

# UPSTREAM CIO

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## Part I:

## Achieving Sarbanes-Oxley Compliance for Corporate Governance

*Complying with the Sarbanes-Oxley Act of 2002 (SOX) passed by the U.S. Congress poses significant hurdles for upstream companies in general. Although SOX is targeted at large, public, U.S.-based companies, private and international companies are also affected. In Part I, Upstream CIO looks at SOX challenges from the viewpoint of upstream and smaller companies, and determinants of compliance spending. In Part II, Upstream CIO describes the parts business intelligence and reporting records management and security play in corporate governance. The role of third party service providers such as auditors, systems integrators and outsourcers will be analyzed.*

Upstream companies are characterized by wide geographic dispersion of assets and decentralized organization and business processes that help them respond rapidly to local conditions while bringing new oil and gas discoveries onstream as quickly as possible.

A consequent lack of emphasis on standardized processes and timely and accurate reporting increases the magnitude of burden resulting from SOX compliance.

"As opposed to some other recent full deployment acts for IT such as ERP, e-business initiatives and Y2K, this one [SOX compliance] doesn't go away," remarked Stan Lepeak, vice president, META Group, during a Sarbanes-Oxley teleconference held on Oct. 28, 2003.

Most companies are spearheading compliance efforts around Section 404 of SOX. CFOs are taking charge of the compliance efforts but it's crit-

ical that CIOs are actively engaged.

The Sarbanes-Oxley Act, a corporate governance act established by the Securities and Exchange Commission (SEC) in response to the Enron and WorldCom-type accounting frauds, requires publicly traded companies to provide enhanced disclosures on internal financial controls, thereby improving transparency and accuracy in financial accounting and reporting to the public.

The emphasis on internal controls is not new, observed Richard Lydecker, chief accounting officer, Enron, during a luncheon panel in Houston organized by the Harvard Business School.

"Now we have the Sarbanes-Oxley. Ten, 12 years ago we had a provision forum called the Treadway Commission," he said.

The Treadway Commission or the  
See **SARBANES-OXLEY** on page 2

and enhance purchasing power by enabling consolidation across business units and product lines.

- More effective collaboration with suppliers - as well as syndication to clients - can only be truly realized through rich attribute-based data.
- Focusing on the supply chain (where the majority of the spend occurs on direct materials) provides the most cost-

benefit opportunities.

- Enterprise data classification is a means of developing a common language - an attribute-based system where information can readily be shared with partners.
- Participation by an industry forum of OEMs and suppliers is key to moving toward a single taxonomy and reducing the need for suppliers to develop multiple "tailor-made" systems

for each client.

- Increasing efficiency in the supply chain by automating supply-side processes will become even more important as companies exhaust internal opportunities to reduce costs.

*Editor's Note: A related article on PLM systems appears in the May 2003 issue of Upstream CIO on page 1.*

## Shrink-Wrap, Vendor-Neutral Integration Solution for G&G Applications, Data

***In this article, Upstream CIO profiles OpenSpirit, a middleware solution for G&G requirements. Extensive interviews with OpenSpirit customers, Shell International E&P and Talisman Energy, shed light on factors such as functionality, reliability, ease of deployment, and value offered by OpenSpirit products.***

Before Shell, ChevronTexaco, Kerr McGee and many other companies deployed OpenSpirit's solution, they developed their own integrations between subsurface data from OpenWorks (Landmark Graphics), Geoframe (GeoQuest) and Excel spreadsheets and the subsurface processing and modeling applications.

To determine or evaluate well drilling locations, E&P companies need to handle and interpret of massive amounts of data that are performed in several steps.

These steps are individually performed by a wide spectrum of specialized professionals and involve multiple hand-offs, software applications and systems.

First, to clearly identify physical attributes of potential hydrocarbon-producing locations, a geophysicist processes and polishes data captured in specific software applications that for example, only work on UNIX-based systems.

Next, using modeling software on PC-based systems, a geologist interprets data that have been processed by geophysicists.

Finally, to determine locations that offer financially viable opportunities, a business manager performs elaborate economic analyses on data interpreta-

tions provided by geologists using Excel or any other spreadsheet tool.

Although all the steps described above need to be integrated in one workflow, often the software applications used don't talk to each other and sometimes they don't talk to the databases where the required data reside.

