

## System Migration: Supporting the Four Pillars of Legacy Systems Through Modernization

Don't forget what your company is built on: people, business processes, applications, and data.

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As IT executives seek to support their organizations' competitive strength and agility, the question of how to modernize legacy systems is crucial. Migration represents a strategic alternative to more superficial or limited solutions. The decision to migrate--or to implement other alternatives for modernizing an organization's systems--will have far-reaching implications for all aspects of an IT system and for the people who develop and use it. By understanding the effects of migration and other modernization alternatives on the four pillars of legacy systems--applications, processes, the database, and human capital--IT executives can more effectively choose a path that both preserves the value inherent in the legacy system and enhances the system's and organization's productivity and agility.

### The Challenges of Legacy Systems

Legacy systems present a conundrum for IT executives. On the one hand, these systems often embody an organization's primary competitive advantages--its unique methods of working with customers and partners as well as internalizing information and acting on it. They comprise an investment that the organization has invested in and built over years, perhaps decades, and are a cornerstone of the organization's business structure.

On the other hand, a legacy system inevitably becomes a liability:

- Legacy systems can increasingly limit an organization's agility and ability to compete over time.
- Legacy applications become progressively more expensive to maintain and upgrade.
- The value of legacy systems is not easily extended to new applications, interfaces, and Web Services.
- Finally, the complexity that arises from legacy applications, data sources, business processes, and programming resources can seem overwhelming and insurmountable.

Such systems were not developed to address needs an organization sees today, and as a result, they tend to limit an organization's opportunity for growth and market strength.

Organizations cannot simply replace their legacy systems, nor is this necessary. These systems are made up of workhorse machines on which a large number of business applications have been built and maintained over the decades. Their long use has created a highly valuable culture of people, business processes, applications, and data that are unique in the industry. The price of replacing them--in business disruption, lost productivity, lost intellectual capital, and hard dollars--is prohibitive.

Rather than replace these systems, the challenge for IT managers is to modernize their legacy systems in a way that not only preserves the investments made in them, but also ensures that the systems are adaptive, flexible, and cost-effective in meeting current needs. Historically, the usual

response to such challenges was to throw money at them. But in the post-dot-com era, IT budgets have been cut, the expectations of return on investments are higher, and managers must effectively balance strategic business benefit with cost concerns.

To make an application "modern" often suggests giving it a new GUI or extending it by allowing other applications to integrate to it. This alternative remains popular, although it represents a superficial and limited degree of modernization. To truly modernize an application implies using modern programming techniques that will allow the application to work with Web Services and to be aligned under a service-oriented architecture. Most solutions for achieving this level of modernization require the applications to be rewritten. It is possible, however, to modernize applications without rewriting them by using currently available solutions that can append, extend, or migrate legacy applications at the IT manager's discretion.

## The Four Pillars

As IT executives select the best modernization path, they must consider the impact on the entire structure of the legacy system. This structure includes not only the applications, but also the legacy system's database, processes, and human capital. These four elements constitute the "pillars" of the IT system and indeed of the organization. Together, they embody the system's evolved value to the organization.

Development staffs have been building and refining applications for years. They know the system inside out, and they are intimately familiar with the business processes these systems support. The user community is also used to working with these applications, and they too have familiarity with how they work and why they work that way. Like the applications, processes, and human capital, a typical legacy system's database has taken years to build and refine. Over the years, business rules and semantic dependencies have been built in at the field and table levels, and these are known to developers and users. Hence, the four pillars are interdependent, and wholesale and disruptive change can result in consequences that may cost a company dearly.

Perhaps the most underestimated effects of modernization initiatives are on the legacy system's human capital. Many companies have found, too late, that they had a great deal of investment, in terms of training and intellectual property, in their staff, which they lost when they replaced systems. Staff who are replaced take with them years of knowledge about business, business process, and business systems specific to their employer--knowledge that was more often than not locked up in the employee's head and not written down.

By modernizing its system in a way that enhances rather than destroys its human capital, the organization leverages existing human resources and extends their capability and productivity. Conversely, when systems are replaced, it takes years to replace the knowledge that has been built into legacy applications and the staff who support it.

Any modernization initiative will, ideally, modernize each of the four pillars, or, at a minimum, preserve them. By doing so, the organization preserves critical elements of all legacy assets and leverages its investment in the system, augmenting it with modern solutions. The results of modernization include not only increased productivity and responsiveness but also a shift of expenditures from maintenance to advancement and innovation in the IT system. Perhaps most important, modernization, in contrast to replacement, can be achieved through an evolutionary process, a step at a time. The transition is controlled, managed, and timed by the organization.

