



Halliburton Improves Communications, Collaboration, Operational Efficiencies

Overview

Country or Region: United States

Industry: Oil and gas

Customer Profile

Based in Houston, Halliburton is one of world's largest providers of products and services to the oil and gas industries. It employs more than 100,000 people in more than 120 countries.

Business Situation

Executives of the Halliburton Energy Services Group wanted to improve communications and collaboration among staff and customers and boost operational efficiencies.

Solution

Developers enhanced software tools designed to simplify communications and collaboration in the field and to help schedule jobs and resources more efficiently.

Benefits

- Improved collaboration
- Highly efficient utilization of resources
- 60% more efficient job scheduling
- 20% reduction in day sales outstanding
- Occasionally connected environment
- Support for electronic workflow
- Higher developer productivity

“We develop a lot of applications, and anything we can do to make it easier to roll out those applications means ... a more effective and productive workforce, which adds dollars to the bottom line.”

Gary Tyler, Director of Information Technology, Halliburton Energy Services Group

Executives at Halliburton Energy Services Group wanted to boost the bottom line by enhancing collaboration among engineers, operators, service coordinators, and customers, and by improving resource utilization and other operational efficiencies. To accomplish these objectives, the executives decided to give employees and customers more-powerful software solutions for making calculations in the field, sharing information, and scheduling jobs. They also decided to base the applications on a service-oriented architecture provided by the Microsoft .NET Framework 2.0, and to develop and deploy the applications using the Microsoft® Visual Studio® 2005 development system and a SQL Server™ 2005 database. Consequently, the group has enjoyed a higher level of communications and collaboration among and between internal staff and customers and a vastly more efficient approach to job scheduling.

“[The flash-drive-based eRedbook] is an unbeatable way to ensure that everyone on the team is aligned on the same job objectives.”

Anthony Badalamenti, Strategic Business Manager, Halliburton Energy Services Group

Situation

Founded in 1919, Halliburton is one of the world's largest providers of products and services to the oil and gas industries, and today, anywhere that oil and natural gas is being produced, Halliburton is there. Halliburton employs more than 100,000 people in more than 120 countries.

Halliburton Energy Services Group addresses the entire lifecycle of oil and gas reservoirs, with expertise ranging from exploration and development to production, operations, maintenance, conversion, infrastructure, and abandonment. Two of the company's core capabilities are cementing wells and managing “workovers,” which are remedial operations designed to increase production. To execute well cementing and well workovers to the satisfaction of its customers—primarily energy exploration and production companies—Halliburton depends on a high degree of collaboration among individuals who may be working in multiple, highly remote locations.

Another challenge for Halliburton is to use its human and other resources wisely. Whatever the project, it is likely to involve large teams of individuals, multimillion-dollar equipment, and complex and costly operations for years or decades. For Halliburton, using resources efficiently is essential for the company's overall operational efficiencies and for helping to ensure successful projects for its customers.

With these challenges in mind, Halliburton executives recognized not long ago that project team members needed more-powerful software solutions for making calculations in the field, sharing information, and scheduling jobs. For example, engineers and service operators frequently had to supplement their electronic information tools with pencil and paper or separate pocket calculators for tasks ranging from sketching a

job diagram to determining well-cement volumes. “We needed a more automated and integrated approach to these tasks, because there were lots of opportunities for mistakes in the approach we were using,” says Strategic Business Manager Anthony Badalamenti. “We also needed a more interactive communications environment so we could better collaborate with staff and customers in the field.”

As for job scheduling, Commercialization Manager Dwight Turner explains that the group lacked a unified approach to this challenge, which made it hard to coordinate jobs and to use resources most effectively. “We had the software and we had the access to the Internet, but we didn't have a comprehensive, integrated suite of tools that would help everyone to be on the same page and looking at the same information,” he says.

Solution

For the ultimate in portability and versatility, Halliburton developers set out to create applications that could take advantage of an occasionally connected environment and Web services—both for accessing the Internet and diverse databases and for sharing information seamlessly and globally. This led the development team to choose a service-oriented architecture for the solutions, according to Project Development Lead Geoff Niehaus. “A service-oriented architecture became obvious when we began to see common business practices over the multiple product service lines that are involved in Halliburton projects,” he says.

