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This Issue

FEATURE STORIES

Web Portals Can Lead to Higher Productivity, Lower IT Costs5

Attribute-Enriched Data Is Critical for Supply Chain Collaboration7

Shrink-Wrap, Vendor-Neutral Integration Solution for G&G Applications, Data11

INDUSTRY NEWS

Solution Converts Paper Invoices and Field Tickets to Electronic Form17

Software Solution for Oil and Gas PIDX Standard17

Sercel Acquires Soderia17

Web-Access to Strategic Information, Revenue Data Provides Quick Access for Owners18

Data Import Capability and Site Assessment Functions Added to Software18

O'Shea Appointed Vice President of International Business Development ..19

CAT Offers Distance-Learning Course for Oil and Gas Industry19

Project Management Solution for the Oil and Gas Industry Available19

Comprehensive Manufacturing Solutions Based on ISA S95 Guidelines20

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

SARBANES-OXLEY from page 1

National Commission of Fraudulent Financial Reporting was a jointly sponsored project by the Committee of Sponsoring Organizations (COSO).

The COSO consisted of the American Institute of Certified Public Accountants, American Accounting Association, Financial Executives Institute (FEI), Institute of Internal Auditors and Institute of Management Accountants.

The commission's objective was to identify causes for fraudulent financial reporting and to reduce its incidence.

It also made recommendations for management, boards of directors of public companies, the public accounting profession, SEC, and other regulatory and law enforcement bodies.

What's different about SOX is that unlike other regulations enforced by the SEC and corporate self-regulation codes prescribed by accounting and audit associations, SOX holds CEOs and CFOs personally liable for attesting to the accuracy of their company's financial statements by requiring them to sign off on the documents.

In addition, under the regulation, auditors will need to certify all internal controls and processes, including those for IT.

Companies will need to perform real-time disclosure of any events that could possibly affect their financial performance.

Why should CIOs be concerned?

Although SOX is primarily a financial legislation, companies that don't involve the CIO and fail to recognize the large role of IT in compliance "will find out later on that they are wrong," stated Tom Patterson, information risk senior manager, KPMG.

Section 404 - involving management assessment of internal controls and procedures - is central to SOX compliance (Figure 1).

The SOX legislation ensures that "internal controls or rules are in place to govern the creation and documentation of information of financial statements," according to Ben Worthen, CIO.com.

"Since IT systems are used to generate, change, house and transport that

data, CIOs have to build the controls that ensure that information stands up to audit scrutiny," he added.

CEOs and CFOs share principal responsibility for the validity of financial data. Nonetheless, the case of

"The expenses of compliance are higher for large, complex oil and gas companies but as a percentage of income or revenues, they are probably higher for smaller companies..." - Richard Woodward, partner, oil and gas practice, Deloitte Consulting

HealthSouth, a health services company, demonstrates that CIOs may also be held personally responsible for invalid or fraudulent data.

Kenneth Livesay, CIO, HealthSouth was fired in April 2003 after he pleaded guilty to federal charges of falsifying financial information and conspiring to commit wire and securities fraud.

COMPLIANCE CHALLENGES FOR E&P COMPANIES

When the SOX regulations were formulated, they were not made industry-specific nor were they envisaged while keeping smaller companies in mind.

The prospecting nature of upstream companies creates special challenges for SOX compliance, noted Richard Woodward, oil and gas partner, Deloitte Consulting, in an interview with *Upstream CIO*.

In the interest of prospecting or finding oil and gas cheaply, most E&P companies operate from multiple locations and involve decentralized and disparate organizational structures and business processes to adapt to local needs.

"Upstream companies that have operations in multiple geographies need to be decentralized to be responsive to the local market.

"For example, upstream companies have often established multiple procurement processes across the organization. Standardization of these processes is not a concern.

"The advantage of having a single

Sections 302 & 906	Corporate Responsibility for Financial Reports
Section 404	Management Assessment of Internal Controls
Section 409	Real-Time Issuer Disclosures
Section 802	Criminal Penalties for Altering Documents

Section 302: Officers of the company must make representations related to the disclosure of controls, procedures, internal controls, and assurance from fraud.

Section 906: Ensure that the 10-K's, 10-Q's, annual reports, periodic reports containing financial information comply with SOX, representing an accurate picture of the firm's financial condition.

Provide an annual assessment as to the effectiveness of internal controls in financial reporting, and obtain an attestation from external auditors that the controls are effective.

Disclose to the public on a "rapid and current basis" material changes to the firm's financial condition.

Ensure authentic, immutable records and retention.

Sources: FindLaw, META Group.

Figure 1: IT plays a critical role in facilitating compliance of certain Sarbanes-Oxley regulations

procurement process is outweighed by having multiple ones that allow you to be very responsive to getting all the things you need so that you can bring production online quicker," explained Woodward.

In such a scenario, timely and accurate reporting becomes more difficult. The degree of documentation of internal controls at these companies is likely to be limited.

Complexities in coordination of processes across geographies complicate mapping of material control processes, making it a much more extensive and tedious exercise.

In addition, differences in the levels of difficulty of extraction of oil and gas and the levels of depletion of reserves represent differing economics to firms in the industry.

Unlike the downstream processing and refining segment, which has a fairly consistent industry player profile, the upstream segment attracts companies of varying levels of capitalization and abilities.

An enormous number of relatively small public and private companies play alongside larger integrated oil companies and E&P companies.

"The total expenses of compliance are higher for large, complex oil and gas companies. But, as a percentage of income or revenues, they are probably higher for smaller companies. Smaller companies are likely to experience a disproportionate burden as a result of compliance," he stated.

Woodward is a thought leader on SOX within Deloitte and will be presenting at a panel discussion Corporate Governance: Beyond Sarbanes-Oxley to be held during Deloitte's Second Annual Oil and Gas Conference in Houston on Nov. 19, 2003.

SMALL, PRIVATE COMPANIES AFFECTED

While SOX was initially intended for larger publicly traded U.S. companies with revenues over \$75 million, all companies will experience the impact eventually.

