D·R·HORTON

IBM

D.R. Horton, Inc.:
Building an Infrastructure for Data Sharing and Workflow

An IDC e-business Case Study

THE SUBJECT	With 47 operating divisions—spanning 23 states—generating $3.7 billion in revenue in 2000, D.R. Horton is one of the largest homebuilders in the United States. D.R. Horton also provides mortgage and title insurance services in many of its markets.
THE GOAL	D.R. Horton aims to streamline its internal business processes, reduce the flow of paperwork, and ensure the timeliness and accuracy of data shared throughout the organization. It also seeks to empower its divisions by providing the tools required to maintain fresh, valuable Web content.
THE SOLUTION	D.R. Horton's Home Sales Automation (HSA) solution is a Lotus Domino-based workflow application that is linked to the company's legacy systems (an IBM AS/400 running IBM DB2) via Lotus Enterprise Integrator. The HSA solution aids sales agents by providing up-to-date information of inventory, pricing, and project status, and automatically generating sales contracts. The Web-site solution allows would-be home buyers to take virtual tours of D.R. Horton properties.
WHY IBM	*"We were looking for a platform that would allow us to grow this solution as we grew as a company. Lotus Domino emerged as the ideal platform for our needs. Other packages on the market were simply inadequate in the areas where Domino was strongest—especially its communication capabilities."*

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Executive Summary

Innovation Spotlight

Through its use of IBM and Lotus technology—namely Lotus Domino, IBM WebSphere and DB2—D.R. Horton has laid the groundwork for a successful integration of its entire architecture. "We have made intelligent platform choices that will make it much easier for us to achieve our e-business vision," says Max Doyle, Assistant Director of Information Technology at D.R. Horton.

Even as D.R. Horton has grown to 47 operating divisions, the company has continually nurtured the entrepreneurial values that lie at the root of its success. In late 1999, the company recognized the need to create a robust, scalable platform for sharing and managing data across the entire company that could keep pace with its rapid growth. To address this, D.R. Horton selected its long-time solutions provider—Austin, Texas-based Titan Solution Group (an IBM and Lotus Premier Business Partner)—which had already developed a Lotus Domino-based solution known as Home Sales Automation (HSA) in one of D.R. Horton's divisions. Now deployed in five divisions, HSA features seamless integration (enabled by Lotus Enterprise Integrator) between D.R. Horton's legacy systems and the Lotus Domino-based front end of the solution. This ensures that vital sales contract data accessed by sales agents is up-to-date, thus saving time and money and shortening the transaction cycle.

Titan Solutions was also selected to build a dynamic Web content management system whose ease of use allows non-technical staff at the division level to assume content management duties previously done at the corporate level. The system, which enables customers to take a virtual tour, was also built using Lotus Domino, and employs WebSphere's servlet functionality to enable fast searches.

D.R. Horton's Solution at a Glance

▶ **Core Functionality**   Domino-based workflow and collaboration platform that facilitates data sharing across the entire D.R. Horton value chain, ultimately automating much of the sales process. Also, a Domino-based, template-style Web content management platform that allows non-technical staff to perform all content management functions.

▶ **Software**   Lotus Domino R5, Lotus Enterprise Integration, IBM WebSphere Application Server Standard Edition v3.5 for NT, IBM VisualAge for Java, IBM DB2 Universal Database for AS/400 V4R3

▶ **Servers**   IBM AS/400, IBM Netfinity

▶ **Partner**   Titan Solutions Group, Inc. (Austin, Texas)

▶ **Key Benefits**   ▶ On average, D.R. Horton divisions that have deployed HSA have achieved 100 percent payback within 12 months.

▶ HSA enables a faster, more efficient, and more accurate selling process, which has led to a 30 percent increase in productivity for sales personnel and a 10 percent reduction in costs associated with contract processing.

▶ HSA lowered courier costs by 90 percent and printing costs by 50 percent.

▶ The Domino-based content management solution allows local employees to manage Web content, leading to lower costs and better, fresher sites.

▶ Domino and Lotus Enterprise Integrator enable speedy integration with back-end data, greatly benefiting the application development process.

