Why integrate simulators with real time well data?

Simulators for operations managers

Wi-fi on offshore oil platforms

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EMC Documentum recently installed and expanded company-wide content management systems at BP, BG, Anadarko, PetroCanada, NordSkHydro, and also some of the world’s largest state owned and non state owned oil and gas companies.

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Production Access is Houston is on a mission - to persuade independent oil and gas companies to move from spreadsheets to integrated software.

Oracle and data management
An estimated 90 per cent of oil and gas data is stored in Oracle databases. Here’s how Oracle thinks we should approach data management.

Digital Energy Conference

Houston
The SPE Digital Energy Conference in Houston April 11-12 included a substantial update on BP’s Field of the Future program, updates from Shell’s chief scientist for well engineering, and Petrobras’ digital oilfield manager.
For readers craving a deeper understanding of the context in which our industry operates (which is probably all of you), I can recommend a recently published book 'The Last Oil Shock,' by BBC journalist David Strahan.

Mr Strahan has spent the last two years trying to find an answer to the question, is the world in deep trouble because the oil is running out?

He hasn't been talking to environmentalists, but mainly ex-oil industry executives, geologists and engineers, and, when he was able to, current oil industry executives and geologists, to try to put together his answer.

You have probably already reached your own conclusion about when the point will arise, if ever, that Western traditional suburban living will cease to be viable.

But is fairly clear that managing tomorrow's energy supply will be much more complex.

We're going to need as good systems as we can get, to work out where the reservoirs are, work out if they will be profitable to drill, and optimise the management of the available resources to produce them - capital, expertise and equipment.

We'll also need to weigh up a growing range of energy sources.

We'll have big challenges educating the public, so that their expectations match the deliverables, rather than people resorting to riots and violence.

The people who can make the best contribution here are people with an intimate understanding of the oil and gas industry, who will still be alive in 30-40 years, and have a good understanding of data communications and information management, have good communications skills, have good management skills, and prefer to compete based on their technical competence, rather than their ability to fight wars.

Sounds like most Digital Energy Journal readers to me.

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GXT processes more seismic data faster

www.gxt.com
GXT Technology Corporation, a subsidiary of seismic systems company Input Output, has launched Auto-Output, a seismic data processing system, to help the company process larger data sets.

The system can be used to automate pre-stack quality control workflows.

It should help increase the data handling capacity of large processing jobs, and reduce the cycle time of seismic data processing.

For certain processing jobs, the system will be able to deliver outputs in 12-24 hours, which previously would have taken 45 days.

The first version of the system is being applied on BP’s Wamsutter fractured gas reservoir, where the data is full wave and densely sampled.

Oil and gas companies continue to demand faster delivery of higher quality subsurface images, says Nick Bernitas, senior vice president of data processing at GXT.

“We needed to develop an extremely powerful data processing engine that could serve as the foundation for all of GXT’s advanced imaging techniques. “As we see streamer counts increase offshore and station counts increase onshore, the amount of data that is being handled for each seismic survey continues to increase. “The system can sort incoming seismic data in many different ways. For example, the field data can be organised into both cross spread sorts and tile sort, so it is ready for different noise reduction processes.

The decision making modules contain automated geometry quality control and refraction static algorithms, to help streamline many routine processing workflows.

GXT believes the system will be of particular value in marine seismic projects, using computing intensive techniques such as Open-Source Based Multiple Elimination.

It will also be useful for onshore seismic processing, where many seismic teams still use older (‘legacy’) processing software which was developed for much lighter data jobs, with around 3,000 channels.

GXT will be using the system on its seismic program with BP and Apache, together with its FireFly seismic data gathering system, where it will have 10,000 three component (3C) stations, so 30,000 channels altogether.

Lynn Babec joins OpenSpirit as vice president of marketing

www.openspirit.com
Lynn Babec will focus on product planning and the future extension of version 3.0 of the OpenSpirit application.

She joins OpenSpirit from Halliburton Drilling Evaluation Services and Solutions to manage the Business development efforts.

Lynn Babec was previously at Halliburton as the Production Data Coordinator of Newfield Exploration.

Newfield selects InnerLogix well data quality software

www.innelogix.com
Newfield Exploration Company of Houston has selected InnerLogix’s QCPro to manage its upstream data quality.

The implementation follows a successful trial.

QCPro provides a faster, more efficient process for making quality data available,” says Jim Day, Geoscience Application and Data Coordinator of Newfield Exploration.

“InnerLogix says that the data exchange between corporate and project data stores will be smoother.

InnerLogix software to manage upstream data in this screenshot, the colour indicates the quality of the data for that area (sample data only)
Reservoir Exploration Technology awards $29m seismic contract

Reservoir Exploration Technology has awarded a $29m contract to seismic systems specialist Input Output, to collect seismic data from the bottom of the ocean.

The system is redeploiable (it can be moved somewhere else after it has been installed) and gathers full wave (multi-component) data.

The system has enhanced diagnostic capabilities, which come with its Gator command and control software, made by Input Output’s subsidiary Concept Systems.

Delivery of the system is scheduled for the fourth quarter of 2007. “Seabed acquisition is proving to be a valuable and cost-effective solution for exploration and reservoir appraisal in areas having complex geology or high development costs,” says Chuck Ledet, senior vice president of the Marine Imaging Systems Division at Input Output.

“Our last several months, we have worked in close partnership with RTX to witness first-hand their field experience with the VSO system.”

“...and as a result, we have identified valuable ways to advance its performance.”

Dynamic Graphics uses OpenSpirit data integration

Dynamic Graphics of California, which produces the EarthVision, WellArchitect and CoViz 3D software, has made a deal with OpenSpirit to make its EarthVision and CoViz software integrate with other software applications.

Users will be able to integrate their EarthVision and CoViz databases with other databases, such as Halliburton’s OpenWorks and SeisWorks, as well as open formats like SEG-Y and RESCUE.

The company has taken out a license of OpenSpirit’s application and data integration developer’s kit, so it can make use of OpenSpirit to enable users to share its data with software applications made by other companies.

CoViz is a software tool to view 2D, 3D and even 4D data. The data can also be interrogated.

EarthVision is a 3D model building and viewing tool, that can be used to create and update 3D models for well positioning, reservoir characterisation and environmental analysis.

OpenSpirit thinks that the idea of interoperable tools, which enable teams to work together across different software packages, is gaining a foothold in the industry.

