digital energy journal

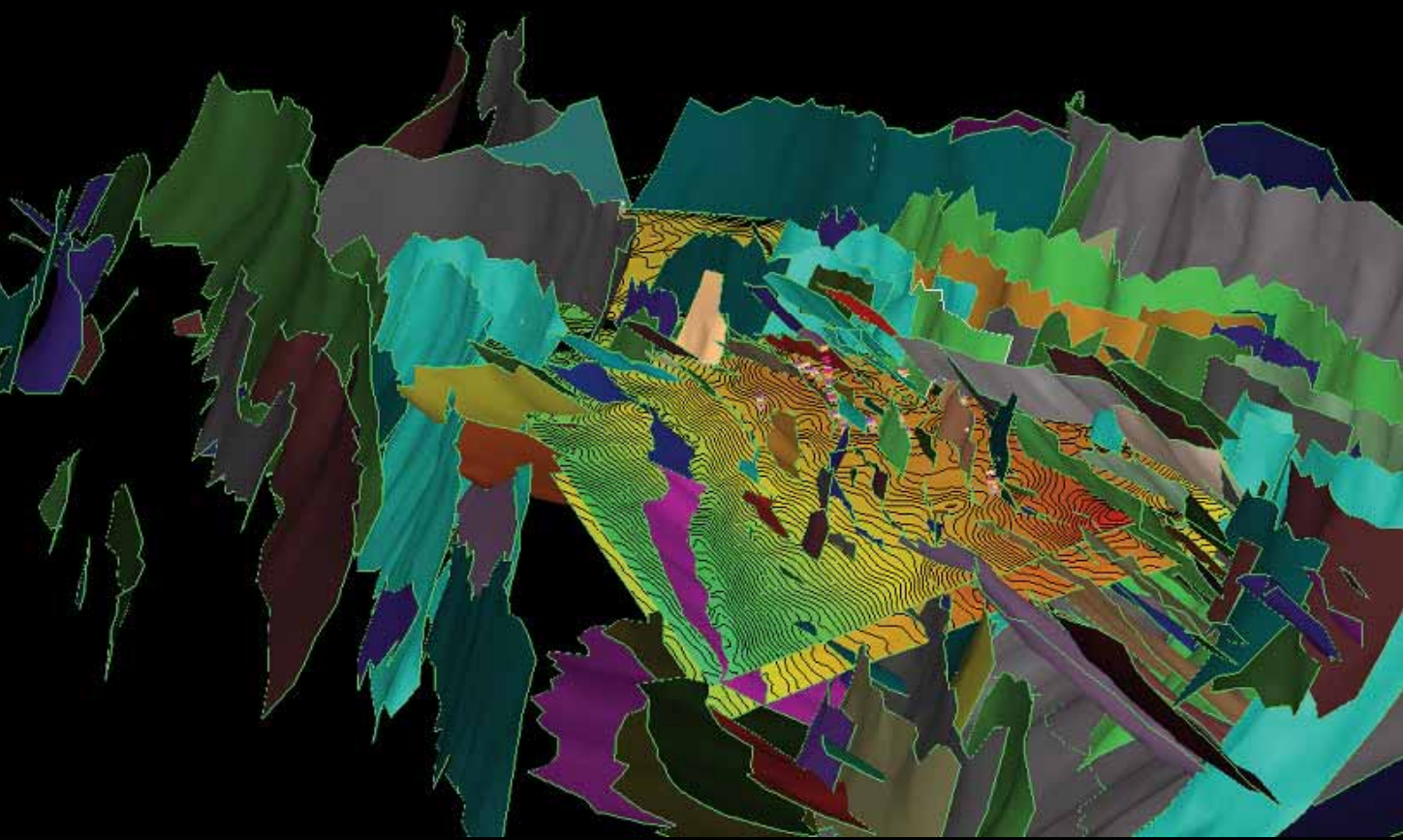
June 2009 Issue 19

Subsurface:

Working out the grain of the rock

Knowledge which would have prevented dry holes

Software that helps you ask questions



Surface:

Why IT often doesn't work with the business

Persuading staff to catalogue information

E-commerce - getting data fit for purpose

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Cover photo - model made in JOA's Jewelsuite software of a structurally complex Nigerian field with over 350 faults and more than 20 stacked reservoirs, all of which are incorporated in the single 3D grid. Uniquely, JewelSuite's patented 3D grid creates vertically stacked orthogonal cells that honour the geology regardless of complexity. See www.jewelsuite.com for more information

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Everybody needs digital technology - but only if it works

David Bamford
A non-executive director of Tullow Oil and past head of exploration with BP, joins Digital Energy Journal as Consultant Editor

It's with some pleasure that I find myself writing my first article for Digital Energy Journal, having just joined the editor Karl Jeffery as a shareholder and consultant editor.

First of all, a bit about who I am - I'm a geophysicist by training and an explorer by recent history, a past head of BP's global exploration program and general manager for BP West Africa, nowadays a non-executive director of Tullow Oil plc, also a director of two or three smaller companies (for example, I held equity in, and was a non-executive director of, PARAS Ltd before it was sold to RPS Energy last October), and an occasional consultant and e-journalist.

Finding Petroleum is a neat summary of what I'm interested in – the how, why and wherefore of finding oil and gas in frontier basins, in mature areas, close to existing fields or in existing fields.

I'm then drawn to the digital world because it is a fact that the vast majority of the folk who find petroleum, from the teams who discover new fields in West Africa to those who add reserves to older ones in the North Sea, do so sitting at a screen similar to the one I'm sitting at as I write this short article.

In the main, the days of the intrepid geologist braving hostile terrains and hostile 'locals' to hit rocks with a hammer are now pretty much behind us and even those hardy souls who still undertake fieldwork will perhaps load their thoughts and digital photos into their lap-top in the evening, having downloaded satellite imagery of their field area before they set off!

So, although a humble geophysicist, I feel like I should be interested in any technology, any hardware and any software that enables or underpins the business of finding petroleum, perhaps especially any that enables us to avoid the disappointment of drilling a well – at vast expense – only to find no petroleum has ever been present at our chosen spot or that it was once there but has already been produced.

Before I continue, perhaps I ought to declare an allegiance. For me, John Browne was the best and most remarkable business leader of his generation, and it was a privilege to be working in BP, especially its upstream division when he was leading it.

I mention this now because just a while ago I was reminded of some words of his from 8 years or so ago whilst I was contemplating the wreckage of Lehman Brothers, Merrill Lynch and the travails of Morgan Stanley and Goldman Sachs.

At the time when the mysteries of Enron were beginning to be revealed, he said, "the first challenge for any business is delivery and my sense is that the markets of the world have begun to restore a degree of authenticity to valuations - a gentle reminder of the rigorous requirement that a company is about producing real results - not just promises and aspirations."

Perhaps not so 'gentle' this time around!

This is relevant because just as there are explorers out there who have only 'promises and aspirations' and no chance of Finding Petroleum so there are folk in the technology and digital worlds whose offerings have no chance of helping anybody else find petroleum!

There's a need for a forum where real results, preferably success case, can be shared and what attracted me to Digital Energy Journal was that it seems to have a uniqueness - talking to people in the industry with interesting stories to tell and making articles about them in a way that people can easily read and understand and hence relate to their own needs.

I'm glad to be a part of that!

IO 09

SCIENCE AND PRACTICE

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This conference is about the methods and tools for integrated operations, today and in the future. IO09 is the place where science and practice meet. It will present the experience from some of the most advanced oil companies, system suppliers and research institutions internationally in this field today. By contrasting today's best practice with forward-looking perspectives this will create a productive meeting place for generating new impulses in the further development of integrated operations practice. See: www.ioconf.no

Sessions
IO 09 will highlight aspects of the technologies and work processes for better productivity and safety.

1. Intelligent petroleum fields and IO in a low price scenario
2. IO solutions for improved safety and environment
3. Smarter oil and gas world – experiences and solutions
4. Roadmap for green fields and brown fields – IO solutions and IO compliance
5. Pushing the boundary of integrated modeling
6. New work processes and collaboration environment
7. Industrial gaming applications for IO in the oil and gas industry
8. Pushing wired pipe – smarter well solutions and reservoir optimization
9. Operation management through integrated planning and optimized maintenance
10. Digital platform for the next generation IO – a prerequisite for the high north

sfi Centre for Research-based Innovation

Sponsoring organization: The conference is organized by the Center for Integrated Operations hosted by the Norwegian University of Science and Technology. The IO Center was established in 2006, by leading international oil companies, system suppliers, academic institutions and the Research Council of Norway, with the objective to undertake research, innovation and education on integrated operations. **www.ntnu.no/iocenter**

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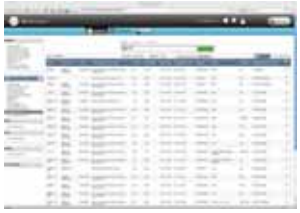


Communications

Dry holes – did we have the information to prevent them?

In many dry hole reviews, it emerges that the technical team had identified problems with the well – but the information was lost amid all the other information involved. How can we prevent this from happening on future wells?

By David Bamford, consultant editor of Digital Energy Journal

My recollection of the (too many) dry hole reviews that I have been involved with is that oftentimes the reason the prospect under review failed was identified by the technical team well in advance of the decision to drill the well.

Unfortunately, the spotting of this fundamental problem was obscured and overtaken by all the other information that typically swims around as a decision to drill is made.

Also, it is a frequent observation that when technical explorers describe a prospect as "high risk", typically with a chance of success of worse than in 1 in 4 or 1 in 5, they are actually indicating either that there is some fundamental problem with the prospect or that they do not really believe the hydrocarbon volumes that they have attributed to the prospect.

In these cases, the exploration team has identified a 'loose end' in the prospect description which is the reason why the prospect will not actually work.

I am suggesting that the most profound impact will be in the correct identification of risk: note I am talking here of identification of risk not its quantification (which is a whole other story).

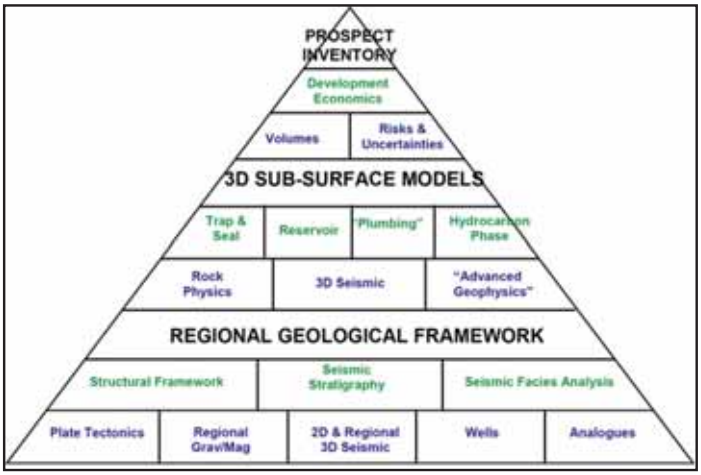
So here is my assertion – the most significant way for a company to improve its exploration performance would be to stop drilling dry holes or, put slightly differently, to stop drilling dumb holes where there is a clear 'loose end' which means the prospect will fail.

But there's the rub – it is exceedingly difficult to spot a true 'loose end' amidst the plethora of data and information of different quality and dimensionality that is contained in a typical prospect evaluation.

Integrating data

In exploration many different types of data need to be integrated before we can offer knowledge about a petroleum system, a play, a series of prospects, or a prospect we wish to drill, and talk sensibly about volumes, uncertainties and risks.

At the risk of gross over-simplification, the technical process in exploration can be represented by the pyramid shown right (note that this is just one face of a pyramid – another might describe the whole process of Portfolio and Prospect Inventory management, for example).



In this technical face, various different types of data (in blue) combine to give particular insights (in green) which are then integrated to reach a key stage in the evaluation (in black):

Any one of these elements involves a potentially unique mixture of processes, models and interpretations.

As an example, consider the following three:

Regional Geological Framework

Building such a framework necessitates an a la carte selection from (seismic) chronostratigraphy, petroleum system types, play fairways, regional cross-sections, gross depositional environment (GDE) maps and common risk segment (CRS) maps.