To integrate these applications and databases, companies have typically pursued one or more of the following strategies:

- they employ a database manager or data loader who manually imports data from one database such as a Geoframe or an OpenWorks one, reformats it and exports it to another and/or imports, reformats, and exports data from one application to another;
- they require their expensive geotechnicians and business managers to do data importing, reformatting, and exporting by themselves; or
- they hire in-house developers and/or outside systems integrators to write programs or implement tools that automate data importing, reformatting and exporting.

Each strategy is expensive and limits the utility of data. In addition, man-

ual integrations are time consuming and error-prone.

OpenSpirit appears to have changed that, at least in the arenas where well and seismic data types are used for now.

Simply put, OpenSpirit is an off-the-shelf, middleware solution that



***Figure 1: OpenSpirit is a platform-independent, plug-and-play framework that communicates between various vendor databases and applications which haven't been pre-designed for interoperability.***

integrates two or more geological and geophysical (G&G) applications and databases. (Figure 1).

## **PRODUCT FEATURES**

OpenSpirit's solution consists of three components.

First, there's the OpenSpirit Base Framework, which "is the piping or gut of the integration tool that keeps track of events and who's going where," described Clay Harter, CTO, OpenSpirit.

OpenSpirit Base Framework enables datastores used by the end-users to be viewed and described.

Second, there's the Subsurface Data Module.

At present, OpenSpirit's Subsurface Data Module or subsurface library allows end-users to access information in Landmark and GeoQuest subsurface datastores.

OpenSpirit plans to add databases such as Seismic Micro Technology's Kingdom database to its existing Subsurface Data Module, declared Harter.

Finally, there are utilities or data adapters and application plug-ins.

Utilities such as the ArcView Extension allows end-users to pull in data from OpenSpirit-enabled databases into ArcViewer, a geographical information system (GIS) software product from ESRI.

The Excel Adapter automatically pastes required data from OpenSpirit-enabled applications and databases into Excel, a format that most end-users are already familiar with.

Application plug-ins involve code that provide connections between the commercial software applications being used, OpenSpirit's Data Modules, the OpenSpirit box (Base Framework), and the customer's data storage.

Application plug-ins are sold by software vendors that have developed integrations using OpenSpirit frameworks and standards.

Currently, over 20 software vendors have developed OpenSpirit application plug-ins.

OpenSpirit's products span sub-surface data types: wells, well logs, formation tops, horizons, faults, and seismic.

Its products can be used across

platforms and applications that use various programming languages because it supports several operating systems and programming languages used in the E&P sector.

Programming languages supported include JAVA, C++, Visual Basic, and C# (C-sharp) and operating systems supported include UNIX, AIX, Irix, Linux and .NET.

## **HOW SHELL, TALISMAN ENERGY USE OPENSPIRIT**

Bina Howard, an OpenSpirit expert, integration and infrastructure

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*"The key to OpenSpirit is that the end-user doesn't even know that they're using it." - Bina Howard, Shell International E&P*

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team, Shell International E&P B.V. illustrated OpenSpirit's functionality and benefits with an example.

Earlier, "in order to model reservoirs in Petrel, a PC-based software application, a Shell geologist had to export data used for the modeling from Landmark and/or GeoQuest databases that only work on Sun Solaris workstations, reformat it and send it to Petrel," explained Howard.

"OpenSpirit works with Sun Solaris, PCs, and Linux.

"Now the geologist can start Petrel and request data from OpenSpirit. OpenSpirit will access that data from Landmark and/or GeoQuest and give it to Petrel in real-time without the manual process of importing and exporting data.

"Data object management is a critical component of OpenSpirit," stated Howard.

"Data object management refers to getting data from different sources and

handling them in a manner that turns them into common objects for the applications that OpenSpirit integrates.

"For instance, when an application calls for well data, OpenSpirit knows that a well consists of five pieces of data and gives them to the user.

"OpenSpirit pulls the same five pieces of data irrespective of source. OpenSpirit will extract that data from an Oracle database for Landmark in one way, from a GeoQuest database in another way, and an internal Shell application database a third way.

In addition, "we can install OpenSpirit on the Solaris workstation, tell it where the data is, and install a client version of OpenSpirit on the geologist's PC where Petrel has already been installed," Howard continued.

"The key to OpenSpirit is that the end-user doesn't even know that they're using it. The benefit of using an application that's OpenSpirit-enabled is that it works with Landmark or GeoQuest formats and the end-user doesn't have to think about it," she claimed.