IHS releases Acquisition Screener and PETRA with Enerdeq integration

IHS has launched IHS Acquisition Screener, a new asset screening resource for oil and gas acquisition and divestiture (A&D) teams.

Acquisition Screener provides information that helps identify potential acquisition targets and validates economic assumptions on specific assets. It offers new and unique information, including: operator rankings, valuations, activity trends, operating expenses, ownership and reserves.

Currently, A&D engineers screening Texas assets only have access to detailed data for properties that are publicly offered for sale. With Acquisition Screener, users can query a complete set of screening-level data to identify assets, or entire companies, to approach with an offer.

Users can also generate ranked production lists for fields, operators or leases within a basin. These ranked lists will help users find more detailed economic information based on selected attributes such as daily production, number of wells, depth and production formation.

Regional subscriptions for Acquisition Screener are based on geological provinces and roughly cover North, South, East and West Texas.

The new release of PETRA (version 3.1.9.0), IHS’ PC-based geological analysis software now includes an IHS Enerdeq Direct Connect feature providing customers an easy mechanism for creating and refreshing oil and gas companies’ interpretation projects with the latest IHS data.

In the past, this often required manual effort or the development of custom data transfer interfaces. Enerdeq Direct Connect helps to reduce access time, and improves data currency by retrieving the most recent data available on IHS servers.

KCA Deutag expands use of Well Data Technology’s reporting system

KCA Deutag, one of the world’s largest drilling contractors, and the North Sea’s largest offshore platform drilling contractor, has extended its use of Well Data Technologies’ daily drilling reporting solution WellInform.

It is now using WellInform for activities in 18 different countries, compared to 9 previously. KCA Deutag now plans to additionally roll out WellInform for its operations in Sakhalin, Libya and Saudi Arabia.

KCA now considers the software to be a global performance tool, providing the ability to report, analyse and measure globally.

WellInform is a web-based daily reporting system for drillers, designed to be easy to use at the well site, where there is generally restricted data communications capacity.

The tool can generate reports according to the user’s requirements, which can be automatically e-mailed to people needing them. The system is designed to be able to gather data in many different ways, using whatever units of measurements are being used.

Drilling contractor KCA is using Well Data Technologies drilling reporting solution in 18 countries.

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Monitoring and models

There's a lot of talk in the industry about integrating real time well information with predictive modeling software, but not so much about the value that can be achieved from doing it. We asked WellDynamics, a leader in providing intelligent completion technology to the upstream oil industry, and Landmark, a brand of oil services provider Halliburton Drilling, Evaluation and Digital Services, about the benefits of their goal to bring an integrated solution to the industry.

Written by staff from WellDynamics and Landmark

With all of the costs associated with doing business in today's oil industry, operators are increasingly focusing on their decision-making processes – such as the quality of data they have, how effectively they are using it, and how they might apply it to make better, more accurate decisions that squeeze every available drop of oil from the reservoir.

Technology is helping with this challenge, providing an assortment of real-time data, collaborative computer environments that allow people in many locations to share information, and sophisticated modeling capabilities that rapidly solve complex problems.

The integration of these technologies into a real-time, collaborative environment that helps operators to make the best, most accurate decisions – and then act on those decisions in time to impact production – is the “Digital Asset.” Working within the Digital Asset, operators can monitor, measure, model and ultimately optimise an asset.

Among other things, they can use the time they typically spend on collecting, compiling, organising and distributing data to quickly assess a situation and make any necessary adjustments. They can also use real-time data as input to self-learning predictive models that rapidly provide results, allow for “what if” analysis, and handle hundreds of constraints in as little as a second.

WellDynamics and Landmark

The integration of real-time data, predictive models, and intelligent completion equipment is one component of a company’s ability to realize the vision of the Digital Asset. WellDynamics, the market leader in intelligent completion technology, and Landmark, a brand of Halliburton Drilling, Evaluation and Digital Solutions, have recently collaborated to “close the loop” on well optimization using this integration.

SmartWell intelligent completion technology provides downhole control of flow into or out of a reservoir, remotely and without intervention, and offers better management of recovery mechanisms associated with complex reservoirs, secondary recovery, and enhanced oil recovery (EOR), providing real-time monitoring, zonal isolation, and subsurface control across extended reach and multilateral wells. Reservoir managers can use the data from the SmartWell equipment to maintain reservoir models and to determine the optimal positions of the flow control devices.

The WellSolver application is a real-time, model-based optimisation application designed for individual wells. Using an advanced neural network technology, WellSolver creates a very robust data proxy model of the well. The model solves in less than one second, and is capable of running complex optimisation strategies in relative real time.

Combining real-time data with models

The integration of SmartWell data and the WellSolver software allows operators to monitor, model, predict and optimise well performance scenarios using real-time production data, and to interface with control systems to effect closed-loop control of the SmartWell completion. Engineers use the data as input to the model, run cases in only seconds, and then apply the results to downhole SmartWell valves to optimize production from the reservoir.

The integration also supplies valuable enterprise-wide business intelligence in a collaborative decision-making environment, where the reservoir management team uses the data to forecast production needs and perform more accurate planning. This collaborative environment allows them to plan and execute proactive production and injection optimisation strategies.

The environment also supports the management of complex recovery methods, like chemical flooding, miscible replacement, and thermal recovery. Resolving conflicting objectives becomes easier, such as increasing net oil production while constraining water production.

Conventional Approach

Traditionally, reservoir engineers have relied on the dynamic reservoir simulation model as a tool to understand subsurface conditions. In this situation, the engineer uses data from gauges and valve readings, along with the reservoir simulation model, and makes decisions about both independently.

Some operators have tried to integrate SmartWell functionality with reservoir simulation models to gain the freedom and control offered by SmartWell technology; however, the typical reservoir simulator that is currently available lacks the speed and robustness required and cannot efficiently optimise the downhole control function (relative to a pre-defined objective function).

As a result, any attempts to quantify the value of intelligent wells in a field application, or to determine the best way to operate intelligent wells on a production or recovery basis, require frequent, labor-intensive interface with the reservoir simulator over multiple runs. Based on this conventional approach, reservoir simulation with intelligent well capability and well optimisation occurs intermittently, if at all.

The new approach of closing the loop effectively resolves the problems of the conventional approach by successfully integrating SmartWell technology with the WellSolver predictive modeling software.
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Good subsurface data

Maintaining good quality subsurface data is a challenge nearly every oil and gas company is struggling with. Paras Consulting expert Lee Hatfield gives his tips on how to do it

by Lee Hatfield, senior consultant,
Paras Consulting

Data management has become one of the most important tasks facing subsurface teams. As more and more data is acquired it becomes more important to manage that data in order to avoid the cost and time issues associated with mismanagement of data.