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► Background

Since its founding in 1978, D.R. Horton, Inc. has emerged as one of the nation's premier builders of high quality, single-family homes. Through an aggressive, yet highly selective acquisition strategy, the firm has evolved from a family-owned business to nationwide powerhouse, with 47 operating divisions spanning 23 states generating $3.7 billion in revenue in 2000. D.R. Horton's business model—built around leveraging the broad geographic scope of its operations—has enabled the firm to thrive in some of the nation's fastest growing housing markets. The broad scale of its operations has also given D.R. Horton a purchasing clout rarely seen among home builders, enabling it to provide premium quality features in its homes at a reasonable cost.

As the scope of its operation has grown, D.R. Horton has continually sought to nurture the entrepreneurial values that lie at the root of its successful growth. According to Max Doyle, assistant director of information technology at D.R. Horton, the firm's main approach—and a core element of its business model—is to build and maintain relationships with its locally-focused subcontractors and their suppliers. "Our focus on maintaining strong local ties has kept the entrepreneurial flavor of our company, even while we've become a nationwide organization," says Doyle. "Naturally, information technology has been the critical ingredient in keeping our local roots strong."

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► Building an IT Foundation

As with any company following a highly decentralized business model, D.R. Horton relies on timely and accurate communications to ensure the effective operation of the organization as a whole. For D.R. Horton's sales agents, the most critical pieces of information relate to subdivision status, including:

- properties available within a subdivision
- the stage of construction of a given property
- the present configuration of a property (in terms of features and amenities)
- the current price of the property.

Accurately portraying project and pricing data is vitally important at all stages of D.R. Horton's construction and sales cycle. For instance, sales representatives need to know a project's current configuration and status to avoid pricing a property too low or making design commitments to the customer that are—because of the project's stage of construction—impossible to keep. This requires the company's building superintendents at the subdivision site to continually update this information to keep sales offices in the loop on where projects stand. D.R. Horton made its first moves toward automating this information flow in the mid 1990s when one of its operating divisions selected Austin, Texas-based Titan Solutions Group, an IBM and Lotus Premier Business Partner, to create a Lotus Domino-based solution known as Home Sales Automation (HSA). HSA allowed the division's staff to create and maintain project data in a Notes database, and to replicate the data to its sales offices—

vastly increasing the division's efficiency. Despite the many benefits the HSA solution brought to the division, by all accounts it remained a well-kept secret.

▶ The Need: Rapid Growth Calls for a Scalable Solution

As the scope of D.R. Horton's overall operations grew, so did the volume and complexity of the information flowing across its organization. As Doyle points out, the company's rapid growth—including more divisions, more projects, and more employees—was challenging its ability to effectively share data across the organization. "We had outgrown the systems that we initially had in place, which were designed to manage localized relationships, as opposed to national relationships," says Doyle. "We realized we needed a platform scalable enough to accommodate our growth as a company—one that wouldn't hold us back." In 1999, Doyle and his team began evaluating the solutions then available to address his company's pressing need for a next-generation plat-form, one that could tie together all of its business processes—from its project staff in the field to agents in its sales offices. "In the end," says Doyle, "we found the best solution in our own backyard."

Action Plan and Decision Process

▶ First Steps

After seeing the Domino-based HSA solution in action at the division level in late 1999, the D.R. Horton team saw instant promise in the platform as a company-wide solution and soon met with Titan Solutions to examine the opportunity. According to Doyle, the quality of Titan Solutions' division-level platform—and the firm's demonstrated knowledge of D.R. Horton's business—were the key factors that led the company to choose Titan over larger competi-tors such as Price Waterhouse. "We were immediately impressed with the quality of the Titan solution, as well as the degree to which it was integrated into the division's operations," says Doyle. "The breadth of their core technol-ogy expertise and their knowledge of our business was a combination we found very valuable."

"We were looking for a platform that would allow us to grow the solution as we grew as a company. Lotus Domino emerged as the ideal platform for our needs. Other pack-ages on the market were simply inadequate in the areas where Domino was strongest—especially its communication capabilities."