Shell, which owns a third of OpenSpirit through its venture capital arm, Shell Technology Ventures, has been using OpenSpirit since OpenSpirit's inception.

Shell has licensed OpenSpirit's Base Framework, its Subsurface Data Module, its utilities such as Excel Adapter and ArcView Extension, and has purchased OpenSpirit application plug-ins from commercial software vendors that are OpenSpirit-enabled, for example, Petrel, now owned by Schlumberger Information Systems and Gocad, owned by Earth Decision Sciences, according to Howard.

Besides using OpenSpirit for application and data integration, Shell also uses it as a way to perform data quality and integrity checks.

"Because OpenSpirit allows data managers to examine together on the same screen the same data from two different sources, data managers can compare and verify the data's quality and accuracy," stated Howard.

Howard stated that at present, Shell has deployed 80 licenses and has purchased 70 additional licenses that it will deploy in the next six months.

Overall, OpenSpirit will continue to be deployed in a total of 20 sites.

More than 50 percent of Shell E&P offices that could use the OpenSpirit framework are using it. However, less than 50 percent of the users who could use it are doing so.

Shell's end-users see tremendous benefit in using OpenSpirit for integration and are clamoring for additional licenses, according to Howard.

Is Shell's enthusiasm for OpenSpirit a result of its investment in the company?

Dan Piette, CEO, OpenSpirit, asserted that Shell, ChevronTexaco and Schlumberger, the three investors in OpenSpirit, treat the company as an investment.

Neither does OpenSpirit receive preferential treatment from its investors in terms of special access to people in their companies, nor does OpenSpirit offer its investors special pricing for OpenSpirit products.

The investors' influence over OpenSpirit is limited to quarterly board meetings.

As far as software purchase decisions by Shell and the other investors are concerned, OpenSpirit is playing a level field with other software vendors, stated Piette.

In addition, Talisman Energy, another OpenSpirit customer, albeit a more limited and recent user of its products, reflected similar eagerness for OpenSpirit's products in an *Upstream CIO* interview.

Scott King, application specialist, exploration, Talisman Energy, stated that he has been observing OpenSpirit's progress from the sidelines for over two years.

King is aware of other solutions and approaches that attempt to address the problem of lack integration of G&G applications and databases.

"However, there is nothing quite as close to OpenSpirit in terms of shrink-wrap, off-the-shelf data and application and data integration," emphasized King.

"How the application and data integration work so well off-the-shelf is what sets OpenSpirit apart from other products. That is its number one strength.

"A lot of great workflows are

enabled by OpenSpirit without doing anything other than installing it and running it. No specialized development or customization is required," King added.

Talisman's deployment of OpenSpirit is not very large.

The western Canadian oil and gas company's exploration department deployed a couple of licenses in late 2002 after OpenSpirit expanded the data types it covers to include 2D seismic, something Talisman uses a lot.

By that time, it had also become

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*"A lot of great workflows are enabled by OpenSpirit without doing anything other than installing it and running it. No specialized development or customization is required." - Scott King, Talisman Energy*

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convinced of OpenSpirit's stability and industry uptake.

Talisman's main database is a Geoframe one.

OpenSpirit extends the utility of Geoframe for Talisman, he commented.

It brings together several domains on a common canvas

"OpenSpirit enables many applications such as Petrel and ArcGIS to poke into Geoframe without any dataloading, which I find very attractive.

"ArcGIS is coming into more and more use at Talisman. Until OpenSpirit evolved, we had no easy way to plug Geoframe into ArcGIS," he stated.

King marveled at how OpenSpirit brings together several domains on a common canvas at Talisman.

"When we select objects in ArcGIS, OpenSpirit goes to Geoframe gets the data and populates it in Excel.

"The three items are inter-operat-

ing even though Geoframe sits in the UNIX world, and ArcGIS and Excel sit in the PC world.

"Cross-platform, cross-application integration from an off-the-shelf product is a quite an advancement from where we were a few years ago," he said.

National oil companies such as Petrobras and Statoil are also endorsing OpenSpirit's products.

"Recently, Statoil did an open-bid involving [G&G] software solution vendors. As part of that bid they required that the solution be OpenSpirit-enabled," said Piette.

## ***NO DIRECT COMPETITION***

Piette and Harter don't see direct competition to OpenSpirit any time soon.

"The barriers to entry are too high. When you see the technology behind this [OpenSpirit] and the dollars spent, you realize that it's very difficult to replicate in a short time," according to Piette.