"Many private companies have executives from public companies serving on their board who are participating in an assessment process within the

public company," explained John Van Decker, vice president, META Group.

"They [board members of private companies] are also expecting that the private companies that they are serving on the boards of go through a financial

"[Implementing SOX changes] sends a clear message to the markets of how strongly committed Petrobras is to protecting minority rights and creating shareholder value by adopting the best corporate governance practices set forth in every market where shares are traded." - Jose Eduardo de Barros Dutra, president and CEO, Petrobras

controls process," he continued.

Public companies that earn less than \$75 million in revenues but are growing will eventually have to comply with SOX regulations.

At present, it appears that if the Public Companies Accounting Oversight Board's (PCAOB) rule is approved by the SEC, those companies earning below \$75 million in revenues will also have to comply with SOX in two years.

The PCOAB, a private non-profit created by SOX to oversee the auditors of public companies, spells out internal controls requirements for all public companies.

Section 105 of SOX grants the PCAOB broad investigative and disciplinary authority over registered public accounting firms.

The PCAOB's rulemaking process results in the adoption of rules that are then submitted to the SEC for approval.

PCAOB rules are enforced once the SEC approves them.

PCOAB's current draft, which will be effective by mid-December 2003, requires that public companies earning less than \$75 million in revenues conform to internal control requirements by their auditors for fiscal years ending April 15, 2005 and later.

According to Van Decker, although \$75 million in revenues is the current threshold for SOX compliance, the official threshold could potentially go lower in the future.

Companies that are considering an exit strategy in the near term, either by trading publicly or by being acquired by a public company will have their financial controls process scrutinized by investment banks or by acquiring firms during the due-diligence process.

"Despite the fact that the acquired firm will have to eventually conform to the larger enterprise's standards, having a set of certified internal controls and financial management processes will make the firm more attractive to the acquiring firm," stated Van Decker.

Many smaller or private companies that are either suppliers to or sales partners of larger, public companies and have their systems integrated with the larger companies will need to adhere to the financial control mandates dictated by the larger companies.

"Many institutions that are receiving grants from public companies may also be required to demonstrate an internal-controls competency around grant management as well as overall financial management," according to Van Decker.

In general SOX is raising the bar for internal controls and financial management, he emphasized.

INTERNATIONAL COMPANIES SEE AN ADVANTAGE

International companies that are listed on the New York Stock

Exchange (NYSE) are making changes towards compliance as required by the regulations.

Complying with SOX is a way national oil companies can distinguish themselves in the international capital markets.

Petrobras (NYSE-listed PBR) president and CEO Jose Eduardo de Barros Dutra called the costs of complying with SOX "well worth incurring."

Implementing changes, he stated, "sends a clear message to the markets of how strongly committed Petrobras is to protecting minority rights and creating shareholder value by adopting the best corporate governance practices set forth in every market where shares are traded."

Last year, Sinopec (NYSE-listed SNP) proposed changes to its corporate governance policy such as enhancements to the decision-making power held by the board of directors in accordance with SOX and the "Principles for the Corporate Governance of Listed Companies" jointly issued by the China Securities Regulatory Commission and the State Economic and Trade Commission.

In order to prevent their own country's capital markets from being marginalized, some Canadian companies are urging their federal government to introduce government reforms as stringent as those in the United States.

These publicly traded Canadian companies including Encana Corp. and TransCanada Pipelines formed a lobby group called the Advisory Committee on Corporate Responsibility Review in fall 2002, reported *The Globe and Mail*, a Canadian newspaper.

COMPLIANCE PROGRESS

META Group conducted a SOX survey in July 2003. Results from the approximately 100 respondents included:

- 90 percent were either actively engaged in SOX projects or were planning to initiate one;
- 6.0 percent of the companies stated they were already in compliance;
- 53 percent are going through Section 404 initiatives and identifying projects;

- 45 percent stated that CFOs are the most likely leaders to initiate SOX;
- 5.0 percent of the audience cited the CIO as a SOX leader; and

"The CIO must guarantee that the CFO is effectively supported for Section 404 business process documentation activities and identify where IT investment can be leveraged for an effectively managed and certified business process." - META Group

- 25 percent of firms believe that they will also use SOX as a means to push business improvement projects beyond what is required for compliance.

"The CIO must guarantee that the CFO is effectively supported for Section 404 business process documentation activities and identify where IT investment can be leveraged to ensure that business applications and IT infrastructure can adequately support SOX requirements for an effectively managed and certified business process," noted META Group.

Deloitte similarly noted that CIOs are taking a secondary role in compliance projects.

The SOX compliance projects are, "usually led by the CFO or the controller. CIOs have only very recently been engaged as to their role and the role of IT," Woodward mentioned.

"[IT provides] the basic infrastruc-

ture through which information is created initially and through which it is then analyzed for reporting. And that infrastructure is pretty critical not just for compliance but moving beyond compliance," he cautioned.

Like META group, Woodward too believes that IT's role in SOX compliance cannot be underplayed.

Deloitte has been working with about 400 companies across industries for SOX compliance. Most clients are Fortune 500 companies.

To Woodward's knowledge, at least 10 to 15 Deloitte clients belong to the oil and gas sector.

At present, most companies are working around Section 404.

The extension of the Section 404 compliance deadline to June 15, 2004, effectively gave companies an additional year to "stand back and assess both the speed with which they want to achieve compliance and the scope of compliance they wish to achieve, whether they want to move beyond compliance, whether they want stick to the letter or the spirit of the law," according to Woodward.

To achieve Section 404 compliance, companies are mapping their various material processes.

"Some organizations are more far-sighted than others. They are saying while we're there let's re-engineer processes to make them more cost-effective and efficient," Woodward stated.

"Others note what the deficiencies are, identify and remediate processes that are not in compliance with full intention of returning to them later after they're done achieving compliance," he added.

A majority of the companies that Deloitte was working with "are a third to half-way there" in terms of compliance.

"Some companies, very few, are three-fourths of the way there," he commented.

