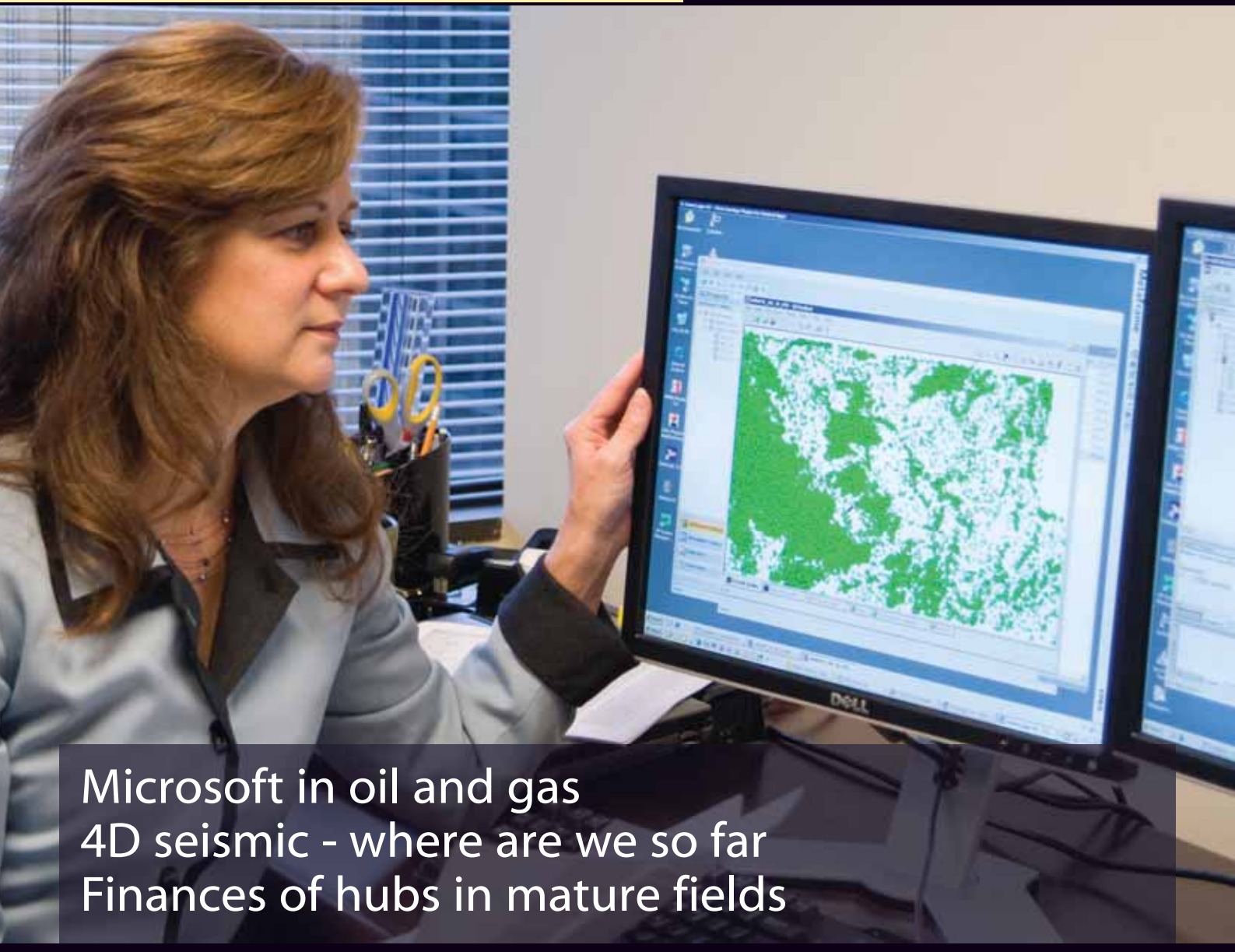
digital energy journal

The 10 flaws of every DOF project

Better pore pressure from seismic

Permanent seabed seismic - financially viable?

June 2010 Issue 25



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Cover photo: Tina Warner of HighMount Exploration and Production (Houston) observes the continuous application of the InnerLogix data assessment and correction processes, project data (green) conforms to business rules.

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Finding Petroleum - making you feel better about working in the oil industry!

David Bamford
Consultant Editor, Digital Energy Journal

At the end of my last editorial, I commented that as a geophysicist and explorer, a sub-surface person, I recognise that the digital world provides the blood stream which enables everything to happen.

Without it we could not acquire and process seismic data, interpret 3D, work on well logs, integrate different sorts of data, run a reservoir simulation, visualise the results in 3D and in 'time lapse' mode etc.

And of course the concept of the Digital Oil Field extends this reality to integrated production operations.

So I suggest that the various disciplines that work in the oil and gas industry are linked together not only by the fact that we all work with petroleum but also by how we do this work.

For this reason, and many others, we geoscientists, drillers, reservoir engineers, petroleum engineers, production engineers, commercial analysts, accountants and IT specialists form what [US marketing consultant] Seth Godin (www.ted.com/talks/seth_godin_on_the_tribes_we_lead.html) would perhaps call a single 'tribe', made up of many nationalities.

A couple of questions then follow.

For the members of this undoubtedly large group feel like a 'tribe' and whether no or yes, do they feel good about the industry they work in?

My instinctive answer to the first question is No; most of us work for a company or institution, big or small, that makes it pretty clear that our first loyalty is to it – at best we may perhaps be 'allowed' to join a cross-industry technical discipline organisation such as the SEG, AAPG, SPE.

And my instinctive answer to the second question is at best a qualified "Sometimes" – in general we feel better than we did in the mid-1990's when oil and gas was widely regarded as a dying dinosaur but not as good as we might considering that some of our achievements rank alongside getting a man to the moon.

Many people simply see big powerful corporations they can't speak to and instinctively dislike and unfortunately the oil and gas industry isn't very good at explaining what it does.

And just to shine a light on a small corner of this issue, in getting people to come and present at our Finding Petroleum Conferences and Forums, it is remarkable the extent to which companies', especially big companies', relationships with the outside world are nowadays controlled by "Investor Relations" who seem to have corralled all the technical folk into a sheep pen!

We had the idea of establishing Finding Petroleum to provide a forum where real results, successes and failures, can be shared around the 'tribe' and where Digital Energy Journal had a uniqueness, a uniqueness that is..... 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.

As we have worked with our idea and the Journal, we have realized that the 'interesting stories' are not just about the digital world, about the blood stream, but cover much more of what the 'tribe' is involved in, the whole body.

On this basis, we are going to rename our Journal the Finding Petroleum Journal as from the September issue – a small step in unifying the global 'tribe'!

David Bamford is non-executive director of Tullow Oil, and a past head of exploration, West Africa and geophysics with BP

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HighMount Exploration – automating data quality management

Highmount Exploration and Production of Houston uses InnerLogix software to automatically clean up data to 4-6 sigma levels (quality level of 99+%)

By Tina B Warner, business systems specialist and data quality management architect at Highmount Exploration and Production, Houston, and Carolyn Keller, geologist and marketing analyst at Schlumberger Information Solutions (SIS)

In today's increasingly challenging oil and gas business environment, huge volumes of data have to be processed and delivered to desktops on a daily basis, and this amount continues to grow exponentially every year.

The importance of finding solutions for and committing resources to continuous data quality management (DQM) cannot be underestimated.

An inaccuracy of as little as 10% in a batch of data can adversely impact critical decisions regarding exploration and production, risking enormous financial loss.

Clearly, E&P decision-making must be based on reliable methods that ensure a high degree of data integrity, while maintaining ease of access.

Trust

Geoscientists and engineers need to trust the information they have available for interpretation.

Traditionally, they have manually reinterpreted project data before fully trusting its accuracy.

However, as many corporate databases are now approaching the size of petabytes (equal to 1,000,000 gigabytes), human intervention is no longer efficient, practical or advisable.

Schlumberger's InnerLogix* data quality management software was developed to assist E&P companies in managing their complex data environments, providing a systematic methodology for assessing, improving and controlling data quality over time—not just for a single event.

Quality levels

With the major objective of data error reduction, DQM processes can be measured in terms of Six Sigma, a set of metrics originally designed for eliminating manufacturing defects.

It is compelling to see the change from levels 1–3 Sigma (quality score of 30% - 93.3%) when oil companies used manual techniques, to 4–6 Sigma (quality score of 99+%) once automation takes over the same tasks.

And as the Sigma score goes up, the resource cost goes down, as well as data uncertainty.

A conservative evaluation of the financial impact of "not" implementing the InnerLogix DQM process at a HighMount field of 40,000 wells indicated a cost to the company of USD $3 million.

Standardised data quality management

HighMount Exploration & Production LLC had an objective to standardize DQM company-wide.

In particular, there was a need to improve project data quality in the Petra® system, a geologic interpretation program used by HighMount to generate prospects and determine drilling locations.

Issues of data integrity, accessibility, and synchronization between corporate, regional, and project repositories had to be addressed so that information could be captured and retained as a valuable, trusted asset.

Invalid well data, missing information, and inconsistencies between data sources were causing much user frustration.

With several points of data entry, multiple software systems, and non-uniform data-loading methods on different time schedules, an overriding concern was different presentation of the same project information by various groups within the organization.

The company strategy was to implement software technology with the required DQM functionality—of which data quality analysis was an essential component—to deliver reliable, synchronized data to end users through a centralized corporate database, the Petroleum Information Data Model (PIDM).

Automated rule based system

After evaluating DQM applications, HighMount selected the Schlumberger InnerLogix software suite for its automated, rule-based system that analyzes the quality of the data based on specifically defined

"Geoscientists and engineers need to trust the information they have available for interpretation" - Carolyn Keller, geologist and marketing analyst at Schlumberger Information Solutions

measurements; corrects the data based on customer-prioritized workflows; and creates quality exception reports to measure improvement over time.

This scalable, customizable software solution accommodated HighMount's need for multiple sets of DQM rules that could be applied to either the corporate- or business-unit level.

Corporate-level rules maintain quality standards across corporate and regional data stores, while the business-unit-level rules define area-specific quality standards.

It was also capable of handling HighMount's requirements for five identified data types: well headers, directional surveys, perforations, marker picks and production data.

Collaborative

All DQM stakeholders were involved in a collaborative approach, which formed the

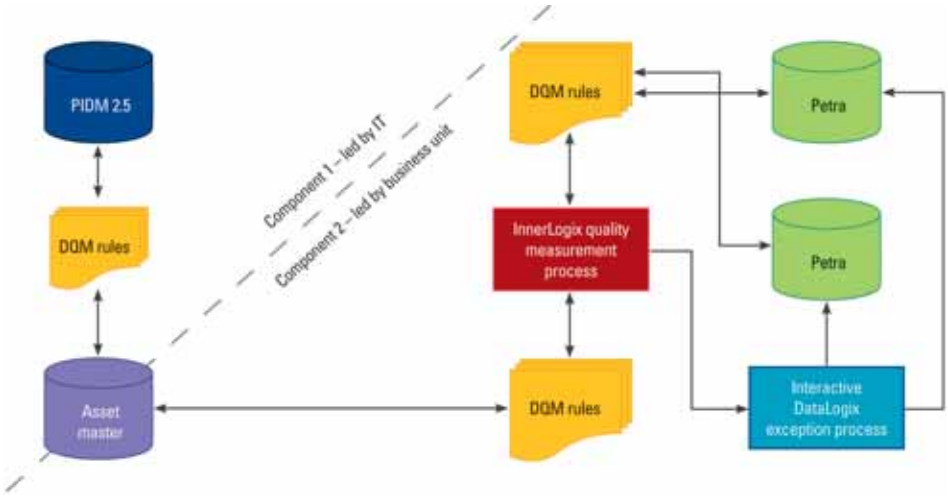
basis of a project partnership between IT, the business unit and management.

To create DQM rules, the IT staff met with the business units (focusing on highest-priority data areas first) to gather their requirements and determine their unique friction points such as problems that were stopping users from interpreting.

These friction points were turned into system-based rules to help resolve data issues, grouped by the categories completeness, consistency, uniqueness, validity, content, audit, data changed.

Not only did the business units help define basic DQM rules, they also helped ensure that quality data was identified and delivered to the asset team's regional master projects and they determined their own quality standards (acceptable levels) and correction rules.

This meant that each business unit was responsible for timing of QC jobs, reviewing quality exception reports, and correcting data as needed.



HighMount's DQM (Data Quality Management) process illustrates the importance of DQM rules in measuring the quality and ensuring the reliability of data before it is distributed to users

Optimised data flow

HighMount's data flow process now begins with the company's PIDM database (IHS Petroleum Information Data Model), which holds all of the US well data and production data for approximately 3.7 million wells.

This repository can store multiple well header iterations for the same well, allowing both retention of the industry version and the ability to capture and retain any revised versions of the well header.

The value-added data is then flagged as "preferred" and is promoted to the top without loss of, or modification to, any pre-existing data.

The data is next assessed against the quality standards defined in the InnerLogix RulesEditor.

Data items that fail assessment are in many cases automatically corrected based on corporate- or business-unit-defined rules. If the data does not meet the specified level of quality and cannot be autocorrected, it is passed to an exception process where issues are manually evaluated and resolved using components of InnerLogix technology.

As users revise working project data in Petra® and OpenWorks®, the InnerLogix system detects the changes and applies criteria to determine the changes that should return to the regional- or corporate-level database.

User data is promoted to master and regional projects provided it meets the standards defined by the business unit as value-added information to be retained or promoted. The data is also synchronized with the corporate database.