— Max Doyle, Assistant Director of Information Technology , D.R. Horton

Outlining its needs for a broader, company-wide HSA platform, the D.R. Horton team pointed to scalability and communications functionality as the most important functional characteristics. "We were looking for a platform that would allow us to grow this solution as we grew as a company," says Doyle. "Lotus Domino emerged as the ideal platform for our needs. Other packages on the market were simply inadequate in the areas where Domino was stron-gest—especially its communication capabilities." Among the platform's communications-related strengths, its ability to deliver user-specific content— such as allowing sales agents to access data relevant to their subdivision—in a timely fashion was seen as the true show stopper. In 4Q99, Doyle's team chose Titan Solution's HSA solution as the platform it would offer individual divi-sions after successfully piloting it in two of the company's divisions.

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▶ A Broader Role—and Deeper Roots—for Domino

Following the successful deployment of HSA in two of its divisions, D.R. Horton gave the green light for a nationwide deployment of the solution. In keeping with the company's decentralized culture, D.R. Horton made adoption of the HSA solution an option for its operating divisions. D.R. Horton's roll-out model is highly incremental, with each division contacted by a team comprised of corporate IT and Titan Solutions staff, which present the solution to divisional decision-makers. According to Austin Heath, President and co-founder of Titan Solutions, the solution has received a uniformly positive reception. "The divisions that have seen the system are immediately struck by its value," says Heath. "The fact that HSA essentially 'sells itself' is a testa-ment to its robustness and flexibility." Thus far, five D.R. Horton divisions have deployed the HSA solution.

> "It had reached the point where the basic content management task had grown into an enormous undertaking. We needed to develop a dynamic content management solution that was in synch with D.R. Horton's strategy of empowering its divisions."
>
> — Austin Heath, President and Co-Founder, Titan Solutions Group

In 1Q00, soon after the successful piloting and deployment of the HSA plat-form, D.R. Horton engaged Titan Solutions to further develop its e-business infrastructure through a fundamental redesign of its corporate Web site. Like the HSA platform, the underlying driver of the Web site redesign effort was the rapid growth of the company. Specifically, the growing volume and complexity of D.R. Horton's Web content created the need for a scalable, flexible platform that could handle the content management needs of the increasingly decentral-ized company. As Heath points out, D.R. Horton's need stemmed from the inflexible nature of its previous content management system, under which corporate staff was compelled to update any of 2,500 static Web pages on a regular basis. "It had reached the point where the basic content management task had grown into an enormous undertaking," says Heath. "We needed to develop a dynamic content management solution that was in synch with D.R. Horton's strategy of empowering its divisions."
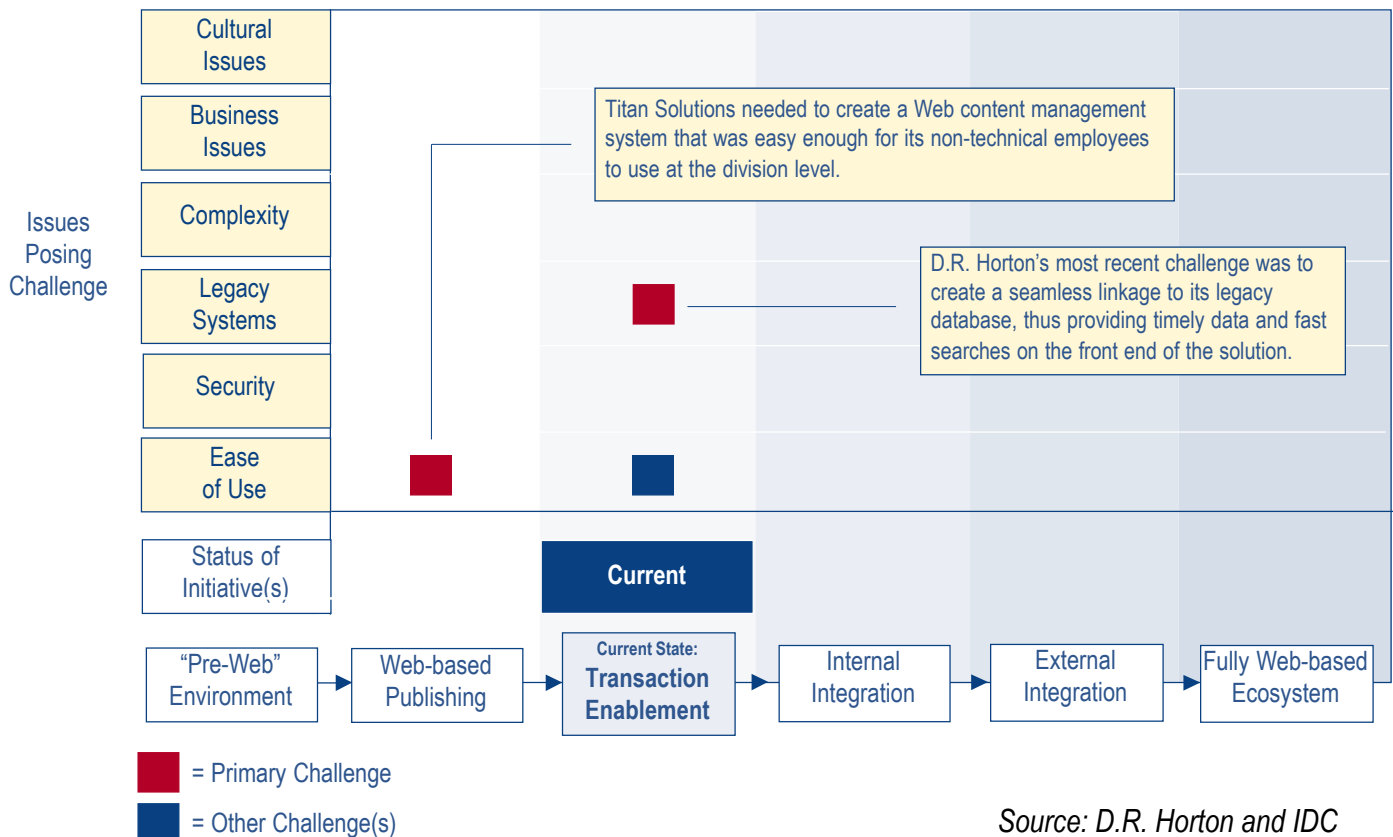
D.R. Horton saw the need to push the content management function out to the divisional level. The major rub in this strategy, however, was a shortage of technical employees at the division level, which implied that ease of use would be one of the most critical requirements for the new solution. Moreover, both Heath and Doyle agreed that any Web site solution developed by Titan Solu-tions should be architected to allow easy integration with the HSA platform down the road. Given these parameters, observes Heath, Domino again emerged as the ideal solution for myriad reasons. "Domino allowed us to create a powerful, yet easy-to-use design tool that yielded a quantum improve-ment in efficiency and a uniform look and feel across the company," says Heath. "Even more important, our decision to build the platform with Domino will make it much easier to integrate the Web sites with the HSA platform, allowing D.R. Horton to create a single, integrated e-business platform."

