."

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L.D. Consulting
A Modernization Case Study

For over a decade, L.D. Consulting has provided packaged software and application development services to industrial and environmental firms in Europe's Benelux countries. From the day that he founded the company, Ludo Dierckx bet his business on IBM's iSeries server. In the late 1990s, however, he began to wonder whether he could retain his clients if he continued to develop traditional iSeries solutions with 5250 interfaces.

"Our customers were demanding intuitive, graphical interfaces that could bring more data to their desktops," explains Dierckx. "They were not just asking for attractive screens. They wanted our solutions to integrate easily with external data sources and with front-office applications running on Microsoft Windows. At the same time, they wanted any application changes to be seamless and painless."

With these requirements in mind, Dierckx and his management team decided not only to modernize their own iSeries applications, but also to create an architecture for modernizing the RPG applications of their clients. This led to the creation of the Java WorkFlow Design Framework (JAWFLOW). According to Wim Van Leuven, L.D. Consulting's Director of Research and Development, "While JAWFLOW maintains an application's business logic in ILE RPG modules, it replaces the 5250 screens with a presentation layer that uses technologies such as the Swing toolkit, JavaServer Pages, and JavaServer Faces. A Java-based controller manages interactions between the presentation layer and the RPG modules. The controller also enables robust yet simple integrations with non-iSeries data sources and applications."

In recent months, L.D. Consulting has used JAWFLOW to modernize its packaged software and tools, its clients' applications, and those of other IBM Business Partners. To the great satisfaction of Dierckx, the architecture has gained a following in the Benelux region. "Our customer base has increased substantially since we announced our architecture. While our workloads have increased, we are meeting our development deadlines and increasing our code quality. Because JAWFLOW promotes the reuse of existing components, our team is at least 25 percent more productive than it was under the old system of development." What pleases Dierckx the most, however, is something that the new architecture allows him to do. "Five years ago, I wondered whether L.D. Consulting had a future. Now that it does, I can pass it on to a young and ambitious management team." ◆

- *Opportunities to provide modernization services to other organizations.* Some solutions providers who modernize their applications may find themselves fielding requests for modernization help from other firms. Indeed, two of the software vendors in the study said this has happened to them, and that they are offering or planning to offer modernization services. L.D. Consulting's Dierckx remarked, "By creating the JAWFLOW framework for modernization, we were able not only to modernize our own applications, but those of our clients and other IBM Business Partners." On a similar note, Gary Barnes, Vice President of Technology at Butler & Curless Associates, stated, "A number of RPG application vendors have taken a keen interest in our Java conversion effort. We expect that after we ship the Java version of ec21, many of them will ask us to help them convert their applications to Java as well."

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Roxanne Reynolds-Lair, CIO
Fashion Institute of Design & Merchandizing

- *Reduced costs to host applications.* By modernizing their applications, organizations may reduce the costs of hosting those applications in several ways. First, if they eliminate 5250 screens, they may be able to run the applications on an iSeries Standard Edition rather than a more expensive Enterprise Edition that supports 5250 workloads. Second, if they make the application portable to another operating system, they can run it on hardware environments that may be less expensive than an OS/400 partition. This could include an iSeries Linux partition or an Integrated xSeries server. In addition, end users may require less support because the graphical interfaces are easier to understand. Two of the study participants reported that one or more of these factors would, over time, allow them to reduce costs for providing their applications to customers as hosted services.

While the above business benefits received mentions by multiple study participants, several other benefits received single mentions. A broader study might reveal that these benefits are realized in many modernization projects. The benefits included:

- Improvements in developer satisfaction levels
- Improvements in developer retention rates
- Increased end user productivity
- Increased customer retention rates (i.e., among software vendors who modernize their products)
- Improvements in code quality
- Increased ease of software deployment

Regardless of the business benefits that the study participants reported, it was clear that each of them realized not only the benefits that they originally sought, but also others that they did not seek or even anticipate. In short, modernization projects may often set off a chain of cascading benefits throughout a company's operations. Organizations that understand this may be able to leverage more from their modernization projects than those that do not.

Time Required to Realize Benefits

The study participants were also asked how long it took them to realize business benefits after they had completed their modernization projects. Surprisingly, many of them said that they realized certain benefits almost immediately. One such immediate benefit was a growth in the number of sales opportunities from prospective customers. Of the four software vendors who reported that they had realized this benefit, three of them stated that they had more sales prospects as soon as they started demonstrating their modernized applications. Their general experience was that the graphical interfaces and improved functionality of the applications created immediate responses from prospects. The responses usually took the forms of requests for proposals or a sales call.