User productivity

The standardized DQM software and processes have significantly increased user productivity through automation, while also reducing manual data entry efforts and the risk of introducing human errors.

HighMount users now have access to current, consistent information stored in a single repository, which has built trust in data validity.

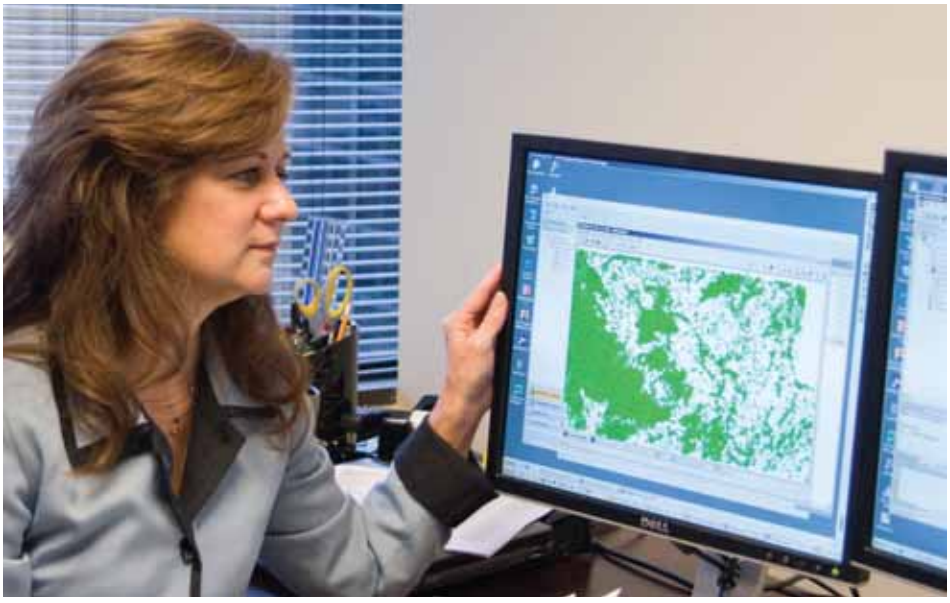
The DQM process has cut the amount of time that employees have to spend on investigating, validating, and correcting data issues, allowing them to concentrate on their primary tasks of finding and managing reserves.

By implementing this repeatable methodology, HighMount is positioned to continuously improve the quality of its data.

The new way of working in conjunction with new software technology has enabled in-depth data analysis and showed major improvements in just 8 months, reaching a level of 99+% data quality (or 4–6 Sigma).

This translates into not only higher confidence in the data, but also maximum return on investment from better exploration and production decisions.

Much of the project's success can be attributed to the company's commitment to and focus on DQM processes, with extensive early planning and communication before deploying the solution—first understanding the big picture and then stepping into the details.



Tina Warner of HighMount Exploration and Production (Houston) observes the continuous application of the InnerLogix data assessment and correction processes, project data (green) conforms to business rules

*Mark of Schlumberger

Ikon Science – rock physics atlas of Moray Firth

Rock physics company Ikon Science has launched a rock physics atlas of the Moray Firth, off North East Scotland, provided as an A3 book and database.

UK company Ikon Science, a specialist in rock physics, has launched a rock physics atlas of rock properties, synthetic seismic responses , elastic property and depth trend relationships covering the Moray Firth,abasin of interest off the North East Coast of Scotland.

Oil and gas consultant Nick Pillar, a past operations director and chief geophysicist of Ikon Science and one time chief geophysicist of Enterprise Oil, talked about the atlas at the Finding Petroleum forum in London on March 16th.

Work to develop the atlas was underwritten by 8 oil companies, three main companies and the rest partners; Ikon is now making it available to all companies.

The atlas covers 3 sub basins: the Inner Moray Firth (7 wells), the Outer Moray Firth (23 wells) and the Witch Ground Graben (20 wells), using well data which was provided by oil and gas data provider IHS.

The book is available as a printed A3 reference book, covering the rock physics theories and methodologies used, analysing the elastic properities of the 108 reservoir intervals, and trends in the basin.

It is also available as a .rok file which can be imported into Ikon's RokDoc software so people can work on it directly. The .rok file includes log data from the wells, petrophysical analysis, fluid and mineral data, AVO models, and seismogram displays.

Altogether, the well data provides information about 108 potential reservoir intervals within the study area.

The data can be used to help get more out of new seismic data gathered in the region; by combining data with rock physics data you can get a better estimation of the actual rock properties, not just the rock structures.

The data should be useful when evaluating the risking of prospects or for well ties, determining depth trends for particular formations and building background models for seismic inversion.

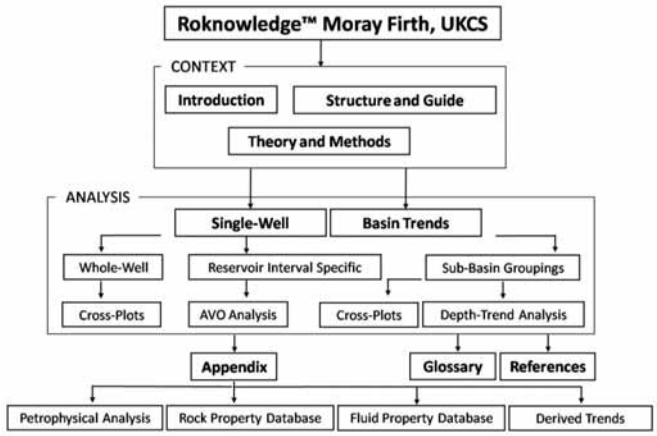
There are sections on single wells (providing data gathered on the 54 wells covered) and basin trends.

The single well section gives you information on all the reservoirs the wells go through, and background information (such as why specific wells were drilled).

It also provides fluid and rock analysis data from the wells - eg pressure temperature , rock properties , fluid properties, hydrocarbon API, GOR etc.

The notes also give analysis about how good the data gathered from the specific wells was.

The "basin trend" section looks at trends within the sub basins, eg looking at shear wave velocity in different rock types, from different formations.



The structure of the Ikon Science rock physics atlas of the Moray Firth

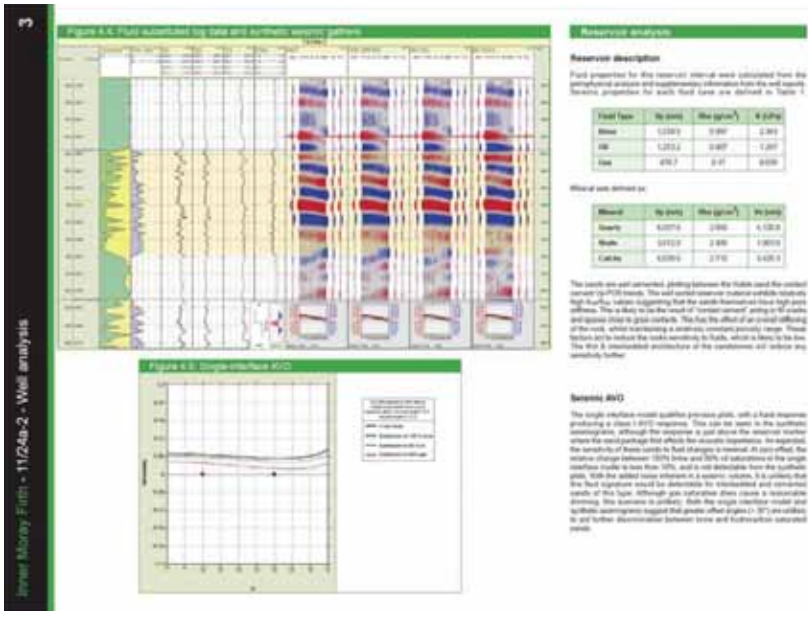
Data analysis

In particular, the data can be used to make an estimation of shear wave velocity (for regions where available shear data from wells is not available or poor quality). You can study trends and try to understand what the anomalies in seismic data might mean.

Having good data for shear wave velocity is essential for doing amplitude vs offset (AVO) analysis, which can potentially tell you a great deal about the rocks and in some cases their fluid response

The problem is that shear data is often not available or of poor quality, Mr Pillar says. There is also many different logging techniques, which can make it hard to compare one well with another.

The atlas includes all measured shear data from the region, and analyses the Vp/Vs relationship for all the epochs in the basin The trends derived from the data can be used to calibrate old or new shear data and can be used to derive relationships where there is no shear data available i.e. used instead of standard Vs modeling techniques.



Example from a page of the Ikon Science rock physics atlas of the Moray Firth. This page shows fluid properties for a certain reservoir interval

Finding Petroleum

Upcoming Events

FindingPetroleum.com

Finding Petroleum has five more London events planned for 2010

Finding Petroleum has plans for 10 events in London in 2010, many free to attend and all affordable, to help you to share knowledge and meet people.

Our events cover new technologies, business / investment opportunities, and people's experiences with them around the world.

We're connecting the oil and gas industry's three generations: the semi-retired, mid career and young professionals / students.

All our events are supported by our online social network at network.findingpetroleum.com.

For updates on our events, please sign up to our newsletter at www.findingpetroleum.com. Our outline agenda for the rest of 2010 is shown below.

David Bamford
Director, Finding Petroleum

(Also non executive director, Tullow Oil and past head of exploration with BP)

Exploration Technology Business

EarlyBird Ticket Offer
We have a very limited number of £50 tickets available for DEJ readers
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October 07, 2010 - Inmarsat Conference Centre - £450 per delegate

Speakers Include

Ivan Sandrea, Vice President of Strategy for International E & P, Statoil

James W. Farnsworth, President & Chief Exploration Officer, Cobalt International Energy

Chris Matchette-Downes, VP Business Development, MD Oil

Mark Enfield, Aurelian Oil & Gas

Oswald Clint, Senior Analyst, Bernstein Research

Keith Myers and Alastair Bee, partners, Richmond Energy Partners

Kenneth Chew, Vice President - Industry Performance, IHS Inc, Oil & Energy

Other Forthcoming 2010 Event Dates

Carbon capture and storage
September 15th

The 'capability crunch' in the oil & gas industry
November 23rd

Digital Energy Technology
December 14th

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Developments with 4D surveys

The business case for 4D reservoir surveys – doing repeated seismic surveys over the same area – has been proven – but that doesn't mean it is right for every reservoir, says 4D seismic expert Matt Luheshi. You can do it with both towed streamers and permanent seismic cables on the seabed.

4D seismic surveys – doing repeated 3D seismic surveys over the same area, so you can see what is happening in the reservoir, have now proven their financial viability after 10 years of commercial projects, said 4D seismic expert Matt Luheshi, speaking at the March 16 Finding Petroleum forum in London on advanced geophysics.

So far they have mainly been done by oil majors Shell, Statoil and BP, he said.

The companies believe they have got good return on investment – Shell estimates a 20:1 return on one project,– and Statoil believes that its Gullfaks system has a net present value of about $1bn based on costs of around $60m, he says.

Based on the data gathered, you can get better simulator models, you can spot areas of reservoir which aren't being drained into the well, you can see how well a water flood is working, you can spot high pressure build up (which could lead to a safety hazard), and for carbon dioxide storage, you can check the carbon dioxide is staying where it is supposed to.

The first experimentation in 4D seismic started in the mid 1980s, followed by the first commercial projects in the mid 1990s, mainly in the North Sea, the Gulf of Mexico and onshore US.

During 2000-2010, 4D seismic has had "pretty much widespread implementation at least amongst the majors," he said. "In the North Sea - BP and Statoil have repeat seismic surveys on 75 per cent of their fields," he said. "It's fair to say it is routine."

For the business case of 4D seismic in general, "It has been demonstrated very vigorously - what added value you can associate," he said. "The case has been pretty much made."

"A lot of the knowhow is inevitably within the large companies," he said. "But it's expanding globally in a relatively organic way - spreading out form the majors to others."

There are efforts going on to improve the acquisition technology.

Companies are also starting to look more at using 4D seismic for gas reservoirs (to date it has been mainly oilfields).

Most of the reservoirs with 4D seismic surveys to date have been clastic reservoirs. There could be a huge missed opportunity for using 4D seismic on carbonate reservoirs, such as reservoirs in the Middle East, he said.

Streamers and seabed cables

Some of the 4D seismic projects to date are just repeated 3D seismic surveys carried out in the conventional manner, using towed streamers.

Another approach is to install permanent seismic detectors on the seabed. This has a higher initial capital cost, but has the benefits that it is much quicker and easier to get a new seismic survey when you need one – you just need to find a vessel able to act as seismic source, you don't need to find a streamer vessel.

"A cable on the seabed is a nice quiet environment," he said. "It's not being jerked everywhere - it makes repeatability that much easier. Also it allows for the possibility of really rapid repeats."

So far BP has been the main exponent of ocean bottom cable seismic surveys, with systems installed in Valhall (Norwegian sector of North Sea), Clair (West of Shetland) and Azeri-Chirag (Azerbaijan).

In Valhall, it acquires new data between 1 and 3 times a year, Mr Luheshi said, since the first survey in 2003.

"The reservoir is very low permeability - very complicated system - with subsidence," he said.

However if you are going to make additional upfront investments in ocean bottom cables, the business case needs to be more carefully thought out.

"There's a big debate that's been going on around the industry about if you go for permanent systems or streamers systems," he said. "It needs several legs to convince people they should spend the money to buy bespoke cables."

It helps if there are "clear reservoir management objectives," he said.