► Challenges

Above and beyond the usability of the Web content management system, Titan Solutions also faced a number of challenges related to the decentralization of the organization. For instance, although its goal was to create a standard, template-based content management tool that could be used by all 47 divisions, it also recognized the need to allow each division to tailor the solution to their needs. According to Heath, the need to strike a balance between simplicity and configurability led Titan Solutions to follow a "mass customization" model that leveraged Domino's core strengths. "We needed to develop a solution that could easily adapt to the specific needs of each division," says Heath. "We overcame a major technical challenge by taking advantage of Domino's ability to configure the application to fit their needs."

An even more formidable challenge for Titan Solutions was the issue of legacy integration. Within the solution, linkages between front-end systems and D.R. Horton's back-end IBM DB2 database were crucial. For instance, the HSA solution required that information such as pricing data be moved from the company's legacy database to sales offices at regular intervals to keep reps up to date. Similarly, D.R. Horton's Web site solution needed to upload data such as property availability from numerous division-level Web sites and store it in the company's legacy database. In both cases, the key challenge was to facilitate a reliable flow of data, thus ensuring the timeliness of the company's data.

Challenges at Various States of D.R. Horton's e-business Evolution

Issues Posing Challenge						
Cultural Issues						
Business Issues		Titan Solutions needed to create a Web content management system that was easy enough for its non-technical employees to use at the division level.				
Complexity						
Legacy Systems		■ D.R. Horton's most recent challenge was to create a seamless linkage to its legacy database, thus providing timely data and fast searches on the front end of the solution.				
Security						
Ease of Use	■	■				

Status of Initiative(s)			**Current**			
	"Pre-Web" Environment	Web-based Publishing	Current State: **Transaction Enablement**	Internal Integration	External Integration	Fully Web-based Ecosystem

■ = Primary Challenge

■ = Other Challenge(s)

Source: D.R. Horton and IDC

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Solution Profile and Implementation Strategy

## ▶ Bridging the Gap with Lotus Enterprise Integrator and WebSphere

Managing the flow of data between D.R. Horton's corporate legacy database and its divisional offices was arguably the most important technical need faced by the Titan Solutions team. To address it, the team turned to Lotus Enterprise Integrator (LEI), an extension of Lotus Domino which allows data movement between DB2 data running on an IBM AS/400 and Domino with no programming required. As Heath points out, the fact that LEI provided a standard interface to D.R. Horton's back-end data gave the team much needed flexibility as it rolled the solution out on wider scale. "Our ability to use LEI to pump the Domino data to the AS/400 was a major advantage," says Heath. "The native interface between Domino and DB2 allowed us to create a seamless linkage, which in turn guarantees data synchronization between the HSA application and D.R. Horton's legacy systems."

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— Austin Heath, Titan Solutions Group

To address the other key issue—facilitating fast searches within the DB2 database—Titan Solutions turned to WebSphere Application Server. In addition to its top-notch search capabilities, Heath views WebSphere's robustness and flexibility as an integration tool to be its most valuable attributes. "The sheer size of the database, and the fact that the data is changing all the time, calls for a very high-performance searching tool," says Heath. "WebSphere's searching capability was a perfect compliment to DB2's high-performance."

▶ The D.R. Horton Solution in Action

In a typical usage situation, the HSA system is accessed via a Lotus Notes client by a D.R. Horton sales agent working with a prospective client in a sales office. After the agent logs onto the system, the first task is to gather and input customer information, which is then used to create an initial contract form. During the session, the customer and the agent can configure a home with appliances and other features. At this stage, reliable information from the legacy database is extremely important, since it ultimately indicates which properties are available in a given subdivision, as well as the extent to which each property can be configured (based on its stage of construction). Once the prospect decides to buy a home, the system automatically translates that customer information into a contract document, which will include the customer's specifications and the resulting price of the property.