Data manipulation and display commonly uses GIS products (such as ARC_GIS) but viewing an integrated final Framework, such as the simultaneous display of regional seismic lines, seismic stratigraphic interpretations and GDE maps, is both difficult and rare.

Advanced Geophysics

What is meant here is an à la carte selection from high resolution gravity/magnetics, electro-magnetics (e.g. CSEM), specialist Seismic (e.g. multi-component; multi-azimuth; wide-angle), lithology & fluid prediction from seismic – including AVO for lithologies, perhaps fluids, direct-hydrocarbon-detection ('flat-spots' etc), rock physics (including stress, pressure prediction).

It's a real challenge to workflow processes to integrate these numerous information strands and to be able to view several outputs simultaneously.

3D Sub-Surface Models

The key word is again Integration, enabling multi-disciplinary team-work, by providing a 3D geological "framework" - containing multi-attribute cells allowing specification of for example lithology, porosity and permeability, stress and pressure, Sw - allowing these teams to resolve uncertainties and spot "Loose Ends" (see below).

The à la carte nature of these technical exploration processes raises profound issues with respect to both work-flow processes and comprehension.

How can the team comprehend multi-faceted and sometimes conflicting interpretations, both efficiently and effectively?

The process can be rather cumbersome, bringing both inefficiency and ineffectiveness to exploration management and decision-making; optimization will bring important benefits in terms of both cycle-time and cost reductions.

Critical issues

One critical point seems to be that organizations - and related processes, workflows, standards and procurement practices - need re-shaping to support "integrated explo-

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ration" projects. Acting 'locally' in this way seems to be far more significant than the 'global' pursuit of initiatives such as Energistics or PPDM.

Another issue is that there are no applications packages which span the entire exploration technical process.

Regional work tends to rely on GIS products such as those provided by ARC. The interpretation workstations offered by Schlumberger and Landmark typically address only a subset of the data manipulation and interpretation described by the pyramid, for example aspects of 3D seismic interpretation, the use of well data; definition of trap, seal and reservoir. There are a number of 'niche' products that focus on particular aspects of the process, for example the interpretation of seismic attributes, their relation to rock physics and so on. Yet another set of products deal with risk, uncertainty, volumes, development economics and so on.

As a consequence, much exploration management and decision-making still lives in a world of Excel spreadsheets and PowerPoint, and those who tend the key (upward) information flows within many organizations seem to regard Microsoft Office as the leading edge of the digital revolution: one result is an emphasis on internal marketing rather than collaboration and understanding.

Visualisation

For me one of the most exciting recent tools of collaboration is Visualisation which gives us something we've never had before - the ability to give all the people involved in an exploration project a common mental picture of the sub-surface on which they are working, a rapid and common understanding of something they will never actually see.

Visualisation is an immensely powerful stimulus for collaborative working styles, changing the boundaries of teams, and bringing together people of very different disciplines - all applying their skills to a common objective, and as a result of the technology being able to reach decisions in a matter of days rather than weeks or months.

Actually that sounds like "management speak"! In reality, I can count on the fingers of one hand the number of times I've seen a truly integrated display; for example, a review of a regional geological framework where I could simultaneously view plate tectonic reconstructions, regional potential field maps, a regional seismic data base, seismic stratigraphic and facies interpretations, migration pathways ("plumbing"!), gross depositional environment maps/

Integrated Exploration is tough to do, challenging to deliver…… but the future "winners" in the oil & gas patch will deliver it…..to their advantage.

Caesar Systems - software to help you ask the right questions

As finances get tighter, the importance of good decision making gets a lot more important. Caesar Systems offers a range of software, training and advisory services to help with all types of oil and gas decision making and help you ask the right questions.

Caesar Systems of Houston is developing a range of software tools, training and consultancy services, to help oil and gas companies make decisions.

It provides software tools used to understand the risks and opportunities of a situation, training to make better use of decision-making principles and tools. It can also work side-by-side helping companies determine the numerous uncertainties and risks in exploration and production for better decision making. "Our goal is making the complicated simple," says Victor Koosh, CEO, Caesar Systems.

"Decision making gets a lot more complicated when you have to make commitments without having good answers to the right questions," he says. ""If you ask the wrong questions then no tool in the world will make them right."

The company is seeing good growth in the current economic environment, as people increasingly want to try to understand their businesses at a deeper level. At the time of writing (late April 2009) the company had already booked more business than it did in 2008, both from new clients and existing ones using the service more.

The company has 30 staff, half software developers and half advisors helping people use the software effectively.

The company has been developing tools which can be used in offshore deepwater, as well as enhanced oil recovery, and unconventional oil and gas. "These are growth areas for the E&P industry," he says.

Companies have often made these kinds of decisions with spreadsheets in the past, but it is hard to incorporate the required knowledge models with all of their variables in a spreadsheet.

"We can consider all the information simultaneously – and what you do when other information is available," he says. "That's different from the static spreadsheet approach – that really only considers what you know today and each of those alternatives individually."

"The software can be used to create dynamic scenarios for production forecasts, expense forecasts and cashflow forecasts, and provide you with metrics to differentiate those forecasts," he says.

The right questions

The software does not actually tell people what decision to make, but helps provide them with better insight about what is going on, so they can ask the right questions.

Providing tools to help you make decisions, training you how to use the tools - or even helping you make the decision - Victor Koosh, CEO, Caesar Systems

"I hate to use the tired word 'solutions'," says Mr Koosh. "But basically we're a problem solving company. We try to help our clients identify the real problems they're trying to solve."

"It's more about enabling people to visualise alternatives, generate insights, and thereby facilitate them to make good decisions," says Mr Koosh.

"In order for humans to make decisions we must understand our choices. We also have to have a way to differentiate the alter-

Finding Petroleum

London

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OilVoice Forum

digital energy journal

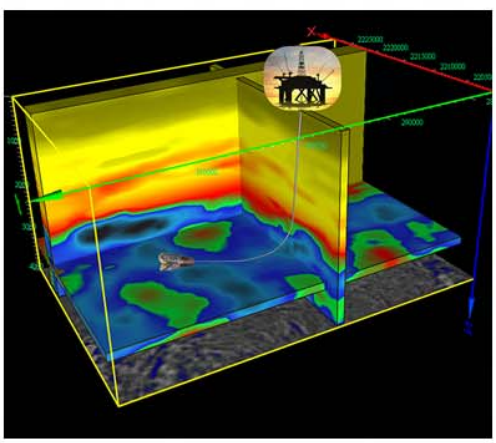
Conference and exhibition on pushing the boundaries in finding petroleum

David Bamford (pictured right), a past head of exploration and general manager of West Africa with **BP**, is joining up with OilVoice, one of the largest oil and gas websites (and organiser of the OilVoice Forums series of events) and Digital Energy Journal to produce *Finding Petroleum*, a new conference and online social network about new technologies and methods to push the boundaries in finding petroleum - with maximum efficiency, safety, environmental performance and optimum use of available capital.

Our emphasis is on new technologies and methods which are already providing results in the oilfield - looking for stories about what people have done, how they did it and what they will do next, and the oil operators, service companies and suppliers behind it. We'll encourage minimal use of technical jargon, so that people from different disciplines can easily share their experiences and views.

The conference is supported by an online social network at network.findingpetroleum.com, where you can contact other speakers and delegates publicly and privately, blog about your experiences and share photos, videos and powerpoints.

Our delegate fee will be just £300 per person with discounts for students and educators.



Themes

- **Exploration hotspots**
- **Integration & teamworking**
- **Transforming exploration drilling**
- **Breakthroughs in seismic technology**
- **New technologies**
- **A competition to find the best new idea in exploration**

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Photo credits (clock wise from top left): David Bamford, OilVoice Forums, Halliburton, Geotrace

natives," he says.

"Should we drill or not? When? How many wells? How big a plant or surface facility should we build? When should we use waterflooding, gas injection or other recovery methods?"

When the oil price is low and revenues reduced, decisions have to be made about deferring projects where it is possible. "Understanding that has become critically important," he says. "We give insights into the right scheduling."

You can try out different scenarios to see how they would change the overall outcome.

"Say if rig rates multiply by 3, you can model what might happen," he says. "You can see and identify opportunities that allow you to be successful in those circumstances and also avoid the things that prevent your success."

You can also model what your competitors might do, and how that might affect things.

For example, if a company has to make decisions about building a whole new plant upfront, or building it in stages over time then they would gain insights about which of those strategies helps them achieve their goals best and why.

A common problem is that people don't feel they have enough information, and have to make a decision on whether to invest in getting more information – such as through a new seismic survey.

You can identify the uncertainties that the information will help you resolve, and based on the resolution of those uncertainties, how that knowledge would then change your ability to make the decision. Sometimes, the cost of more information is greater than the value of having that additional information.

"They can use the software to find out what they know, what they'd like to know, what they could maybe find out – how much investment would it take to get the knowledge they seek, how would that impact their overall outcomes once they have it," Mr Koosh said.

Connecting the domains

The important thing is the connections between the different disciplines. "In the traditional way of approaching problems – you break the problem down and you have specialists work on each part of the problem and each specialist brings you their perspective. The challenge is integrating all of those in order to make a decision," he says.

The financial success of most projects will depend on what happens in the subsurface – and there are very few people with a comprehensive understanding of both the reservoir and finance.

This is something Caesar Systems aims to address. "Our VP of client service is a reservoir engineer with significant finance experience," he says. "We offer people with knowledge from both domains."

Of course the oil and gas industry has many different knowledge domain areas, including subsurface, surface, commercial environment and political environment. All of these can make a big impact on the overall success of a project.

"The key is really the knowledge models – whether it's a subsurface knowledge model, surface knowledge model, drilling knowledge model – they all have to be brought together in order to understand the dependencies and inter-dependencies because that's where the value lies," he says.

Helping customers learn

Mr Koosh strongly believes that the more customers are able to use the tools, the better it is for both parties. The more they know, "the more opportunity there will be for us to collaborate on new ways of doing things," he says.

The company is developing its own training material, including help systems and how-to videos. "That's an enabler for a client to learn at their own pace, at their own time, how to apply a particular concept when they face a similar situation," he says.

It has formed a partnership with a Houston company called Decision Frameworks, which offers courses to help with decision making. It was founded by Ellen Coopersmith, a petroleum engineer and decision expert, with offices in Houston, Calgary and Germany.

"By having the software, the class room training and advisory services – you can have the skills to deal with whatever happens," he says.

Caesar Systems and Decision Frameworks offer a workshop called Project Jumpstart, where companies begin to solve actual problems on a real project. "The client has a real decision problem – and they provide us with a certain amount of information about that decision problem. We go to their offices and prepare that project for their decision-making."

"In that case – we're teaching as well as solving simultaneously."

"Typically it's something that they've tried to solve themselves – they couldn't solve on their own – or were insufficiently happy with their solution."

IT good - IM bad - survey

Most oil and gas companies are satisfied with their IT departments, but think there is room for improvement in information management -particularly in how well a company ensures that its information management is kept to an adequate standard across the company, according to a recent survey conducted by Venture Information Management.

Respondents said they were mostly satisfied with their company IT practises - but not satisfied with the way the company was evaluating new applications and hardware.

When it came to information management practises, most companies were satisfied with how they were collecting data in real time, updating it, assessing competitors' innovations, sharing information with partners and providing training.

However they weren't satisfied with how well the company was regulating its data management- making sure that it is good enough, being used properly in business decisions and people know how to organise it.

When asked about their information usage, most people said that there were clear boundaries and expectations between personal and company use of data and information and that there are clear lines of communication between IT, the business and the data/information management organizations.

Again they were mainly disatisfied with regulation of standards and processes for data quality, performance management and practices for sharing of data/information.

"IT is more mature than Information Management practices, behaviour and values," says Alan Pointing of Venture Information Management.

The company is keen to continue surveying the industry at regular intervals to see how things change - and in particular, if information management budgets are cut in the downturn (as they were in the 1990s downturn), or the gradual increase in investment continues.