Subsurface managers have a responsibility to the company that they work for and to the staff that work for them to provide quality data in a time effective manner.

Effective data management provides a host of benefits that can be seen throughout the subsurface team.

Efficiencies will be realised both in terms of time and costs, and additionally productivity will increase, but perhaps the main reason for good data management is to provide confidence in the data that is used for decision-making.

The three main factors that influence confidence of data are consistency, accuracy and completeness.

It is now common practice for exploration and production companies to require their asset managers and subsurface managers to provide auditable reserves figures. This means that the associated data and assumptions that go with that data need to be preserved throughout the subsurface interpretation workflow/lifecycle. In cases like this it is important to be able to supply the correct data and content.

Data management framework

The data management framework is a way in which many different aspects of data management can be defined under one umbrella. It provides a way of working that is sustainable and self-promoting.

One of the most important points to note is that the data management framework must have continued management support.

A good data management framework needs policies, industry standards, processes and procedures for the functional data types.

The data needs to be accessible, have good architecture/dataflows, have good naming standards, a publishing system, a physical data management system, a quality management system and good data capture systems.

On the people side, you need a sustainable system which people have ownership of. You need roles and responsibilities, organisation and leadership.

Data audit

Before embarking on designing and implementing a data management framework it is advisable to undertake a data management audit to understand what the specific issues are within the team.

The audit should include database interrogation to gain an idea of existing data quality, as well as ‘interviews’ with team members to identify the main issues and concerns.

The audit results should drive the items to be included in the data management framework and the priority of implementation.

Data ownership

Data ownership ensures that persons are responsible and more importantly accountable for the data that the team uses and produces.

Ownership should be assigned to all data and those responsible should manage the data by tracking, maintaining and publishing according to defined processes.

The levels of ownership within your team will depend on the size and complexity of your organisation. You should however, have the following key roles:

- Management - usually an asset manager or subsurface manager who is accountable for all data used and owned by the team
- Data owner - technical experts who are responsible for the specific data in their area of expertise. These personnel should look for consistency, correctness and completeness of data as well as advising on publishing and flow through the team
- Data custodian - responsible for day to day data management activities and integrity activities

Data ownership should not be a difficult or demanding task if the correct standards, processes and procedures are in place.

Data publishing

Any unpublished data is usually hidden away in databases and filing structures, making it very difficult to find and use. Data publishing is key to making data accessible to those that rely on it. Data should be published in the most suitable repository, whether it is an EDM (Enterprise Document Management System) for reports or a database for some MDT (Modular Formation Dynamics Tester) results. This repository should always have an owner.

The five main stages to publishing are document creation; putting in the content; approval/quality assurance/review; getting the final version; and publishing it for the target audience.

When publishing data the following rules should be applied:

- Always add a date stamp to the data
- Always include a data owner
- Only publish relevant data
- Use keywords to make searching and retrieving easier
- Ensure that data is published in the most suitable place

If possible, ensure that the team are notified of new published data availability.

Data quality

All exploration and production companies strive for perfect data quality and almost none obtain that goal.

The reasons why are varied but it has to remain a high priority and something that the subsurface manager should be aiming for. Items to consider include consistency against standards, constant checking for accuracy, duplication and incomplete data, and ensuring that all information is up to
Subsurface data and absolutely unambiguous.

In order to ensure compliance and accountability at a later date, it is also vital that the audit trail is available, consistent and of high quality.

The important factors in ensuring quality data are:
- An awareness of data quality issues in the team
- Identifying critical data
- Evaluating all current data problems
- Assigning responsibilities and data ownership
- Agreeing definitions and requirements for all data types
- Defining a process to identify and resolve data issues
- Seeking expert guidance if necessary
- Sustaining the effort on quality initiatives.

Data architecture and connectivity

Subsurface managers should consider whether their team has the correct data architecture. The data architecture relates to the way in which data is stored, used and moved around the system.

By defining a dataflow for each data type showing the main steps in the use, storage and responsibility of the data, the subsurface manager should be able to see where the ‘stoppers’ or ‘bottlenecks’ are in the flow, and hence identify required changes in architecture.

Examples may include how different databases and applications are connected, how data flows through them and how to maintain data from master to working projects. The example below shows part of a potential seismic data flow.

The first stage is that data is acquired or purchased from a third party, including field tapes (in SEGd or SEGd formats), navigation data and other reports.

The data is processed by a processing contractor and sent on to the operations team. It is indexed by the storage contractor.

The field data is indexed by a storage contractor and sometimes quality controlled.

The processed data is passed to a data loader for loading to applications.

After being loaded to the applications, the data is quality controlled by the operations team, and if it is not good enough, the original data is processed again.

Meanwhile the data in the applications is catalogued and sent into storage, and sometimes quality controlled.

Physical data management

Physical data Management is the management of all physical media, reports, sections and so on.

These materials are usually stored and managed by dedicated storage contractors but the subsurface team has a role to play in how they are managed and what is stored.

Consider the following:

Does the team have robust procedures and standards for getting physical data into the correct storage supplier with the correct metadata?

Do you issue retention dates with the data?

Have you ever investigated the physical data held by your team to see if it still has relevance to modern working?

When archiving physical media into storage you should supply as many details as possible so that the data is easy to find at a later date. You may want to set up standard templates for the data that you send to store.

You should consider undertaking projects that will increase efficiency and decrease the amount paid in storage costs. These may include scanning of hardcopy reports, tape transcription to new media and data rationalisations.

Effort must be made to implement and maintain an index of all the data, with associated metadata. This index needs to be accessible by all team members.

Policies, procedures, processes and standards

Policies, procedures, processes and standards provide the backbone for data management and ensure that all work done in the data management domain has a firm foundation for future development and growth.

The subsurface manager should identify gaps in the standards and procedures currently used by the team and should put in place an action plan to fill these gaps.

Standards would typically include naming conventions for different data types.

Procedures can be written for physical data management, document management and control, most data types and data loading into applications.

Whatever is chosen, the standards and procedures should reflect the way in which the team works, but should also provide efficiencies.

They should be published in the public domain and should be actively communicated to all parties.

Data accessibility

Data must be accessibility for it to have value to the team.

This means that the data must be published in the correct place (see above) and applications, databases and disk space used by the team must be correctly configured and managed.