Companies such as El Paso Corp. have publicly stated that its corporate governance policies meet or exceed all requirements of the SEC, the NYSE and SOX.

"In some cases, companies might have underestimated what it's going to

take [to achieve compliance] and will make frantic attempts in the last six months. Others have taken a more realistic approach. They will finish early. It varies.

"All companies will achieve compliance. They don't have a choice," remarked Woodward.

COMPLIANCE SPENDING VARIES BY RISK, EXPOSURE

Several research groups have taken a stab at predicting compliance-related costs to companies.

For mid-capitalization companies, the costs directly associated with being public could double as a result of SOX, new SEC regulations and changes to exchange listing requirements, according to a recent study by Foley & Lardner, a national law firm that focuses on a variety of industries including energy.

AMR Research predicts spending by Fortune 1000 companies striving to reach compliance with the regulation is expected to reach \$2.5 billion.

According to AMR Research's SOX survey, 85 percent of the more than 60 Fortune 1000 companies sur-

veyed responded that compliance will require changes in IT and application infrastructures that support business.

"Nearly 77 percent of companies will spend more on IT, business-process change, corporate governance,

"Spending by Fortune 1000 companies striving to reach compliance with the regulation is expected to reach \$2.5 billion." - AMR Research

or consulting this year as a direct result of compliance with the act, with spending levels directly tied to a company's risk and exposure," states the

research report.

SOX compliance projects will have an impact on IT spending beginning fourth quarter 2003 through 2004/2005, META Group predicted.

The 83 firms with revenues over \$3.3 billion surveyed by FEI suggested that they will spend \$5 million to \$6 million on an average in their first year of compliance. This spending involves approximately 6,000 hours or \$500,000 worth of consulting.

Woodward refused to throw out numbers on compliance costs.

"Tossing numbers is not a useful exercise. Those numbers aren't necessarily representative.

"There's a massive spectrum in terms of costs of compliance.

"The amounts are driven by a number of factors such as the level of geographic dispersion of assets, whether the organization plays in one segment of the value chain or multiple segments, whether the organization has a reasonable level of documentation to begin with, and whether the organization wants to go beyond SOX or wants to achieve the bare minimum," he added.

Web Portals Can Lead to Higher Productivity, Lower IT Costs

Prior to deploying Plumtree Software's Enterprise Web software, each of the systems in Syncrude Canada Ltd.'s departments as well as intranet sites were managed separately, noted the company, causing difficulty for groups to leverage electronic information and services of other groups.

"Syncrude has hundreds of independent information systems, and had more than 20 separate intranet sites across the enterprise," said Darcy Daugela, web services team leader, Syncrude.

The company found that employees often had difficulty finding information they needed, often unaware of systems and data available in other parts of the organization.

To overcome this limitation, it opted for an integrated portal and collaboration solution to provide a com-

mon, extensive framework for sharing systems and information throughout the enterprise.

In January 2002, Syncrude installed Plumtree's Enterprise Web solution, assembling 150 web applications in the portal for streamlining processes, enhancing employee self-service, and providing managers and executives with a real-time dashboard of production performance and costs.

Enterprise web portals, like the one chosen by Syncrude, are much like corporate intranets. It is true to Webster's definition of a portal, in that it is a "door" or "gateway" to business information - a single interface to access information dispersed throughout an enterprise through a secure Internet environment.

When thinking of web portals, one might think of Yahoo! or Excite. These

portals were designed to assist Internet users in locating web pages, and accessing e-mail, news and discussion groups.

The success of Yahoo! led many software vendors to think about enterprise web portals, which have the same concept of helping users access information more easily, but have been customized for corporations rather than casual Internet users, adding personalization and security options.

"People don't want just a web portal by itself, they want content management, collaboration, single sign-on and search to be part of a portal to make it richer so people will use it more and it would be more beneficial," said Carilu Dietrich, public relations manager, Plumtree Software.

Corporations have vast amounts of data which they need to organize, store and share. Enterprise web portals, have

a search engine, security features (such as a single password login) and collaborative features and allow access to several enterprise applications.

Intranets, although they are usually initially appealing, gradually lose frequency of usage due to lack of up-to-date information. In addition, an enterprise could have several different intranets managed by several different entities.

Also attributed to intranets are loss of knowledge due to attrition, liability exposure due to lack of standard processes and the inability to find information related to an employee's job.

Enterprise web portals allow users within a corporation to access knowledge management, collaborative features and employee information, and integrate applications in real-time.

"With Plumtree, we have been able to bring together the information that workers need from across the enterprise, in a way that makes it quick to find and easy to use," Daugela noted.

Syncrude reported that the portal has made its back-end systems more accessible and easier to use, improved ROI on its existing technology investments and reduced training costs across the business.

In addition, thousands of dollars in anticipated hardware costs were avoided by providing kiosk and remote access to the web portal for plant and field workers rather than personal computers, said the company.

"Syncrude has deployed portal, collaboration and search technologies in one enterprise web solution, reducing time and cost required to deliver over 150 new applications," said, John Kunze, chief executive officer, Plumtree.

Another E&P company, Pioneer, has also implemented Plumtree's Enterprise Web solution to better their ROI.

"Pioneer has built some executive dashboards that tie into the performance, showing how much production is coming out in each site.

"They can see the oil site and roll it up to a regional basis and then an international basis so that executives can see if they are on target with their production values or are under performing.

"They have also tied in some different financial measurements to see how each arm of the business is doing, up-to-date versus goal," said Deitrich.

WEB APPLICATIONS, FEATURES

According to Plumtree, enterprise web applications are applications hosted on different application servers, such as Microsoft Windows and Legacy and are managed within one framework, differing from traditional applications in three ways.

First, its Enterprise Web applications combine existing data and processes from diverse enterprise systems with new, shared services, providing greater return on assets.

Second, applications are assembled dynamically, incorporating new capabilities on the fly, allowing for greater agility in solving business problems.

Finally, these applications are designed to be integrated into an enterprise-wide environment, providing greater economies of scale. Users can easily navigate between or search across applications, and web services developed for one Enterprise Web application can be re-used as-is in

other applications.