Migration--the process by which data, the business processes encapsulated in software applications and programs, and the underlying support are transferred from the legacy environment to a more modern computing environment--may encompass the migration of applications, resources (including files, accounts, and databases), skills, or some subset of these. Migration replatforms the legacy system while preserving current processes and business rules and, at best, permitting current developers and users to utilize and build on their existing skills. Hence, migration may constitute an organization's most strategically attractive option for preserving and enhancing the four pillars as it modernizes its legacy system.

## Paths to Modernization

IT executives planning a modernization effort should consider both how best to leverage existing assets and, equally important, how best to support future initiatives, about which they may yet know very little. The broad options for modernization are:

- To emulate the system on other systems
- To rewrite and replace the existing assets
- To scrape the display file DDS to provide a WebFaced solution
- To convert the legacy source code to Java or C#
- To convert the source code to an alternative compiler that supports familiar syntax and technique while producing modern code and applications

It is evident that the first two options are not modernization options at all. Emulation of the legacy system makes no fundamental change to the organization's situation; the application continues to run exactly as the original one and is not modernized in any way. In addition, the organization must rely on a proprietary and artificial platform, and it is made dependent on assets from the company that provides that platform. Choosing to scrap and rewrite the applications means the current assets will simply be replaced, incurring all the losses and risks noted above.

To evaluate the remaining options, it is important to consider the ways in which they each leverage and impact each of the four pillars of business: people, processes, applications, and data. In addition, it is crucial that managers consider whether a modernization path favors future development and growth. Any modernization effort must result in a system that both enhances the organization's agility and preserves the four pillars upon which the business depends. In addition, any viable option should address service-oriented architecture initiatives such as Web Services and platform integration.

Screen scraping (or "Web facing") is a method of Web-enablement that has been very popular among users seeking to make applications and data available through a graphical interface or to convert host screens to a Web-like look and feel, without altering the applications or processes. This is an expensive option that rarely returns its value. It results in the appearance without the reality of modernization. It fails to enhance the organization's human capital, as the programmers simply pass the legacy source code through a tool that creates the output. The resulting Web pages are limited in functionality and cannot be enhanced. If any changes to the application are made, all of the affected screens have to be re-scraped. Scraping has no modernizing effect on the data, which remains on the iSeries. The legacy source code and applications also remain. Only the interface is modern.

## Minding the Four Pillars

The conversion of legacy code to another modern programming language and compiler results in true modernization, yielding code that is compliant with modern programming environments and a system capable of meeting both present and future needs. The choice of path and compiler requires careful consideration. All can create sophisticated, modern business applications that can access a wide variety of database platforms, but they have various effects on the four pillars. The following are important questions to consider:

- Can migration be performed in-house, or will it necessitate outsourcing the work to developers who are unfamiliar with the organization's business?
- Will the development path allow adaptation of existing iSeries-based business functions to Web Services?
- How much control over implementation does the path allow the IT executive? Must the migration be completed all at once, or does the path permit an evolutionary process that takes place as requirements, schedule, and budget allow?
- What will be required for maintenance of the processes? Will in-house programming staff be able to perform this maintenance? (Converting your application to a modern programming language like Java or C# results in an application that will not be understood or maintainable by the staff that created the legacy application.)
- Can data remain on the iSeries? If it must be migrated to another platform, are tools available to do so? What will be the level of difficulty of this task?
- What programming languages does the compiler permit? Will the new compiler leverage the skills and knowledge of the organization's staff, or will current RPG programmers have to be retrained or replaced?
- Will the new code be easy or difficult to maintain? This will partially depend on the skills of the new or retrained programmers and on the quality of the translated code.
- Will the resulting applications possess the desired level of agility, customizability, and extensibility within the new environment?
- Will the programming environment readily accommodate the organization's applications and data access requirements?

## Modernization, Agility, and the Future

The availability of solutions to migrate legacy system components to Java, C#, or .NET-compliant offers a far superior alternative to emulation, screen scraping, and replacement of legacy systems. As information technology evolves, organizations dependent on iSeries systems will find that modernization becomes imperative. Regardless of the path they choose, carefully considering the four pillars of business--people, processes, applications, and data--will assure that they balance strategic business benefit with rational cost concerns to meet competitive pressures and enhance agility and market strength.

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