The integrity and accuracy of D.R. Horton's legacy data is largely dependent on timely updates from personnel working at the subdivision level. The current system allows D.R. Horton's field superintendents at each subdivision to update each property's construction status in the legacy database using a wireless hand-held device, a cellular phone, or a browser-enabled PC. Leveraging Domino's selective replication functionality, the system provides field sales agents with only the data that is pertinent to a given property within the subdivision they work. After the data is entered, it is moved to D.R. Horton's DB2 database running on an AS/400. As D.R. Horton's Max Doyle notes, this
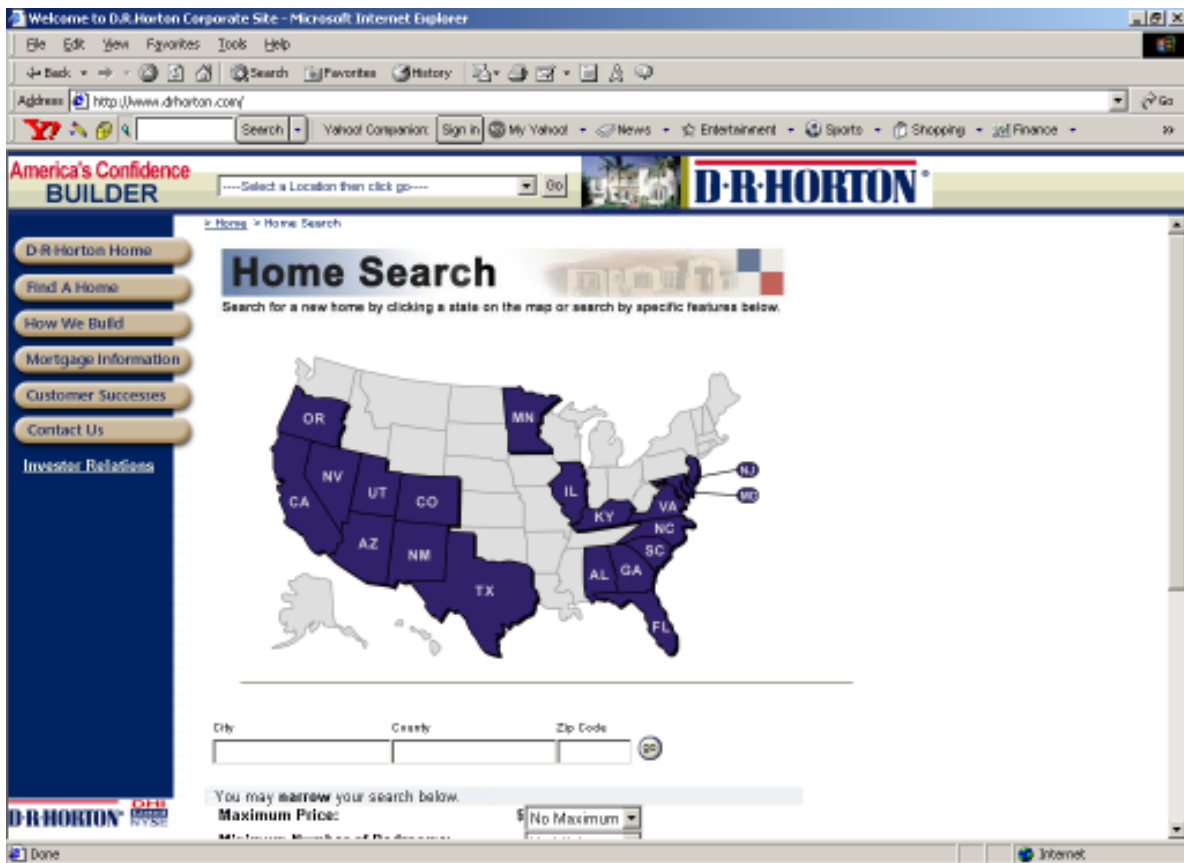
ability to keep a steady and reliable flow of data from the field means fewer costly and time-consuming adjustments to contracts. "Our sales agents can now get accurate information as to what options can be added at any particular point in the project," says Doyle. "This means spending less time re-writing contracts and more time selling homes."
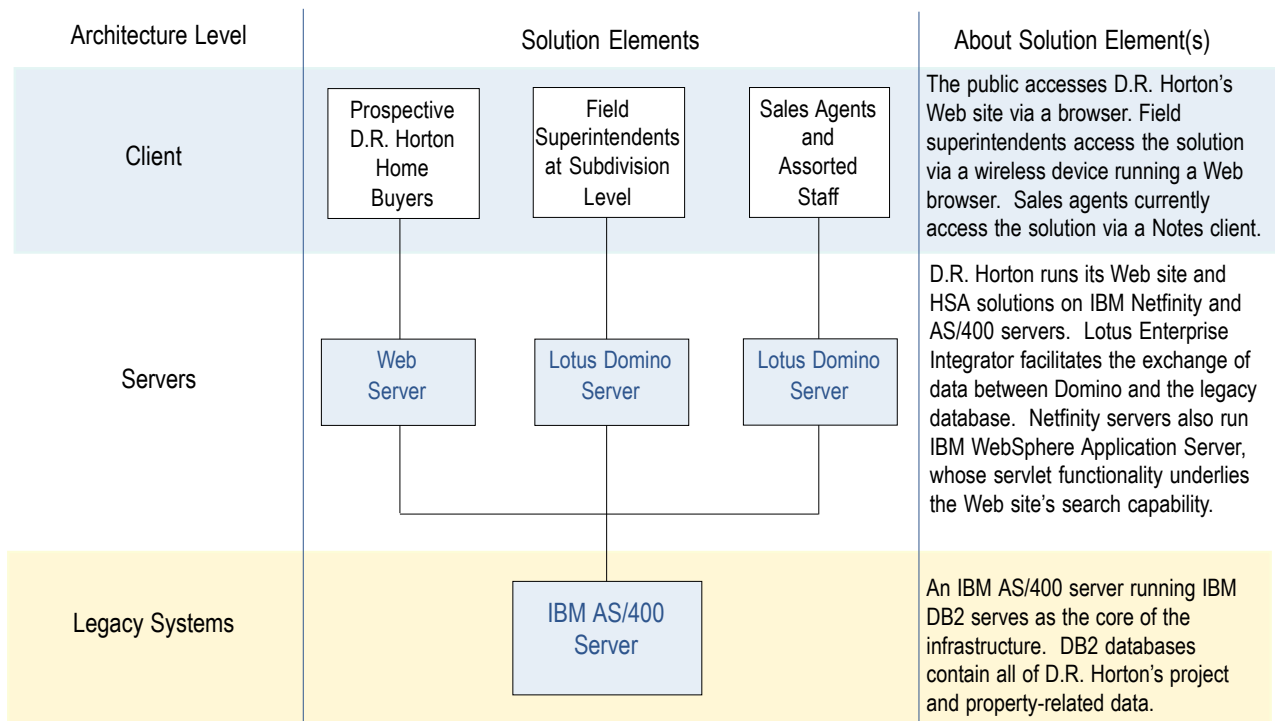
D.R. Horton's Web site, built using Lotus Domino, allows prospective homebuyers to view properties by subdivision and, if they wish, request information on a given property. [If an inquiry is made, the customer's information is routed as a prospect to the sales agent, who can then follow up with a letter or a telephone call.] Information displayed at the Web site includes information about available homes, mortgage information, and title information. Through WebSphere's functionality, the site allows customers to conduct parametric searches for properties in any areas where D.R. Horton has a presence. If a search is executed from the master D.R. Horton Web site (www.drhorton.com), the system searches across all divisional builders for results. If the search is executed from a local builder such as Milburn Homes (http://www.milburnhomes.com), the search applies only to that builder. After a search query is entered by the customer, the search criteria are then passed to a WebSphere servlet, which generates search results and passes the results back through the Domino interface to the user.