Another benefit that most participants realized immediately was an improvement in integration levels between their applications. Since most of the participants rearchitected their code bases as they added graphical interfaces to their software, they had many opportunities to make their code more modular, flexible, and easy to integrate with other applications. If the participants had not rearchitected their code to the extent they did, they may not have realized this benefit as quickly or as frequently as they reported.

While the study participants realized increased sales opportunities and software integration levels almost immediately, it typically took 6 to 18 months to realize other business benefits. These included the following benefits.

- *Reduced costs to train and support users.* In several cases, the participants found that while they saved money overall on user training and support, they initially had to spend more time and money retraining users of 5250 applications on the new graphical interfaces. Once the retraining was completed, however, additional training and support costs declined. This usually happened within 6 to 12 months.

- *Reductions in the time or expenses required to recruit developers.* Most of the organizations required several months to determine what kinds of skills they needed and how to acquire them. Once they had done so, however, the recruiting process became significantly easier.

- *Increased developer productivity and code maintainability.* This is one benefit that took a longer time—typically more than a year—for most participants to achieve. Much of this delay was due to the time that it took developers to become proficient in new languages and technologies. In addition, several participants had to learn new ways of managing development projects and adopt new tools to aid in the management process. Their experience indicates that most development teams should plan for a period of reduced productivity after they embark on their first modernization projects.

Challenges Encountered During Modernization

While all of the study participants stated that the benefits from their modernization projects more than justified the required effort, they did encounter business and technical challenges along the way. For instance, four out of seven participants faced challenges getting their developers to become productive with new tools and technologies. Three out of seven felt that modernization expenses were a challenge in and of themselves. All of the participants cited some challenge that involved the added time, complexity, or costs associated with modernization.

Over the course of the interviews, it became clear that all of these challenges had their root in a deeper challenge. Historically, iSeries development teams have enjoyed a single, integrated environment for developing and running applications.

Lavender & Wyatt Systems, Inc.
A Modernization Case Study

As a leading provider of software that helps behavioral healthcare companies manage their businesses, Lavender & Wyatt Systems provides solutions that offices with limited IT budgets and expertise can easily manage. That made the software vendor highly interested in modernizing Essentia™—its information management solution—to meet the unique needs of its customers.

"As we talked with our customers, it became clear that they needed more intuitive user interfaces that would require less administrative overhead than 5250 screens," explains Don Savoie, Director of Technology for Lavender & Wyatt. "We also learned that we could reach many more customers if we could offer Essentia on Intel-based xSeries servers as well as on the iSeries. That convinced us to start down the modernization path five years ago."

To provide customers with the graphical interfaces they needed, Lavender & Wyatt initially converted its existing 5250 screens to browser-based interfaces with a third-party product. It is now using IBM's WebSphere Development Studio to rewrite the interfaces as JavaServer Pages (JSPs) that offer greater flexibility and functionality. The interfaces communicate via Java-based controller programs with Essentia's back-end RPG and DDS applications using DB/2. In addition, Lavender & Wyatt is rewriting its RPG and DDS applications as JavaBeans, Java servlets, and SQL routines. According to Savoie, "The conversion effort should allow us to offer Essentia running on IBM's Intel-based xSeries in two years."

Lavender & Wyatt's modernization effort has already netted substantial benefits for the company and its customers. As Savoie recounts, "Our customers often had to do follow-up trainings with end users to make sure that they understood our software. Now, they can train users in half the time that was required on the 5250 screens." Just as importantly, the solutions provider knows that it can continue to delight its existing customers while acquiring new ones. "Our customers are always looking for ways to enhance their services and expand their businesses. With the help of the modernization technologies on the iSeries, we can help them grow their businesses and ours as well." ◆

They have also received integrated support from IBM. Once development teams begin to modernize their applications, they often find themselves working with development and runtime environments that are loosely integrated and run across multiple operating systems and servers. They may also have to get support from multiple groups within IBM and sometimes from other vendors and organizations.

This switch from a single, integrated environment to a heterogeneous, "some integration required" environment may increase the time required to define objectives, learn new skills, resolve problems, and manage projects. The study participants had to negotiate their way through this new environment, make mistakes along the way, and incur some unexpected costs and time burdens. Fortunately, this is a support issue that IBM is addressing. Recently, for instance, the iSeries Division took responsibility for providing technical support to iSeries customers who need help using WebSphere Application Server Express.