The most common types of web applications being deployed within organizations are: employee services; knowledge management; customer, supplier, and sales support; executive dashboards; finance; and corporate compliance.

Halliburton has been able to offer its employees, executives and customers a portal to all information within the company, allowing for a more collaborative atmosphere.

Much like My Yahoo!, Halliburton has a myHalliburton personalization option for its customers, offering information on invoicing, job scheduling, field tickets and proposals.

"Collaboration within a portal is sharing documents and having threaded discussions. If an engineer has a question about something, they can ask the question to other engineers, which will then become a threaded discussion and the portal will capture that knowledge," said Dietrich.

"Also, group calendars and versioning of documents are available. If they are working on a project plan for a new site, each of the changes to the

An example of Halliburton's personalization option.

document is maintained so that everyone is assured they are working on the latest document," she added.

There are several vendors that offer enterprise web solutions but Plumtree Software believes that it differentiates itself from the other companies through its flexibility.

"You can use our application on many different types of application servers, program in many different types of languages, and tie into many different back-end systems.

Syncrude Canada recently deployed Plumtree's Corporate Portal, Collaboration Server and Search Server to over 5,000 employees, partners and contractors.

ADVANTAGES, DISADVANTAGES

Although many large corporations are purchasing enterprise web solutions there are still complaints.

One problem that Forrester Research expressed about Plumtree is that it does not have a sophisticated enterprise application integration (EAI) or business process automation (BPM) capability that other enterprise web portals have. Instead, Forrester states that applications must be integrated point-to-point.

Some companies do not see this as a problem. With Plumtree, a particular EAI or BPM system does not have to be in use to implement its suite.

Line56 Media, a company that analyzes enterprise technology, found that integrating an enterprise web application with other systems was difficult for nearly half of the companies it recently surveyed.

Other significant problems found were the need for process automation, monitoring and management tools and self-service web publishing.

The challenges in deployment of the solution the surveyed companies reported ranged from developing a vision of what the enterprise web should be to indexing from third-party repositories.

Some benefits that Line 56 found with deployment of an enterprise web is process automation, general productivity, lower IT costs, collaboration, better time to market and increased revenue.

However, 87 percent of the companies reported a positive ROI with less than 6.0 percent reporting a negative.

Deployment speed of a web portal depends on the specific company and what it is trying to build, said Dietrich.

Line56 found that the average time to deploy enterprise web software is eight months, with 30.9 percent of those surveyed doing it in three to six months and only 12.3 percent launching it in under three.

Attribute-Enriched Data Is Critical for Supply Chain Collaboration

By Virgil Vincent, Weatherford International, and Richard Turner, Convergence Data Services

Quality of data is essential if a company expects to realize significant value from its enterprise resource planning (ERP), product life-cycle management (PLM) and business intelligence (BI) tools.

Consider, for example, that reducing inventory (by identifying duplicate buy items), increasing purchasing power (by consolidating direct material spend across business units and product lines) and maximizing collaboration with suppliers and clients can only be truly realized by having rich, attribute-based data.

Unfortunately, the discipline with which many companies prepare data for migration from legacy applications to enterprise systems is limited - a problem that routinely compromises margins.

A particularly salient example is supply-chain management. With many

corporations spending nearly 60 percent of their revenues on purchased products and services, supply-chain

"A major obstacle to achieving improved efficiency in the supply chain is the inability to share and transfer meaningful information to the extended enterprise - particularly outside suppliers."

management has a fundamental impact on the bottom line.

However, improving efficiency in the supply chain is routinely constrained by organizations' inability to share and transfer meaningful information to the extended enterprise - particularly outside suppliers.

And the principal culprit is data corruption and inconsistencies (internal and external).

Typically there are several causes of redundant, erroneous, or nonstandard data:

- disparate systems that cannot communicate internally or externally;
- different commodity naming and numbering conventions;
- lack of a formal process for creating new parts; and
- lack of governance with respect to data standards.

Many companies have sought to overcome these problems by implementing enterprise systems.

Unfortunately, many such efforts have been less than successful because of their failure to deal with unstructured information and the

lack of industry-standard taxonomies.

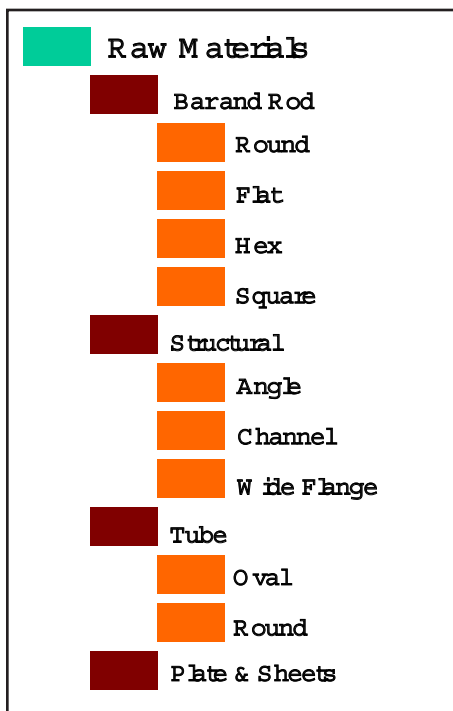
USING ENTERPRISE DATA CLASSIFICATION

Enterprise data classification is a method of organizing data by grouping similar products into a common classification hierarchy.

As shown in Example 1, a company's classification structure often looks like a tree with branches, with a product grouping of attributes used to uniquely describe the products at the end of each branch. Products with common attributes thus can be found under the same category in the classification tree. Example 1 depicts the classification structure for raw materials commonly used in the oil and gas industry.

An enterprise classification structure contains the agreed-upon standards for describing all products. This begins with major product and service groupings, and bores down to defining acceptable attribute values for a specific group of products.

It usually is very easy to see the difference in data quality between companies that have done little with their data and companies that have applied



Example 1: Classification tree structure for raw materials. Items are grouped based on identical attribute types.