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► Solution Architecture and Development Approach

D.R. Horton's HSA and Web site solutions are built on IBM Netfinity servers, which run Lotus Domino and IBM WebSphere Application Server. In the back end—linked to the Netfinity servers—is D.R. Horton's IBM AS/400 server, which houses a Domino server running Lotus Enterprise Integrator and all of the company's legacy data in an IBM DB2 database. All hardware is located at D.R. Horton's Arlington, Texas headquarters. Using Lotus Domino's development environment, Titan Solutions developed the core HSA solution in approximately 12 months. By comparison, the process of bringing divisions online with the HSA system requires only three months on average. This generally entails inputting a division's critical information—such as project information, prices, contract forms—into the HSA divisional template.

Titan Solutions developed the Web site solution in approximately eight months. Following a prototyping development methodology, the Titan Solutions development team worked simultaneously on the user interface development, WebSphere integration, and architecture planning. As Heath explains, the team leveraged IBM VisualAge for Java's servlet builder functionality to build and test the servlets that drive the solution's search capability. "The fact that VisualAge for Java is so tightly integrated with WebSphere made the application development effort much faster and much easier," says Heath. The solution was completed in 4Q00.

Basic Architecture of D.R. Horton's Solution

Architecture Level	Solution Elements			About Solution Element(s)
Client	Prospective D.R. Horton Home Buyers	Field Superintendents at Subdivision Level	Sales Agents and Assorted Staff	The public accesses D.R. Horton's Web site via a browser. Field superintendents access the solution via a wireless device running a Web browser. Sales agents currently access the solution via a Notes client.
Servers	Web Server	Lotus Domino Server	Lotus Domino Server	D.R. Horton runs its Web site and HSA solutions on IBM Netfinity and AS/400 servers. Lotus Enterprise Integrator facilitates the exchange of data between Domino and the legacy database. Netfinity servers also run IBM WebSphere Application Server, whose servlet functionality underlies the Web site's search capability.
Legacy Systems		IBM AS/400 Server		An IBM AS/400 server running IBM DB2 serves as the core of the infrastructure. DB2 databases contain all of D.R. Horton's project and property-related data.

Source: D.R. Horton and IDC

Development Timetable for D.R. Horton's Solution

	1Q99	4Q99	1Q00	4Q00	1Q01
D.R. Horton begins search for a more scalable platform for companywide data sharing and home sales automation.	■				
D.R. Horton decides to deploy the Domino-based Home Sales Automation (HSA) developed by Titan Solutions on a companywide basis.		■			
D.R. Horton engages Titan Solutions to create a Domino-based Web content managment system.			■		
Titan Solutions completes the development of the Web content management system.				■	
D.R. Horton deploys the HSA application in its fifth division.					■

Source: D.R. Horton and IDC

Business Results

"We fully expect the divisions that implement HSA to achieve a full payback within the first 12 months of deployment."