In particular you would need to be in a position to do something with the data gathered. For example, drill more infill wells you spot part of the reservoir which does not seem to be draining into your existing wells.

For many oilfields, 4D seismic surveys are only initiated during the later stages of the reservoir, when production gets harder to maintain and questions start to arise about what is happening down there.

"You're more likely to be able to convince someone to reshoot the survey when they're trying to maximise the return - e.g. when its plateuing," he said.

For example, it can be useful in working out what is happening with water flood, if the water is pushing oil into the production wells, or the water itself is flowing straight into production wells without doing anything. Water shows up on seismic as a "relatively large signal," he said.

Some of the big returns are achieved when another in-fill well is drilled to access parts of the reservoir which are not draining into the original wellbore for some reason.

The systems normally end up being installed on fields which are particularly large or complex, or which have a significant imaging problem, or some other reason why they need 'on demand' data.

Statoil

Statoil has used 4D seismic extensively on its Gullfaks field in the Norwegian sector of the North Sea, but without ocean bottom cables, and used the data to develop an extensive saturation model of the reservoir.

It has drilled 17 infill wells between 2007 to 2008 as a result of the information, he said.

The company believes the system has a net present value of about $1bn, and it cost around $60m, he said. "You've got huge value additions by being able to see where you've put your wells more effectively."

In Norway's Sleipner field, carbon dioxide is injected into sand at around 600m depth – and Statoil does a series of repeat surveys to check the carbon dioxide is staying where it is supposed to, he said.

"It showed them that the CO2 is staying where it should be - and you can monitor it quite effectively," he said.

Shell

Shell had a projecton the Norwegian Draugen field, in the 1990s which made "quite a big difference to people's acceptance of the technology," he said. It was a mid Jurassic sandstone with high porosity and 1-2 darcies of permeability. "It looks geologically quite a simple system."

However, following a series of 4D seismic surveys, they could see a growing water zone in the reservoir. This led to a change of plan, switching off one of the water injectors

and adding a new infill well.

"Shell reckon they got a 20:1 value uplift from this example alone," he said.

"This is one of the examples that make people sit up and take notice. You get some significant commercial value, for a relatively simple field."

Data analysis

The ultimate goal is getting accurate and up to date pressure and saturation data on a map, so you can see where the oil is and how much pressure it is under to get into the wells.

To calculate pressure and saturation from seismic data is complex.

One way is to try to calculate this from the models – start off making measurements from whatever well data you have to try to work out seismic velocity, and do amplitude vs. offset analysis to try to work out pressure and saturation, he said.

A simpler approach to the data analysis, which has been promoted by a team in Heriot Watt University in Edinburgh, is to simply assume that any changes in the reservoir are due to your intervention – you can see how the reservoir has changed, you know what you have produced and the pressure in the well, and you can use this data to work out the saturation and pressures. "You bypass all the modelling work," he said.

Other 4D technologies

There are other types of ways of continuously monitoring a field.

Passive seismic, or listening to microseismic events (small explosions) has been used successfully by Saudi Aramco he said. "You can just listen to what is going on - if you just listen all the time. You're producing micro fractures all the time if you're injecting water - you can see which way the water might be going."

Another idea is having a controlled source electromagnetic on the surface, with permanent EM detectors downhole. "The idea is that over time - as distribution changes resistivity will change," he says.

Gravity has been used to monitor changes over a period of time.

"The other one is just looking at the surface geometry - that's been tried in Algeria - looking away with a GPS system for change in elevation. Very crude but very effective and dead cheap."

Ocean bottom seismic – improving cost and reliability

Stingray Geophysical of the UK is aiming to reduce the cost and improve the reliability of permanent seabed seismic monitoring, thereby making seismic permanent reservoir monitoring practical.

When permanent seismic monitoring first came onto the market, many people thought that it would become the standard way of monitoring reservoirs – and that it would replace towed streamer for 4D seismic.

But so far, only 4 systems have been installed since 2004: by BP on Valhall and Clair in the North Sea and ACG in the Caspian Sea; with the fourth, by Shell on the Mars field in the Gulf of Mexico, unfortunately destroyed by hurricane Katrina.

Stingray Geophysical of the UK is on a mission to make seismic Permanent Reservoir Monitoring (Seismic PRM) the "solution of choice" for maximising the effectiveness of reservoir management offshore and especially in deep water.

Martin Bett, CEO of Stingray, believes that seismic PRM could become mandatory in time. "Increasingly we will see governments and the agencies that control natural resources mandating technologies and techniques that deliver a systematic data-driven approach to maximising total recovery. This is the only route for the oil and gas business to be truly sustainable," he says.

The Stingray system uses fibre-optic cables, both for the hydrophones and accelerometers themselves, as well as for the communications between them.

A big advantage of fibre is its reliability. For normal electronic components, the mean time between failure is typically measured in thousands of hours. For fibre-optic components the unit of reliability is hundreds of years, Mr Bett says.

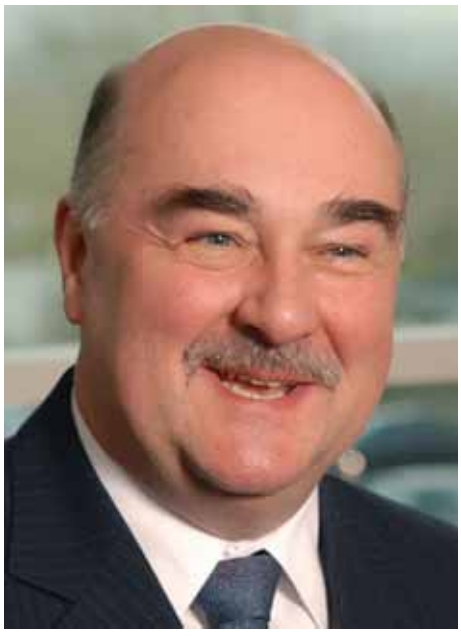
"The failure rate of Stingray's fibre-optic hydrophones is 1 in 18,300 years," he says. "It hasn't broken yet."

There are possibilities that a system could be damaged, for example by a dragging ship anchor or fishing activities, but this only applies in shallow water. Mr Bett believes that the chances of damage to the system are so low "we can almost discount it, especially since the arrays are typically buried for protection and coupling with the earth."

Even if a sensing cable is severed, Stingray's Fosar Seismic PRM system is usually configured in a bi-directional mode. This means that the system will continue to work, with no degradation in system performance, as each sensor can be accessed by two alternative routes.

Stingray's Fosar system has been substantially tested, undergoing 10 field tests with no failures over the last 6 years. A military system, from which the Fosar system is derived, was installed for 11 years and still working perfectly when it was retrieved.

The biggest weakness in any such system is probably the connections between different fibres – so, to reduce this risk, the system is designed with as few fibres and connections as possible, he said.



Martin Bett, CEO, Stingray Geophysical

Also, if you are using conventional electronics, you need to bear in mind that the voltage required increases with the length of cable. For example, if you have 200km of

cable, you need "several kilovolts" of power to reach the full length of it, he says. And the higher voltage is more likely to cause equipment failure.

"Permanent 4D will also give you a better resolution," he said.

The company is so sure that companies will get long term benefits that it is offering to put together schemes whereby the equipment and installation costs of a Fosar system are financed, then oil companies pay either an annual fee or a fee per survey – so the system is leased rather than purchased.

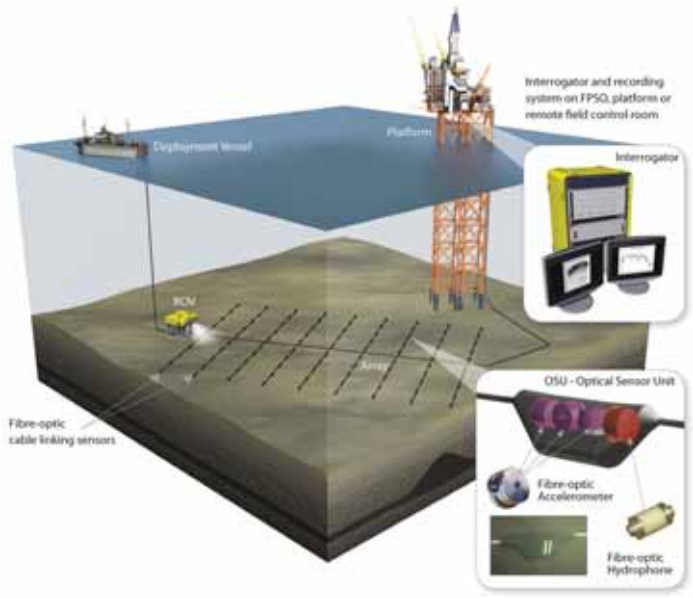
"It's very very reliable and very sensitive," he says.

Perhaps expectedly so as the technology was originally developed at UK government research centre DERA (Defence Evaluation and Research Agency) for detecting submarine movements during the "Cold War".

The company can fix 20,000 to 30,000 sensors on 200 or 300km of fibre-optic cable and acquire measurements on each sensor several hundred thousand times each second when pulsing laser light into the array.

With higher quality data about the reservoir, it is possible to improve production and minimise cost and risk. A more detailed view provides a deeper understanding of the reservoir, in particular about its heterogeneity which evolves as it is produced. "All reservoirs are more heterogeneous than at first thought – and normally they become even more so as they are produced," he said.

In a typical reservoir situation the reservoir engineer has a great deal of information about the areas in and around the wells, but reservoir characteristics between the wells are typically extrapolated from well-centric data.



Stringay's "Fosar" Fibre optic seismic reservoir monitoring system. An array of seismic receivers is permanently installed on the seabed, with data being recorded on a nearby platform or vessel

By mapping attributes aerially across the reservoir, 4D seismic typically delivers a return on investment that can be "50 or 60 times" greater.

However this doesn't necessarily make it easier to go to management and ask them to invest – because they want to know about the benefits they will get today. "The NPV calculation applies a full weighting to upfront costs and significantly discounts benefits that will occur in the future," he said.

Mr Bett estimated that the cost of just 1 misplaced subsea well could pay for the costs of a Seismic PRM system – and of course there are additional benefits from having a better understanding of the reservoir and being able to spot small changes going on in it.

A seabed system can also collect 4-component data, unlike a towed streamer. It can be used in obstructed areas – e.g. doing a survey on an area where access with a 3-D streamer vessel is difficult or even impossible.

"If we can address the upfront cost and the reliability, we're going to be onto a winner – and that's what Stringray is all about," he says.

The operations manager of Stingray is a subsea installation engineer, focused on making the seabed installation work, rather than the seismic aspect of PRM, he said.

The Valhall system has 140km of cable, with 28,000 sensors in it.

Mr Bett said that independent Availability Reliability & Maintainability (ARM) studies for specific Fosar configurations indicate that after 15 years we could still expect (with a 90% probability) to have in excess of 98 per cent of sensors still working.

The dynamic range of a Stingray's Fosar hydrophone is about 180dB, compared to 120dB range for a conventional electrical hydrophone. The sensitivity works out at about 1,000 times greater (because the db scale is a logarithmic measurement).

It is also possible to use such systems on land, although it hasn't been done so far, he said. The economic benefits would appear to be less attractive because the cost of installing such systems on land and drilling wells is significantly lower.

"Nevertheless, we are approached by a number of companies each year to ask if we would build a land based system – and maybe we will…" he says.

Installing the Stingray "Fosar" fibre-optic seismic Permanent Reservoir Monitoring system

The success of today's E&P business largely depends on well established processes and the ability to access valuable information. Energistics' commitment to the development and deployment of open data exchange standards is essential in helping E&P companies deliver integrated IM solutions through collaborative efforts, thus enabling the upstream industry to achieve increased efficiency.

Mr. D. K. Pande, Director (Exploration)
Oil and Natural Gas Corporation (ONGC)

energistics™
The Energy Standards Resource Centre

ViaLogy – new ways to separate noise from signal

US company ViaLogy is developing new techniques to separate seismic signal from noise – by analysing the noise rather than removing it.

ViaLogy, a US company listed on the UK's Alternative Investment Market (AIM), is developing new technologies to exploit noise in geophysical datasets to de-risk prospects and help find more oil and gas.

It is also developing techniques to analyse subsurface fluids by how they attenuate seismic waves, and get better predictions of rock porosity.

To date, ViaLogy's QuantumRD technology has been deployed to characterize porosity in complex onshore stratigraphic formations that exhibit fracture and structural changes below seismic acquisition resolution.

The system is being used to get a better understanding of the subtleties of geological variations within proven resource basins such as the Permian, Haynesville and Bakken in the US.

The technology is being used to detect productive depositional geologies, map their fluid distribution and porosity using 3-D and multi-component seismic.

In February this year, ViaLogy said that its technology helped to successfully identify a good place to drill a 170 bopd well in the Strawn Field of the central Texas Permian basin – a region where 18 wells had been drilled previously, 15 of which turned out to be dry.

The company was funded by a UK investment trust in 2001, this NASA's Jet Propulsion Laboratories, operated by California Institute of Technology spin-off focused on commercializing technologies originally developed for use in defense and space. In Summer 2008, the company launched new services to the energy industry.

Separating noise and signal

The core technology, tradenamed QuantumRD, uses "Quantum Resonance Interferometry (QRI)" to detect "weak signals" as a disturbance to noise, not the other way around, as it is usually done.

Unlike conventional signal processing, QRI does not filter out coherent and incoherent information, and low and high frequency noise.

Instead it analyzes noise variations to assess how the noise distribution across a target formation has been impacted by variations in rock matrix and lithology.