OLD LEGACY DESCRIPTION	NEW ENTERPRISE DESCRIPTION
03.250 02.440 41X 065-105Y TPN	Tube, 3.250 OD 2.440 ID 4130 SRL HF WS-440
4.750 X 3.890 80KSI	Tube, 4.750 OD 3.890 ID 4130 Q-T HF WS-410
1.875 x 1.502,1020	Tube, 1.875 OD 1.502 ID 1020 SRL WS-107
TUBE,BBL,CARB,2 1/4 X 2 3/4	Tube, 2.750 OD 2.250 ID 1020 CARB WS-191
TUBE, STL 3.09X2.29	Tube, 3.090 OD 2.290 ID 1026 SRL CD WS-141
4.100 TBG 1.000 X .875	Tube, 4.100 OD 1.000 ID 4130 NORM CD WS-451
1.2603 X 1.760,1015	Tube, 2.603 OD 1.760 ID 1015/26 CD WS-143
4 X 3,4130,TB	Tube, 4.000 OD 3.000 ID 4130 ANL CD WS-451
1 X 0.625,304 STNLS STL	Tube, 1.000 OD 0.625 ID 304 ANL CD SS-201
1.500 X 1.125,304	Tube, 1.500 OD 1.125 ID 304 ANL CD SS-201
TBG,4130CDS,1.500X0.813X52-3/4	Tube, 1.500 OD 0.813 ID 4130 NORM CD WS-451

Example 2: Legacy vs. Attribute Enhanced Descriptions

enterprise classification mechanisms. Example 2 highlights these differences.

As shown in Example 2, there are significant differences between the old legacy product descriptions and the new enterprise product descriptions.

For example, the new descriptions depict a consistent order of information, as well as a consistent format involving the use of decimal places, use of abbreviations, use of the same noun to start a description and so forth.

The product descriptions on the left also are written haphazardly. Each description looks different, lacks useful information and has no standard format.

Basically, a lot more information can be obtained on the products on the right side, thus making it much easier to find what you are looking for. Descriptions on the right are made up of attribute values that can also be used to find a certain product.

Example 3 illustrates the value of attribute-based data in developing a consistent enterprise description.

Using an automated description generator with enterprise agreed templates, based on allowed attribute values, drives description conformity throughout a product category.

The process also serves as an effective validation tool in identifying any missing or incorrect attribute values.

IMPORTANCE OF MAINTAINING DATA STANDARDS

Once a company has carefully converted its legacy data to an agreed-upon standard enterprise classification, the next step is to apply the same level of diligence to any new products that will be created going forward.

The focal point here is the new part creation process that typically is managed by today's product life-cycle management (PLM) systems.

Most PLM systems are not capable of policing the creation of new product classifications, which often contributes to a free-formatting approach to describing new products.

OLD LEGACY	NEW ENTERPRISE DESCRIPTION
2.0 TUB	Tube, 2.000 OD 1.500 ID Q-T HR 4130 WS-102
	ATTRIBUTES
	Noun: Tube
	OD: 2.000
	ID: 1.500
	Grade: 4130
	Finish: Quenched and Tempered
	Condition: Hot Rolled
	Spec: WS-102

Example 3: An example of enriched product data described by attributes

Consequently, it is essential that companies introduce exceptional levels of order to their new-part-creation processes.

To keep up to date with new products and standards, companies also will need the ability to maintain and update their enterprise classification structure.

In other words, if a PLM system is a particular company's master data manager for its product data, then it will need to determine how to update and maintain the classification in its PLM system on an ongoing basis.

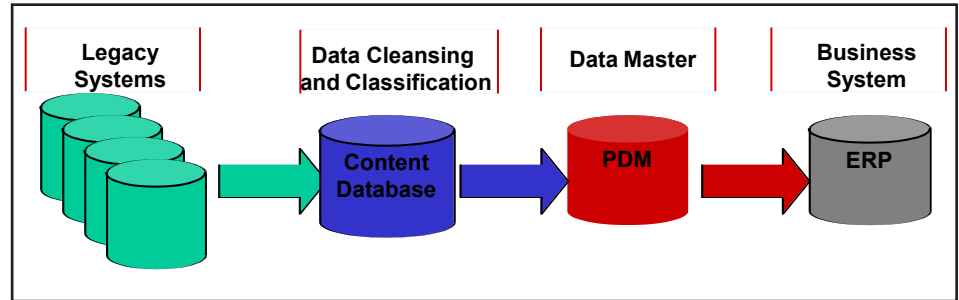
CONSOLIDATING DUPLICATE PRODUCTS

Once attributes have been defined for a company's key product groups, the process of identifying duplicate products becomes much easier.

If it has done a good job of enforcing the use of standard attributes to describe each product group, then those attributes can be used to conduct consolidation searches (Example 4).

It is also important that - to enable true search results - a standard set of attribute values exists for each attribute.

Example 4 (depicting a large oil and gas OEM that uses raw materials across all of its business) shows the power of having a rich attribute set that helps



Example 5: Example of a Data Classification Architecture

identify duplicate raw materials.

ENTERPRISE DATA CLASSIFICATION PROCESS

As we have noted, successfully extracting data from multiple legacy systems - and then passing the data on to new enterprise applications - demands a robust data-classification process.

In fact, a robust data-classification process can pay big dividends to an organization through its ability to pass a clean, rich data set that has been pre-validated to meet the requirements of new enterprise applications.

For this reason, it is vital that companies work to prepare their legacy data before loading the data into a new application architecture.

A robust classification process starts with extracting only the most pertinent information - not passing

along information that should have been purged previously.

Once the optimal legacy data-set is determined, the information then should be loaded into a temporary classification content database.

Example 5 describes a classification architecture.

Prior to classifying a new batch of legacy data, the company should work to consolidate duplicates and map newly loaded parts to any existing, matching classified parts.

Data classification represents a good opportunity to consolidate potential duplicate parts prior to loading classified data into a new system.

The next step is to take the remaining legacy data-set and classify those products into the approved enterprise classification structure.