Take the survey yourself at
www.questionpro.com/akira/TakeSurvey?id=1051937

Halliburton – forum for software vendors promotes collaboration

In April of this year, Halliburton held a forum to for software vendors to help them determine new ways to integrate their products with the Landmark software suite and to find new capabilities to better address customer challenges

In early April 2009, Halliburton held its first DecisionSpace® Developers' Network Forum for software vendors that have or plan to have integrated products that work with Landmark's E&P technology workflows.

About 30 software vendors worldwide integrate with Landmark workflows – and ten of these sent fifteen attendees to the forum, primarily from the Houston area.

Vicki Jowell, global project director for Landmark's R5000 suite of software, says the meetings provided an opportunity for attendees to get ideas for extending their products or creating new products. They also learned more about software development kits (SDKs) that make it easier to integrate into the DecisionSpace open environment.

"We already have two companies that have extended their application community because of the SDK technology," she says. "They can now offer additional functionality not available previously, which opens new market opportunities in the current economic climate."

"We've made a step change here – by broadening our openness – and being proactive in collaborating with software vendors," she says. "We're committed to offering the proper level of communications and support."

Halliburton plans a range of offerings to support software vendors through the DecisionSpace Developers' Network, or DevNet for short. This includes training sessions about specific software development kits, forums and webcasts, online knowledge management and expert support. "Keeping software vendors up to date on latest releases and our strategy and vision will help them plan their integration efforts and identify new opportunities," she says.

To help reduce their development time and maximize their delivery to market, DevNet participants can purchase Landmark application and database licenses at greatly reduced rates. They can use the licenses to test that the software works together and for product demonstrations to their own customers. DevNet participants can also take advantage of co-marketing opportunities.

Landmark plans to develop similar forums for its customers, many of which want to integrate their proprietary software systems with Landmark applications. A customer forum is planned for the 3rd quarter of this year.

If anyone is interested in participating in DevNet, they should contact their Landmark account manager, Ms. Jowell says.

Halliburton stresses that it is happy to talk to anyone at any time about improving software integration.

Ecosystem

Last year, Halliburton announced a major new release of its software – R5000 – where all of its software tools, spanning exploration, drilling and production, could access data across multiple data stores.

Halliburton never anticipated that its software could do every conceivable task an oil company would want – and indeed, a number of other software vendors have found niches developing software tools that integrate with Landmark software, doing specialist tasks.

"We have a large suite of applications – and white spaces within some of our workflows that strategically we know are better filled by other vendors," says Ms Jowell. "And some of our customers choose to create multi-vendor workflows or choose to use other applications as part of the workflows.

"Other vendors fill in the white spaces – to provide applications where we might not be providing those particular solutions," she says.

Halliburton believes that the openness of its software is one of its strengths in the software market. "We see ourselves as being the leader in openness," she says. "That's been our strength in the past – and with the R5000 software release –we're really taking it to the next level."

Halliburton is making great efforts to nurture an ecosystem of software vendors to ensure the success of its R5000 software uptake, which enables oil and gas companies to benefit from new capabilities.

Ms. Jowell admits that the success of R5000 uptake requires the participation of the other software vendors – ensuring that their products are ready for R5000. "If they aren't ready then our customers can't always move to the R5000 software as quickly as they would like," she says.

Helping software companies integrate their products with Landmark software - Vicki Jowell, global project director, Landmark R5000

"We want to help them be successful," she says. "If they succeed, then we all win – the software vendors, Halliburton and our customers."

Software development kits

The software development kits (SDKs) make it possible for different software applications to easily integrate, with no proprietary formats, and no data being tied to any particular vendor's application. So oil and gas companies can put together seamless structured workflows, taking the user from one application to another, without any complex importing and exporting of data.

"Our objective is making it a seamless and integrated environment," she says. "The DecisionSpace environment and SDKs provide that openness."

The SDKs provide tiered access for the DecisionSpace environment, including classic application support through data-centric integration, SOA-ready (Service Oriented Architecture) optimization for Web deployment and interoperable modules providing exceptional workflow support.

The SDKs provide data synchronization for varying data types, from drilling and

completions to production; process integration across thick interpretation and engineering applications, distributed data management and GIS applications, and thin web-based applications, and loose or tight integration via remote components for distributed and Web applications or coupled applications as part of a modular framework, providing desktop access to other companies' applications.

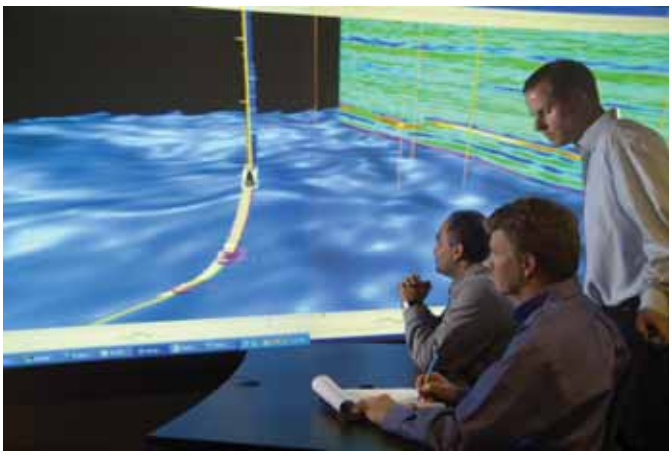
Complex

It is very easy to underestimate how complicated it is to integrate oil and gas data software and data together.

Plenty of feature-rich interpretation and engineering applications exist, such as heavy mathematical field science engineering applications.

Then there are distributed data systems – such as GIS – that often involve both fairly compute-intensive software on the desktop and much information sent over the Internet.

In addition, thin web applications are available – such as Landmark's PowerExplorer® (for viewing geographical data over the Web), Team Workspace® (for viewing information about oil and gas projects over the Web), as well as documentation management systems and desktop dashboard systems.



Halliburton - making it easier for other software companies to integrate their software with its own Landmark software

The software systems are integrated together at varying degrees – from one extreme where two applications work on the same database at the same time, to another where applications are coupled loosely for easy data import from one to the other.

Consider that the data has an enormous variety of different formats – for example, reservoir and seismic models are a small number of enormous files – whilst production data has a large number of small files – and GIS data has both.

Using low frequency seismic

Analysing low frequency seismic waves, which come naturally from deep in the earth's surface, is developing as a useful way to find oil and gas. Dale Blue and Audius Meskauskas of Spectraseis explain how it is done.

By Dale Blue and Audrius Meskauskas, Spectraseis AG

Low Frequency (LF) passive seismic is a fast moving technology. It draws on an analysis of the passive seismic wavefield of the earth around 1-6Hz to identify new attributes indicating the likely presence or absence of hydrocarbons.

LF passive seismic's light environmental footprint and its ability to reduce risk and costs have made it increasingly popular.

The resulting information can greatly reduce the risk and improve the success rate of costly oil exploration and drilling activities, and improve decision-making throughout the life cycle of exploration and development.

Challenges

LF passive seismic comes with a series of unique challenges. Challenges include the need to take account of naturally occurring and human induced noise, very long trace lengths, and the fast moving nature of the technology.

First, LF passive seismic surveys are very different from conventional seismic surveys.

In a typical LF passive seismic survey, each standalone station consists of a single sensor that records the three components (vertical, north-south and east-west components) of low frequency passive seismic signals for 24 hours or more.

Because the anomalies, which are being detected, are so low in amplitude, it is critical to reduce the amount of noise and this needs to be considered from the survey design and planning stage through processing and analysis.

Due to the sensitivity and low S/N (Signal-to-Noise Ratio) of the measurements, the technician must capture information about the surroundings including the soil conditions, photographs of the nearby area, measurement dates and times, and any other factors that may affect the outcome of the measurements and negate noise.

The local time of day that the measurement is recorded must be considered, as human induced noise can vary throughout the day or even throughout the week. Maintaining all of the metadata and photographs associated with a measurement provides an information management challenge that has to be addressed as efficiently and with as little human intervention as possible.

The second challenge is the nature of the data. Whereas conventional seismic surveys tend to generate large numbers of data traces which are closely spaced together and recorded for a relatively short length of time, LF passive seismic contains very few traces, but these traces are recorded for days routinely.

Traces are analyzed separately and in long, synchronized arrays. Both manual and automatic error detection and corrections are applied in the QC process. And due to the comparatively small number of measurements, every single trace is valuable.

Traces may also have individual bad quality ranges that must be excluded from analysis. The result is that large and complex

data structures cannot be efficiently handled directly via the file system and instead need comparatively complex database schema.

Other data must also be collected and considered. Any earthquake signal, for example, can be identified and removed so as not to contaminate the data. It is useful to filter the data based on the earthquake's magnitude and proximity.

Finally, the fast changing nature of the technologies and the new scientific models we are developing to better understand the geophysical principals involved, require a flexible, modular workflow and the ability to design and constantly update the software tools.

From survey planning to acquisition, processing, analysis and the presentation of the final high quality results, the challenge is how to build the necessary software tools to ensure a seamless workflow.

Recording natural low frequency seismic waves to be processed using Time Reverse Modeling (TRM) techniques - in Voitsorf, Upper Austria

Data acquisition

In order to negate external noise when gathering data, Spectraseis has developed sensor layout patterns which have been designed using a layout generator that enables a geophysicist to create a survey design that is optimized for the exploration objectives in the area.

This design is then imported into standard geographical information software, so specific receiver locations can be adjusted to avoid natural and man-made obstacles and noise sources.

The final survey design is then loaded into a data acquisition management system that allows the operations manager to schedule and plan acquisition activities. The survey planning information is then loaded onto robust handheld devices, running data acquisition software, which are used by the technicians in the field when placing sensors and downloading recorded measurements.

For soil conditions and other parameters, a touch screen contains lists of available values for the technician to select. After the measurement has been recorded, a wireless connection allows fast download of the information from the acquisition instrument to the handheld device so that all of the measurement data and metadata are contained within the device as a single digital package.

After the field measurements are collected, all the data, including photographs and metadata, are quality controlled in the field and then sent to Spectraseis' office in Zurich for processing and analysis.

The first phase is data characterization where special software tools are used to characterize the data according to time stability, noise, influences of weather.

The next phase is to remove unwanted noise. Broadband noise spikes tend to occur as a result of human actions, such as traffic or industrial activities.

Spectraseis has designed software which is used to mark unwanted time windows in the data signals and allows the data analyst to view both the raw signal in the time domain as well as in a Spectrogram, where the frequency components of the signal can be viewed in relation to time. Spectraseis' processing software has also been designed to perform basic filtering and processing of the longer traces mentioned earlier.

Our software also automatically downloads publicly available earthquake data. The earthquake viewer shows a timeline of recorded earthquakes, their relative magnitude and the distance from the center of the selected survey. The data analyst can then filter this viewer to only show earthquakes strong enough or close enough to have an effect on local measurements, thereby determining if a specific noise event may have been caused by an earthquake and filtering out the data in the time window as required.

A data analyst can then use this tool to plot a Syncrogram - multiple spectrograms that represent data recorded during the same time window, and identify specific measurement windows to analyze over a geographic area.

This makes it possible to do further analysis on these synchronous measurements and create 2D attribute profiles or grid maps of LF attributes.

Software development for LF passive seismic also supports research into this new technology. One example is Time Reverse modeling (TRM) which takes synchronous recordings from multiple receivers in a selected area and performs reverse modeling on these signals to determine the source location of the LF anomaly.

The goal of TRM is to effectively create a depth image of the potential hydrocarbon reservoir. TRM has been built in such a way that it is easy for a geophysicist to add new modeling techniques and imaging conditions to quickly see the results.

The results can then be immediately integrated with the forward modeling applications that are tailored for the development of further research into this LF passive seismic technology. Integration with operators' own seismic and exploration development workflows can also follow.

About the authors

Dale Blue is the Software Product Manager at Spectraseis. He has 20 years of experience in E&P Information Solutions, Software Product Management, and Workflow Process Consulting, working in several major E&P services companies. **Audrius Meskauskas** is a Software Team Leader in Spectraseis. He has over 10 years of experience and list of scientific publications from leading the software development side of research related projects, taking this role in Oxford, Manchester, Ulm and other universities.

Working out the grain of the rock

Geotrace has developed a technology for working out the direction of the grain of subsurface rock – useful for estimating the direction of natural fractures, and which direction the rock could be fractured in.