— Max Doyle

By incorporating Domino's world-class workflow capability into its business processes, D.R. Horton has made quantum improvements in the overall efficiency of its far-flung operations, resulting in significant cost reductions. In the big picture, improved efficiency via workflow means that D.R. Horton can spend more of its time building and selling houses, and less time pushing paper. But a number of other key benefits have already begun to show up that have clear relevance for its bottom line. Specifically, divisions implementing the HSA solution report a reduction in the incidence of contract and scheduling errors, producing a cost savings of approximately 10 percent.

The HSA solution has also allowed D.R. Horton to make huge strides toward becoming a "paperless" company. Take the case of automatically generated contracts, under which an agent can generate the entire contract package with the click of a button. "HSA has lowered our courier costs by 90 percent and our printing costs by 50 percent. At the same time, the system has increased the productivity of sales personnel by 30 percent by cutting down the time spent reviewing contracts," says Doyle. "We fully expect the divisions that implement HSA to achieve a full payback within the first 12 months of deployment."

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Overview of D.R. Horton's Business Results Achieved

Business Process Area	Nature of Benefit	Description or Metric
Sales and Marketing	Aggregated Benefits	On average, D.R. Horton divisions that have deployed HSA have achieved 100 percent payback within 12 months.
Sales and Marketing	Lower Costs	HSA lowered D.R. Horton's courier costs by 90 percent and its printing costs by 50 percent.
Web Content Management	Lower Costs, Fresher Content	The Domino-based content management solution allows local employees to manage Web content, leading to lower costs and better, fresher sites.
Application Development	Increased Efficiency	Domino and LEI enable speedy integration with back-end data, greatly benefiting the application development process.
Sales and Marketing	Increased Productivity	A faster, more efficient, and less error-prone selling process has led to a 30 percent increase in productivity for sales personnel.

Source: D.R. Horton and IDC

D.R. Horton's Web site initiative, which pushed Web content management to the division level, has also begun to pay off for the company. As Doyle points out, the new Domino-based architecture allows the company to better leverage local knowledge and resources, a key principal on which D.R. Horton's business model is based. "Our divisions can now concentrate on the freshness of their Web sites," says Doyle. "They also now have more flexibility to provide richer content and ultimately get closer to their customers."

Doyle also sees important long-term benefits from his company's recent upgrading of its e-business infrastructure, including the ability to integrate into other back-end systems such as enterprise resource planning (ERP) platforms. The key, says Doyle, is LEI's ability to seamlessly adapt to changes in the back end without requiring changes in the front end. "We intend to establish linkages from our HSA solution to an ERP system in the future," says Doyle. "The fact that LEI allows me to just point to the new data points in the back-office system—without interrupting any of the flow of the sale side—is extremely valuable because it is non-disruptive."

D.R. Horton's recent e-business initiatives have focused largely on integrating its infrastructure to improve the flow of data across the company. In the future, the company plans to intensify its trend toward integration by bringing together its HSA and Web site solutions. Under Doyle's vision, buyers will be able to log onto the D.R. Horton Web site, find the home they want, schedule meetings with salespeople, and start the configuration process—allowing a shorter turnaround time in the sales office. "Our ability to integrate these systems into a common platform is direct outgrowth of our choice of IBM technology—specifically Domino, DB2, and WebSphere," observes Doyle. "We see it as a major endorsement of IBM's e-business infrastructure technology."

D.R. Horton also plans to add transactional functionality to its HSA platform such as the ability to automatically trigger transactions such as issuing purchase orders based on a project's stage in the overall workflow. Under a set of processes Doyle calls "transactional workflow," superintendents would update a project's status from the field, which would then trigger the issuing of purchase orders to suppliers, which would then make the appropriate deliveries to the site. "We expect our aggressive adoption of e-business technologies to allow us to spend less time on paperwork and inefficient processes," says Doyle, "and more time building homes for—and relationships with—customers."

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