If an enterprise classification structure does not exist, then subject matter experts need to determine what that structure should be, including identifying the product categories and attributes used to describe these products.

Once a legacy data set has been classified, the data can be cleansed and populated with additional attribute information.

Example 6 describes some of the key activities that take place during the time that data are held in the classification content database.

DATA CLEANSING AND CLASSIFICATION

After populating data with attribute values, the classification and attribute values then will need to be validated against agreed-upon enterprise standards.

Once the classification cleansing and validation have been completed, various descriptions can be generated

CDS Attribute Analysis System

Raw materials|Tube and pipe|Tube

Select a maximum of 6 attributes to search by -- 8631 Record(s)

- ☒ MATERIAL GRADE
- ☒ OUTSIDE DIAMETER
- ☒ INSIDE DIAMETER
- ☐ STRENGTH
- ☐ FINISH
- ☐ CONDITION
- ☐ LENGTH
- ☐ SPECIFICATIONS
- ☐ DRIFT DIAMETER
- ☐ MATERIAL
- ☐ INSIDE DIAMETER PLUS TOLERANCE
- ☐ INSIDE DIAMETER MINUS TOLERANCE
- ☐ OUTSIDE DIAMETER PLUS TOLERANCE
- ☐ OUTSIDE DIAMETER MINUS TOLERANCE
- ☐ CONCENTRICITY
- ☐ TUBING WEIGHT
- ☐ DRIFT LENGTH
- ☐ HARDNESS
- ☐ SPECIAL REQUIREMENTS

Find Matches

	Count	MATERIAL GRADE	OUTSIDE DIAMETER	INSIDE DIAMETER
▶	19	1026	2.750	2.245
	19	1026	2.750	2.250
	17	1026	2.250	1.745
	16	1026	1.875	1.495
	16	1026	2.125	1.745
	15	1026	1.625	1.245
	15	1026	2.250	1.995
	15	4130	2.250	1.745

Example 4: Attribute Consolidation Tool

Quality Data is Key to Successful Strategic Sourcing, Spend Analysis, Collaboration

Strategic Sourcing. Suppliers are an increasingly valuable contributor to profitability. In fact, through innovation, continuous improvement and collaboration, many have become extensions of their customers' organizations.

For this reason, most extended enterprises must work to ensure the delivery of real-time information to suppliers.

They also must acknowledge that customer-supplier relationships of this type have characteristics that are different from other types of supply chain activities; for example, "total supply cost" is more important than purchase price only.

All in all, these are relationships that demand information and technology sharing to achieve common standards and cost reductions.

Work flows and supply chain information will support common standards such as XML for interoperability among critical suppliers.

Spend Analysis. Consolidating purchasing power - driven by repeatable spend analysis - is a major component of strategic sourcing.

Purchasing at the enterprise level, rather than at the single-facility level can have significant impact on spend reduction.

In many ways, maximizing buying leverage across divisions and product lines is made possible by data with a rich set of attributes, enterprise descriptions, reconciled

units of measure and accurate supplier information.

Collaboration. A collaborative supply chain efficiently integrates suppliers, manufacturers, warehouses and stores, so that products are produced and distributed so as to minimize total system costs and meet customer requirements.

Enabling supply-chain technologies will provide more efficient communication - with decisions based on real-time information - without cause to worry about data discrepancies.

The collaborative flow of data must be: 1) attribute based; 2) integrated into enterprise systems; and 3) web-based to maximize flexibility.

Supplier benefits associated with an attribute-based, collaborative process include:

- an easier way of doing business;
- fewer errors;
- better inventory management and forecasting accuracy;
- reduced data maintenance, e.g., not having to map part-numbering systems;
- improved ability to engage in e-commerce;
- value-added service that differentiates a supplier from its competitors;
- unit-cost savings and lower operating costs; and
- opportunity to manage all of a customer's data, thereby simplifying change control and maintaining industry standards versus local standards.

from the existing attribute set.

The next step of the classification process then is to run final validations on both the classification structure and the new data set to ensure that the information will be accepted by the new enterprise applications.

Typically, the data is classified in

batches, as described in the previous example. The size of each batch can vary widely, depending on how many disparate legacy databases exist across the enterprise.

The initial condition of the legacy data and the desired future state will dictate the number of resources need-

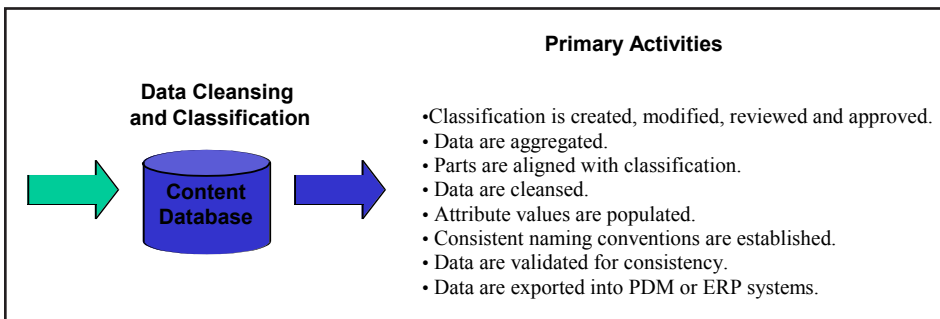
ed to help classify and cleanse the data for each batch.

KEY POINTS

The mission of this brief paper has been to emphasize the importance of consistent, high-quality data, and to identify the key activities associated with introducing that data into a new enterprise application environment.

The key points of this mission are summarized below.

- Data must be classified, enriched with standard attributes and developed with a consistent naming convention to achieve maximum benefit from enterprise systems.
- Identifying duplicate items using attribute searches can help reduce inventory levels



Example 6: Typical activities involved in the classification process

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 subsurface 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

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

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

"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

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,"

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

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.

"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

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.

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

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.

Solution Converts Paper Invoices and Field Tickets to Electronic Form

Expansion of Digital Oilfield's OpenInvoice technology is now available with OpenInvoice Image, which converts paper invoices and field tickets to an electronic format.