Sustainability and data management culture

Whilst the subsurface manager investigates and resolves items defined above, it is imperative that all the work done is sustainable, and that the subsurface team develops a data management culture that grows and will actively promote data management in other parts of the company.

This should be done by involving the team and if possible making data management part of staff annual objectives and incentive schemes.

Once over the initial push of data management activity, the subsurface manager should find that his/her staff become more amenable to data management and the benefits that it brings.

In effect the subsurface manager should try to help the team help themselves.

In order to promote sustainability the subsurface manager should consider instituting periodic reviews to consider what is and isn’t working.

Focal points are vital for teams managing data, and data management tasks should be given time on a daily basis.

All data management issues should be actively promoted by the subsurface manager at all times, in order to sustain consistency and team working.

Ultimately, it is imperative that subsurface managers are seen to be putting time, resources and expenditure into data management. Failure to do so risks the consequences of loss of data, inability to prove resources and take responsibility for individual datasets.

This in turn potentially leads to low morale within a team as they spend large amounts of time looking for data that should be easily accessible, and ultimately a lack of confidence in both the data and the decision makers, usually the subsurface management.

About Paras Consulting

Paras is an international consulting company, highly regarded for its ability to define and resolve difficult challenges within the exploration and production world. Independent of any technology, Paras is able to assist clients in selecting “best in class” solutions, and develop strategies for technology enabled change.

With a wide variety of senior-level experience including information and data management, investment decision making, subsurface and capital allocation process improvement, Paras consultants deliver measurable, lasting business value across the whole E&P spectrum.
No single data management solution - Crouse conference

One emerging theme of Philip C Crouse’s first ever European conference, was that there is no single way to fix oil companies data and knowledge management challenges - but enforcing universal rules goes a long way to help

By Tracey Dancy of Paras Consulting, consulting writer to Digital Energy Journal

The 11th International Conference on Petroleum Data Integration, Information and Data Management, organised by Philip C Crouse and Associates, Inc, was for the first time, held in Europe as well as in Houston this year, in Amsterdam Marriott Hotel on April 19-20, co-sponsored by Energetics and Shell E&P.

One emerging theme was that there is no quick solution to the challenge of data management, solving all the needs for integrating, accessing and storing the exponentially growing mountain of data.

Sushma Bhan, information management director and head of research and development, Shell, set the theme by explaining how Shell’s approach has been to have a number of smaller knowledge management efforts, with leadership endorsement and high management accountability, rather than one master project.

Mr Bhan explained how the challenge of information management in research and development is very different to in other parts of the company, because in research the emphasis is on wisdom and knowledge, rather than on data and information. Research and development people are often resistant to change, and dislike the lack of flexibility often found in generic IT tools, he said.

Staff often stay in the same company doing good long term research, and therefore have vast tacit experience to pass on - not something that is easy to do in current data management IT solutions. Investment in research and development IT is typically below average for the industry.

Dag Heggelund, president and CEO of automated data cleaning company InnerSight, spoke about data quality statistics can be made available on which areas need cleaning up, he said. Data completeness, consistency, uniqueness, and validity and content. Good quality management following DMAIC (define, measure, analyse, improve, control) will enable a company to have a decisive competitive advantage over others, he said.

Vidar Andresen, product manager of InnerSight, explained how it is vital that rules are established over data quality, covering completeness, consistency, uniqueness, validity and content.

It is good to have tools which can show which areas need cleaning up, he said. Data quality statistics can be made available on the company intranet - providing a “name and shame” motivation for users. This kind of motivation always has a downside however - how to prevent users entering “null” results to make the metrics look good.

Gerhard Thonhauser of the University of Leoben, in Austria, spoke about data quality control in the context of managing sensor data. The important steps are data standardisation (in this case using WITSML); quality control; quality reporting; data compression where appropriate and good access / visualisation, he said.

If done correctly, any problems can be identified, flagged and corrected automatically. This can be done in very close to real time, although applying extra filters for outliers and noise reduction can increase the access time.

Archiving

Lee Hatfield, senior consultant with Paras, talked about data obsolescence and archiving, explaining that archiving should be process driven, using core principles, including standard neutral formats, good data indexing using metadata, and with dedicated resources.

Discussions over whether archiving needs to extend to software versions and operating systems continue, but with digital storage becoming cheaper and less space-consuming, this is an argument that may eventually resolve itself, he said.

Data ownership continues to be a big issue - it is vital for the efficient running of archiving systems to have ownership of data. Assigning ownership implies accountability, and requires that the system be extended to software versions and operating systems.

In the conference discussion, it was stated that 98% of legacy data is never re-accessed, according to figures from outside the E&P industry. How do you decide which 2% will be accessed? Clearly there is a requirement for at least a basic level of indexing, but often it is a question of prioritising which data set to index first.

With company reorganisations and mergers an everyday fact of life in the industry, it is all too easy to allow data to become lost in the system.

Regulatory compliance forms a large part of the motivation for keeping legacy data, although the length of time required varies greatly, and may require keeping a mountain of data in order to access the envelope of information needed.

Standards

Alexander De Leon with NCR Teradata took a look at the lessons learned by WalMart in the US, where all transaction data goes into a central data warehouse, which can contain a number of data types and applications, and is fed out to the decision makers and users, he said. WalMart’s system is updated by 500 terabytes of data every 5-10 minutes. The starting point with this solution - as with all others - is to create standards at least company wide, if not industry wide, he said.

Randy Clark, president and CEO of Energistics, gave an overview of the business value of implementing Energistics standards. At a time when “Intelligent Energy” is at the forefront of all E&P business drivers, there has never been a more urgent time to look seriously at open data exchange standards, he said.

The upstream oil and gas industry believes that increased standardisation can result in billions of dollars of additional value in the area of production optimization, alone, and knows that there are additional billions to be saved in other areas of the business, he said.

“Standards developed but sitting on the virtual, or any other, shelf have no business value, and Standards developed in a collaborative fashion but not widely adopted only have potential business value. However,
Subsurface

standards developed in collaboration, widely adopted by the industry and deployed in the oilfield have tangible business value that result in improved rates of return, production optimisation and operational efficiency,” he said.

Alan Doniger, chief technology officer of Energistics, spoke about Energistics’ project to develop a global unique well identifier, or GUWI, standard.

Energistics is working together with IHS Energy to ensure that GUWI’s are enabled throughout the industry, he said. IHS Energy will manage an international GUWI database, incorporating information about existing wells, and ensuring that all newly registered wells have a unique number, are registered in their database and are made available to the industry when required.