The variations in noise are extremely subtle and often order of magnitude below the noise amplitude itself, and well below the signal amplitudes used by conventional processing.

QRI uses a "noise-injection" protocol, or a nonlinear mechanism of adding synthetically designed noise to further amplify these subtle changes.

The process can be customized to accommodate drilling criteria and risk-reduction attributes of interest to the drilling operator.

The company claims that the technology is 10-100 times more effective at detecting signals in noisy environments than standard passive signal processing techniques.

Another technique is to examine the noise itself to try to find more of the signal. With weak signal processing, the signal can be as little as a tenth or a hundredth of the noise, he says. But then you reach a point where the signal causes changes to the noise.

The company spent many years developing algorithms to pick out weak signals, focusing initially on genomics, drug discovery, mass spectrometry, security and surveillance applictions.

In particular the company looks at low frequency noise (3-10 Hz) and high (80-200 Hz).

Dr. Sandeep Gulati, Chief Technical Officer, believes that in seismic processing, a lot of the useful information information is often removed from the signal in the efforts to reduce noise.

While this simplifies structural interpretation, this process removes subtle features that could be strongly correlated to porosity, lithology and fluid distribution attributes, thereby limiting the use of seismic information.

Other technologies

Dr. Sandeep Gulati, Chief Technical Officer, ViaLogy

The company is also developing technologies to work out what fluids you have in the reservoir by looking at how much the material absorbs different frequencies of wave.

In a study conducted by the company, they showed that based on well control the difference in how much energy is absorbed can be as little as a 0.01 per cent, between hydrocarbon bearing rocks and non-hydrocarbon bearing rocks, whole the noise could be 3%-4%.

A further focus is trying to get better predictions of porosity is the deconstruction of large 3D seismic volumes into volume cells or "voxels" which can be processed individually for reservoir properties.

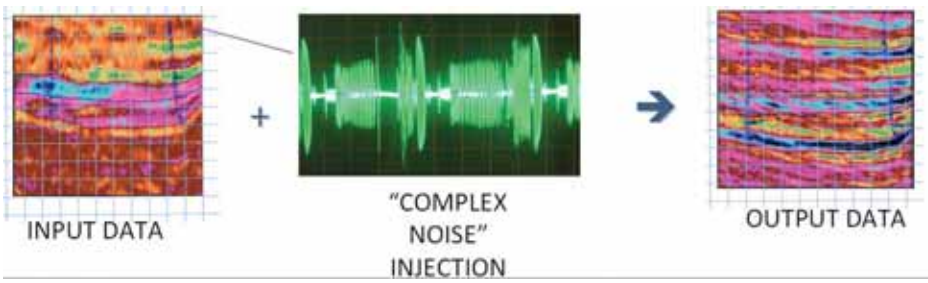
Based on geological understanding of prospects of interest, the company decomposes seismic time/depth reflection amplitude volumes or raw gather blocks into discrete "voxels".

These can be very small in areal extent and depth – for example 20"X20"X6 feet or 20"X20"X 1ms.

In fields where porosity is 6 per cent at best or changes rapidly, being able to calculate porosity down to 1-2 per cent resolution is essential.

For each voxel, ViaLogy uses the seismic reflection spectrum to predict porosity and porosity changes away from the wellbore.

It re-uses the same seismic spectrum differently to detect variations in lithology



and sense for fluid presence. The resulting porosity, lithology and fluid attributes are combined to develop net-pay distribution for stratigraphic reservoir mapping, spawning out “sweet spots” or drilling targets.

Strawn Prospect

ViaLogy successfully used its technology to develop a limestone Strawn field in Andrews County, Texas.

The company was tasked to find "sweet spots" in the strawn stratigraphic platform with more than 4% porosity and natural fracturing that matched a productive geological deposition.

The company pinpointed a location for multiple wells. The first drilled well had shows in multiple clastic and carbonate zones, and the Strawn zone yielded an initial production of 170 barrels of oil per day, Dr. Gulati said.

Prospect acreage assigned to ViaLogy has 18 wells on it – of which only 3 are Strawn producers. The 3 producers were all drilled in the 1960s – the next 15 were drilled more recently using conventional seismic technology and turned out to be unproductive in the Strawn.

Before agreeing to drill using ViaLogy’s analysis, the client asked ViaLogy to show that they had a technique which would have shown that the 3 successful wells would be successful and the 15 dry wells would be dry.

However with a well in the right place “you can produce for 30-40 years,” he said.

ViaLogy's test area included 15 miles of 3D seismic shot in 2002 by CGG Veritas. Since then it has been reprocessed by a number of different companies and leading geophysics research groups. “So it has gone through a fairly rigorous analysis,” he said.

The reservoir is 11,000 feet deep and porosity of between 1 and 5 per cent – with about 90 per cent of the reservoir having porosity of under 3 per cent.

“The client said, ‘if you find regions of porosity of more than 4 per cent then I’ll drill’”, Mr Gulati said. But the company did analysis of the existing wells and “we found that’s not enough,” he said.

Porosity prediction is at the heart of discriminating potentially productive carbonate bodies.

Unlike structural faulted traps (e.g., conventional normal/reverse faulted sandstone reservoirs), Strawn platform is a stratigraphic formation with enigmatic discontinuities over small areas.

Because of the broad-spectrum of diagenesis (chemical, physical, or biological change undergone by a sediment its initial deposition) that affects carbonate rocks, the final porosity in these carbonates may or may not be related to the depositional environment.

Basin geology models provide limited insight to positioning of individual wells and offsets, as formation properties change unpredictably.

Also, unlike other lithologies, the original primary porosity in carbonates may be totally destroyed during diagenesis and significant new secondary porosity may be created. So to get a successful well, it was important to find a certain pattern of natural fracturing and high continuous porosities from 3D seismic.

The company is currently deploying its technologies to develop Wolfcamp, Strawn, Devonian, Ellenburger and other stratigraphic formations.

In addition to de-risking new drilling locations, ViaLogy is working in developing a systematic, automated approach to redeveloping under-performing or abandoned wells that could be sitting near porosity pockets within resource horizons or near-pay zones that may have just been missed.

In other words, it aims to "get the asset to speak to the asset team,” says CEO Philippe Flichy.

Upgrade SEG-D acquisition seismic data

The Society of Exploration Geophysicists (SEG) has upgraded its SEG-D data standard, which is used to store seismic data.

www.seg.org

The upgrade will enable additional data about the survey - such as about the equipment used, and the crew - to be stored together with the seismic data - rather than in separate files, where it can easily be lost.

The revision is not a complete rewrite of the standard however – as this would require that all computer system software using it would need to be rewritten. The new revision is SEG-D revision 3.0.

The new format is multi-discipline so that additional data types may be recorded such as passive and electromagnetic. Metadata is also catered for which historically was stored separately.

New data to add

New data which may be captured in the revised standard includes:

- General survey information - such as area it covers, the prospect, seismic line, vessel, crew information, the client and the job.
- Source type, strength, timing, status, layout and field conditions
- Receiver type, orientation, sensitivity, status, layout and field conditions
- Co-ordinates of the reference system
- Preplan bin layout.
- Data recording sample rate if non standard
- Continous passive recording
- Multicomponent sources and receivers
- Sophisticated field filters

In SEGD3.0 you may also capture information about processing which has been done in the field, such as trace edits.

The standard upgrade aims to be as clear and simple as possible.

Problems

There are plenty of common problems with the basic SEG-D standard.

Field systems engineers complain that they generate good quality control data, but there isn't a way to pass this onto the people who process the data.

Seismic processing staff often complained that they spend a lot of time trying to track down observation sheets and merging and doing quality control on co-ordinates.

Seismic sometimes interpreters don't have information they need about datums used in surveys, so they don't know exactly where the seismic receivers were.

Much of this data is held in software "extensions" developed by specific vendors, which use standards which might become obsolete over time, which means that it is impossible to understand the data in the future.

The format is now published on the SEG web-site. All historic notes and minutes of meeting held regarding this format can be found at: ftp://ftp.troika-int.com/segfield

Paradigm: workflows to scenarios

Is it time to stop thinking about "workflow" – a series of steps in a linear process – and think instead about "scenarios" – a sequence of tasks which are performed when they are required?

By Jean-Claude Dulac, executive vice president, and Emmanuel Gringarten, product manager, Paradigm

Today, geoscientists and engineers use a mix of different software applications to perform their work.

These various components can be part of a same integrated suite or come from different vendors.

Some of the functionalities will be very familiar while others are only used occasionally and can therefore be classified as unfamiliar.

When users are familiar with an application, they know how to navigate through menus or shortcuts. If they are experts at the use of the application, they will want to record and make use of their own macros to streamline repetitive tasks.

On the other hand, if they are not familiar with an application or are non-expert at the tasks at hand, they will have difficulty knowing where to find all the available options that may be necessary to successfully complete their work.

Workflow – linear sequence

To help tackle these two different ways of working, namely either being guided through or easily automate a series of actions, the software industry introduced the concept of workflows.

Two types of workflows are therefore needed to handle these two very distinct processes: workflows or macros created by users; and workflows created by the manufacturer or by expert users to help the "unfamiliar" user navigate through the application's many options.

Generally speaking, the term workflow refers to a sequence of steps performed to accomplish a specific task.

No linear component?

However, if one considers for example the seismic interpretation task, it has for all practical purposes no linear component.

It uses a limited number of commands, repeated over and over for many hours and sometimes days.

In the past, there were specialized applications for doing interpretation only; menus in the user interface were therefore generally simple.

Nowadays, interpretation is often part of a bigger process and therefore includes many more options such as the validation of the interpretation and steps that go beyond traditional interpretation, e.g. prospect sanction or geological model construction.

It is also often part of integrated multi-disciplinary "seismic to simulation" software application suite.

An interpretation "workflow" must therefore provide a focused environment by adjusting the graphical renderings and by grouping together the relevant options in such a way as to optimize the interpretation task.

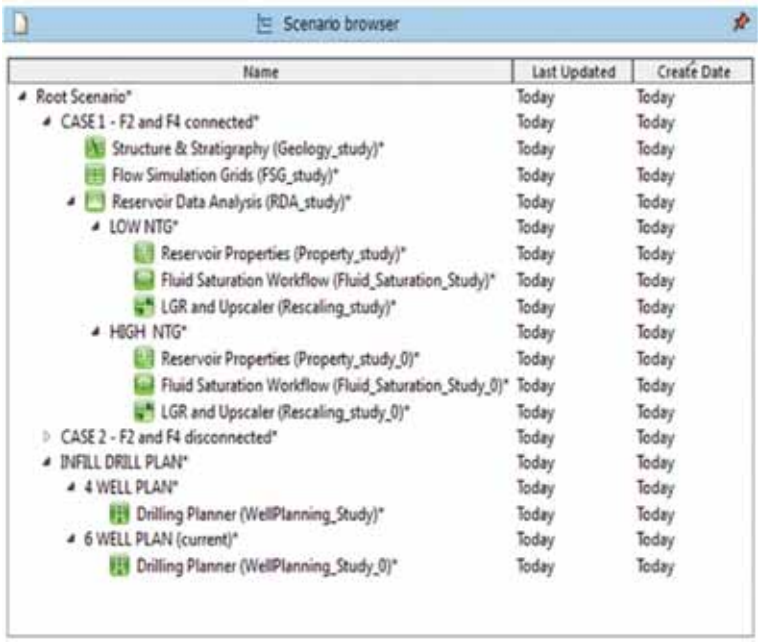


Figure 1: Instead of doing tasks in a specific sequence or "workflow", you can keep track of which specific processes, or "scenarios", your data has been put through and when it was done

Results of the interpretations and the decisions that led to these interpretations must be captured by the workflow.

A workflow therefore becomes a user interface component that physically groups options in a logical order and associates them to the steps that are effectively executed as well as to the data that is used, the decisions that are made, and the results that are obtained.

From workflows to scenarios

From an asset team point of view, geoscientists and engineers work on generating alternative exploration or development scenarios.

Each scenario may consist of a specific structural interpretation, a reservoir model, or a development strategy.

The scenario is the central concept around which practitioners organize their work and their decisions. The scenario must therefore also be a central concept around which the application organizes both input and output data for users.

Since a workflow is the way tasks are organized to generate interpretations and construct models, an instance of a workflow should be associated to a specific scenario. Furthermore, by attaching the results of these activities to the execution of the workflow, the results of the workflow are now linked to a scenario.

Under the assumption that every action is recorded as users advance through the workflow, activities and results are linked. All the results ensuing from the execution of a workflow (in the most generic sense) are then associated to a scenario.

Results can be objects (e.g. structural maps) or numbers (e.g. OOIP estimates) and the activities that created them are recorded. Given two scenarios (or two executions of the same workflow), users can investigate differences in output results and understand correlations with input parameters.

Workflow reports can be automatically generated detailing all the steps taken and containing all associated decisions and results as well as explanations of the methods and the parameters that were used.

A complete study generally corre-

sponds to a nesting of tasks resulting in a hierarchy of scenarios and workflows (Figure 1).

This can be seen to mimic a decision tree in which the probability of an end result is compounded from the probability specified at every node in the tree.

Made by users or software company?

As discussed above, there needs to be two types of workflows.

The first workflow type is created by the software manufacturer or an expert user, they are "built-in" workflows.

A second type is created by users and interactively constructed by concatenating application commands or activities associated with a given task into macros through a workflow builder (Figure 2) that operates either within a software application or at a higher level encompassing different applications.

Working across applications is a requirement for uncertainty propagation and optimization loops.