Digital Oilfield's OpenInvoice Professional product is designed to automate the process of invoice generation, receipt, adjudication and approval, and streamlines traditional labor-intensive paper-based workflow processes.

In addition, detailed spend data acquired through the invoice process can be analyzed to identify inefficiencies and enable improved operational performance.

OpenInvoice Image, an add-on module, enables the operating company to use the OpenInvoice workflow engine, even for those invoices that are still submitted manually.

"Existing customers have already begun expanding their implementations to include OpenInvoice Image," said Rod Munro, president and chief executive officer, Digital Oilfield.

"They realized that having one system for all invoices is of great benefit and now with the release of Image, their personnel have a uniform process for coding and approvals, and the transition from paper to electronic invoices will be virtually seamless," he explained.

By converting the paper invoice to a digital image through the module, the same processing, routing and approval workflows offered through OpenInvoice Professional for processing electronic invoices, are now available for paper invoices as well.

In addition, cost categorization can be applied to the paper invoices,

allowing an operating company to immediately analyze 100 percent of their spend, said the company.

A single method for processing all incoming invoices, whether paper or electronic, provides a seamless transition as suppliers and operators move from paper-based invoicing to electronic invoicing.

According to Digital Oilfield, paper invoices and field tickets are scanned and converted to digital invoices before being routed to specific company departments or individuals.

After coding and approval, the invoice information is uploaded directly into the operating company's financial system for settlement.

www.digitaloilfield.com

Software Solution for Oil and Gas PIDX Standard

EE B2B™, a PIDX/RosettaNet B2B solution, is now available to the oil and gas industry to translate e-commerce documents into an XML format.

Stone Bond Technologies L.P.'s EE B2B handles the translation of any type of e-commerce document (e.g. EDI, CSV, etc.) or data directly from a backend system, into a PIDX compliant XML format and transmits the information securely over the Internet using the RosettaNet Implementation Framework 2.0.

Stone Bond's packaged solution is powered by Enterprise Enabler™, which eliminates the need for programming and provides the flexibility for a customer to do business easily in many different variations of the PIDX standard, and to respond quickly as the standard evolves over time.

It can also be installed behind the customer's firewall, avoiding costly VAN or HUB charges and keeping the customer in control.

Stone Bond believes that most

commercial solutions currently available on the market are either very costly to implement or require an intermediary approach to e-commerce document exchange.

According to the company, EE B2B avoids these high cost alternatives and allows companies of any size to exchange documents with their trading partners cost effectively and with rapid implementation times.

"We have developed EE B2B to make it possible for every company to participate in e-commerce and its

resultant business advantages without the tremendous overhead and risk that are associated with most solutions," explained Pamela Szabo, vice president and chief information officer, Stone Bond.

"EE B2B allows early adoption of standards because it supports the inevitable changes along the way as well as the multitude of interpretations of any standard," she noted.

www.stonebond.com

Sercel Acquires Sodera

Compagnie Generale de Geophysique (CGG) has announced that Sercel has acquired all the shares in Sodera S.A. in a private transaction, including most assets of Seismic Systems Inc., SODERA's sister company located in Houston, Texas.

SODERA, based in Toulon, France, is a provider of airgun sources used mainly in seismic data acquisition. Sercel is a wholly owned CGG subsidiary.

www.cgg.com

Web-Access to Strategic Information, Revenue Data Provides Quick Access for Owners

The creation of a web-based exchange of production and sales volume information, called Production Connect, helps enable operators to quickly deliver near real-time information to their non-operated interest owners, and provide these owners with tools to track, report and analyze performance.

Oildex Connect, a TransZap Inc. service, will provide the performance-tracking tool to the energy industry.

"The Production Connect exchange benefits both operators and owners. Operators improve communication with their working interest owners while reducing the costs to disseminate production and sales volume information," explained Peter Flanagan, president, TransZap.

"The paper-free exchange eliminates faxing, mailing and replacement of lost documents and provides a simple conduit through which operators can meet the reporting requirements of most joint operating agreements (JOAs).

"Owners benefit by accessing time-

ly production information used to better manage their investments and respond to fluctuations," he continued.

Through its services - Checkstub Connect, JIB Connect and now Production Connect - Oildex provides the revenue, expense and production information needed to evaluate the performance of outside-operated wells.

According to Oildex, data will first be available through the tool from companies operating in the mid-continent, with operators from other regions joining the exchange in early 2004.

WEB-ACCESS TO ESSENTIAL REVENUE DATA

BP and Oildex have partnered to provide 35,000 royalty and working interest owners with unprecedented access to oil and gas revenue information through the on-line service, Owner Relations Connect™.

"BP values its royalty owners and has chosen to supplement our current line of communication with the progressive Owner Relations Connect

service, providing timely information and assisting royalty owners in the management of their oil and gas investment.

"By delivering paper-free information, BP shaves costs from the owner relations process and disseminates information quickly and easily, benefiting both royalty owners and BP," said Lee Scarborough, BP.

The Oildex service delivers BP's interest owners paper-free revenue, production, cost and year-end tax information, throughout the day.

By coupling this web-based data with electronic funds transfer (EFT), owners have the option to eliminate paper altogether.

"BP joins a growing number of industry leaders supplying owners with on-line tools to track well performance and effectively manage their investments in oil and gas," said Flanagan.

www.oildex.com

Data Import Capability and Site Assessment Functions Added to Software

An enhanced version of Quorum Land v3.0 software has been released that incorporates new data import capability and site assessment functions.

Quorum Business Solutions Inc.'s software suite streamlines the energy industry's complicated land and lease management processes and is currently used by several Fortune 500 oil and gas producers and operators.

The newest release of Quorum Land features several important new enhancements that were identified in collaboration with the Quorum Land User Group.

Included in the enhancements is a built-in tool that allows users to

import, validate and upload acquired land data into their Quorum Land software.

As energy companies routinely acquire large quantities of land data, either through data purchase or through the acquisition of another company, the ability to quickly and easily gain access to this data in a common format is essential, said Quorum.