For two out of the six software vendors in the study, another challenge was the apathy or resistance of their current customers towards the modernized applications. While prospective customers find modernized applications more appealing because of their graphical interfaces, some existing customers may prefer 5250 interfaces because their end users are familiar with them. Other customers may resist modernized applications because of concerns over business disruptions, or because they do not want to pay for software upgrades or user retraining. As a consequence, some software vendors may need to support two code bases for the same applications over a period of years. In our experience, however, vendors can often overcome this challenge by collaborating with their customers before they modernize their interfaces. Such collaboration can often secure the enthusiastic support of most users.

Because of the above challenges, five of the seven study participants felt that their development teams were either no more productive than they were before modernization or that they might be slightly less productive. It should be noted, however, that some of these study participants found their teams were more productive on specific tasks such as API maintenance. In addition, three participants stated that they either had realized overall productivity gains or anticipated doing so in the near future. This indicates that while many organizations may find it a challenge to retain productivity in a modernized development environment, it is a challenge that can be overcome.

HarrisData
A Modernization Case Study

Years ago, HarrisData decided to focus on providing core business software to mid-sized organizations. It also decided to deliver those solutions exclusively on IBM's iSeries server. One of the reasons it did so was because it wanted its applications to be easy to service and support. That objective also played a significant role in the Wisconsin-based firm's modernization plans.

"Mid-sized companies do not want to spend lots of money on software customization projects," states Lane Nelson, President of HarrisData. "They also hate big bills for end user training and help desk support. We started an application modernization process back in the 1990s so that we could reduce the time we spend on such services and minimize their financial impact on our customers. Our goals were to make our customers happier and improve our ability to retain them."

To reduce the effort required to customize its applications, HarrisData's development team used ILE RPG to modularize its code base and create consistent interfaces to all of its business logic. This allows the team to modify the logic with fewer lines of code and with higher code reuse rates. To reduce end-user training and support costs, the company replaced its 5250 screens with dynamic browser-based interfaces. The screens were developed with IBM's Net.Data, a scripting language that comes packaged with every iSeries server. Compared to 5250 screens, most end users find it easier to understand and work with browser-based interfaces.

HarrisData's modernization campaign has helped the company realize a growing list of benefits. As Nelson notes, "Because our applications are easier to customize and support, our fees for services now make up less than 10 percent of our revenues. Our customers are happier because of it. In fact, customer retention rates have consistently been over 95 percent since we started the modernization effort." In addition, HarrisData has enabled its customers to realize a benefit of their own. "Many of our users are extending our applications via the Web to their own customers and business partners. I am hearing more stories about how our customers reduced costs or retained an important account because they could offer that kind of real-time access. It's good to know that we are enabling that, because when our customers win, we win." ◆

While many iSeries developers voice concerns about the performance, stability, or security of modernized applications, the study participants had relatively minor concerns about these areas. In each area, only one or two of the participants faced any challenge during their modernization efforts. They usually overcame the challenges well before their deployment dates and did so with relative ease. On the whole, the participants found the overall complexity of the modernization effort was a greater challenge than these particular concerns.

In closing, it should be noted that most of the study participants embarked on their modernization efforts before IBM created the iSeries Developer Roadmap. Several of them mentioned this fact and acknowledged that their "early adopter" status probably posed additional challenges for them. That is a fair assessment that leads us to believe that most iSeries owners who are modernizing today face fewer challenges than the study participants did.

Benefits Realized Versus Challenges Encountered

Though the study participants faced challenges during their modernization projects, they all agreed that the end results more than justified the time and money that they put into their efforts. Among the software vendors in the study, modernization was widely seen as necessary to expand the customer base and ensure long-term business survival. As HarrisData's Nelson observed, "We view modernization efforts as critical to maintaining a healthy and profitable relationship with our customers. In addition, modernized software offers new market opportunities and functionality for prospective customers."

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It should be noted that none of the study participants has performed a formal study of the return on investment that it is receiving from application modernization. However, since all of the study participants agreed that their modernization projects are paying for themselves, we can safely conclude that many of them have realized significant returns on investment from their efforts. In addition, our own experience with clients confirms that when applications are modernized to achieve the types of business benefits discussed earlier, returns on investment can be substantial.

Final Thoughts

When one studies a topic as complex as the modernization of IBM eServer iSeries applications, it can be dangerous to draw sweeping conclusions about the results of the study. Application modernization projects vary widely in their objectives, scope, and the technologies used. Indeed, as the case studies in this report show, there were considerable differences in the modernization projects of the seven development organizations that we studied. Despite these differences, however, the seven study subjects strongly agreed about the benefits, challenges, and the overall value of modernization. This consensus among otherwise different organizations was striking, and it indicates that it is possible to draw conclusions about some aspects of iSeries application modernization. Here are the four conclusions that Andrews Consulting Group draws from the study.