Rock, like wood, has a grain to it – a direction in which it fractures most easily. Seismic data processing company Geotrace has developed a processing method to work out which direction the grain is running.

Knowing the direction of the grain is very helpful - both to know how it is likely to be fractured already, and to know in which direction it will be easiest to fracture or drill.

Fractures which already exist are very important for carrying oil and gas around the subsurface – collecting it into reservoirs and draining them into wells.

"The earth goes through many stresses and strains through its years of evolution – and the rocks just break –there's fractures everywhere," says Dr Jaime Stein, chief geoscientist with Geotrace.

Then, if we're planning a horizontal drilling or fracturing operation, "you need to know if you're cutting with the grain or against the grain," Dr Stein says.

You want a man-made fracture to extend into the reservoir – not out of it, perhaps helping more water to flow into the well, this could be disastrous.

"If rock fractures in the wrong direction you might lose your production," he says. "People might say – "I wish I knew this before I fractured the rock".

"This information is going to be very valuable to the petroleum engineers – it's an area we are very interested in exploring," he says.

"If we can connect our seismic expertise with the drilling expertise – there might be very synergistic relationship. Engineers don't normally see much value in what we do."

"The engineers we've spoken to are extremely excited about this information – because it affects directly the drilling decisions that they make. Clients have made drilling decisions based on these kinds of displays."

The service has been available for around a year so far. There are already companies using the system in various plays of the US lower 48 states (including Texas, Oklahoma and Louisiana) and clients in the Middle East, Dr Stein says. For all of these, Geotrace is providing the data processing services itself.

Geophysicists have always been aware that it should be possible to calculate the grain of the rock, but they haven't done it due to lack of available data and processing power, but this is all starting to change, he says.

"It was one of those things ahead of their time," he said. "We did not have sufficient (wide azimuth) seismic data to support their use in any way shape or form, so it was just an oddity."

Data acquisition and processing

You normally need wide azimuth data for it to work – which has generally only been available recently.

"We are exploring ways of maybe relaxing conditions on the data acquired," he says. "Wide azimuth surveys are expensive to acquire."

"With wide azimuth acquisitions – there's a new richness in the data that we didn't have before," he says. "And these new dimensions that the data has, has allowed us to develop new data attributes that help us detect anisotropy and fractures t."

Traditional seismic processing methods, such as with common mid points and offsets, ignore the azimuthal information, – but with offset vector tiles and gathers, the seismic data retains all its azimuthal information allowing us to construct these new vector quantities. "These objects are a lot more complicated than they were before," he says.

It is helpful if Geotrace can get involved in the planning of a new seismic survey, because it can make sure that it is made in an optimal way for the data processing.

You have to record which direction the rays came from. "The big difference between the data we have today and the data we had before – is we can preserve the orientation and geometry of the acquisition," he says.

"In the past, if you look at marine data – the boats were sailing, pulling an air gun and long cables and the data was treated as if it had no azimuthal information."

"Now people say it does make a different – it matters how we plan the trajectory of an acquisition – where do you position the sources and receivers makes a big difference to the final outcome."

The processing is made by sorting the data up into discrete tiles or 'bins', that have offsets and azimuths in a range of values, and processing the data, including time and depth migration in such a way that all the information is preserved in what we call Offset Vector Gathers.

Fracture maps

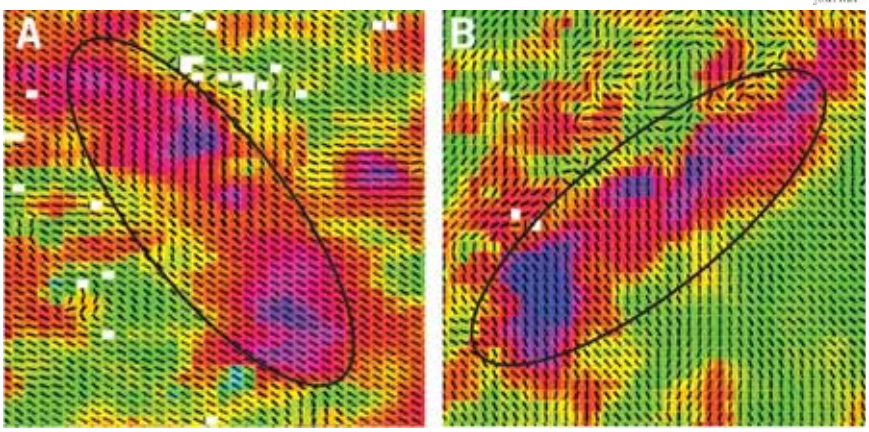
Geotrace puts together fracture maps, which indicate the direction of fractures in a cross section of the reservoir.

In the images below (ref images A and B), you can see a reservoir (purple shading) where the rock grain direction has been calculated (shown as pick marks). On figure A, the rock grain is mainly in line with the direction of the reservoir.

This means that you could drill through the reservoir quite easily going top left to bottom right. Once you had done that though, if you wanted to fracture the rock in a direction perpendicular to the well (ie going towards the top right or bottom left), you would be going against the grain. It would be possible that the fracture would bend to follow the grain and quickly leave the reservoir.

In image B, the grain is in the opposite direction relative to the reservoir. So drilling through the reservoir (eg top right to bottom left) would be harder work. But the rock should fracture much more easily in a direction perpendicular to the well.

Geotrace calculates the direction of the grain by dividing the subsurface up into small squares (called tiles) and modelling offset vector gathers.



Working Together to Create Value from National E&P Data

Join us at NDR9 – the ninth in an ongoing series of global meetings promoting the collaboration of regulatory agencies and industry on oil and natural gas data management standards.

When: 31st August - 3rd September 2009

Where: New Delhi, India

Who: Regulatory agencies, government ministries, energy companies, oilfield service companies, software vendors and anyone interested in the exchange of oil and natural gas information with governments.

To register and see the agenda for NDR9, please visit: **www.ndr9.com**, email **ndr9registration@energistics.org** or call **+1.713.267-1880**.

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ENIGMA DATA SOLUTIONS

National Data Repositories – conference in Delhi

As plans come together for NDR9, the ninth oil and gas National Data Repository conference in Delhi on Aug 31 – Sept 3, we spoke to Martin Peersmann, chairman of the NDR Work Group about what delegates can expect, business opportunities around NDR and what the NDR organisation does.

NDR9, the ninth meeting of the National Data Repository (NDR) work group will take place in Delhi, India, on August 31st to September 3rd, with discussions about how to set up and run national data repositories, procure software and services. It will discuss benefits for emerging nations, ways to help governments and industry work together, and developments with standards. Further information is online at www.ndr9.com.

The meeting should be useful to people from regulatory agencies, government ministries, energy companies, oilfield service companies, software vendors and anyone interested in the exchange of oil and natural gas quality information with governments in a structured manner, says Martin Peersmann, chairman of the Energistics NDR Work Group and director of the National Joint Venture Topographic Base-map of the Netherlands (LSV GBKN).

One of the reasons Delhi was chosen for the 2009 meeting because it fits into the agenda of the organisations to act as a global organization formed to assist government and regulatory agencies in the collection, storage and dissemination of quality oil and natural gas related data After South-America (Cartagena 2006), Africa (Cape Town 2008), the Indian Directorate General of Hydrocarbons(DGH) by their "kind invitation, enthusiasm and great support" provided the opportunity to organize a NDR in South Asia, Mr Peersmann says.

"Particpating in NDR is all about working together, both government and industry, on a common set of requirements in support of shared goals such as developing regulatory IT administrative systems, linking NDR processes with administrative processes and releasing high quality data to the upstream energy industry in a global context," he says.

"NDR meetings are open to all government and regulatory agencies as well as other industry organizations and focus on sharing lessons, learned, data management techniques and exploring software available to manage data repositories in the value chain and true the different phases of the E&P life cycle from exploration, appraisal, production, enhanced production up to abandonment.

"We are convinced that at NDR9 in Delhi government and regulatory agencies in this region can benefit form the experience obtained by agencies in the mature E&P regions in Europe and North America.

The event will be held at the Vigyan Bhavan, described as one of the top conference centres in India.

Many of the countries attending the conference have oil and gas industries which are still in a fairly junior phase – they have started producing oil, but not yet worked out how to manage the production for the best interests of the country. The conference allows a sharing of technology and expertise between countries which have already set up successful national data repositories with countries which are just setting them up. "We have an enormous learning curve about what you should do and what not," he says.

"As an organisation, we exchange knowledge of data management and standards," he says.

"E&P business is a global business, so we need global standards and need this kind of forums. We also want to share our experience on how you set up data management around the world with new emerging E&P operators, both government and industry .

"Government has a critical role in the management of data associated with the regulation of oilfield activities and a legal responsibility to provide quality data to the industry in a very structered manner. Without open standards being used by the regulatory agencies in a global fashion, industry is required to meet many data types requests form many different countries and ultimately the data quality suffers.

"Regulatory bodies must be proactive in the implementation and uptake of standards in collaboration with the industry. The NDR Work Group and NDR meetings facilitate this process and is on the fore front and unique in its kind and on how both government and industry work together on the standarisation of data and information exchange compared with other industry sectors ,e.g. water management, environment or civil engineering.

A national data repository is a database of all the oil and gas activity going on in a certain country – to make sure oil companies do not have to duplicate work done by someone else, and the government can keep track of what is going on, among other purposes.

Helping set up global standards for oil and gas national data repositories - so information can easily be shared - Martin Peersmann, chairman of the Energistics NDR Work Group

"It serves three different groups: the government, which is ensuring that the country gets the maximum from the resource over the long term and that it is well managed, and can attract investment; oil and gas companies, which want to know which fields to invest in, and generate the data; and service companies, which normally collect the data and manage the repository.

The primary operator of the repository can be the government (eg the US Geological Survey); a business providing a service to government (eg DISKOS in Norway, operated by Halliburton on behalf of the Norwegian Petroleum Directorate); or a new company established by business with the support and involvement of government (Common Data Access in the UK). The role, to put it short, is ensuring that the data is complete, consistent, of high quality, robust and available.

From a national point of view, it is very important for a country to manage its data, to ensure that the resources provides the maximum benefit to the country over the longer term.

The data repository can also act as a showcase for a country aiming to attract oil and gas investment – demonstrating what they already know and that the data is readily available so companies do not have to collect it all again. The data is also very useful for a country to examine its current and future tax income.

There are plenty of benefits to oil companies as well. They can use the data to ensure that they aren't doing seismic surveys

over an area which has already been surveyed to a similar standard. Oil companies can ensure they can access the best possible data in the best format, so they don't spend their time reformatting it.

Before his current position, Mr Peersmann worked at Shell for 10 years. "We always worked in joint ventures, and sometimes 40-50 per cent of time we wasted in a project with data conversion – making sure we had the right data," he says. "People said – we want to spend our time doing our core business data analysis and modelling, finding and producing oil and gas – not data conversion". This is one of the initial drivers for setting up data exchange standard within the E&P industry the last decade..

Business opportunities from NDR

There are plenty of potential business opportunities from helping to set up and operate an NDR, including providing consultancy, software, hardware. The opportunities and required support by government and industry differ over the E&P life cycle in the value chain and depend on the scale of E&P activities and geographical situation. This at present day has created an attractive portofolio in the E&P data management business ranging from many small to a few big opportunities

Countries and regions currently looking at setting up or improving their data repositories include Central Asia, Kazakhstan, South East Asia, India, China, South America, and Africa, Mr Peersmann says.

The biggest contract is for operating the service itself and providing software to operate the service. Unsurprisingly, these tend to go to large service providers (for example Schlumberger and Halliburton have won contracts to operate the Norwegian data repository).

There are plenty of business opportunities for smaller companies though. For example, Kadme and Digital Earth won contracts to help the Columbians with their data.

Countries setting up data repositories might want to engage consultants to give them advice on the data storage and management infrastructure, converting data from large analogue archives (tape or plotted logs), quality control the data and manage data communications.

There is also scope for consultancy services around new data formats (such as 4D seismic) – or advising how the system could be organised and how the legal infrastructure could work. Many countries do not have large government budgets, so all of this needs to be achieved at low or zero cost to the government.