From a software design point of view, the question then becomes:

What level of complexity should a workflow builder allow for? Are users proficient enough to be programmers, even if only visual programmers? How can one easily check the validity of user-created workflows? What tools should be available for that purpose? Does the workflow builder need a sort of debugger?

User-defined workflows should be quite simple, that is, mainly sequential.

Any additional and more complex programming should be done with scripting languages such as Python, JavaScript, TCL, C++, or C# and should provide access to the application object states and windows.

Specialized "company-specific" workflows become application “plug-ins” available to users at the same level as built-in workflows.

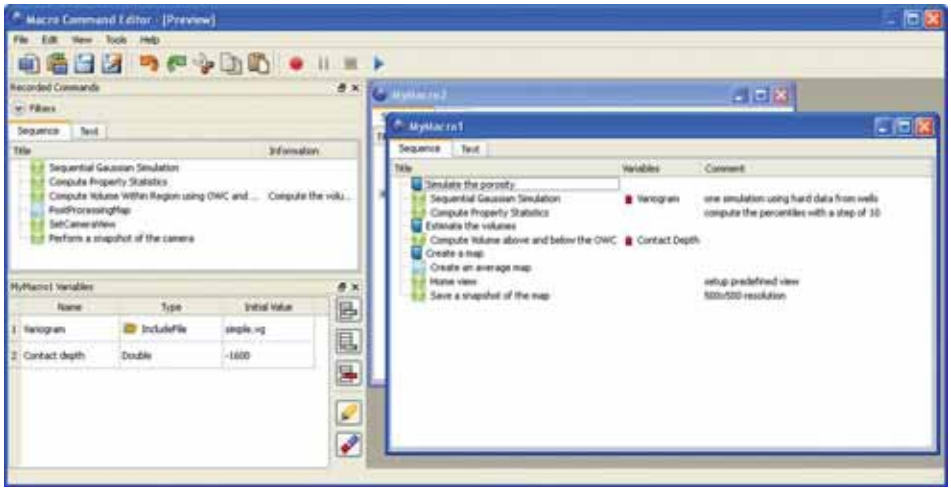


Figure 2: Users can construct their own workflows in the Macro Editor

Built-in workflows can serve different purposes. They can guide users through a series of activities or group sets of relevant commands that may otherwise appear at distant locations in the user interface. They may also act as a repository for processes that require many parameters such as the construction of a reservoir property model (Figure 3(a) and (b)).

In both cases, a workflow must remember all the choices made by the user, and enable a rapid replay of input data or modeling choices that were changed from one process to another. Furthermore, alternative scenarios can easily be created by simply copying the workflow and varying some parameters.

Since a single application platform rarely covers optimally all relevant technical aspects of asset management, it is necessary to construct and implement workflows across applications, specifically when dealing with complex optimization loops, real-time updates or uncertainty propagation.

In such a case, it is necessary to pilot the applications from an external workflow engine. Typically, a Service Oriented Architecture needs to be implemented and each application becomes a service provider.

Data is passed from application to application as the workflow progresses. In our industry, initiatives such as WITSML, PRODML and RESQML are on track to provide the message data layer required in a SOA.

The service definition, however, is much more difficult to tackle. Many approaches exist in optimization systems in which a reservoir flow simulator cohabits with a reservoir modeling software package.

The messages passed between the applications are ad-hoc. For a more interpretative workflow, SOA architectures can be used to gather rather large chunks of functionalities, while "macros" and "plug-ins" bring additional technology and therefore additional workflow steps into existing applications.

Conclusion

Several goals can be accomplished using workflows: repeatability, ease-of-use, audit trails, and collaboration. They facilitate project and technology transfer and also provide training.

Built-in workflows and user-defined macros are two very important means of delivering efficient applications today.

Practical inter-application workflows are still in a distant future.

Linking the concepts of scenarios and workflows at the software level enables the grouping of both activities and results in better auditing, bearing in mind that "the methods used to obtain the results are as important as the results themselves."

Figure 3(a): Built-in workflow for building reservoir model architecture

Figure 3(b): Built-in workflow for capturing velocity model parameters

Managing hub finances

As oil and gas fields get older and more complex, companies will increasingly have to deal with the difficult calculations when several fields with different owners are tied into one hub and fields start to be abandoned, says Calum McGregor of Maersk Oil North Sea.

The scenario of having several fields, all with different owners, tied into one hub, and the fields being gradually abandoned, is becoming a common one, said Calum McGregor, assistant director commercial with Maersk Oil North Sea UK.

He was speaking at a London seminar "The challenge of hub economics" on May 20, organised by oil and gas financial software and consulting company Palantir Solutions.

The finances (and the financial decisions) get very complicated very quickly.

It starts simply enough, when one company wants to drill a satellite field plumbed into an existing "host" or "hub" infrastructure, which has a pipeline back to the shore.

The normal initial arrangement is for a tariff to be agreed which the operator of the satellite field pays to the operator of the host field. Many deals were put together on this basis in the 1970s and are still in place today.

But over time, as both host and satellite fields start declining, the tariffing arrangements inevitably move to a cost sharing structure, where the costs of sharing the infrastructure are shared between everybody, and the tricky negotiations start.

And when fields are abandoned altogether, they stop contributing to the overall costs, and so higher costs have to be borne by the other fields, which could lead them to become uneconomic.

Mr McGregor said that the average production of a UK North Sea well today is 10,700 barrels of oil equivalent per day (2008 data).

Most new discoveries of oil are around 20m barrels of oil equivalent

We all know that operating costs of oilfield infrastructure in barrels of oil equivalent per year are also climbing.

Future monetary value

When managers want to know how much money a certain investment will be making in 20 years time, it gets hard to provide the answer, he said.

If you need to work out the finances for a standalone oil and gas project, it is relatively easy, he said. You can start off with a relatively good idea about the amount of oil in place and what your costs will be and work it out from there.

But when you start going through hubs there are many factors to take into consideration – because the overall finances of the hub will be influenced by revenues (and lifespan) of other oil fields going into the hub, and there may be different owners with different objectives – you may also have limited access to relevant data.

Sophisticated economic analysis tools may not help because they are only as good as the input data.

It gets even more complex when you have sub-hubs (a satellite field becomes a hub itself) and cost share arrangements, choices of different hubs to connect to.

There is also uncertainty about future taxation levels, although the normal strategy is to make calculations around maximizing pre-tax revenue, he said.

Speaking about his experience working with managers at a number of different oil companies, Mr McGregor said that when it comes to economic issues, management always want a black or white answer, but everything is always in shades of grey.

Negotiation

The basic business arguments of a hub are win-win for everybody – the hub operator gets an additional source of revenue for provision of relevant services, and the satellite field operator gets a path for getting hydrocarbons to market which would not otherwise be available. But that does not mean that the business negotiations are a walk in the park.

There are plenty of other common conflicts between the hub and satellite operator, Mr McGregor said.

The host operator will typically want to keep any agreement as standard and basic as possible – while the satellite operator will want an agreement which allows for a range of different future events.

If production is close to the maximum production the infrastructure can handle, the hub operator will want to be sure that they have the maximum possible capacity available to them.

There might be concerns that the satellite field is draining the field plumbed directly into the host.

If there is a 'cost share', there will be discussions about if the timing of the "trigger date" and the cost elements contained in the cost share pool.

Calum McGregor, assistant director commercial with Maersk Oil North Sea, says that an increasingly common scenario is when there are several fields, all with different groups of owners, connected to one hub – and as the fields become uneconomic, the costs of running the hub needs to be covered by the operators of the other fields

Both companies will want to maintain as much control as possible.

You always get the host protecting themselves against any possible incident that might happen leading to increased costs, saying "I will take no risk" – although it might be appropriate to expect a hub to take on relevant additional risk provided the risk : reward balance fairly reflects such risks, he said.

The operator of the hub will have to deal with the increased complexity of the system – which will, if anything, increase costs – changes to system complexity can be difficult to measure.

There might be additional kit which the satellite field operator provides.

The challenges increase if a field has several partners with different objectives – or if you have companies playing "strategic games" with each other.

Companies might also disagree on the ultimate objective – e.g. maximising net present value, or getting more 'valuable barrels'.

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3. Truly integrated operations – merging people and models
4. IO work processes, technologies and training
5. Smarter well solutions and drilling for improved recovery
6. Integrated planning and maintenance management
7. A holistic approach to IO
8. New business models and contract strategies for IO
9. Collaboration across boundaries – The science of integration
   - Panel discussion

- 40 speakers
- Young Professional Program
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Sponsoring organization: The conference is organized by the Center for Integrated Operations hosted by the Norwegian University of Science and Technology (NTNU) in cooperation with SINTEF and the Institute for Energy Technology (IFE). 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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Other problems are that incremental production might be such a small amount compared to what is going through the host platform that the host operator doesn't really care to get into discussions about it.

The law can also play a role. Various regulatory regimes are in place to strongly encourage, or force, oil companies operating a platform or pipeline which could act as a 'host' to allow other companies to connect to it, because there is a national interest in maximizing production from the region.

For example in the United Kingdom, there is a structure called "Infrastructure Code of Practice" or ICOP.

Dominoes

Mr McGregor described an example scenario as "like dominos" where you have several wells fields into one hub.

You calculate the contribution each field should make to running the hub for fairness, and discover that one of the 7 field becomes unviable when it has to contribute its cost share at a point in time.

So you repeat the calculation for the remaining 6 fields – and the contribution they all have to pay increases – and one of the 6 becomes unviable – and so on – with the fields gradually falling 'like dominoes'.

For years people have ignored the 'domino effect', he said, but "we're getting to the point where people will think about what they're going to do about it."

The questions can get even more complex if you have (say) a field which crosses different license blocks and / or country boundaries, and with a choice of hubs it can connect to.

Mr McGregor is wary of doing Monte-Carlo style calculations, which try to work out the probability of different choices, ending up in providing the right answer. "

It is difficult enough doing hubs on a deterministic approach," he said.

Managers are rarely impressed by complex calculations. "Its deterministic examples that they can understand that they like."

"There is a business need for a [software] analysis toolkit which makes hub analysis easier, aids understanding and works for tomorrow's business needs," he said.

Mr McGregor mentioned another field, where the satellite operator has been paying a fairly modest tariff for many years, but all of a sudden the host has to spend a "chunk of change" to upgrade it – and host's existing revenues don't cover the cost. So some of the money will need to be raised from the owners of the satellite field.

In real life, you would hope that the parties involved will say that the current arrangement doesn't work and a "pragmatic and commercial negotiation kicks in," he said – which keeps the whole system running as long as possible.

"There always comes a point where you need a cost share, but if it was cost share from day 1 that just doesn't work," he said.

Abandonment bill

Mr McGregor says he has put together analysis showing the abandonment costs the company can anticipate to pay through time for the assets within its portfolio – and how this changes if the oil price declines (and fields are viable to operate for a significantly shorter period).

He calls it the "Tsunami graph" because, at lower oil prices, there can be a massive abandonment bill which happens all at once, and sooner, rather than being spread over time.

When the fields reach their cut-off point, if the company still has their reserves on its accounts, they need to be unbooked.

Palantir

Software company and economic consulting house Palantir Solutions has come up with a solution to overcome common difficulties encountered modeling shared infrastructure setups.

"We now have a solution that reflects the real lifecycle of hubs, including asset interdependencies and the full domino effect as mentioned above", said Kurt Prendergast, principal consultant with Palantir in Aberdeen.

"With our approach, a user can very quickly generate a flexible model with a standardised format for inputs, calculations and results" he said. "This not only speeds up the process, but greatly reduces the margin for user error and increases transparency of results."

Palantir investigated several approaches, finally settling on the use of a set of 'Wizards' to gather the required information from users. This information is then used to automate the creation of a fully functional Excel model, which can also be integrated into their portfolio economics tool PalantirCASH.

The software can easily handle 'domino' problems – where you divide the cost of running a hub between several wells, only to discover that it would make some of them unviable, raising the cost for the others as they are abandoned.

The Palantir system can also be independently reviewed easily, because you can clearly see how a given result was calculated. You can create standard reports and choose which variables you want printed out.

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Microsoft in oil and gas

We interviewed Microsoft's head of oil and gas Ali Ferling about what Windows 7, the Xbox and Cloud Computing have to offer the industry – and how Microsoft plans to make it easier to work with corporate software.

We're all familiar with Microsoft products – running our computers and desktop applications, and perhaps also our computer games and our e-mail. We might have tried Windows 7.

But Microsoft has a lot more to offer the oil and gas industry than that – and it is planning to do a lot more in the future.

Windows 7, the new operating system, aims to provide both high performance computing and high security. Many of us believe that there is a play-off between having a secure computer (with everything on the hard drive encrypted) and making it fast. Microsoft is aiming to give us both at the same time.

When it comes to working on corporate systems, many of us have discovered that they can be a lot less user friendly than our usual office software and web browsing, with long delays, navigation through complex screens, and time spent learning how to use it.

Microsoft is hoping to provide us with access to our corporate systems (such as SAP and maintenance management software) which is just as easy as working on office software – by helping build another layer of software which brings you, as the user, exactly what you need.

Cloud computing is another interesting area. Steve Ballmer, Microsoft's CEO, recently spoke at the company's January 2010 Oil and Gas Global Energy Forum, saying he was trying to work out the best time to make a bet that the oil industry would move to cloud computing – where all our software will be run from a remote location, not our company servers.