- First, development teams that modernize their iSeries applications have a high likelihood of realizing significant business benefits. This is particularly the case for organizations that want to improve the integration of their iSeries applications with other systems and new technologies. In addition, software vendors that modernize in order to make their applications more attractive to a broader market or to reduce training and support costs are likely to realize these objectives.

- Second, in many cases, organizations that modernize their applications can realize additional benefits besides the ones that motivated them to modernize in the first place. They may often find it easier or less expensive to recruit developers. They may also realize improvements in code maintainability

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and reduced times to perform certain development tasks. Over time, modernized applications may also enable organizations to reduce expenses and increase revenues. Such benefits may often be realized when modernized applications reduce the number of manual steps in business processes or enable customers and business partners to access the applications via the Web.

- Third, while it may take several months for organizations to realize some of the business benefits from application modernization, they may often realize other benefits almost instantly. This is particularly true of business benefits that arise from improved application integration levels, as such improvements can almost immediately reduce operational costs and turnaround times. In addition, software vendors who modernize their user interfaces may see immediate improvements in the number of sales inquiries and requests for proposal that they receive from prospects. By contrast, benefits such as reduced training and support costs, greater ease in recruiting developers, and increased developer productivity may take 6 to 18 months to realize.

- Finally, while the business benefits of application modernization are real, the challenges of modernization can be just as tangible. Development organizations should realize that iSeries application modernization often involves a transition from a single, highly integrated development environment to one that is heterogeneous and loosely integrated in places. This makes it necessary for developers to not only learn new tools and programming methodologies, but also to learn how to solve more complex problems with multiple sources of technical support. While these challenges are far from trivial, they are manageable with the right approach and with guidance from other organizations that have experience in application modernization.

Butler & Curless Associates
A Modernization Case Study

Years before IBM announced the AS/400-iSeries, Butler & Curless Associates was developing software and services for the wholesale distribution market. Today, the company provides ec21™—its integrated suite of operational and financial management applications—to distributors worldwide.

While the solutions provider has a long history of serving distributors, it was not content to rest on its past achievements. As John Butler, President and cofounder of the company, puts it, "We intend to expand our market by an order of magnitude. While the iSeries is a great server that we will always support, we realized that we could more easily get that kind of growth by offering ec21 on multiple hardware platforms." This realization led the firm to explore ways to convert its RPG applications to a pure Java code base. According to Gary Barnes, Vice President of Technology, there was more than one reason to take the all-Java route. "Besides gaining platform independence, we wanted to integrate ec21 with new technologies and with applications running on other platforms. We knew that Java would give us the greatest flexibility to do that."

To achieve its objectives, the software vendor turned to TransTOOLs, a provider of Java tools and services, to convert the ec21 code base to Java. At present, Butler & Curless Associates is testing the converted code on the iSeries and finding that it performs very well. "While we have not yet shipped the code to our customers, we have already realized two benefits from the conversion," comments Barnes. "First, we are finding it easier to recruit new developers, as Java is what universities are training their students. Second, we are accelerating our work to integrate ec21 with the applications that most of our customers use. For instance, the converted code supports the creation and emailing of product quotes within Microsoft Outlook."

When the Java version of ec21 ships in early 2005, Butler & Curless Associates is confident that it will win over new clients that would never have considered the software vendor in the past. As Butler states, "We are betting our business on this modernization effort. From what we know of our market, however, this is a bet that we are confident we will win." ◆

Recommendations for Prospective Modernizers

As the last conclusion indicates, the preparations that development organizations make before they begin a modernization project are critical to the level of success that they realize. With that in mind, Andrews Consulting Group asked the study participants what steps iSeries developers should take to maximize the benefits of application modernization while minimizing its challenges. While we received a wide variety of answers, several common themes emerged. The following paragraphs reflect those themes as well as our experiences from working with our own clients.

- *Base your projects on user requirements.* Every modernization project presents an opportunity to listen to users—be they customers, business partners, or employees—to understand what they need to do their jobs better. When those needs are defined, prioritized, and built into modernization projects, the users will support the projects even when they encounter challenges. At the same time, development teams should not attempt to fit every user request into a modernization project. We will say more about this point later.

- *Get active support for the project up and down the chain of command.* Application modernization projects can create significant disruptions to the way that businesses run. Since disruptions are inevitable, development teams should work closely with corporate management to gain their support for the changes that need to be made. As Savoie at Lavender & Wyatt Systems advises, "Be sure to get 'buy in' from every key person in the company. Explain to them what you are doing in detail. Share the budget and project plans with them. If you miss deadlines or run over budget, let them know right away and present a plan to address the problems." Such actions can often make the difference between a canceled project and one that is successfully completed.