Data repositories also need a large amount of hardware and software.

The holy grail, which not even the Dutch or Norwegians have achieved, would be for production data to be sent directly and automatically from the field to the authorities, in a standard language such as Energistics' Production Mark-up Language (PRODML).

Mr Peersmann believes that it is important to encourage more people to get involved in data management – a field which is tremendously important, but not usually seen as an attractive career option. "The trade of E&P data management – is a very challenging, involving not only technological challenges but in which processes and people and knowledge networks also play a major role. It provides enormous added value to government, industry and society, hence is therefore very rewarding and a trade to be proud off. " he says.

History

The UK, Netherlands and Norway are normally credited with leading the oil and gas national data repository movement. The UK established its Common Data Access national data repository in 1995; Norway established its DISKOS national data repository in 1994 – with Stewart Robinson (UK) and Eric Toogood (Norway) normally being credited as taking leading roles, Mr Peersmann says.

Meanwhile the first National Data Repository conference was held in London in April 1996, to try to develop common standards between the UK, Norway and the Netherlands, so oil companies could access data out of all of them in the same format (for example if they had a field which crossed national boundaries).

The meeting was followed quickly by a meeting in Stavanger in September 1996, and Calgary in June 1997. Then there was a break until a March 2002 meeting in Stavanger. Then the meetings increased pace and scale, being held in Washington DC in September 2004, Utrecht (Netherlands) in September 2005, Cartagena, Columbia in September 2006, February 2008 in Cape Town, and now August 31 – Sept 3 2009 in New Delhi.

Countries closely involved at present include UK, Netherlands, Norway, Australia, Canada, India, Kenya, New Zealand, South Africa and the United States.

Energistics (previously known as POSC) was involved with NDR right from the beginning. The NDR organisation was formally established as a work group of the eRegulatory Special Interest Group within Energistics in February 2009.

Master data - critical for e-commerce

OFS Portal, the e-commerce service for oil and gas, gives some new ideas about how to make e-commerce work – and make sure your data is good enough.

By Paul Mayer of Eiro Consulting, on behalf of OFS Portal

Looking at companies that have capitalised on e-commerce it is clear that they have invested on getting the processes right as well as managing the master data.

The vast majority of master data management activity is focussed on the quality of information that flows within a company. This internal attention, whilst essential, may fail to recognise the opportunities and risks associated with the exposure of and to external data.

The quality of information that flows between trading parties directly affects the confidence in products, services and value for money.

If the information provided is wrong or misleading the operational and financial implications can be devastating.

Meanwhile organisations need to consider strategies that can handle data volumes that double every 18 to 36 months. Working with the rapidly increasing volumes of data increases the need for the data to be high quality.

Fit for purpose

In order to realise all the benefits of e-commerce data needs to be fit for purpose.

An engineer's data requirement is quite different from procurement professionals.

A cohesive data strategy is required to fulfil the different needs across the organisation and supply chain.

Getting data to work effectively for you is a balancing act. The need for quality and detail must be assessed against the costs, risks and benefits.

Getting the data to align, and stay aligned so that each element drops into place seamlessly is often more of a challenge than anticipated.

A clear understanding of the processes involved allows the flow of Master Data to be mapped as it traverses the supply chain.

E-commerce

E-commerce has the ability to impact so many business processes; these benefits will be multiplied with high quality data.

For example: optimisation of the sales process, inventory visibility, operation tracking, project management, seismic and survey data, service levels and making documentation and drawings rapidly available.

One of the much anticipated steps in E-Commerce is the ability to set up purchasing of goods and service from an electronic smorgasbord. Indeed much of the talk about E-Commerce and Business to Business (B2B) exchanges post Y2K was exactly this scenario.

The difficulties experienced in doing this were underestimated and thus far the majority of success has been with simple to purchase commodity items like Maintenance Repair and Operations (MRO) items.

Goods and services in the upstream oil and gas arena are often specialised. This increases the importance of providing clear and specific information in order to differentiate products.

Providing the appropriate level of information in a digestible format is the key consideration when setting the most appropriate master data management strategy.

One of the realities recognised early in the evolution of e-commerce is that one solution does not fit all scenarios. Some vendors are niche and supply to a sole vertical market sector, for example: drilling fluid suppliers. Whilst other vendors are cross sector and provide products that are used widely, for example, bearings.

This relativity is a factor to be considered when designing the data strategy. It is, for example, unrealistic to think that the oil industry is going to have any impact on the way that V-belts are described.

Many of the vertical markets have subscribed to the concept of using a standardised method for the transmission of data. However gaining agreement on the depth and detail of content being exchanged is a more complex matter and has far reaching implications on how data is to be managed.

Industry standards

A sustainable approach to ensuring data can be used by different departments is the adoption of industry standards. This approach aligns data from different companies so that it can be used more effectively.

It lets organisations focus on the content and quality of the information and not worry about the format, taxonomy and classification being employed.

This strategy is being embraced by many operators who are using the standard

It is much easier to continously keep your data clean, rather than engage in periodic clean-up efforts

to describe their material master data and suppliers who are using it to describe their products. Data will be provided to buyers by suppliers using the same PIDX classification standards.

Therefore when the buyer purchases a product or service they can automatically receive the information electronically with the associated metadata. This may include the attributed descriptions used to describe the item in the material master data and the relevant photographs, drawings, manuals and technical documents that can be made available as attachments or hyperlinks.

An additional benefit associated with standards is that of classification hierarchies. These are available pre-mapped and standardised .

The most widely adopted classification hierarchy in upstream oil and gas industry is the United Nations Standard Products and Services Code , commonly abbreviated to UNSPSC.

The allocation of a standardised classification code to products and services allows similar items to be grouped together for many purposes including: spend analysis, business intelligence, inventory reporting and supplier identification.

The UNSPSC system has a 4 level hierarchy and has been designed to allow everything and anything to be classified.

Each segment, family, class and commodity is given a two digit code. (See below) There are 2 segments that were developed specifically for the oil and gas industry. Segment 20 Mining and Well Drilling Machinery and Accessories and segment 71 Mining and oil and gas services.

Any item starting with 2012 falls within the segment "Mining and Well Drilling Machinery and Accessories" and family "Oil and gas drilling and exploration equipment" This allows items to be grouped together which is particularly useful when reporting.

Below the hierarchy there may be several Noun Modifier pairs. Each pair has a set of attributes allocated to be captured to describe the item as seen below.

Connecting suppliers to buyers

To realize the full benefits the data should flow to where it is required.

Typically sellers offer a large number of products and or services to their assorted customers. Each buyer is unlikely to be in a position to purchase the entire range on offer and therefore will need to set up agreements with the seller to specify the range, terms and price. This may then be distilled into a buy side catalogue.

If and when a purchase is made only the items that are purchased are created in the buyers Enterprise resource planning (ERP) application.

The ideal scenario is one where the relevant master data drops into the appropriate location as a buyer selects an item from a catalogue and places an order. This streamlined process facilitates the rapid identification of items across the supply chain as well as reducing errors that might otherwise be introduced by manual data entry.

The crux of the matter is understanding which data is relevant - deciding which data to use and adopt and what to discard.

In some industries the sellers' descriptive data is simply mirrored in the buyers' systems. Whilst this method is elegant in its simplicity it just does not hold up as a viable methodology to be applied, universally, in the oil and gas industry.

There are many reasons why this approach does not work including:

Commodity items are purchased from multiple sources and need generic meta data to specify them

Specialised items are often highly configurable and may be uniquely configured each time they are purchased. These items are unlikely to be catalogue purchases however it is essential that they are accurately described.

Single source items need to be classified and described to match the basic data requirements of the purchasing organisation.

Taxonomy and Nomenclature differ from company to company in order to avoid double standards of data within an organisation. Standardisation and normalisation is required, this in turn should enable standardised classification to be achieved.

The lesson that has been learnt through experience is clear. A thorough analysis of the data is needed right at the start of the planning process. If the in-house experience to do the analysis is not available then find people that do have the experience to help guide the organization through the process.

Written by Paul Mayer of Eiro Consulting, writing on behalf of oil and gas e-commerce thought leaders, OFS Portal.

IT and the business - common mistakes

Many implementations of new IT fail because they are not integrated well enough into a company's existing business, writes Dutch Holland of Houston consultancy Holland and Davis.

What is not happening yet in the digital energy world is an investment in the interface between the business and technology worlds - because the seemingly unsolvable problem still exists - how to get people to communicate from the operational functions to the innovation function and vice versa.

For example, it is not uncommon for asset managers and digital energy research to work at cross-purposes with each other. Too often, R&D is expected to continually develop innovations and then make them available to the asset managers who take the new technology and figure out what to do with it, if anything.

What is missing in this faulty scenario is that a part of operations must be proactive about getting improvements and receptive to innovation and, conversely, a part of the Innovation side must be implementation-oriented.

What companies must do, and what continues to be missing, is to invest in the quality of that intelligent interface.

Implementing digital technology into an oilfield company's work environment can potentially add substantial value - but technology insertions are repeatedly easier said than done.

IT implementations are even more painful than a root canal in failing to meet management expectations an excruciating eighty percent of the time.

While companies have figured out how to implement new core technology, a lesson learned the hard way is that an intelligent interface – connecting the digital technology innovation with the existing business - is vitally needed.

The issue is not to continue wondering why so many insertions go belly up but how to leverage an intelligent interface and dramatically improve the rate of successful insertions.

The human interface

Essentially, an interface must be a formal function staffed by real and talented people primarily from the business side.

Interfaces are not one-dimensional concepts, but rather concrete connections between innovation and business functions.

These designations refer to people and processes which connect technology and operations.

The intelligent interface must have multi-faceted capabilities that translate business opportunity into technical requirements; innovate, test and evaluate; and seamlessly implement new technology into the business.

"IT implementations are even more painful than a root canal in failing to meet management expectations an excruciating eighty percent of the time." - Dutch Holland, CEO, Holland & Davis

A major change is necessary from what is being done today in many parts of the industry that are using a mechanical template-driven interface that "only communicates" between research and development / IT and the business.

Instead, the business side must drive an intelligent interface by coming through with passionate participation and leadership – from initial exploration of possibilities to full implementation and utilisation.

More than lip service is imperative; somebody on the business side must be committed to mining IT's technological value for their business.

Still, many in business management ranks carry negative baggage from failed insertions at a time when they should actually be mobilizing their "best and brightest" and energising them to extract the most value for the business from each piece of new technology … including digital energy.

In working to improve technology insertions five types of interfaces are in play.

The by-the-book business analyst

Generically, a bright young guy in a suit and tie, working on the "innovation" side, is assigned to interview various individuals on the business side.

Using a checklist to ask questions and record answers, his mission is to provide a completed template to document and develop an understanding of what the business needs from technology.

Theoretically, if this approach works, an applications sourcing expert can interact with both the analyst and template data to select and develop appropriate technology and configure it to meet business needs.

The business-experienced analyst

The idea is that "He comes from the business side so he knows what business wants."

In all aspects, nobody is looking for him to push the envelope in any way, shape or form. From a positive perspective, he brings a wealth of business experience to the table.

For many companies, the way to make sure new software integrates well with the business is to bring in a business analyst to come into the company, and ask lots of questions by going through a checklist

On the negative side, he also drags along decades of biases (both conscious and unconscious). Frequently not an effective or disciplined template developer, he may make decisions about business needs by feel rather than conducting a data-based analysis.

The businessman CIO

Realistically, this is perhaps the most reactionary one of the five. For example, top management comes to the conclusion that communicating with the company's IT personnel is very difficult if not virtually impossible.

Therefore, they believe that IT is "not under control" and should be commandeered. Management's mission becomes "We'll fix them (IT)" by installing someone from the business side as the new CIO or IT head.

"When trying to connect technology innovation with business, an intelligent interface between the two is required. It must be able to translate business opportunity into technical requirements; innovate, test and evaluate; and seamlessly implement new technology into the business."

Before anyone quickly applauds, however, be advised that this approach is very tough to execute for fairly obvious reasons. Not surprisingly, the level of communication is indeed improved between the CIO and the business side because the latter is where the new CIO came from.