It might take 3 years, it might take 8 years, but cloud computing is inevitable, Mr Ballmer believes. Running servers is becoming very complicated and hard for companies to do themselves – but in the standardised cloud environment, one person can administrate 1000 servers. It is also much easier for people in different places – or in different companies – to collaborate.

The Xbox also has something to offer the oil and gas industry. Microsoft is thrilled that oil and gas software company Landmark recently built a reservoir modelling tool running on the Xbox – using the Xbox's powerful graphics processing and controller, you can fly through the middle of a reservoir model – and get a much better understanding of it than from the typical birds eye or 2D view.

"Turn left and you see left," Ali Ferling, head of oil and gas with Microsoft said. "It's a much more natural way of how you explore."

The next generation of the Xbox, to be released this year, will have a system for tracking body motion. This is mainly designed for computer games, so you can play soccer by kicking a virtual football on your bedroom floor. It could also be used to track eye motion in videoconferencing, so you can give grandma direct eye contact.

"Its not a goofy teleconference - grandma always feels like we're looking just at grandma," Mr Ballmer said.

But Mr Ballmer envisages there will be plenty of opportunities for this in the oil and gas industry – including enabling people to get rid of the keyboard in dusty environments – people can interact with a computer with their bodies and don't even need to take their gloves off.

It could even be used to identify people – since the way people's bodies move are fairly unique to them.

Even the humble Excel is due for an upgrade. The next version of Excel will be able to handle millions of lines – more than most people would create manually, but not much if the lines are being generated from sensors taking regular readings. But you'll be able to scroll through it as fast as if it had 10s of lines lines, not millions Mr Ferling says.

Windows 7

But the most important development for the oil and gas industry is probably Windows 7 and its associated Windows 2008 Server R2.

The Norwegian Petroleum Directorate and Statoil (see case studies on following page) have already started rolling it out to their whole companies, and report that computers are much faster to start up, the users need less support, it is easier to run over slower internet connections.

With the "BitLocker" tool they can ensure that all users data is encrypted, whether on the laptop hard drive itself or on portable hard drives, so there's no risk if data is ever stolen or taken out of the system for other reasons. This can be enforced by the network, so that people can only connect to the network if their computer is encrypting everything.

The DirectAccess tool is designed to make networks easier to run. Branch offices can hold temporary 'caches' of commonly downloaded files, so people do not have to download the whole file from head office every time they want it. IT managers can use it to push security updates out to all computers on the network, wherever they are. It

Microsoft is trying to fill the gap between the user oriented software products it has traditionally made and corporate IT systems which can leave the user experience a bit lacking, says Ali Ferling, head of oil and gas with Microsoft

Filling the gaps

Microsoft is trying to do more to fill the gap between the user-orientated software products it has traditionally made, and corporate IT systems which can often leave the user experience a bit lacking.

The company was recently involved in a project with a major oil firm in the Gulf of Mexico, where it built an 'abstraction layer' on top of the company's existing software applications (including MRO for maintenance and SAP), which would make the tools easier to work with.

This means it can easily and quickly provide people with the information they need, all on one screen, designed for someone in their role.

"We need to understand how people really work to get the right information into their back office systems," said Mr Ferling.

Microsoft is unique in that it does not generally deal direct with end users, but works through partners which deal direct with customers. Big Microsoft partners in the oil and gas industry include Schlumberger, Halliburton, Honeywell, Invensys and AspenTech.

Microsoft has a consulting organisation, which deals with the company's biggest enterprise customers directly for architecture and support. It also works with partners to enable and deliver their projects.

Reference architectures

Microsoft is also keen to start efforts to help the industry use standard 'reference architecture' for how everything fits together.

"We really believe that working closer together as an industry in deploying similar architectures, at least between companies – really getting them more agreeing on some principles – would help move the industry forward," says Mr Ferling.

A reference architecture is like the IT plan – showing how everything fits together, and how one data from one person's system will link into another's.

Cloud computing

Steve Ballmer, Microsoft's CEO, believes that in the short to mid term future, no-one will store data on their own PCs or office servers any more – everything will be in the cloud – because it is so much easier to maintain servers that way.

With cloud services, the number of servers which one person can comfortably look after is much bigger – increased from 140 servers typically managed by 1 administrator in an office, to around 1,000 for a cloud service.

In an interview with Harts E&P magazine, Mr Ballmer said that one of the things he was trying to assess was the likelihood that the oil and gas industry could move all of its computing onto cloud computing

"The question is, is it reasonable to bet that within three years, people in this industry will be working just in a cloud environment? That's one of the things I'm trying to get a feel for in this visit to Houston."

"We've got to make the right bet now for a year, two years down the road. But that's not the same bet for five, six, eight years from now, which tends to be more of the case, I'd say, in the energy business."

Microsoft has built many large data centres around the world, supporting its applications such as Hotmail and Bing search engine.

It offers the Azure platform, or 'Windows in the cloud' – which developers can use to build applications, running on the Windows Azure operating system, or using its Microsoft SQL Azure relational database.

Keeping data on a cloud does not imply that it needs to be on the same hard drive, or same data centre, as your competitors' data – there could be advantages to oil majors running their own cloud systems.

Cloud Computing services are particularly useful for managing data which people from different companies are working on, because it avoids the need for one person to get behind another company's firewall.

Companies might end up mixing public 'cloud' data with more sensitive data on their own servers.

For example the company iStore has a service which can combine a cloud database with data about 3 million US wells, together with a company's proprietary seismic software.

Microsoft, together with partners, installed a system for BP in the Gulf of Mexico, which would take together data from 30 different sources, some public, some proprietary, some from cloud systems – and gather it together to provide early warning systems, which would provide BP with more advance knowledge about a hurricane building up so it could start planning the evacuation.

The Norwegian Petroleum Directorate

The Norwegian Petroleum Directorate, a government agency, upgraded all of the computers for its 220 employees to Windows 7 Enterprise during 2009, with staff all provided with Dell Latitude E6400 laptops.

It also installed the new version of WindowsServer, optimised for Windows 7 PCs, and BitLocker, which ensures data is kept encrypted, and DirectAccess, a software tool to help remote workers.

Roald Ommundsen, IT Manager, Norwegian Petroleum Directorate, sees the biggest benefits of Windows 7 as being "faster startup and shutdown times, improved usability, and faster access to documents from anywhere."

It expects people will save 30 minutes a day from being more efficient with their computers, and IT staff will save 100 hours a year in software deployment and have 30 per cent fewer support calls. The computers will be more secure.

When everyone was using Windows XP, the organisation tried to work with encryption software which would ensure that all data stored on the PCs was encrypted; but it found that it slowed the PCs down so much it was impossible to work with. This was very dangerous with such sensitive data being stored on them.

NPD (Norwegian Petroleum Directorate) used the Microsoft Deployment Toolkit to roll out the first 100 computers, then used Microsoft System Center Configuration Manager 2007 for the other 120, to deploy and configure all desktop software from a single console.

Engineers and information workers also are using the Windows 7 DirectAccess feature to quickly access files from the corporate network when out of the office and to synchronize files when offsite.

The IT staff use DirectAccess, to apply security updates to portable computers more regularly and to access and view computers of users calling for support.

With the Windows 7 BitLocker To Go feature, NPD can now secure all its portable computers and USB drives without paying for third-party encryption software. This means savings of $14k per year.

Atle Vatland, systems consultant for NPD, says that Windows 7 can be deployed in 15 mintues, compared to an hour with Windows XP.

Statoil

Norwegian oil company Statoil joined a Microsoft 'early adopter' program in April 2009, deploying Windows 7 on 100 computers, and using a pre-release version of Windows Sever 2008 R2.

The main reasons were that it wanted to improve IT security, improve network connectivity for remote employees, the company says.

It is using the BranchCache service to enable branch offices to get better access to corporate networks, and DirectAccess to simplify remote connectivity (for travelling employees).

The company wanted to enable employees to access collaboration tools without first connecting with a virtual private network.

"A couple of our offices in Africa, for example, have real challenges with internet access," says Petter Wersland, Leading Advisor for IT Infrastructure at StatoilHydro.

When downloading files, Windows 7 detects what communications speed the user has and if the speed isn't so high, retrieves documents from an offline cache.

The company expects a big increase in the number of portable computers used by its employees and wants to make sure it's IT infrastructure is secure. "With Windows XP, the standard user configuration was not easy to implement in our environment, with so many applications and user scenarios," Mr Wersland says.

"Consequently, nearly all users had local administrator rights, which enabled them to download unauthorized programs."

The IT staff also wanted easier ways to apply security updates to Internet-connected computers and to generally gain better control.

Statoil used Windows Deployment Services to move its PCs to Windows 7 quickly.

It will use Microsoft System Center Configuration Manager 2007 to install the software on 30 per cent of its computers. 70 per cent of its 40,000 computers will be replaced entirely, with new computers provided with Windows 7 pre-installed.

The company is implementing BitLocker technology which can encrypt data on entire hard drives and also portable USB drives. This is built into Windows 7, so there is no need to use third party encryption software.

Using DirectAccess, IT administrators can update remote computers any time they are connected to the internet.

IO-hub – getting good data out of bad

Houston start-up company IO-hub aims to provide a real time service to take the chaotic streams of data from your sensors and use it to tell you what is actually happening in the well and the reservoir, by processing the data according to its complexity.

The benefits of all of this are that people can get a much more direct understanding of what is happening in the reservoir, and get better quality data streams to export into reservoir models.

And if the data is more trusted, more people in the organisation will use it.

The technology has been developed outside the oil and gas industry for the past 20 years. It is used in many other industries, but IO-hub has exclusivity to sell it in the energy industry.

IO-hub thinks that the service should be particularly useful for distributed temperature sensing (DTS), pressure / temperature and flow data, data from electrical submersible pumps and drilling data.

The raw data is sent to IO-hub's service, and a "validated" data stream, with additional information, comes back together with a trend analysis and decision support tools. IO-hub also offers optional services to store the data, and provide notifications about exceptions in the data stream.

IO-hub is currently working with an (unnamed) oil and gas company to get everything working.

The company CEO is Philippe Flichy, who was previously VP business development with Merrick Systems, and a digital solution manager at Schlumberger. He was also intranet manager for the 2002 Salt Lake City Winter Olympics.

The CFO is Robert Flavin, previously CFO of Sequent Energy; the CTO is Thomas Lovell, previously a Senior Engineer with Foster Miller. The Director of Applied Technology is Rick Mauro, a Director at Endeavor Management, formerly with Landmark and Mobil.

Algorithms

The algorithms look at the level of "'information entropy" or disorder in the information.

This means that when trying to work out what is actually happening (when presented with a series of readings), the computer can work out a trend which fits the points according to their complexity, rather than an average of the points.

Usual streams of data from oilfield sensors contain outliers, where, for a short time, the sensor reading spikes. A decision needs to be made about if this indicates that something is wrong in the well, or if it is a short term problem with the sensor, or if the apparent outlier represents a real event.

Another common problem is if a sensor gradually loses calibration, which means all the readings from it start to drift.

By calculating data as a multidimensional histogram, you can get an understanding of what is happening – for example if the histogram "data-cloud" gradually moves over time, that may indicate sensor drift; but a change in shape of the blob can indicate something different happening in the reservoir.

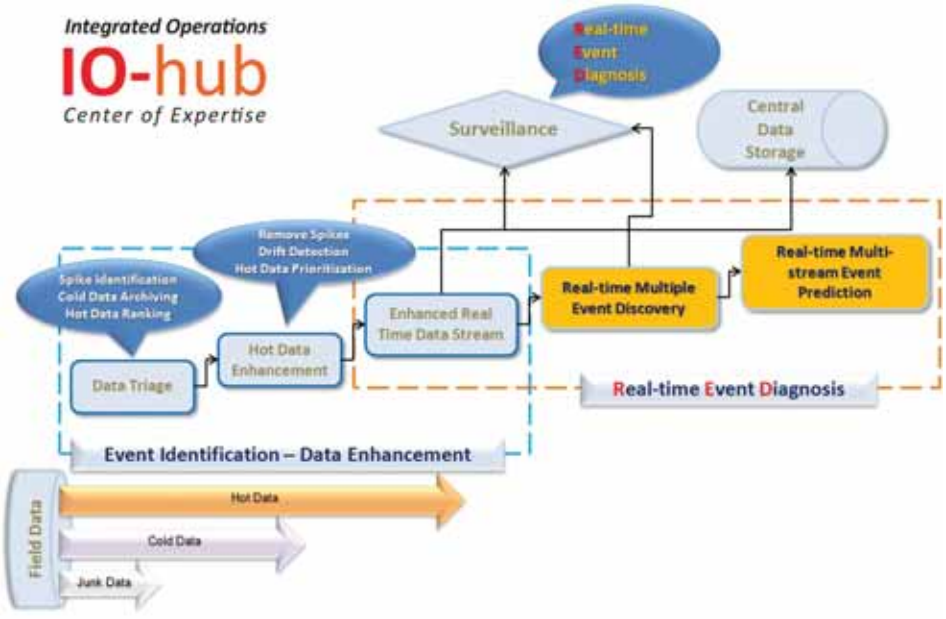
You can tell if 'subtle changes' in the data indicates something important (or something big about to happen), or if those changes are just a continuation of the noise.

It gets more interesting when you analyse the level and specific mix of complexity in the data. An increase in data complexity isn't necessarily obvious from looking at the raw data.

For example, the data complexity could change significantly in areas where the raw data amplitudes are low and apparently insignificant.

The algorithm does not follow any specific rules or need pre-defined models - it just aims to provide you with useful information about what is happening in the data, by measuring the complexity of the data and how that is changing. IO-hub is now looking at aggregating many real time data streams to identify correlations between signals.