At the same time IHS will continue to maintain the additional information they hold about wells, which will, as before, be commercially available to clients who request it, he said.

Trudy Curtis, CEO of the Calgary based Public Petroleum Data Model Association (PPDM), talked about the need for data to be kept in the long term, not just for the lifetime of any asset, as we cannot tell in advance what and when information might be vital.

She emphasised the need for processes, policies and procedures to be implemented, to ensure data use and access is identified and documented at every stage of the workflow. Integration is hard work - there is no easy solution, but as the data mountain grows, the implementation of good solid workflows at ground level will ensure that future data is more manageable, she said.

Pre-stack seismic

Janet Hicks, marketing development director with Halliburton Landmark, talked about using pre-stack seismic data together with processed data to improve geophysical interpretation.

The market perception of using pre-stack data has been that it is too big for interpretation or too specialist, she said. But you could store the entire data for (for example) The Heidrun Field, including pre-stack data, can be held on a 60Gb iPod, and the data can also be made available over a network.

Much pre-stack data is held on tape with questionable quality, and needs to be remastered before it can be used. But with technology in this area moving so quickly, this is clearly an area that may provide better interpretative models in the future.

Social networks

David Zappa, knowledge management marketing manager with Halliburton’s Baroid Fluid Services, spoke about increasing knowledge sharing by developing employee social networks.

Based in Caracas, Venezuela, Mr Zappa knows well the problems associated with being away from the central knowledge hub of any company.

The concept of structured networking within a company is not a new one - though the Halliburton answer has been to provide the applications to formalise the sharing of knowledge and expertise through a defined social and professional network.

The advantages are many and disparate, and the ability to use and share knowledge in the network is tied to employee performance - good networking skills are rapidly becoming a requirement for advancement to management levels.

This presentation did provoke the question - if there are incentives to employees to participate, how much of that is tied to their personal goals rather than the somewhat altruistic aims of the programme itself?

In the meantime, it is clearly a way in which knowledge, particularly heritage knowledge, can be shared with a wide variety of participants, based on the dominance of more flexible working tools, as opposed to traditional networking methods.

Taxonomy vs folksonomy

Alessandro Allodi, team leader documents and knowledge management with Petroleum Development Oman LLC, spoke about taxonomies and folksonomies.

Taxonomy is the more traditional method of tagging data - a rigid hierarchical structure based on Dewey Decimal System type classifications.

Folksonomy, on the other hand, is based on an open ended labelling system - where users contribute to tagging, using familiar, shared vocabularies. These are already widely used by public websites like Amazon and delicious to great effect.

There are potential downsides to folksonomies however - users may not be considering the “common good”, and could use tagging to wilfully mislead other users - and there is clearly the possibility of a “tag swamp” - where tagging the minutiae of data leads to thousands of unwanted hits.

Metacarta

Kay Sutter, energy manager with Metacarta

Kay Sutter, energy manager with Metacarta presented her company’s way of dealing with unstructured data, often the type of data that is left out of technology solutions because of the complexity involved in indexing.

Energy company employees produce - and purchase - millions of documents, and these are stored in a number of ways - repositories, servers, even personal laptops, she said. Finding and accessing data is fundamental to business value, but this task is truly the ultimate needle in a haystack.

35-50 per cent of information is not found by typical search engines, and 30 per cent of the time available to knowledge workers is used in searching for documents that are not found. With 80 per cent of the data stored by the average oil company unstructured, a solution to this is vital.

Metacarta’s solution is to index the documents around the geographical reference points mentioned in them. Metacarta’s application can combine structured and unstructured data, using familiar interfaces, that can be called up using geographical referencing.

The information does have to be cleaned up first - some standardising is vital, and intelligent tagging methods will have to be employed - many documents in this industry will have a tag for “Houston” for example, but not be relevant to that area.

The PNEC conference audience
Subsurface uncertainty

Isle of Man company Geodirk has some interesting new methods to improve knowledge about rock formations between wells, by combining seismic data with measurements from inside the well, and building up a picture of how the rock formed.

Oil and gas companies are very good about learning about the subsurface up to about a few metres around a well, obtained from sensors inside the well (on wireline). The data can be over 90 per cent accurate.

The problem arises when people try to work out what is going on between the wells. Exploration and production managers know that seismic is useful for mapping shapes and getting some attributes about the rock, but it can give very wrong information when used together with well data to map, inter-well, geology and petrophysics information.

The innovative steps in Geodirk’s methods start with means to map how a sediment volume was buried, and whether there were anything abnormal in the burial or if it happened normally.

If you understand that the sediment was buried normally, then via GeoDirk, you can convert seismic data more accurately into relatively complete geological and petrophysical models, unless such anomalies are ‘normalised’, via GeoDirk.

GeoDirk evolved from the ‘Spiral’ project research, (some of which was supported by Philips and ARCO), evaluated by a UK government Department of Trade and Industry commission of Plymouth University, which reported it to be the biggest breakthrough in E&P geoscience of the 90s.

This was extended whereby now, GeoDirk expert systems claim world records for both speed and accuracy of working seismic into geology and petrophysics.

GeoDirk believes it can help provide twice as much risk relevant knowledge for the same cost as other companies, and invites customers to test this.

“We would like to invite a National Oil Company or Hydrocarbon Ministry to host an event to assess the performance of seismic interpretation workstations available to them,” says Ken Armitage of Geodirk.

GeoDirk has tested its methods in many projects, by comparing seismic, worked minus well control, resolution about 10m, against over 100 km of well data, resolution 0.2m. This included an audit, using PAD (Irish government) data in the Porcupine Basin, Ireland.

Mr Armitage says that the audit showed that seismic can be quickly processed at over 90% accuracy into geology and petrophysics, without well data, and better with well data.

It showed that four out of five wells made available after processing, were drilled into structures in which insignificant closed reservoirs existed.

The company is offering service processing and training courses in its methods in the Isle of Man, and is also planning with others to enable a multidiscipline PhD project at Trinity College, Dublin, to explain, document and apply the new processes and compare them with what was being done previously.

GeoDirk contends that today’s exploration and production efficiency levels are related to inability to quantify about 40% of risk relevant information, per cell.

GeoDirk believes that this project should help exploration and production efficiency in Ireland increase by 15 per cent through its methods, paving the way for use in other basins.