Unfortunately, the new chief knows no more about IT's nuances than a genuine IT-experienced CIO knows about business-side details.

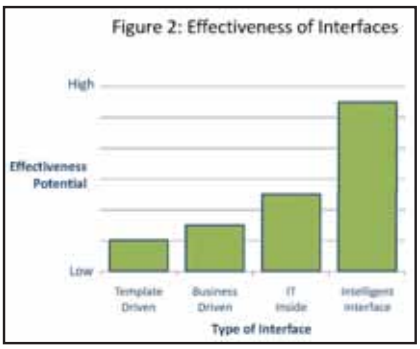
The IT expert Inside the business

Obvious logic here: Why not place one or more experienced IT/R&D people "inside the business," both physically and organizationally?

Once again, if not prompting a "That could work" reaction, it still might strike some as not necessarily a bad idea.

But, hold that thought. Taking an innovator and inserting him into the business side – attending meetings and picking up daily information and observations – only means having someone hearing the business through IT ears and processing it accordingly.

Regardless of good intentions, without figuratively having business in his bones, no real net gain occurs because the IT expert is typically tuned out at business meetings.



The operations-led interface

Here, the actor is the business side committed to exploiting technology - in this case, digital energy.

The interface is comprised of operations/business experts who are not only passionate about exploiting digital energy, but formally commissioned and made accountable by the business side to penetrate the innovation side and make business improvements happen.

Consider the NASA environment to see how an intelligent interface, in the form of an astronaut, examines the flight hardware which will take him into space. These future fliers interact directly with technology providers, which can sometimes be ugly. Usually the ugliest part is when a technology innovator or vendor responds to an astronaut's operational question with jargon or alphabet soup acronyms.

It takes but a few seconds for the intelligent interface to clarify who the customer is, who defines the needs and who has ultimate control of the dollars – then to insist that the conversation continue without the obfuscation. Most likely, the digital energy equivalent is an experienced business person fully committed to putting new digital technology to work to pay off for the business. For this, there is no substitute.

Tell us about your experiences

We're always looking for digital oilfield implementation stories, cases (good and bad) and good ideas to feature. Send your input to dutch at hdinc.com Who knows? You may be "in print" (with your permission, of course).

For more than a decade, Dutch Holland has been the pioneer in applying a systems engineering approach to Change Management in the digital oilfield (Engineering Organizational Change® patent pending) and Systems Engineering Approach to Business Readiness®. Dutch Holland, PhD, is CEO of Houston, TX-based Holland & Davis LLC (www.hdinc.com)

Palantir Solutions – modelling your company in one go

UK company Palantir Solutions has launched a new version of its economic modelling and financial forecasting software running on 64 bit which can handle data sets 3,000 times larger – so you can see what the impact of reducing production on a single well for a month will be on the company's annual tax calculation.

UK oil and gas financial modelling and planning company Palantir Solutions has beefed up its software to run on 64 bits, which means it can process data sets of up to 8 terabytes in one go. The software is being rolled out by its offices in London, Aberdeen, Calgary, Houston, Singapore and Bangalore.

This means that the computer system can process all of the variables involved in an enormous oil and gas financial planning model – without saving part of the calculation to disk along the way.

For individual wells, there can often be over 1500 variables included in financial planning – including how you expect production to change over time, what work you expect to do on it, who will own it, what royalties you have to pay, drilling costs, operating costs, labour costs all with perhaps P10, P50 and P90 variables. For many of these, you might have a new variable for each month over a period as long as 60 years.

Meanwhile for the whole company, you have variables for the oil price, and you might have to borrow money, at varying interest rates. You might have different tax systems which kick in at different profit levels.

Trying to forecast the future and work out how certain changes might impact the overall profitability can become an enormous calculation, too big in fact for a computer to store in its memory at once, says Bryan Dyck of Palantir Solutions.

If the calculation gets too large, then the computer system has to split it up into smaller chunks, which means it takes much longer to get the right result.

So Palantir has upgraded its financial software to run on 64 bit Windows, running on high performance computing, so it can handle data sets up to 3,000 times larger. Theoretically, the computer can handle datasets of 8 terabytes, compared to a previous limit of 2 to 3 gigabytes under 32 bit Windows.

This means that a company can remodel its entire business plan with each small change (eg a decrease in rig rates or a change in the oil price).

The 64 bit capability was released on May 27th as part of its version 3.5 software upgrade. Companies already using the new software include Talisman, Dana Petroleum and E.ON Ruhr Gas.

Finer granularity

In the current business environment, many customers are keen to get an understanding of what impact small changes might make on their overall business, for example finding cost efficiencies, or working out the best place to build a new hub, or what is the cheapest way to increase the reserves on their books, or which assets are the best to sell.

"Having the data to a much finer granularity will give much greater insight on which assets are bringing them down," he says.

"Before this change – there was always a trade-off between the granularity and the accuracy of the data. You could have accurate data, but process less data. You couldn't have both."

So, for example, companies take loans and pay tax and see the financials on a company-wide basis – but they don't connect these decisions easily with decisions about individual wells.

"With our system we know how much of the corporate loan could be attributed to each individual project."

The financial models often have to be auditable, so someone can see later exactly how a decision was made. "There's always a lot of data you have to process," he says.

"It gives us that ability to really push the limit – to address the data and the business workflows in a way we couldn't previously."

The software can be used to see what your cash flow and profitability will be over the next 40-50 years based on your current assets and how you expect your asset portfolio to change, looking at data for each month.

"Having the data to a much finer granularity will give much greater insight on which assets are bringing them down. Before this change – there was always a trade-off between the granularity and the accuracy of the data." - Bryan Dyck, Palantir Solutions

Cloud computing

As the software calculation gets bigger, it is likely to be moving off desktop computers into corporate high performance computer rooms, or remote "cloud" computing systems. "The next thing that we're focussing on – is pushing this into a cloud environment," he says.

Palantir could host the cloud computing network itself, or rent computing space from a larger company; or oil and gas companies might develop their own cloud computing networks.

"Large calculations are better on a strong centralised environment," he says.

Social networking tools not used to full potential – Microsoft and Accenture survey

Social networking tools are not being used anywhere near their full potential in the upstream oil and gas industry said respondents to a recent Microsoft and Accenture survey.

Microsoft and Accenture commissioned research earlier this year asking oil and gas professionals how much they think that social networking tools can help them in their work – and whether they think their companies are taking as much advantage of them as they should be.

40 per cent of respondents said they viewed new social media tools as useful to boost collaboration and productivity on the job. However only 25 per cent of respondents said that social media tools are currently available in their companies.

The survey, conducted in January 2009 on behalf of Microsoft and Accenture by Penn Energy, questioned 272 geoscientists, engineers, mid-level and executive management and project managers, based in North America (43.4%), Asia Pacific (28.1%), Middle East (21.7%), South America (21.3%), Europe (16.9%) and Africa (14.6%).

When asked which of the various social networking tools would be useful, 60 per cent agreed video or photo sharing could be useful; 57.3 per cent said social networking sites; 46.8 per cent said wikis; 41.8 per cent said podcasts; and 41.4 per cent said blogging.

50 per cent said they believe these tools could help them find scarce resources; 74 per cent of respondents felt that these technologies could be used to advance the tools of project management.

"We were testing to see if these technologies were just used to talk to your friends – or if these technologies could be used to advance the business," says Craig Hodges, energy and chemicals industry solutions director, Microsoft.

Great possibilities

Of course there is very little which is specifically new in social networking tools – people have been able to pass photographs around, look each other up in a directory, communicate with each other, work on documents together, make newsletters and leave voicemails for many years.

But perhaps social networking is better viewed as a culture – rather than a set of tools – and younger workers entering the industry are much more comfortable with this culture than their older colleagues – and expect to have it around them.

"If you think about a typical 20 year old – they search for all kinds of data, they have people they know, they do instant messaging, they have text messaging, they have so many technologies at their fingertips – my daughter has all of these technologies," says Mr Hodges.

Mr Hodges tells a story which an oil company CIO told him, about his experience dropping his daughter off at college for the first time, and watching her give her new roommate, who she had never physically met before, a big hug.

For the past few months, his daughter had been talking to her new roommate using social networking tools, and they seemed to have got to know each other very well already.

The oil company CIO started wondering – what could we do if we had social networking tools in our company? The oil and gas business, after all, often needs people who have just met to work closely together – what if they could use the full range of social networking tools to get to know each other beforehand?

Challenges of management

According to the results of the survey, "most people believe the [biggest] inhibitor to taking on more of these technologies is management," said Mr Hodges.

"That's not surprising at all," he says.

"A lot of these respondents felt their company cultures were not aligned to accepting these kinds of technologies."

Social networking certainly posts a big challenge to companies – who normally have to post strong restrictions on how much employees can reveal to the public about what they are doing, to comply with stock exchange rules and ensure that the company does not reveal too many secrets. This applies to talking to journalists as much to posting on public websites.

But maybe the question is more – how do you integrate social networking into your company – not whether to have it – because employees will probably use social networking tools whether management likes it or not.

Not surprised that management can be the biggest inhibitor to oil and gas companies using social networking tools - Craig Hodges, energy and chemicals industry solutions director, Microsoft

People immersed in a social networking culture will be able to quickly understand the contribution it could make to any group activity – and are unlikely to accept being told that they can't do it.

"There will be a grassroots movement towards these collaborative technologies," says Brian Miller, senior executive with Accenture's Energy industry group. The question is "how do they leverage the technologies and integrate it into the culture."

Mr Miller believes that companies will gradually create governance systems as to how these technologies should be used – in the same way that they have with document management systems, such as Microsoft SharePoint Server.

Social networking does not necessarily need to be public. For example, Microsoft has developed a tool called MySite, which is like a Facebook but behind a company's firewall – so only people within the company can access other people's information.

Accenture sees itself as a specialist in helping companies make cultural change, Mr Miller says, and so it is eager to help companies adapt to new ways of working.

Structured and unstructured

Some processes in oil and gas companies are very structured – for example, procurement – and it would probably be a mistake to think that social networking tools can be helpful in structured processes.

It is better to have dedicated workflow software tools which take users in specific roles from screen to screen, the complete

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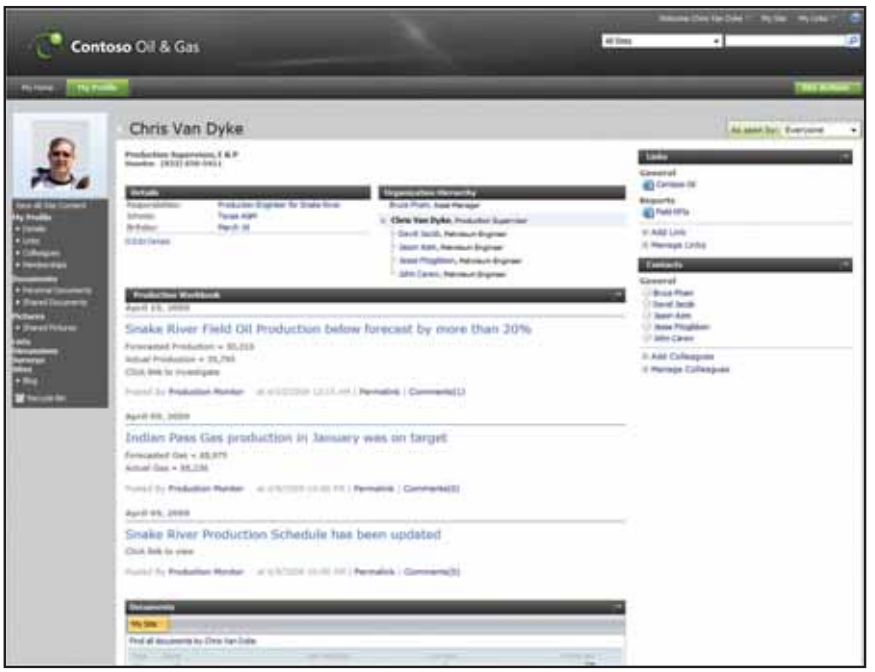


Social networks don't have to be public. This is an example of a social networking tool which could be used by company employees around the world only

specific tasks and create the right documentation in the right format with all the necessary fields completed.