Indirect competitors to OpenSpirit include enterprise application integration solutions from companies like TIBCO and webMethods.

These solutions not only are expensive by themselves but also require costly implementations and customizations by system integrators.

Piette further explains, "Occasionally, an oil and gas company will hire a Deloitte or an Accenture to build links with their data.

"The problem with that [integration] is that it's essentially a snapshot.

"As the software changes, the companies have to bring these people [systems integrators] in to rework their workflows.

"OpenSpirit allows companies to have an ongoing solution.

"Upgrades to software and database solutions are almost forgotten [by users], because we've already anticipated those changes, tested them with OpenSpirit and they work," he concluded.

Another set of software solution vendors such as Landmark Graphics and GeoQuest are approaching the integration problem by attempting to build a comprehensive portfolio of

solutions to address E&P needs.

Nonetheless, while one Landmark Graphics solution will usually integrate with another Landmark Graphics solution, it will not integrate with a GeoQuest solution.

Further, smaller software application vendors tend to align themselves with Landmark Graphics or GeoQuest but not both.

The fact that OpenSpirit's products are vendor-independent differentiates it from other solutions and approaches.

"What's unique about us is that we are a vendor-independent solution," said Harter.

"We bridge the technology gap to talk to any database, across a variety of platforms, for several vendor applications.

"OpenSpirit acts as the glue that sticks vendors, operating systems and programming languages together," he continued.

Vendor-independence gives OpenSpirit a great deal of traction with end-users.

"The by-product of this is that it allows our product the advantage of integration that's greater than most single-source vendors," stated Piette.

### **TRANSFORMING TO INDEPENDENT SOFTWARE COMPANY**

How did OpenSpirit achieve vendor-neutrality?

OpenSpirit was able to achieve vendor neutrality partially because it started as a joint industry project.

"Prior to OpenSpirit Corp., there was a consortium of oil companies and software vendors, namely Shell, Chevron, Elf EP, Schlumberger GeoQuest, Compagnie Generale de Geophysique and so forth, that provided technical and financial sponsorship to build a prototype of OpenSpirit," explained Harter.

The inefficiencies and high costs incurred by companies as a result of poor integration capabilities of most G&G applications were major concerns of oil and gas companies and some of their suppliers.

Participating companies in the joint industry project recognized that the integration problem was so large

that any one company would be unable to resolve it sufficiently.

Research budgets of individual companies needed to be leveraged.

A sufficient critical mass of adopters was required to drive benefits of integration.

More oil companies would use the integration solution if more application vendors developed their solutions using the integration capability and vice versa.

Moreover, for several reasons some companies such as Shell, "did not want to go with a single software vendor,"

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*"We embrace vendor-neutrality... because we believe that's the key to our success." - Clay Harter, CTO, OpenSpirit*

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claimed Howard.

"Shell felt that [aligning itself with a single vendor] would give it less leverage and suppliers too much power.

"It would also prevent Shell from being able to use best-of-breed software applications for its various portfolios - wells, drilling, production, facilities, subsurface etc.," remarked Howard.

While OpenSpirit started as a consortium, "it soon became apparent that the only way to meet market need was to transform OpenSpirit from a consortium to an independent software company with a product driven by market forces," according to Harter.

"We consider ourselves a very focused company, driven by profitability," concurred Piette.

King acknowledged that there was, "no other way OpenSpirit would have started, and no other way it could continue to work.

"Keeping it under the umbrella of a company is what helps keep it on track and keeps it from being pulled in different directions," he added.

As comparison, he offers the example of a similar organization that was started quite a few years ago.

"The Geoshare Data Exchange technology was similar to OpenSpirit's and is still being used a little.

It was an independent organization that was later developed and maintained by POSC, an international non-profit group organized to collaboratively address E&P information challenges and opportunities.

"However, it suffered from lack of clear direction, a constantly changing data model and never quite got the industry uptake it needed to be successful," stated King.

### **SOFTWARE VENDORS DRIVE ADOPTION**

At present, OpenSpirit has 3,000 users.

Although, this is a reasonable market share, they have by no means reached saturation for their existing products, according to Harter.

He estimated that there are 15,000 potential desktop users who use geotechnical applications from different vendors.

OpenSpirit thinks both oil and gas companies and their software vendors are customers.

Harter compared this idea to how Intel markets itself to end-users and hardware companies.

"We're like Intel in that Intel talks about advantages of using Intel-based PCs to consumers like you and I.