Having better subsurface knowledge makes it possible to reduce drilling risk, and also make sure the production facilities are engineered for the correct flow rate.

www.geodirk.com
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Visit us online at www.pneccconferences.com
Bringing simulation to the well head

Landmark has an interesting vision - enabling the people who actually operate the oil and gas wells to make use of the reservoir simulators.

Reservoir and production engineers have been using simulators for many years, continually refining them, so they make what should be a very accurate model of what is happening underground, so it can be used to make decisions about how to produce the reservoir.

But the problem is that the people who are actually working the reservoir, the operations managers, are a long way away from working with simulators.

Operations managers typically look after a large number of wells, and limit their attention to the wells which seem like they may have a problem, eg a drop in production, water production, slugging or sand.

This is a behaviour pattern which could be described as 'reactive,' continually fixing the most obvious field problems.

Landmark believes that a large amount of value could be achieved, if operations managers could employ a more 'proactive' process, that is fixing problems before they occur.

In other words, they might be alerted to an increasing likelihood of water entering a well, due to information from the simulator, and could then take action accordingly (perhaps decreasing water injection in certain geologic layers, or choking the well).

This kind of proactive operations gets more critical in more complex wells for example with several different zones which can all be choked and controlled independently with the latest interval control systems.

When a problem occurs, for example water entering the well, it is not always easy to fix it reactively - for a start you have to work out which zone the water is entering the well at.

But if you always have a continuous idea about how the water front is moving underground and access to accurate computer models, you can see how close the front is to each well perforation and close it in advance.

You can do sophisticated things like set the system so flowrate from one zone can be choked back relative to another zone, so there is always more fluid coming out of the second zone.

You can change gas zones and oil zones, to tweak the gas-oil ratio, for example if you want to use the gas to give the oil flow a lift, but still maximise the oil production.

You might also want to control the pressure drop from the reservoir to the well, to reduce the risk of sand production.

You also have good data that can tell you when you need to do a well clean up, or use acid to enlarge the pore spaces.

It is possible to develop very sophisticated tools for operations managers, such as dashboard tools which tell them the status of all their wells at a glance. “They can highlight problem wells and highlight solutions much quicker,” says Landmark research fellow Stan Cullick.

Take-up

Persuading operations managers to spend more time with simulators is far from easy.

“We’re finding it to be very difficult,” says Mr Cullick. “There’s a very slow take-up. A lot of it has to do with organisational barriers, functional barriers.”

Confidence in simulation models is a big issue. In order to be persuaded to use the simulators, operations managers have to be convinced that the information coming from the computer software is better than their instincts from years of experience.

One of the problems, according to Mr Cullick, is that many oil and gas companies are still only updating their simulator models every 6-12 months.

It’s not surprising that operations managers, responding to reponses at the wellhead on a daily basis have little confidence in them, when they might describe a picture of the reservoir which is 12 months old.

“If they see a simulation model prediction that was done 6 months prior, and they can see a divergence in what’s happening from day to day, their level of confidence may not be high.”

“The reservoir behaviour gets disconnected from the predictive model,” he says.

To get the most out of a simulator, you also need to have reasonable expectations of the level of accuracy which will be achieved.

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To get the most out of a simulator, you also need to have reasonable expectations of the level of accuracy which will be achieved.

A simulator can’t tell you that, for example, water breakthrough will happen at 3pm tomorrow; but it can indicate the likelihood of water breakthrough over the next 30 days as long as the model is up-to-date with the historical performance.

Most operations engineers, production engineers, and reservoir engineers have common training, and understand each other’s jobs well, but they often have a different time focus, Mr Cullick says. Reservoir engineers who are the primary owners of simulation models might focus on the next 2-3 years of development. Production engineers, who are the primary owners of well production models, monitor the well from month to month, and operations engineers work the well from day to day.

Surrogate simulators

Landmark has developed what it calls “surrogate models”, which are not as sophisticated or complex as the full reservoir simulation model which have complex physics equations, but can run much faster. The surrogate models run on neural networks.

They are basically short term models of what is happening, which run off the main simulator. Something like a simulator ‘lite’.

The surrogate models can reproduce a reservoir simulation, or network flow simulation.

As the main simulation model is updated in a process called history matching, which might take a number of weeks or months, it is used to train the surrogate model. But the surrogate model can run much quicker, in seconds, to provide faster day to day information. The surrogate model can also be updated as needed (for example on a day-to-day basis) using data measured directly from the field. Thus, the surrogate model can give a clearer indication of what is likely to happen over the short term.

So you have a situation where the big reservoir model is updated every couple of months in a long complex process, and the surrogate model updates itself all the time.

The surrogate model can be connected directly to sensors on the wells.

“They are very quick to adapt, and valid over shorter periods of time,” he says.

The surrogate models do not have so many complex differential equations, as traditional simulators do, but they can run in seconds.

This is a different way of working with simulators, that is, using the sophisticated simulator to train a neural network that can provide information to an operations engineer or manager that can be used “proactively” in the field to improve oil or gas recovery and efficiency.

Digital Energy Journal spoke to Landmark Technology Fellow Stan Cullick about Landmark’s vision for bringing reservoir and well simulation right up to the well head, as a tool operations managers can use.
Avin International installs Iridium satcom on tankers

Greek tanker company Avin International has installed Iridium satellite communication phones on its fleet of 22 oil and product tankers. It will also install an Iridium terminal in its company headquarters in Athens.

This will allow the company to phone its ships without having to use fixed telecom networks at all, and hence denying fixed telecom operators the opportunity to add a mark-up to the Iridium prices.

NesscoInvsat satcom contract with Petrobras

www.nessco.co.uk

Scottish communications systems company NesscoInvsat has won a contract with Petrobras to supply a communications system for the Mexilhão FPSO (Floating Production Storage and Offloading) vessels Mondo and Saxi-Paulo. The platform is 230m long and the largest offshore metallic structure ever erected in Brazilian waters.

The contract was awarded by contractor Maúa Jurong of Singapore. The system will be installed at Maúa Jurong’s shipyard in Rio de Janeiro. The platform will work the Mexilhão gas field in the Santos Basin region, offshore São Paulo. The platform is 230m high and the largest offshore metallic structure ever erected in Brazilian waters.

NesscoInvsat satcoms on FPSOs off Brazil and Angola

www.nessco.co.uk

UK satcoms company NesscoInvsat has a contract from Single Buoy Moorings (SBM) of Monaco to supply a communications system for the Floating Production Storage and Offloading (FPSO) vessels Mondo and Saxi- Batuque, owned by SBM and Sonangol, operating in the Kizomba field, offshore Angola.