But plenty of people's work is unstructured. "People in their day to day jobs work part of the time in structured worlds and part of the time in unstructured worlds," says Mr Hodges.

"The social networking is targeted around that unstructured work process," he says.

Unstructured work is often what management spend most of their attention on. "Management generally works by exception – if the process works right they won't get involved," he says.

Finding people

One of the most important contributions which social networking tools can make is helping to find people with certain expertise in the company.

For example, if you want to find someone who worked on a specific asset team, or on a particular problem 2 years ago, it can be very hard to do using the official company directory, says Mr Hodges. You have to rely on people's memory and how good terms you are with experienced employees.

But if everyone has a profile on the company social network listing all the projects they have been in, and all the groups they have been part of, it can be much easier to trace the right people.

It's a matter of working out how employees can use social networking tools - not whether or not the company supports it - Brian Miller, senior executive with Accenture's Energy industry group

Accenture uses similar tools internally, and all staff are expected to maintain a profile on it, so other people can find them. "We are required to update our skills, update our profile, update our resume on a frequent basis," says Accenture's Mr Miller.

When looking for a person in the company with specific expertise, "I can go on that site, enter some criteria, such as expertise on specific technologies – and get a list of everybody that could maybe help me."

"It used to take a couple of days, if not longer, to try to find someone that can help out. Now it can be done in a matter of minutes."

Accenture is already using Facebook as part of its college recruiting, so people can start talking with and find out more about the recruiters before they meet.

"There's more of a push from them to know who you are," says Mr Miller. "They want to know the whole 9 yards."

Whereoil – information exploration

Kadme's Whereoil product helps geoscientists and engineers to find the information they are looking for regardless of the data's shape or the place it is stored.

Kadme, a company based in Stavanger (Norway), has developed a software product called Whereoil which makes it faster and easier for geoscientists and engineers to find the information they are looking for.

The company recently has been awarded a contract with the Petroleum Agency of Colombia (see www.anh.gov.co), to provide its Whereoil software as a front-end for the country's National Data Repository. Whereoil enables users to search, from a single software interface, all of the E&P data of the country.

Kadme has also recently won a tender to supply its Whereoil software for the ArcticWeb project. This will enable engineers working for oil companies to search through all the available data about the Norwegian offshore with a focus on Arctic areas – including data officially produced and managed by the Norwegian authorities including Norway's Petroleum Directorate, Directorate for Nature Protection, Directorate for Fisheries, and scientific organisations such as the Norwegian Geological Survey, and Norwegian Meteorological Institute.

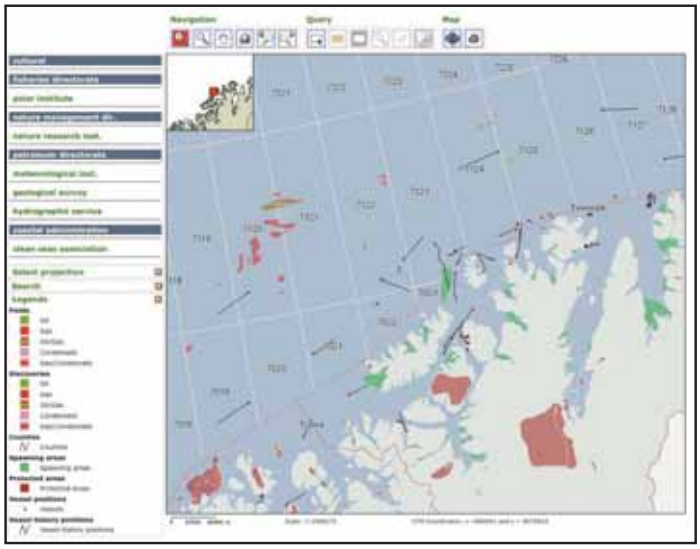
The oil and gas industry has many challenges in data management, it needs extensive searching and meaningful representation of search results, it also needs the ability to relate the information found to a map.

We are used to Google with its excellent page-rank invention, the algorithm that ranks web pages by deriving information from the cross references between pages.

Unfortunately most of oil and gas data sources are silos without any cross referencing, and a huge number of information items of exactly same rank for any given query. This is why Googling oil and gas data, especially in-house, has never repeated the internet success. It is also why a tool that sorts out in-house oil and gas data, based on the rules specific and meaningful for the industry, is in demand.

Whereoil extracts and makes sense out of data from a wide variety of sources, from information published by energy web sites (BERR, NPD Fact Pages, GEUS) to data stored in shared repositories (DISKOS, License Web in Norway), and internal file systems and Project Databases (eg Petrel, Kingdom, Geoframe). The data origin and structure is maintained when the search results are presented. In the end the users can work as though they have one extremely quick database of all the information they need for their projects.

"The competitive advantage of our Whereoil technology is the fact that it offers easier access to information, wherever the information resides" says Gianluca Monachese, CEO of Kadme.



Whereoil gathers information from different sources on one screen. This screenshot shows vessel positions in the last hour on the North coast of Norway, together with oil and gas fields, spawning areas and protected areas

"You search and you get all your hits presented as electronic tables – easy to sort, compare, analyze and export. If you search for a well name you get a table for all tops for this well from Petrel, tables with all the log curves and archive objects from DISKOS, a lithostratigraphy table from the NPD, a table with daily drilling reports from License Web and many others. All relevant results, all similarly organized. If you were really interested in Gamma curves – type GR next to the well name and all the irrelevant information will disappear in milliseconds."

"We do not present web pages to the users, we present data. We liked the idea of streamlined structured data publishing (you can call it "Semantic Web backbone" if you like) so much that we just cannot wait for it to come so we had to model it".

"Yes, our work would be simpler if all our data sources were publishing data rather than web pages, but RDF (Resource Description Framework) is not yet in their vocabulary", says Vasily Borisov, Kadme's technical director.

Whereoil search

The core technology is the "Whereoil" search engine, which searches the vast amount of information collected using its crawler agents, and on the files and web pages referenced by that information. Crawlers update the information regularly keeping it alive and synchronized with all the sources they access.

The advantage Whereoil offers over a commodity search engine, like Google Enterprise, is that it sorts the search results on the basis of the structure coming from the data sources. You are not finding web pages, music, videos and email – you are finding wells, core samples, seismic projects, production data and many other categories extracted by Whereoil from the data origin.

Knowledge about the nature of the information returned (is it a well?, is it an horizon?) provides the basis (semantics) for Whereoil to intelligently process the results – for example linking them to the assets on the map or putting them on a timeline.

"We do not present web pages to users, we present data" - Gianluca Monachese, CEO of Kadme

Whereoil also makes it possible to intelligently represent the results of a search. The

table view makes quick perusal of numerical results much more useful than via a regular search, for example being able to rank wells according to their production rates.

The map view, and its interactivity with the search tool, means the user can intelligently refine a search using the map, or quickly find information relating to an item on the map whether it be a news article or a well completion report.

"Search for a company name and quickly get a list of all the licenses that company is operating, all the wells they have drilled, all the published news about the company and all the public records from online case registers of institutions like the NPD or Petroleum Authority," says Mr. Borisov.

"This is not a task possible for a normal search engine, as you need to have a good understanding of the data sources you are extracting information from. It's not so much the cleverness of the search itself that makes the difference, but the capability of collecting, processing and presenting the information," Mr. Monachese says.

Kadme is entirely inspired by emerging internet technologies. "There are brilliant things out there in the shape of ideas or prototypes that when applied to our industry would put Information Management on a different level" states Mr. Borisov.

"Take for example the SIMILE Piggy Bank tool from MIT (Massachusetts Institute of Technology) which collects structured data from web pages. Brilliant but useless for the moment, since there is no data published. But narrow it down and adapt it to the industry and it will shine".

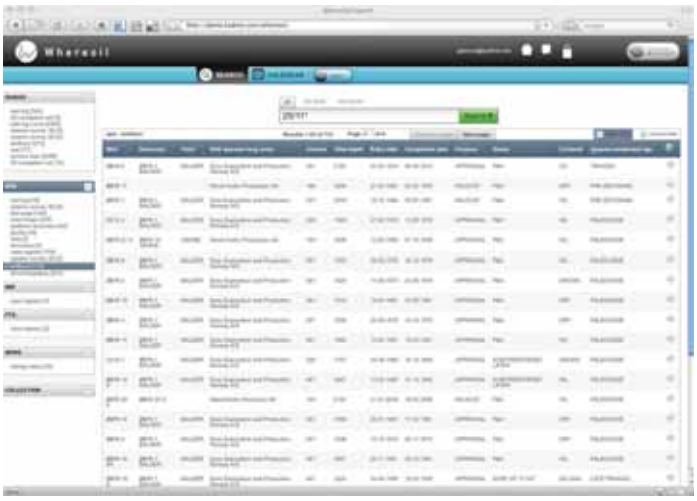
ArcticWeb

An example of how it is possible to provide a search based integration of a wide range of different data sources, in different standards, is the ArcticWeb project.

Kadme technology integrates a variety of different official databases to provide information used by the Oil Companies, for early field development, environmental risk analysis, emergency response, etc. on the Norwegian Continental Shelf and beyond.

"Young people 'don't drill through sediments - they drill through information'" - Vasily Borisov, Kadme's technical director

The sources are, for the moment: the Petroleum Directorate, Directorate for Fisheries, Directorate for Nature Management, Petroleum Safety Authority, Coastal Authority, Hydrographic Service, Clean Seas Association, Polar Institute, Geological Survey, Nature Research Institute, Meteorological Institute, Institute of Marine Research and many more will come.



Searching for well information using Kadme's WhereOil

"In the planning discussions, many people suggested that all of the data providers would need to accept standard data formats and publish standard web services to be able to achieve the vision behind ArcticWeb. This would have proven a major obstacle to the success of the project and a major delay in its execution. By using Whereoil as the underlying technology, this obstacle was removed", says Mr. Monachese.

The ArcticWeb beta system will be online at the beginning of May, opened for the moment only to the six companies that are current sponsors of the project (BG, ConocoPhillips, ENI, Lundin, StatoilHydro and Shell). The project is managed by Acona CMG.

It looks like the Whereoil approach is applicable not only to static data, but also to frequently updated data. ArcticWeb can even provide information about the vessels offshore North-West Europe, gathered from the Automatic Identification System (AIS) transmitters which most of the vessels carry today. The aggregation is provided by Norwegian Coastal Authority. "There are about 5000 ships reporting every minute in the region, and every 15 minutes we get their AIS data in the index and their position updated on the map", says Mr. Monachese.

Colombia

Kadme signed a contract with the Hydrocarbon National Agency of Colombia in August 2008, to develop a new front-end for its National Petroleum Data Bank.

The data bank, known as EPIS, is operated by Schlumberger. The data is loaded into Schlumberger data stores (Finder, SeisDB, LogDB, AssetDB) and into other databases for documents and maps. There are eight different data stores altogether.

The Whereoil software will replace Schlumberger's DecisionPoint software, as the front end for accessing the data.

The initiative is part of efforts by the Colombian government to make their country more attractive to investment by being readily able to provide information about its oil and gas assets and production. Quick and easy access to data, using both keyword and geographic searches, will enable interested E&P companies to quickly assess existing data, thereby reducing their risk.

Oil exploration vs. information exploration

"We see a lot of young people coming into the industry" Mr. Monachese says. "An Internet generation of people that are used to having much more information available to them and that are used to processing information very quickly."

"Those people do not drill through sediments – they drill through information" adds Mr. Borisov.

"The tools that modern oil companies need to have available for this new generation are tools that make it more efficient for them to quickly explore and process information", concludes Mr. Monachese. "Tools like Whereoil, that will directly improve the efficiency of oil exploration by improving the efficiency of information exploration".

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Flare – award for cataloguing oil and gas information

UK company Flare Solutions, which helps oil and gas companies catalogue their information so they can easily find it, has won the UK Queen's Award for Enterprise – Innovation for 2009.

UK company Flare Solutions, which provides software and services to help oil and gas companies catalogue their data and information, has been awarded the UK Queen's Award for Enterprise: Innovation 2009.

Awarded by the UK government, it is claimed to be "UK's most prestigious awards for business performance". The innovation award was given to 49 companies in 2009, including Flare. There are also award categories for international trade and sustainable development.