The decision to use a service-oriented architecture, in turn, led Niehaus and his colleagues to the Microsoft .NET Framework 2.0., the Microsoft® Visual Studio® 2005 development system, and the SQL Server™ 2005 database management system. Niehaus explains that much of the team's

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Dwight Turner, Commercialization Manager,
Halliburton Energy Services Group

reasoning stems from the fact that the Microsoft .NET Framework is such a widely accepted way of implementing service-oriented architecture—throughout the industry and the enterprise itself.

“We had been using Microsoft development technologies at Halliburton Energy Services Group since the late 1990s, so we knew these technologies could provide the service-oriented architecture, the application functionality, and the performance we needed,” Niehaus explains. “We also had been using Microsoft COM components extensively, so by deploying the .NET Framework we could take advantage of our investment in that technology as well.”

With assistance at the beginning from experts in Microsoft Consulting Services, the Halliburton team used these Microsoft technologies to produce two applications in an ongoing series for users working everywhere from the office to the refinery to onshore and offshore drilling environments. Those applications are the eRedbook, a flash-drive-based version of a handbook originally developed back in 1929 for determining calculations for well cementing, and Service Based Open Job, the first of a suite of applications supporting job scheduling and other administrative activities.

Benefits

Now that the applications are deployed and in widespread use, Halliburton executives are reporting the bottom-line improvements in collaboration and operational efficiencies that they were seeking from the beginning. As an added advantage, they are enjoying benefits from having developed the applications in the Microsoft .NET Framework, Visual Studio 2005, and SQL Server 2005 environment. These benefits include comprehensive support for the occasionally connected environment on which the applications—and their

users—depend, application flexibility and extensibility, hardware versatility, reduced code volume, and increased developer productivity.

eRedbook: “Everyone on the Team is Aligned”

As Badalamenti explains, with the flash-drive-based eRedbook, Halliburton staff are designing strategies for drilling, cementing, workovers, and other well operations, and are communicating such strategies in real time to their customers. The result is a degree of collaboration that he and his colleagues could only dream about before.

“Say, we have a well-bore diagram we are discussing, and we have that on the screen,” Badalamenti suggests. “The customer might suggest a design change, so we direct the application to make the calculations and redraw the diagram, and then we send it all to the customer with a single click. Within seconds, we are all seeing the new calculations and the new well-bore diagram, and we can address any new challenges right then and there. It’s an unbeatable way to ensure that everyone on the team is aligned on the same job objectives.”

The eRedbook also helps to boost operational efficiencies through its seamless support for existing tools and technologies across Halliburton. “Each product service line has some specific individual technologies of products and calculators within it, and all of them work off the core backend software of the eRedbook,” he says. “That software provides consistent information, capabilities, and flexibilities across all the product service lines.”

Service Based Open Job: Unified Scheduling at Last

According to Niehaus, the Service Based Open Job application is considered the standard bearer for applications designed to

“We like the fact that Visual Studio 2005 supports coding for different form factors while retaining a common infrastructure.”

Geoff Niehaus, Project Development Lead,
Halliburton Energy Services Group

help Halliburton improve resource utilization—to have the right resources in the right place at the right time, with no delays and no resources standing idle.

“As the first in a suite of administrative applications, Service Based Open Job is positioned as the standard going forward,” Niehaus says. “We expect it to help us schedule jobs more efficiently for well cementing and stimulation, for example, so that people and equipment can move quickly from our service centers to wherever and whenever the customer needs them.”

Another advantage of the Service Based Open Job application is that it provides the unified approach to scheduling that Turner and his colleagues wanted—and which is vital for ensuring that as soon as a project is completed its resources can be reallocated to new projects.

“This application enables our sales staff to see our schedule and sell accordingly so as to keep utilization high,” Turner reports. “Without this application, we would not be able to build enough equipment or hire enough people to meet the demand that we are seeing today.”