The system will include telephone exchange, radio communications, GMDSS, personal data links system, satellite terminals and TV reception, and a back-up power system.

The contract is for a term of five years and includes on-ship installation, commissioning, training and installation supervision.

The systems will be installed at the Keppel shipyard in Singapore.

Meanwhile NesscoInvsat has a £200,000 contract to supply VSAT satellite communication systems for a FPSO currently being converted from a tanker in Poland, to operate in the Siri field offshore Brazil. It will be operated by Teekay Petrojarl for Petrobras.

CapRock VSAT comms for Otto Candies

www.caprock.com

Oil and gas satellite communications company CapRock communications has signed a deal with offshore shipping company Otto Candies, to supply VSAT communications to its fleet of support vessels in the Gulf of Mexico. It is using CapRock’s standard broadband package, with guaranteed data speed of 144 kbps to 256 kbps.

Otto Candies will use the system for sending data such as fuel levels, weather / sea conditions, and information on customer instructions.

Company staff will be able to call the vessels at any time from their home or mobile phones, rather than only being able to call from the office, as they did previously.

Otto Candies is particularly pleased that the new system provides an always on connection for a flat fee, rather than paying by the minute or the kilobyte, as with its previous system.

A problem with the previous system was that employees would often write e-mails in an abbreviated style so they would transmit faster, and this created a margin for error.

Merrick Systems and BJ Services conduct downhole RFID test

www.merricksystems.com

Merrick Systems together with oilfield services company BJ Services have conducted a successful pilot of downhole RFID (Radio Frequency Identification) tags.

The tags ran for over sixteen hundred hours in the field at 343°F degrees under different fluid situations including acid.

RFID tags can be used in asset management to improve how downhole operations are performed, how equipment control systems are applied, and how components are selected, supplied, and managed to upstream oil and gas operations.

According to Merrick its key differentiator is that it works by taking a new approach to the design and materials used to create commercially reliable downhole RFID tags, Merrick’s Rig-Hand and Tool-Hand software products can be used with the RFID tags to effectively track and manage equipment through inspection, transportation and operations.

Merrick has also recently appointed Philippe Flichy as Vice President, Business Development. Prior to joining Merrick Systems, Philippe Flichy was co-founder and CTO of GlobalLogix, and has also worked as Solutions Manager for Oil Field Services North and South America at Schlumberger looking Real Time Production Optimization.

Emerson to supply Qatargas

www.gotoemerson.com

Emerson and Qatargas have signed a long term alliance agreement, making Emerson the preferred supplier of digital automation solutions and Qatargas a preferred customer for the company’s oil, gas and liquefied natural gas (LNG) facilities.

The agreement will build on the strength of the two companies’ previous collaboration to automate six multi-billion dollar facilities in Ras Laffan over the past four years.

As automation supplier on existing and future Qatargas projects, Emerson will engineer, project manage, install, commission, and provide long term support on the automation solutions for the oil, gas and petrochemical facilities in Qatar.

In addition, Emerson will install its PlantWeb digital plant architecture with FOUNDATION fieldbus communications, integrate third-party equipment, and provide information technology services.
BT a new service offering for oil and gas

We all understand what a traditional telecoms company does - but BT is seeking to redefine it. The company has quadrupled its US oil and gas business since 2004. We spoke to head of US oil and gas sales Ross Burley.

UK telecoms company BT has quadrupled its US oil and gas business since 2004, and is making an aggressive sales push in the industry, setting up connections to its network in areas of oil and gas activity, such as Brazil, Russia, India, China and the Middle East.

Ross Burley, head of US oil and gas sales, BT, reckons the company can provide telecoms services in these places "probably better than anyone else in the oil and gas industry."

BT now has 150 employees dedicated to oil and gas, many of which are based in Houston.

The company believes it has made great strides to get beyond 'British Telecom' - it was originally the UK government owned telecom company.

Now, of its 100,000 employees, 30,000 of them are working in global services, with offices in over 50 countries.

The oil and gas service offering hinges mainly around MPLS (multiprotocol label switching) network, which is essentially a global data network (like the internet), but faster, more secure and under the control of one company (BT).

This means that you can do many things with MPLS which you would like to do with internet but can't - such as having guarantees of reliability, security and data speed.

The internet is fairly reliable, fairly secure, and fairly fast. Most of our e-mails arrive, and it works most of the time for voice communication (VOIP). You can get good data speeds on it most of the time.

But if you want something more reliable and secure, then MPLS is the next grade of service.

MPLS is true convergence between voice and data; both travel down the same cables in internet packets.

BT is investing $20bn in its global IP network service, including acquisitions of 17 companies around the world, to put it together. It spans 170 countries.

BT continually optimizes its MPLS network, to make sure that there are no bottlenecks everywhere, all the data can get from its source to its destination very quickly.

Data packets can be labeled as to their urgency and take priority through the pipe. For example, it is much more important that data packets in a voice communication or video-conference arrive immediately (otherwise the conversation is broken), then data packets in large file transfers.

Interestingly, there does not need to be any barrier between your internal corporate networks and external ones. BT can manage it all.

To illustrate its potential to manage large, complex, secure internal corporate networks, BT recently won a contract to manage probably the world's most demanding computer network, that of the UK's National Health Service. It will run the network both within the hospitals and between hospitals. The data network carries people's confidential health data, and real time data from scanning machines, and any downtime could result in doctors not having the data they need at a crucial time. This is possibly a bigger networking challenge than anything the oil and gas industry faces.

There are plenty more benefits to having a global, managed network at your fingertips. You don’t need to manage your own computer networks any more. Tuning even small (eg 20 computer) networks within one office so they work as fast as the internet is not a job for amateurs, as this writer has found out.

When employees are travelling in other countries, they can route their mobile phone calls over it, so no more expensive roaming charges.

You can do high resolution videoconferencing at reasonable cost from anywhere in the world whenever you like.

You can even connect closed circuit TV cameras to it, and monitor them wherever you like.

“We look across becoming a new breed of services organisation, from just a carrier company to an exploitation services organisation,” says Mr Burley.

“BT is absolutely moving to a new breed of services organisation.”

Overly high network expectations

One problem that probably all companies have to grapple with is overly high expectations of their computer networks from users.

It takes a while for people to grasp the idea of the internet which connects everything to everything. But having grasped that idea, people can then easily start assuming that you can get any data anywhere, so for example a person working on rig can get instant access to a reservoir model over the corporate network.