IO-hub CEO Philippe Flichy



IO-hub – analysing streams of field data in real time

Woodside Energy – 84 per cent ROI from engineering software

Woodside Energy, the largest publicly traded oil and gas company in Australia, is calculating that its return on investment from implementing a new AVEVA NET information management system for engineering data is 84 per cent, over the period 2004-2014.

This figure has been calculated by management consultants Deloitte, but on the basis of a figure provided by Woodside that staff would increase productivity by 10 per cent from the new software. The main increase in staff productivity is from enabling staff to find the information they are looking for faster, Woodside says.

The system installed, AVEVA NET, is a standard information store for engineering data, instrumentation data, piping and instrumentation diagrams, 3D models and 2D drawings. It manages all the data and drawings associated with maintenance of the facilities. All of the information for all facilities is available from a single point, which more people in the company can access.

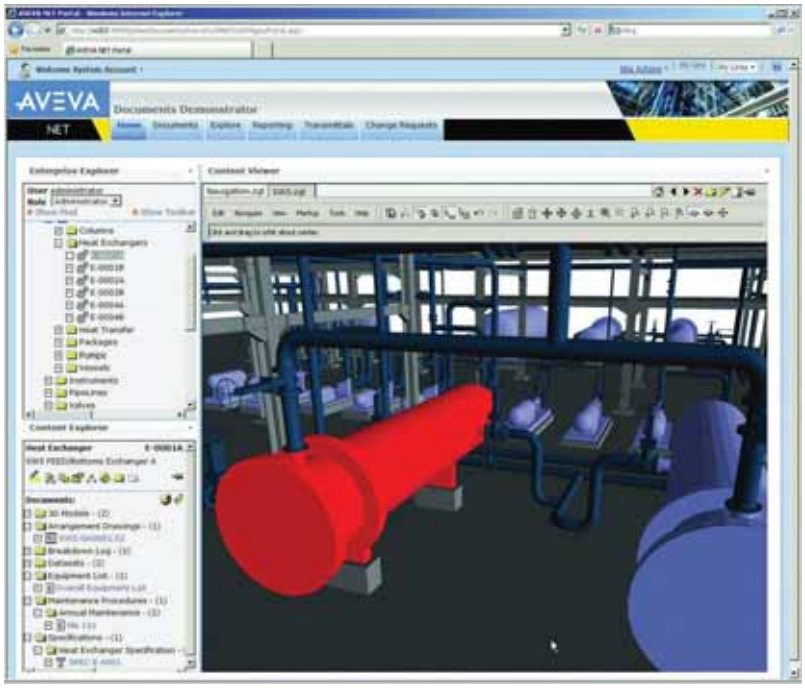
2,000 people use the system, with an average of 350 people a day. Woodside has around 600,000 "tags", or unique identifiers for items.

AVEVA started implementing the software in 2004, and finished it with all of its Australia facilities in 2008. As part of the software implementation, it did a lot of data clean-up, validation and conversion. The implementation also included work to connect the AVEVA NET software with existing engineering data stores and other data stores – and putting together a data governance framework, with defined data standards.

The investment (on which the '84 per cent return on investment' was calculated) includes the cost of preparing the data, training and AVEVA's software license. Woodside says that the return on investment could have been even higher, if the company had implemented the new system across the whole company right from the start, rather than just starting on a smaller user group.

Woodside also calculates that it has reduced IT staff training costs by 93 per cent as a result of introducing the new software. This is mainly due to the fact that the AVEVA NET software replaced many different systems, and staff had to learn how to use them all.

The company was previously spending around 20 hours training each employee to use the different data repositories, including SAP, instrumentation packages, documentation management packages and 2D/3D models, so they could access the engineering data they wanted. With AVEVA NET they estimate total IT training is just 1.5 hours per employee.



AVEVA NET automatically links information together, including 3D, 2D, documents, enterprise data, photographs and laser scanning data. The AVEVA NET user has an instant and comprehensive view of all the information that is relevant to his needs, no matter where it is stored and independent of file type

Following the software implementation, it is much easier for AVEVA to bring in new data, for example when a new facility comes online and the data is passed from the construction company to Woodside to operate it.

For its A$1.6bn Angel Platform, the cost of uploading the documentation was reduced from a typical A$1m-$2.5m per facility to around A$250k.

Woodside has established rules to configure the way in which the system handles data, and it can ask the vendors to help implement these rules into the system, complementing the automated data association and linking processes which are inbuilt.

The company had 253 different applications before AVEVA, now it has just 18. The average annual costs of each software package was A$1,000. So if the average cost of the dumped software packages is also A$1,000, the company is saving A$235,000 a year in license costs.

These savings are going in AVEVA's direction however – Woodside says that it is paying AVEVA ongoing license fees of A$405,000 per annum; it also paid AVEVA A$7.04m in total while setting the system up between 2004 and 2008; and annual license fees are expected to increase to A$555,000 per annum in 2011 when a new version of the software is introduced.

Overall, Woodside's savings as a result of introducing the software were calculated by Deloitte to be A$17.8m (US$16.3m) a year.

Woodside and Deloitte also say there are plenty of benefits to the new system which can't be easily quantified, such as improved safety (as a result of easier access to better data); ease of packaging data when selling assets, ease of reusing engineering data and design, and Woodside having better tools it can use in negotiations.

In future, it could be integrated with the permit to work system – and also integrated with handheld devices, RFID tracking systems, photographs, the SAP, and GIS systems.

10 fatal flaws of every DOF initiative

If a digital oilfield project is not part of the company's strategy, not supported by senior management, not part of employee incentive plans, subject to flaky decision making or poor portfolio management, it will probably fail.

By Dr. Dutch Holland, PhD, Holland & Davis LLC, a service line of Endeavor Management

Gaining business advantage from digital initiatives is hardly a cake walk. Upstream companies and technical vendors alike still find DOF initiatives difficult to design, develop and especially difficult to implement.

A fatal flaw is just what it sounds like, an inherent weakness that could jeopardize the health of an entire initiative. The scariest aspect of many fatal flaws is that management does not always know if they have one until it is too late.

1. Fatal Flaw: Failure to make DOF a part of formal company strategy

Believe it or not, some personnel inside companies really do consider written strategy statements as the official word. In turn, they use those words when assessing and prioritizing how they will spend their time and the company's money. The Acid Test: Is "Taking advantage of digital technology" written down as a formal strategy and briefed to the board and to analysts on the street? The answer is either Yes or No.

2. Fatal Flaw: Failure to have needed level of executive commitment to DOF

Most Program and Project Managers beg for indications of executive commitment to a DOF initiative. And most company executives are likely tired of hearing about the need for more commitment. What's missing? The answer is so basic it's often overlooked. If anticipated business returns from the DOF initiative are not included in the company's financial pro forma for the "Go Live" time period, there is inadequate executive commitment. The Acid Test: Are anticipated returns from the DOF initiative in the pro forma? Yes or No?

3. Fatal Flaw: Failure to have needed incentive structure in place

While many consider goals as the primary steering mechanism for organization, the actuality is that people pursue incentives first and goals second. Show someone a goal-oriented organization and it can likely be shown how their incentive structure reinforces the goals they pursue.

What better test than to watch a DOF initiative come to a screeching halt when an innovation is served up for trial to an asset manager whose incentives are based almost entirely on production and the absence of any disruption. The Acid Test is whether goals and matching incentives for using digital technology are a part of all incentive structures from the top levels of the organization down. Yes or No?

4. Fatal Flaw: Failure to have robust portfolio management

Portfolio Management involves both selecting the best investments for the company's money and ensuring that the investments turn into business value. While most mature companies have at least a form of portfolio management for capital expenditures, many potential DOF projects and their advocates often struggle for visibility, a fair hearing, toe holds and executive-level sponsors.

Launching a DOF initiative under such circumstances is likely a fatal flaw that damages the initiative's chances of success, as day-to-day business priorities weaken or even gut the initiative. The Acid Test: Does the DOF initiative show up as an item on the short list of high priority investments? Yes or No?

5. Fatal Flaw: Failure to make an explicit decision on "Deploy" or "Permission to Adopt"

"Deploy" is usually considered a decision made by a senior executive to put a DOF solution into play in all relevant parts of the organization by a date certain. Failure to make a deploy decision "loud and clear" will result in the organization reading "permission to adopt at our own discretion." While deployment can hit a date, permission to adopt is guaranteed to stretch over multiple years, never reaching all parts of the organization. Acid Test: Is the DOF initiative clearly and explicitly described by top management as a deployment with date certain? Yes or No?

6. Fatal Flaw: Failure to focus the initiative on the business reason and processes

How easy it is to think of a DOF initiative as "an R&D project" or, worse yet, "an IT project." While DOF initiatives almost always start with at least some business goals, how soon personnel forget and find themselves considering the initiative very narrowly as a technical play and not a business improvement. And the problem that follows can be a fatal flaw. As soon as anyone forgets to stay focused on the business rationale for the initiative, they lose business-side feelings of ownership and, therefore, of responsibility. The Acid Test: Is the DOF initiative described solely in terms of the desired business outcomes? Yes or No?

"f a digital oilfield project is not part of the company's strategy, it will probably fail" - Dutch Holland

7. Fatal Flaw: Failure to serve up a fully-tested technical solution

Surely this only occurred in yesteryear. Unfortunately, no, it still happens with technology introduced to the customer (asset managers, for example) with all sizes and manner of bugs. Complete testing in as near a combat environment as possible must be completed before production sees it.

Given that production-side personnel are paid to manage production risks, showing them something not fully developed and tested (therefore, risky) can kill the initiative. The Acid Test is whether the technical team can serve up their technical solution along with full and complete test records. Can they? Yes or No?

8. Fatal Flaw: Failure to have a robust implementation strategy that integrates processes, technology and people

Until quite recently, the words "implementation" and "robust" were not heard in the same sentence or conversation. After all, "robust" is a technical term that goes with the hard stuff, the technology. That contrasts with implementation, which is soft stuff that can never be tied down enough to be labeled as robust.

However, as implementations hit brick walls, the industry as a whole has learned

that strong (read that "robust") implementation methods are needed for work processes and people, as well as for technology. The Acid Test is whether a formal, integrated work breakdown structure for the DOF initiative exists and includes concrete action steps for aligning technology, work processes and people systems to meet business objectives. Yes or No?

9. Fatal Flaw: Failure to organize around "Technology Ready" and "Business Ready"

The work to be done in a DOF initiative is clear-cut. Not coincidentally, the organization needed is also clear-cut: (1) create business value by calling for a Business Program Office (BPO)

(2) prepare the DOF technical system for the organization by calling for a Technical Project organization and (3) prepare the production organization for technical system usage by calling for a Organizational Readiness Project organization. Putting all three kinds of work into a single organization will likely be fatal. The almost certain outcome of use of a single organization is "a technical success but a business failure." The Acid Test: Does the initiative have three separate organizations linked together under a single production-side executive? Yes or No?

10. Fatal Flaw: Failure to use a comprehensive risk management process

Today, having a formal risk management process as a part of any significant technical initiative is standard practice. That is good. Yet, managing the technical risks (i.e., will the technical system work?) is not nearly enough. For DOF success, two other categories of risks must be managed: organizational risks (will production employees use the system?) and business risk (if the system works and if people use it, will the company make money?). The Acid Test: Does the risk management process cover all three primary risks? Yes or No?

Readers with ten "yes" answers are well on the way to success. But, even one "no" answer may indicate a cancer in the company's initiative that will eat its way into business and personal success. Act accordingly.

Better metadata for GIS

We are going to see much more improved "metadata" system for geographical data – which will help integrate it much more closely with bigger information management systems, writes Andrew Zolnai, sales and marketing director, Interactive Net Mapping Ltd.

In a recent social network exchange, an experienced oil company information management manager said he would like to take a broom to the geospatial data management techniques his company used.

The vast majority of geographical information, he maintained, is not held on computers but in people's heads.

Data is given so much attention but remains a seemingly intractable information management challenge, even with the advent of tools and technologies such as Meta-Carta and Google Earth.

The rapid growth of media (social media, wikis and blogs), of technology devices (PDAs, laptops, desktops and mobiles) create a data explosion, where manageability and information relevance are key.

This creates a necessity to build bridges not only among various E&P communities, but also amidst the communities themselves.

Standards and metadata help bring it all together for all users' benefit.

Metadata links create bridges across related domains and topics. It permits greater enquiry, and to drill down searches. And metadata are not only key to each process, but they can also reside in other business processes.

If the metadata are correctly recorded with the various data sets, and the linking frameworks support the proper exchange of data, then communities and processes can be linked. They can build on top of each other into robust infrastructures.

If metadata helps properly structure the data, there follows the intersection of people, processes and technologies, and the union of intelligence, data and location in petroleum data.

As an example, in Finding Petroleum's January Conference , Neftex described a global earth model, correlating basins worldwide by age and sedimentation in applying stringent internal metadata standards.

Users have requested that their workflows remain location-based, as all petro-data in fact is.

They ask that such workflows augment rather than replace existing processes – for example to subsume the technology to the process, rather than let technology dictate it.

What is metadata

Metadata is literally data about data.

Its simplest form is what you write on a tape or disc, or how you label a network drive of USB stick, so that you or anyone else can tell its contents at a glance.

At its most complex it's the information mandated by the US government to record spatial data to FGDC standards.

One example is important metadata might be with survey data, where the careful and thorough documentation of projection parameters is absolutely necessary.