Ease of use and accessibility are yet other advantages of the multilingual Service Based Open Job application. “It works like the calendar function of Microsoft Outlook, and who doesn’t know how to use that?” says Director of Information Technology Gary Tyler. “It provides a savings in time and effort and something we think will be well-accepted by workers in the field.”

In fact, after its initial rollout the application helped the group to boost the productivity of the people who schedule and coordinate jobs, while at the same time easing their perceived workload. “With Service Based Open Job we’ve been able to increase our

scheduling/coordinating workload by 60 percent, while service coordinators are saying it feels like their workload has actually been reduced,” Turner says. “A side benefit is a 20 percent reduction in day sales outstanding.”

The Occasionally Connected Environment

What makes these applications so powerful and usable, says Niehaus, is the fact they were built in the comprehensive development and deployment environment of the Microsoft .NET Framework, Visual Studio 2005, and SQL Server 2005. In particular, he applauds the occasionally connected environment—implemented through the support in these technologies for XML Web services—that enables mobile workers at Halliburton to use the applications for doing work more efficiently and serving customers more effectively.

“With an architecture based on XML Web services, we can use a factory pattern that supports bringing multiple databases online such that an application becomes aware of them when it needs them,” Niehaus explains. “This means that for users in the field, we can move databases from one location to another or have the applications connect with databases residing at different locations.”

In another example of how support for XML Web services helped the team to build successful applications, Niehaus points to the “job data packets” developers created for users to access via e-mail or carry with them to a job site on a CD. “The job data packets are an essential ongoing reference while a job is current and a handy historical reference on future jobs,” he says. “And the Web service integration in Visual Studio 2005 simplifies management of the packets and their related data stores.”

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Kelly Cook, IT Architect, Halliburton Energy Services Group

The Electronic-Workflow Initiative

For his part, Turner explains that the job data packets are vital in supporting an important corporate initiative designed to increase collaboration and operational efficiencies: electronic workflow. “For us, electronic workflow means taking a job from inception through mobilization, demobilization, and invoicing, and collecting useful information along the way—all electronically,” he says. “This is one way of helping people to do their jobs better, and that’s why we are committed to the initiative.”

Niehaus notes that another part of electronic workflow is the seamless integration of all applications so that information gets to where it needs to go. “That, too, is supported by the integration of Visual Studio 2005 and SQL Server 2005 through the .NET Framework environment,” he says. “This works especially well for giving us an integrated environment in which we can code, test, and debug the interconnectivity between the applications and the databases.”

Niehaus adds that the integrated development and deployment environment also helped the team to provide users applications that could run on virtually any and all the mobile devices they are using or might be using in the future. “We like the fact that Visual Studio 2005 supports coding for different form factors while retaining a common infrastructure,” he says.

Reduced Code, Increased Productivity

Beyond supporting XML Web services and providing a highly integrated development and deployment environment, the .NET Framework, Visual Studio 2005, and SQL Server 2005 provided an efficient and flexible way for developers to get their work done. “Thanks to the built-in classes and methods in Visual Studio 2005 we implemented multithreading support without a lot of extra

work,” Niehaus reports. “We found it easy to access and work with data in the SQL Server 2005 environment. We also were able to take advantage of common patterns and practices among all the Microsoft technologies to make our applications work seamlessly with one another.”

For example, Niehaus points to Microsoft Office. “In combination with features of .NET Framework 2.0, the Microsoft Office suite of tools provided capabilities that enabled the team to minimize the need for customization,” he says. “This makes for greater stability, lower support costs, and fewer errors in the final deliverable.”

Another factor helping to minimize errors, says IT Architect Kelly Cook, is the greater code economy available in the .NET Framework 2.0. “Moving to the .NET Framework 2.0 and Visual Studio 2005, we observed a 30 to 40 percent reduction in code,” he reports. “Less code means fewer errors, less complexity, and easier troubleshooting.”

Easier troubleshooting, in turn, can enhance developer productivity—and developer productivity means a lot at Halliburton Energy Services Group, according to Turner. “We develop a lot of applications, and anything we can do to make it easier to roll out those applications means we’ll have better acceptance and higher rates of usage,” he explains. “This leads to a more effective and productive workforce, which adds dollars to the bottom line.”

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