"It also simultaneously sells to PC manufacturers the advantages of using its chip.

"Intel has a very different dialogue with different sets of customers," he ended.

Vendors of software applications used in E&P will drive demand for OpenSpirit, according to Howard.

She explained that OpenSpirit offers vendors an opportunity to expand their utility to E&P companies.

"Now their application can be used across multiple platforms, databases and in conjunction with several appli-

cations," she stated.

"OpenSpirit will appeal to E&P companies because now they don't have to maintain links from the applications they use to their Geoframe or OpenWorks database or both.

"If an E&P company has a Geoframe database, it's probably using all GeoQuest applications.

"By getting OpenSpirit, they'll be able to use applications such as Petrel, now owned by Schlumberger.

"If an E&P company is small and satisfied with the applications it currently uses, it probably won't see a need for OpenSpirit," she added.

Harter agreed that the interest level in OpenSpirit was generated not by its own products but by products that integrate on top of OpenSpirit.

"OpenSpirit will grow as more vendors use OpenSpirit and mature their connections to OpenSpirit," he said.

Harter and Piette clarified that OpenSpirit will strictly remain a middleware company.

"We don't make databases or geotechnical and engineering applications," said Harter.

"That's what makes it more likely for vendors to partner with us. We don't compete with them.

"We embrace vendor-neutrality not for altruistic reasons but because we believe that's the key to our success," he concluded.

## **CUSTOMERS WANT MORE DATA TYPES INTEGRATED**

Customers are very pleased with OpenSpirit's current functionality. However, they are waiting for OpenSpirit to extend the data types it covers beyond subsurface data.

"OpenSpirit started out by focusing on some core areas that they strove to do well, and then started expanding on what they could do," said King.

"By any means, OpenSpirit can't do everything, as far as the data types it supports. But what it does handle, it handles well.

"However, there are so many more data types it could pursue. It goes to show you how much potential there is for these types of things.

"OpenSpirit's functionality is limited only in terms of the data types

OpenSpirit integrates," he added.

"Shell's biggest request to OpenSpirit is to expand its portfolio to more data types because Shell still has to maintain data links for databases containing production, drilling data and so forth," Howard commented.

"We've offered OpenSpirit people from Shell who can explain to them the types of applications drill engineers would use to analyze drilling, the types of drilling data they would require, and where they would find that data within Landmark and GeoQuest applications," she continued.

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*"Our pricing scales well. It's not like the customer has half a million dollar hit that it has pay upfront." - Dan Piette, CEO, OpenSpirit*

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OpenSpirit is responding to customer demands and is now in the development stages of establishing the objects used in drilling applications such as platforms, slots and other components that represent the casing and bottomhole assembly, all of which will be part of their Drilling Data Module.

"Most of our usage until now has been through vendors who make applications used by geologists and geophysicists and to a lesser extent, reservoir engineers," said Harter.

"However, from inception, we had envisioned that we want to cover all the technical demands of oil and gas upstream."

In terms of product development, OpenSpirit is usually unlikely to work on development that generates custom extensions, which are only available to a single company.

"Our product is meant to be a

shrink-wrap product available to all," Harter explained.

"Even when there's one company who wants the enhancement, we'll ask around multiple customers to ensure that it's being used by them."

In addition to its foray into drilling applications, OpenSpirit's expansion plans include growing in the production applications space. Production data types could include production test data and history data.

## **IMPROVEMENTS IN RELIABILITY**

OpenSpirit's reliability has improved several-fold since it was first deployed at Shell in 2001, according to Howard.

"Earlier, people had to learn how long they could keep OpenSpirit running before it crashed or lost things," said Howard.

Initially, when an end-user started an OpenSpirit-enabled application, it initialized eight or nine services that would keep their "fingers in the Geoframe or OpenWorks databases."

The services refer to application server processes that run when OpenSpirit is initialized and allow end-users to grab data from the OpenWorks or Geoframe databases.

Constant running services drained several resources on the desktop and caused the system to crash when an application had a glitch or a Landmark or GeoQuest server would go down.

Additionally, OpenSpirit saved references to data used by end-users so that when the end-user started an application next, the application would run faster than it did the previous time.

These references would be saved in an Oracle database, which is stable but resource-intensive database system.

Responding to customer suggestions, OpenSpirit has now moved away from its dependence on Oracle and uses a couple of files to remember data references, said Howard.

Finally, it has combined the services that run when OpenSpirit Base Framework initializes so that it takes up less processor and memory resources.