New standards

A major upcoming theme of discussion at the 6th International Conference on Geographic Information Science (Zurich, Sept 14-17 2010) , will be to better define the data, knowledge representations, reasoning methodologies, and additional tools to link locations seamlessly into the web of linked data.

Andrew Zolnai

Subsequently, with the advent of linked locations in linked data, the gap between the Semantic Web and the Geo Web will begin to narrow.

The linkage of geospatial data and exploration and production information will become more widely evident and commonplace.

At the forefront of addressing these issues and challenges facing the Upstream Petroleum industry are the petroleum standards modeling and data exchange organisations such as PPDM and Energistics, who seek to guide vendors and oil companies with E & P information within a Standards Based Knowledge Environment framework.

The PPDM model is a comprehensive, reliable, flexible and progressively evolving data model. It is ideally suited for data man-

agement needs where data quality, auditing, business rules are noted.

In addition it is vendor neutral, which assists with interoperability with other standards based systems to link communities and process as explained below.

Energistics recently highlighted the importance of meta-data standards with work groups assigned to this activity and with a meta data catalogue approach at the hub of the framework.

A recent National Data Repository (NDR) Work Group seeks to help countries organise their petroleum related information assets.

Not every player is of the same size, and a variety of approaches are required according to size and scalability needs.

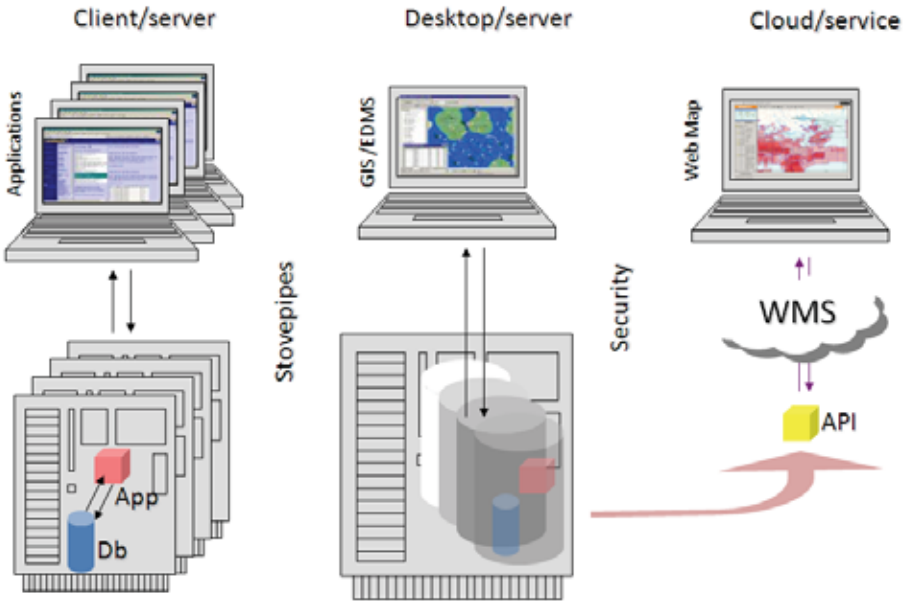
This applies to petroleum companies and agencies, and data service providers. Agencies, operators and service providers share and exchange E & P data as an intermixed community.

And the European Petroleum Survey Group is building bridges and fostering cooperation among diverse parties for decades to develop and disseminate best practice, provide a forum for the exchange of experiences and knowledge, influence Regulators and Standards organisations, liaise with industry associations and be the voice of Surveying and Positioning in the Oil and Gas industry.

New data structures

Historically E&P and GIS systems started as stove-pipes of isolated systems specialising in a task. Then they moved onto client-server systems of tight vertical integration of data and systems.

They are now developing into cloud-service systems of loosely coupled widespread horizontal systems.



The evolution of geographical information systems (GIS) over time. First server + client computer; then server + desktop computer; now servers accessed over the cloud

Microsoft have recently put a new emphasis on the oil & gas sector, by aligning themselves with Energistics for example, and also noting in the press that more data is better and the ability to find relevant data is vital.

At the keynote address of Microsoft's Global Energy Forum on Jan 21, 2010 Steve Ballmer highlighted the power of choice between traditional data centres, virtual data centres, the private cloud and the public cloud.

Accessing data

A simple yet consistent web interface to E&P data management, will give the broadest corporate audience access to E&P data from any source via meta data linkages.

Web portals improve productivity by providing a single interface to data, regardless of its format or its location. This accelerates decision making and reduces data management costs.

Finding the right balance between speed and accuracy of data warehouse retrieval is pivotal.

Systems that are too complex may undermine staff capabilities to efficiently deliver the needed results.

Yet if they're not sophisticated enough they undermine user search capabilities.

There are many ways to enhance a user's ability to locate precisely the item of data that is required, via geographical searches and data filters, or full document searches and indexes.

PIPCs tips for better digital oilfield

Ben Tye, partner for oil and gas at global management consultants PIPC, believes that a common mistake people make with digital oilfield programmes is not selecting the right projects at the beginning.

You need to select a project which the organisation can practically absorb, he says.

Too much of the time, people take a "solution led" approach, aiming to implement big solutions or aiming optimisation projects at assets and business units without fully understanding where the production constraints are and get surprised when they don't deliver the value anticipated. "Why embark on an expensive well and reservoir optimisation when facilities are up and down like a yo-yo?."

Sometimes projects are started without a clear idea (or common understanding) of what the opportunity being developed actually is.

"Change management is about defining the solution at a personal level for all the people involved," he says.

Meanwhile many people have heard about so many new projects they are starting to get sick of it – 'change fatigue' he said – although it doesn't help if few of the projects end up working properly.

A second suggestion is that people should split projects up into smaller chunks – so if you don't make a very good estimate of how much time something will take, it is not so serious. "As an industry we can be bad at estimating," he says.

"It is better to be 1 week late on a 2 week project than 3 months late on a 6 month project."

The oil industry is generally very good at chunking, or "phase gating" its big projects, he says – this expertise is useful in the digital oilfield arena as well.

Mr Tye recommends that typical project (e.g. to improve production or system reliability) should be given a timescale of a few weeks to put the business case together, then between 3 months and 2 years to actually implement the project. "With anything over 2 years – you're biting off more than you can chew," he said. "You need to scope your projects to fit that timeframe."

A third suggestion is to make sure anything brought out into day to day use is robust. "Innovation should stay in the laboratory until it is robust enough to use," he said.

A fourth suggestion is to buy not build whenever possible. "The oil industry has a tendency to tinker with or customize off the shelf solutions in the mistaken belief that each asset or business unit is unique," he said.

"The solutions in the [Intelligent Energy Exhibition] hall can solve 80 to 90 per cent of everyone's challenges."

"Compromise on the nice-to-haves to make sure you have something that works. Don't go the for gold plated solution'

Ben Tye, partner for oil and gas at global management consultants PIPC

PIPC

PIPC's oil and gas practice now has over 30 employees, supplemented by a network of industry specialists to bring in when niche skills are required.

PIPC's particular areas of expertise is Project Execution.. Mr Tye claims that the company can manage difficult projects in the digital oilfield "better than anyone else in the world."

"We are there for when people have a 'big hairy business challenge," he says.

PIPC aims to go much closer to its clients business than management consultants usually do, for example managing relations with vendors.

In 2007, the company decided to expand its oil and gas consulting activity by recruiting Ben Tye as a Partner, responsible for growing the division's international client base and global revenues. He immediately recruited Helen Ratcliffe, Chair of the 2010 Intelligent Energy Programme Committee, and has seen PIPC's oil and has practice double in size within the last year.

IDS – new stock management software

Software company IDS (Independent Data Services) has a new version of StockNet, its web enabled software to help drilling rigs manage stock including deliveries to the platform.

www.idsdatanet.com

The software design was made by a professional North Sea logistics co-coordinator, not a software engineer. The company spent 2 years redesigning StockNet, together with clients in Australia and Asia.

To enable faster browsing through lists, the software has a split screen approach, with a list of stock on the left hand side and planning tool on the right hand side, so you don't have to keep going from one screen to another.

So you can go through lists of stock in the warehouse on the left hand side which you want to use on your project, and drag them across to the right to allocate them to your project.

The company claims that training rarely takes more than an hour and users can raise a manifest in just 2 or 3 minutes.

It has a rental register which flags up reminders if items are on hire longer than intended.

Web enabled

The software, uniquely, is web delivered so there is no client side installation required – only a web-browser. For areas with poor rig-town communications , the company sets up a laptop computer as a server, serving up pages to users onboard the platform and managing the data transfer to and from the platform via a built in synchronisation engine.

Charges are per month per active warehouse. Because the service is web-based, there are no charges per user, allowing for an unlimited number of users on the system at no cost. The pay-as-you-go business model also means no expensive up-front license fees.

On offshore platforms, the company sets up a laptop computer as a server, serving up pages to users onboard the platform, and also managing the data transfer to and from the platform.

A copy of the database is stored on this laptop computer and continually updated. This means that the amount of data which needs to be sent to the platform and back (over expensive and slow satellite links) is minimised.

Because the software is web based, it does not need any installation on users' computers, apart from to set up the laptop server.

Company

The company was founded in Adelaide, Australia, in 1995, developing software for Australian oil company Santos to manage drilling data. Santos still uses the company's products on every drilling project it is involved with around the world, totaling 2,000 wells over the past 11 years.

The IDS HQ is in Kuala Lumpur with offices and agents in key operational regions.

The company aims to be large enough to meet client needs, but small enough to have a family attitude, says Beth Anderson, Sales & Business Development Manager, UK and Europe.

The general manager is Douwe Franssens, a past senior product manager and global real time technology manager at Halliburton.

The core product is DataNet2, which can be used to bring data from drilling, geology and completions reports, so it can be shared between employees via the web or the clients' network.

Data handled includes well file, rig /package file, casing and cementing, surveys, drilling fluids.

It can receive data in WITSML format.

The company has an agreement with Samit Enterprises Pvt Ltd of India, which will promote the DataNet2 software in India, for clients who don't like "license per seat" arrangements and prefer web software.

ProNet

ProNet is a completions and well intervention reporting package, which can be used to gather and serve up data and information for the full history of the well.

You can view everything that has happened in the well construction, and see a borehole completions diagram.

The completions engineer has all the current and historical well data available in a single source, which should mean time saving and fewer errors.

Data captured includes perforations, coiled tubing data, production fluid, production tests, string components, sand control, stimulation, swabbing, well head activities.

The software can receive drilling data in WITSML format.

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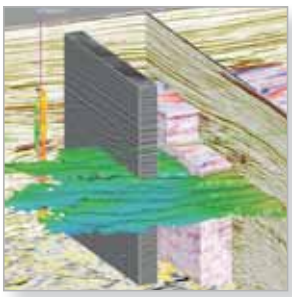

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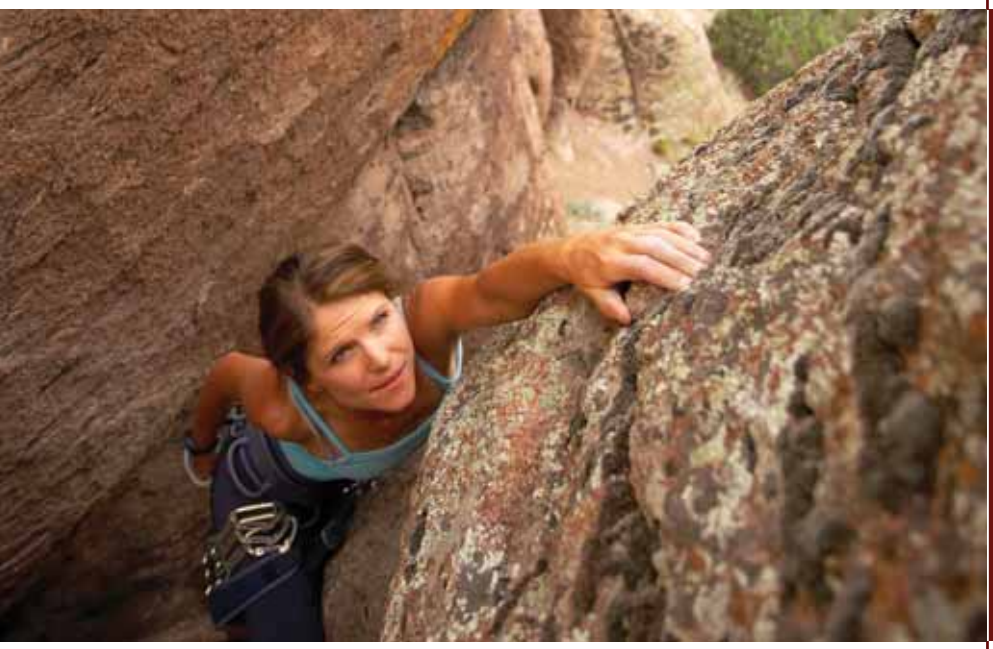

You face challenges every day but when you are working with vast amounts of geo-technical data those challenges can take on a new dimension.

It is your responsibility to ensure that a reliable, secure data archiving solution is implemented to protect your company's data investment. The good news is that's just what Enigma has been doing for over 15 years.

With global acceptance by the oil majors, NOCs, independents and geophysical service companies, Enigma Data Solutions can provide data management software that is policy based, allowing automated information retention and disposal.

The key to our success is ensuring that the solutions we provide are both project focussed and aligned to your business processes and data organisation. This philosophy applies equally to archiving, backups and tiered storage.

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