- *Prioritize modernization requirements and work on the ones that deliver the greatest benefit.* When a development team takes its first steps towards application modernization, the higher risks of those first steps make it imperative that they aim for higher rewards. To put it in the words of HarrisData's Nelson, "Companies should clearly define what business benefits they intend to achieve through each modernization project, then focus their efforts on projects that will create the greatest return in the shortest time." Organizations should defer longer projects and those with less clearly defined benefits until they complete those projects that are shorter and yield greater value.

- *Take advantage of the tools that ship with the iSeries.* Over the last several years, IBM has integrated many modernization tools and technologies into the iSeries platform. These include the Remote System Explorer, WebSphere Development Studio for iSeries, IBM Toolbox for Java, iSeries Access for Web, and the XML Toolkit for iSeries, among others. As Dierckx of L.D. Consulting says, "Do not ignore the excellent technologies that are already on the iSeries, as they can help you keep costs down and are often easier to learn than other tools."

"Companies should clearly define what business benefits they intend to achieve through each modernization project, then focus their efforts on projects that will create the greatest return in the shortest time."

Lane Nelson, President
HarrisData

- *Use outside experts and senior developers to guide the rest of the team.* When organizations embark on their first modernization projects, they usually face significant learning curves on new technologies. Overcoming those learning curves often requires help from outside firms that have expertise in the new technologies and are willing to cross-train internal developers. This is what Barnes of Butler & Curless Associates says on this topic. "When you start to modernize, you have to understand that you are no longer working in your father's development environment. Do not attempt to tackle it on your own. Find experienced resources to help you get up to speed on it." At the same time, organizations should not discount the knowledge of their senior developers. These individuals have the deepest understanding of the existing applications and the organization's business processes. It is best to pair them up with outside experts, have them jointly decide how to achieve modernization objectives, and then ask them to educate the rest of the development team.

- *Build a diverse technical support network.* In many or even most modernization projects, development teams will not be able to get all the technical support they need from IBM's

iSeries Division alone. They will need to find other sources of support that encompass all of the new technologies that they bring to their projects. As Lavender & Wyatt's Savoie puts it, "Get all of the necessary groups within IBM to back you on your project, then make sure that you can get help from them if you need it. Quite often the support is available, but you still need to find it and know how to access it."

- *Adopt an incremental approach to modernization in which the available time determines the scope.* Andrews Consulting Group has discovered in over 15 years of technology consulting that IT projects often become magnets for additional requirements that they were never intended to meet. These requirements increase the scope of work and amplify the complexity of the projects to the point where they often fail. Development teams can prevent this from happening by setting completion dates for their modernization projects *before* deciding exactly what will be done, and then tackling only the requirements that they can achieve within the deadlines. Such deadlines should generally be set no more than six months into the future. If some important requirements cannot fit within an initial project, they can always be placed in a second project with a similarly aggressive deadline. In this way, modernization becomes a series of incremental projects. This limits the time, costs, and risks of each project and allows development teams to build on their successes.

  This is one of the core recommendations of *Revolutionizing IT: The Art of Using Information Technology Effectively*, a book by David Andrews and Kenneth Johnson that describes our project management methodology. Information about the book may be found at www.riteapproach.com.

…we would encourage organizations to not debate about* whether *they should modernize their applications, but* how *and* when *they will do it.

Finally, every development organization can benefit greatly from the iSeries Developer Roadmap and the resources for each of the modernization stages that it discusses. Over the last year, IBM has refined the Roadmap so that it includes more development tools, modernization scenarios, training opportunities, and enablement offerings from IBM and third-party vendors. This makes the iSeries Developer Roadmap a critical resource for every development team. The Roadmap may be found on the Web at www.ibm.com/servers/eserver/iseries/roadmap.

The modernizing of IBM eServer iSeries applications will undoubtedly continue to be a topic for debate among developers for years to come. However, based on our study, we would encourage organizations to not debate about *whether* they should modernize their applications, but *how* and *when* they will do it.

Andrews Consulting Group

Andrews Consulting Group (ACG) has been helping organizations make effective use of information technology since 1984. Few IT service businesses have achieved as high a level of client satisfaction over an extended period of time as ACG. This success is the result of ACG's commitment to their clients' success coupled with an experienced staff of consultants who possess real-world experience as well as multidisciplinary technical skills.

ACG employs a unique approach to projects call the RITE Approach. ACG founder David Andrews is the author of a highly acclaimed book called *Revolutionizing IT: The Art of Managing Information Technology Effectively* (John Wiley and Sons, October 2002). The RITE Approach is explained in detail in the book.

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