The services now have an auto-start function that allows them to be initialized only when they are being used, and

shuts them down when they are idle.

Talisman Energy did have minor issues with OpenSpirit's stability when it was first implemented.

Nonetheless, OpenSpirit straightened the bugs relatively quickly in a couple of months, said King.

Most application patches go through a much longer development cycle of almost a year, according to King.

In general, he felt, "OpenSpirit applications drain surprisingly little of the computer's resources.

"Given the number of behind-the-scenes processes running with OpenSpirit, we were worried that we would have to make a big cache outlay and get a dedicated machine to run OpenSpirit-enabled applications."

However, on testing the system, he discovered that the load on the computer as a result of OpenSpirit was quite light.

### **TIMELY, RESPONSIVE CUSTOMER SUPPORT**

Customer support to OpenSpirit's products is provided by e-mail and phone from OpenSpirit's Houston office, the only office they have so far.

Both Howard and King concur that OpenSpirit is extremely attentive to customer queries and responds to them very promptly and effectively.

OpenSpirit has a couple of customer support professionals but their developers also respond to customer queries.

On most occasions, both Howard and King have had their issues addressed by OpenSpirit on the same day.

"They seem to have a 10-14 hour coverage in terms of customer support," said Howard.

"It was more a matter of learning from our perspective what additional information OpenSpirit needed to solve our problems."

OpenSpirit installations are fairly easy.

In previous years, Howard used to travel between different Shell locations to install OpenSpirit. Now, she e-mails instructions to the local administrators at Shell locations that plan to adopt OpenSpirit.

When asked whether smaller E&P companies that have fewer resources

to spare for their own customer support than Shell would face problems installing and deploying OpenSpirit, Howard maintained that it was most likely that they wouldn't.

"Training [for OpenSpirit] does need to improve," according to King.

"OpenSpirit seems like a very simple concept-make one application talk to another and make data transfer from one source to another.

"In its implementation OpenSpirit is quite complex," he said.

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*"OpenSpirit applications drain surprisingly little of the computer's resources." -  
Scott King, Talisman Energy*

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King was referring to the fact that to get the maximum benefit out of OpenSpirit, users need more extensive training than what is provided in OpenSpirit's basic workflow tutorial.

### **NEED FOR WEB INTERACTION CAPABILITIES**

King suggested that OpenSpirit add some web interaction capabilities, which would allow end-users to access OpenSpirit data from any machine, anywhere.

"Then OpenSpirit wouldn't even need to be installed on that desktop or laptop," said King.

"At the moment, I do have applications that are served on the web by running on CITRIX without any problems.

Running OpenSpirit on CITRIX would be inadequate because running an application on CITRIX involves running the application on another machine where the application is installed.

CITRIX simply displays the application on the desktop.

"If OpenSpirit had web interaction capabilities, a user who isn't familiar

with Geoframe or with a high-end data interpretation application could access data from OpenSpirit without opening that database or application.

Howard agrees that being able to remotely access and use OpenSpirit's capabilities would strengthen the presentation of business cases made regarding decisions or recommendations at Shell.

"A manager would be able to easily demonstrate the analysis or data that led to his/her recommendations about where to drill and so forth at the business presentation," she explained.

### **PRICING VERSUS VALUE**

Piette and Harter claimed that OpenSpirit's pricing would enable more price-sensitive E&P customers to adopt its products.

"Our pricing scales well. It's not like the customer has a half-a-million-dollar hit that it has to pay upfront," Piette stated.

OpenSpirit's licenses are based on the number of concurrent users at the client site.

Each OpenSpirit component is sold separately.

The OpenSpirit Base Framework costs \$2,000; the price of Data and Application Adapters vary in price but roughly cost \$2,000; and, individual Application Plug-ins that are sold by vendors cost about \$750 to \$5,000.

Hence, the total cost per concurrent user is approximately \$5,000 to \$6,000.

"Our prices are quite low compared to the value and efficiencies our products offer in letting users access different databases and applications. Generally, the oil companies seem very pleased," said Piette.

Howard believed that OpenSpirit's products provide more value than what it would have cost Shell to build its own integrations to the applications and databases its geologists, geophysicists, modelers and data managers were using.

When compared to the costs of implementing alternatives to OpenSpirit, King felt that OpenSpirit's pricing was very reasonable.

It encouraged them to purchase OpenSpirit licenses quickly, he said.



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