In December 2006, Flare also won a British Computer Society European Knowledge Management Project Award for its deployment of the E&P Catalog at Shell.

The company has a simple aim – of helping companies manage their information – and the most important tool is a directory of what documents, data and physical items (like cores and fluids) the company has. It makes software to tag and catalogue all the information in a company, and make it easy to find.

The catalogue is an independent software system to the information itself - think of it like a library file index system for books.

The software can be used for managing all kinds of documents, data sets and physical assets created by diverse projects such as field development, regulatory approval, HSE, and well delivery. It can be also be used for indexing reservoir models or seismic projects.

Flare has been in business for over 10 years and still follows the same 'holistic' vision– helping people better manage their information by breaking down the data-document-hardcopy barriers. Now its customers include BP, Shell and BG, Nexen, GDF SUEZ, Scottish and Southern Energy.

The company increased sales 13 per cent in 2008 over 2007, and grew its profits 18 per cent.

Unusually, it has just 10 employees, operating a global business out of their own homes.

Different people – different routes

The biggest challenge Flare aims to solve is the fact that different people in a company seek information in different ways and categorise it in different ways – although they are all using the same information.

As a simple example, consider a health and safety guideline. The same document is seen very differently by a health and safety manager, sending the same guideline out to different assets, as by an asset manager, who has to deal with many different guidelines, not only those , about health and safety.

Or consider a company lawyer would want to see all the regulatory approval documents in the company. An environmental manager would want to see all the environmental records. A reservoir engineer would want to see approvals around production consent and an asset manager is only interested in approval records about his asset. Yet they can all looking for the same document.

When people look for information, they expect it to be sorted in a way similarly to how they sort it in their heads – but different people sort out the same information differently.

This is the limitation of organising documents into folders - people in different roles would expect a different way of finding their documents, so you could never have a folder system which works well for everybody.

"We have a bunch of specialists who all need to be able to share a general language," says Mr Mansfield. "It is a hugely difficult problem."

If a document contains a specific code number or text, then finding the document is easy, no matter which angle you are coming from, even looking for it on the entire internet, using a keyword search.

But oil and gas people rarely know what they are looking for to this level of detail. And even if they do, the industry doesn't necessarily use the same code numbers all the time for the same thing.

Even something as simple as a well name can be stored differently by different people. The well planners originally saw it as a target and gave it a (or multiple) target name. The drillers saw it as a slot on their drilling schedules and gave it a slot name. Geoscientists will use a name more in line with the regulatory name, and operations staff will have a short name. They all have a different name for the same well.

Many oil and gas companies are installing search engines to try to find the right information, because they can see how well Google works. "But that alone does not fix the problem," says Mr Mansfield.

Search engines are fine for finding a list of pages roughly related to something – but not so good if you must find a specific document, particularly if you don't know exactly what you are looking for, or don't know any keywords or numbers which are only included on that document.

"The oil industry has a bunch of specialists who all need to share a general language - it's a hugely difficult problem." - Glenn Mansfield, director of Flare Solutions.

To illustrate the point, he suggests, try putting the same search term in two different search engines – and see how many of the same web pages turn up in the first page of results on each of them. A recent study by Dogpile and researchers from the University of Pittsburgh and Penn State University found that the ovelap was a 1.1% on average for a given query, suggesting that each of the four major search engines has a unique voice.

"This has been a pitfall of many (other) systems, in that you need to know exactly the right question to ask in order to find the information. The E&P Catalog helps users find information from loosely based questions," says director Glenn Mansfield.

So Flare has developed a structure where the same document can be found by following different drill-down routes, or 'funnels'.

So, for example, a well test report for a specific well 110/2-1 could be found by searching through different routes: information type>well test>110/2-1, product type>well

files> well test analysis>110/2-1, discipline>petroleum engineering,110/2-1.

The latest version of the software has free text searching functionality which can work in combination with hierarchical searching. This is useful when you have a rough idea of what you are looking for and where it is (but don't want to have to choose between searching your entire archive for certain search terms and working out exactly where the information is). "You can make a general search - and you can home in and be more precise," he says.

The catalogue also understands asset relationships (which wells are in which field, which fields are in which licenses and so on), to help bring up documents about wells or assets in the region, even if the documents don't contain any search terms which were typed in.

Document structure

In order to build such a system, the computer system has to have a thorough understanding of the different document types the industry uses, and how they fit together.

Luckily, you don't have to build up a structure from scratch for every single client – once you've done it for one oil company, most of it will work for another one, because they are fairly similar.

Every business process has standard documents, files or archives which are created at various project stages – the challenge is to help people find the information they are looking for.

For example, many oil companies have "stage gates" where they decide if a project goes further, and they gather certain information at each one.

"We understand that certain information is linked to specific processes - either used or created by them",, says Mr Camden. "You find this in any business - there are standard things that happen."

Publishing

One of the biggest challenges is ensuring that the catalogue system knows exactly what all the information is, when new information is being created all the time.

The computer system ultimately needs information to be tagged, or labelled, to say what kind of information it contain, and what it relates to.

There are two ways of doing this – doing it automatically or asking people to do it themselves, and both of these methods have their limitations.

The easiest system would be for employees to be asked to complete tags for every new document they create.

"Is it too much to ask – if you spend 3 weeks writing a report, you spend 2 minutes saying what it is (publishing) so other people can find it?" asks Mr Mansfield.

A common complaint is that people don't have time. "One person said to me, what is the point of all this effort – when no-one has asked to see the study I wrote," says Mr Mansfield.

"I said to him, if you haven't published it properly, who knows you've written it?"

The irony is that if the same oil and gas employee was selling his garden furniture on eBay, he would certainly spent a few minutes checking that it was correctly filed under garden furniture, he reckons.

eBay even manages to have a financial penalty for incorrectly filing your sales – there are online services which scan the whole of eBay looking for items which are incorrectly filed, which buyers like because they will probably get a better price for an item which less people are chasing. The result is that most of the time, "sellers make the effort to tag things properly," he says.

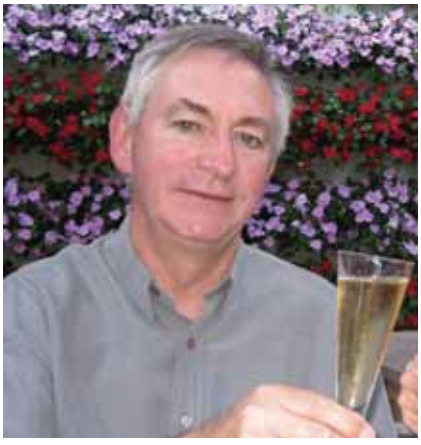
There are also plenty of rewards for keeping things organised, but unfortunately the rewards don't often come directly to the person doing the organising, so the person who needs to get more organised does not have much incentive to do it. You can probably think of many other examples of this problem yourself.

Flare aims to make it very easy to tag something in the catalogue (it calls it 'publishing') with simple drop down lists and tick boxes which someone fills in to say what kind of document it is.

For text documents, users are asked to select tag words which apply to it from a drop down list, rather than write their own tags. "We say, you can't make up keywords," says Mr Camden. "We'll give you a pre-defined list.". Alternative names (synonyms or aliases) and examples give users flexibility.

Another way to help takes us back to the processes – since we often know the major information that will be created we can set up predefined lists of 'things to publish'.

A company annual report is a well-known product and most of its tags can be pre-defined.



Dave Camden after winning the UK Queen's Award for Enterprise: Innovation 2009

If the average oil and gas employee was selling his garden furniture on eBay, he'd take the effort to catalogue it correctly, says Glenn Mansfield, director of Flare Solutions. So why is it so hard to persuade people to catalogue their oil and gas documents correctly?

So a user, for example, will only need to add 3 tags – the published date, the author and possibly a title.

However, a more technical product, such as a well test analysis report on a North Sea well will always require more tagging to describe it properly.

If people can't be persuaded to tag their own work, another option is for the software to tag it automatically. Flare has developed tools which can do this,

This can be useful when loading pre-existing content into the E&P Catalog. Whilst not as accurate as manual tagging it offers a practical approach where large information sets are concerned.

Ontology

Over the past 10 years, Flare has been gradually building and perfecting its ontology of oil and gas terms. An ontology is a list of terms which are related to one another. So for example, it shows that a drill stem test or DST is a type of well test.

The ontology includes how documents relate to one another (hierarchies). For example, it shows that a depositional environment map is a geological evaluation and that it is related to play analysis".

The ontology is fed into the cataloguing system, so it can quickly work out which documents relate to others, or what documents someone might want if they type in a certain search term.

"It's a model of how things are, how they relate," he says. "We know things about formation damage are related to overpressure drilling. No search engine in the world will know that relationship."

"We are still developing the ontology," says Mr Mansfield. "We, and the E&P Catalog, are constantly learning."

The ontology is made available under license to other users, and a simplified taxanomic version has been supplied free of charge to standards organisation Energistics.

O&G use of Inmarsat and Iridium satcoms increasing

The oil and gas industry is increasingly using Inmarsat and Iridium satellite communications solutions, which can offer more flexibility than VSAT, and more reliability than GSM and Microwave, says Eric Verheylewegen, VP Commercial Sales, Americas with mobile satellite communications company Vizada.

If you want to send a large amount of data and make phone calls by satellite, from the same location on land or sea, then you will probably go for VSAT satellite communications.

But for everyone else – Inmarsat and Iridium are offering an increasingly attractive solution, says Eric Verheylewegen, VP of Commercial Sales North America with mobile satellite communications company Vizada.

Both Inmarsat and Iridium have recently launched new services which offer higher bandwidth and lower costs than services previously on offer, with high flexibility and reliable connectivity, he says.

Inmarsat recently launched its FleetBroadband service, which can be used anywhere in the world, to carry voice and data at speeds up to 432 kilobits per second, costing below $16 per megabyte.

The hardware can cost as little as $6,000 for the FleetBroadband 150 service (although that will only give you 150 kbps – for the 432 kbps you will need a 600mm diameter FleetBroadband 500 terminal).

Iridium recently launched its OpenPort service, which can offer data communications of up to 128 kbps and 3 simultaneous phone calls. The hardware costs under $6,000.

The price of phone calls for both Iridium and Inmarsat varies if you commit yourself to buying large amounts of minutes and data, with a ballpark price of around $1 a minute for both.

Mr Verheylewegen says that Iridium OpenPort is proving particularly popular for crew use on drilling rigs, because it can carry 3 phone calls at once. "We just concluded a sale for a large amount of Iridium OpenPort on drilling rigs," he says.

Not tied in

VSAT communications will typically require that a customer contracts for a certain amount of bandwidth for 2-3 years in a certain location, which is typically shared with a number of other customers, he says.

There is no provision if you suddenly want to move the rig or vessel to another part of the world, put the system out of action for a short while (eg if the rig is laid up), or if you need guaranteed bandwidth for a short amount of time (eg to make a videoconference or important phone call).

However with Inmarsat and Iridium, you can do whatever you want, he says. The pricing is the same wherever in the world you are, and it works automatically in different parts of the world, with no equipment reconfiguration required.

On Inmarsat, you can have guaranteed bandwidth of up to 256 kbps whenever you want.

It can be easier for contractors to gain access to satellite communications on Inmarsat and Iridium. they can be billed independently of the main operator of the system, either by invoice or by pre-paid card. Their communications will not interfere with the main company communications.

Vizada recently did a deal with a Brazilian service company, where "one of the requirements was for them to go onboard and set up their own satcoms," he says.

Vizada offers a range of different services to help vessel operators manage crew calling – enabling seafarers to buy pre-paid calling cards to pay for their satellite phone calls, so the vessel operator does not need to get involved in billing.

"We have a series of sub-accounts – so someone can come onboard and open an account – send and receive e-mail, fax, and by the time they leave the rig – either everything has been done pre-paid – or the rig manager can just present them with a bill – so we can present people with the ability to pay for what they use," he says.

Meanwhile, some mobile drilling rigs are increasingly moving to Inmarsat FleetBroadband and Iridium instead of microwave and GSM solutions, for both crew personal and company operational communications, because they find it to be a more reliable service at a similar price, he says.

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