Other enhancements include the addition and integration of the Quorum Site Assessment module that facilitates the tracking and management of environmental, ecological and safety assessment data, and associates it with the correct property within

the software.

Further enhancements have been made to the agreement data sheet as well as to expand the mass changes functionality.

"The Quorum Land User Group has a strong sense of ownership in this product and is committed to assisting in its continued improvement. By combining this guidance with Quorum's industry and technical expertise, we are able to deliver valuable enhancements for new and existing clients," said Paul Weidman, president and chief executive officer, Quorum.

www.qbsol.com

O'Shea Appointed Vice President of International Business Development

Peter O'Shea joined A2D Technologies as vice president of international business development.

O'Shea will spearhead the company's international growth, drawing on more than two decades of global industry experience.

"My goal will be to bring to the international marketplace the same well log data products and services that A2D has successfully deployed in the United States," he said.

Currently, A2D has more than

1.7 million well logs available online. O'Shea will work to expand this coverage to include previously unavailable basins and exploration zones worldwide.

This process will be assisted by TGS-NOPEC's great success in working with government and private entities around the globe to plan and execute seismic surveys.

He holds an honors Bachelors of Science in Geology from the University of Wales, Aberystwyth, and

has 23 years of experience in the oil and gas industry.

Prior to joining A2D, he served as vice president of global account management for ASCO plc. He also worked at Halliburton's NUMAR Division as development manager of global business and as regional manager for Asia Pacific, based in Jakarta.

www.tgsnopec.com

CAT Offers Distance-Learning Course for Oil and Gas Industry

The introduction of "How to Find Upstream Oil & Gas Information on the Internet," an interactive, self-paced training course designed to facilitate petroleum industry research efforts, is currently being offered by Competitive Analysis Technologies (CAT), Houston.

"This innovative self-help course evolved from the feedback that CAT received after facilitating more than five years of oil and gas-training seminars presented nationwide for domestic and international energy companies and industry organizations," said Bill Crowley, president and chief executive officer, CAT.

"With the help of our clients, we developed nine modular training segments that allow for individual one-on-one interaction with the instructor," he noted.

Each module begins with the latest information on the topic, provides the student with step-by-step examples and then challenges the student to find the answers to several questions.

In addition to improving search techniques, the modules include ways to find oil and gas news sources, discussion groups and forums; finished product prices of crude oil and natural gas; and national and international government sources of oil and gas information.

Also included are ways to locate

and oil and gas experts at universities, research institutes and associations on the Internet; human resource and corporate information; oil and gas industry journals and directories that are free; oil and gas studies and research reports; and hidden web sources.

Students search for the answers on the Internet at their own pace and

interact directly with the instructor.

"CAT's new course is designed for anyone needing upstream oil and gas information," Crowley explained.

www.catsites.com/seminar.html

Project Management Solution for the Oil and Gas Industry Available

A targeted project management solution for the oil and gas industry, Enterprise Project Management Systems, enables organizations to improve project performance and minimize surprises.

The system is based on Microsoft Project 2003, and is being offered through key partners, Dolphin Knowledge, a consulting firm, and the Project Group Inc., a Microsoft Gold Certified Partner for Business Intelligence that specializes in project management.

Recent technological advances in MS Project 2003 provide for a common database, e-mail alerts and access

to project information via the Internet from anywhere in the world.

The combination of the Project Group's processes and industry knowledge with Dolphin Knowledge's expertise in collaboration and organizational learning and knowledge of Sharepoint Portal Services, expands the availability of key project information to executives and other key project participants.

"These advances can help our customers dramatically improve their program and project performance across the board," said Marise Mikulis, energy industry manager, Microsoft.

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Comprehensive Manufacturing Solutions Based on ISA S95 Guidelines

Petroleum companies now have access to a major new range of integrated manufacturing software solutions aligned with the international ISA S95 guidelines to manage manufacturing operations, functions and associated workflows.

The solutions, offered by Aspen Technology Inc., address key operations defined by S95, including production scheduling, production dispatching, production data collection, production execution and performance analysis.

The S95 standard supports improved operational performance by defining a set of manufacturing functional activities and workflows, and by establishing a common format for the exchange of information between the plant and business systems, like enterprise resource planning (ERP) systems.

By aligning its products with the S95 guidelines, AspenTech feels it is able to offer modular manufacturing solutions that deliver value, and that offer reduced risk and lowest cost of ownership.

"As many companies are trying to integrate their manufacturing operations with the rest of their company systems, new standards such as ISA S95 are becoming increasingly critical," said Dave Woll, vice president, ARC Advisory Group.

"We think there is a great deal of significance in AspenTech's decision to use ISA S95 to unify its Aspen Manufacturing Suite and thereby enhance the value proposition to its customers."

The enhanced capabilities also allow customers to manage their manufacturing operations, functions and associated workflows - from receipt of raw materials through to the final consumer - with the same underlying data, assumptions, and process models used across the man-

ufacturing process, according to AspenTech.

This enables real-time management and optimization of the operations based on a consistent set of key performance indicators and messages as defined by S95, said the company.

"Our investment in developing software solutions aligned with the ISA S95 guidelines means that our customers can begin to transform their manufacturing operations today," said Steve Pringle, senior vice president, manufacturing/supply chain, AspenTech.

"These integrated solutions allow business managers to see what is actually happening in their operations, rather than getting a historical picture. If a business variance occurs, the solution enables them to identify the root cause, so that immediate corrective action can be taken before it accumulates into significant business loss," he added.

The manufacturing solutions are based on software technologies that are part of the Aspen Manufacturing Suite (AMS) Version 6, which includes products such as DMCplus[®], InfoPlus.21[®], Aspen eBRS[™], and Aspen Apollo[™].

AspenTech actively participates with other leaders in the process industry community in the development of the ISA S95 guidelines.

The latest AMS products reflect this close association with the design and development of the guidelines, incorporating a set of common messages for exchange, a supporting infrastructure to provide agreement on data content, and workflow, event and error handling.

www.aspentech.com