There are plenty of other potential problems with making networks reliable, which people do not necessarily think about, and BT makes it its business to be aware of and good at sorting out.

Many countries around the world have strong regulations about moving data out of the country, or need you to apply for licenses, so they can keep a check of what is going on.

“If you perform seismic testing on a piece of ground which another organisation views as their asset - you cannot necessarily transport that seismic data (property) out of the country,” says Mr Burley.

Furthermore, as the data size increases, the complexity of the telecom network also increases.

If there is latency involved (eg a delay when sending data to and from a satellite), this can cause problems elsewhere in the telecoms network.

It is increasingly frequent for people from different companies to be sharing the same computer network, for example if employees from different service companies are working on a rig, and BT can act as a trusted third party to make sure everyone can access what they need and the security is robust.

Services

BT is making a big push to develop its services offering.

The company believes there is a business ‘sweet spot’ of providing combined computer networks, managed IT and services, such as consulting; in effect, being an outsourced provider of a company’s computer and voice communications networks and everything that goes with it.

A big recent acquisition was INS, an IT consulting and software company based in Mountain View, California with 7,000 employees (see bt.ins.com). The acquisition was made earlier this year.

BT is also developing its IT security services.

As well as the UK National Health Service IT network, BT runs the data communications networks for many cash (ATM) machines in the UK, as well as for one of the world’s largest oil field services organizations.

In October last year, BT bought Counterpane, which provides network security services for retail and financial services.

BT is keen to persuade oil and gas and companies that they do not necessarily need to manage their data security themselves. Data security is getting increasingly complex, so there are benefits in working with a company which has the expertise to manage it.
Communications

One provider
Many oil and gas companies go to BT because they like the idea of having one telecoms provider for the whole company, rather than hundreds of providers.

Many oil and gas companies do business with hundreds of different telecoms suppliers and internet service providers, and the contract management gets extremely complex.

Some of the telecoms providers are the original national telecoms companies, from the old days where each country had a national telecom company you had to deal with there. Others were originally setup by companies which have since been acquired.

Rather than have in house staff spending time managing all of these contracts, oil and gas companies can move their entire network onto BT’s MPLS.

BT provides a ‘tiered’ approach to the managed network.

In the second tier of service, BT will take ownership of a company’s existing telecoms contracts until they expire, then move them onto its own network.

In the third approach, BT will act as a telecoms contracts manager (a “manager of managers” approach), but BT will not manage the oil company’s staff.

Digital networked oilfield
For the oil and gas industry, BT has developed what it calls its ‘digital networked oilfield’ solutions suite, a service to connect together wells with corporate offices, so companies can monitor and optimise production in real time.

BT is not offering services in installing equipment in wells or selling modelling software of course, but envisages it could be ‘prime contractor’ in a project to install a complete digital oilfield working with other software companies, which it already has a healthy working relationship with.

Services can include designing the solution and infrastructure, and working with respective partners to implement it.

BT would like to work with oil companies for the whole life of the asset from exploration to production.

For example, during the geological stage, it could provide rugged laptops with data and voice connectivity over Iridium and Inmarsat.

By the time the field moves into production, it is providing communications for 1000 people, and a whole intranet system.

At the exploration phase, says head of oil and gas marketing Matthew Owen, things are kept very secret, and the company IT department doesn’t normally get to hear anything about what might be needed until the last minute, when the company suddenly requires 50 rugged laptops with satellite communication, which work technically and legally in the middle of the desert in Africa.

“Companies are often knee-jerk with exploration,” says Mr Owen. “They say, we need 50 laptops at short notice in Bolivia. We suggest, you sit down with BT in confidentiality.”

“People don’t consider the need to get licenses for sat-phones in certain centres.”

BT suggests it takes a role as a trusted third party to the oil company, and it can prepare whatever equipment and telecoms services the company needs well in advance.

BT can then help the company expand its communications system as it moves towards producing the field.

Other research
BT has a large research and development operation. Two areas of potential interest to the oil and gas industry are its research into fibre optics and RFID.

As part of its research into fibre optic cables, BT discovered that they are so sensitive they can be used to listen; they are so sensitive that an audible sound can cause a disruption to a signal through them.

So this acoustic sampling could be used to monitor leaks in a pipe, and tell with fairly good resolution where the leak is by listening to a hiss, rather than the conventional method with is trying to detect a leak using flowmeters and comparing input and output.

BT has been researching how radio tags (RFID) can be incorporated into computer networks, and sees plenty of oil and gas applications, for example putting RFID chips into riser pipe to make it easier to track which pipe is where and how many times it has been used.

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Wireless on offshore oil platforms

Using wireless data communications on offshore oil platforms is a much more viable proposition now than it was a few years ago. Stan DeVries, director of upstream solutions with Invensys, explains why.

Wireless networking is now affordable for offshore production platforms. The cost of low-power wireless network components, including battery-powered, hazardous environment sensors, and remote terminal units to equip an entire platform, would fit comfortably within the budget of most offshore operations. Combined with long-range radio modems and gateways such as from vMonitor, which are also quite affordable, many platforms can afford to add sensors at process points that would not even have been considered previously. But the system will fail if it becomes merely an exercise in collecting more data for the sake of collecting more data, or collaboration for the sake of collaboration. Even as affordable as wireless networking has become, it is still overpriced if it isn’t implemented in the context of the business strategy.

New technology
Previously, wireless solutions were not viable for offshore monitoring for many reasons. The technology was still emerging and security was variable at best. Standards were incomplete or were often in conflict with one another, and wireless frequencies and communications protocols clashed as well. There was also general concern that wireless communications were not yet robust enough for industrial strength communications and there was no clear migration path. The applications that did exist were tactical and not extensible and few if any information technology organisations were prepared to provide comprehensive support. And because so much uncertainty surrounded this newly emerging technology determining the true cost of operations was all but impossible. Today, much has changed. Advances in safety, security, affordability, and maintainability within the constraints of frequency allocation now enable energy companies to take full advantage of wireless technology for challenging offshore production environments.

Maintaining networks
Wireless networks for offshore applications are also more maintainable than before. It is now easier to troubleshoot, expand, modify, and upgrade the networks and the components without jeopardizing security and availability. Such improvement comes from the use of a single systems management approach that treats and manages all wireless network technology in a unified, coherent architecture. Such a framework helps technical professionals to manage the diversity consistently.

Saving money
For offshore production, money can be saved by combining mobile video and new sensors in the following ways: Operating costs drop because fewer offshore personnel will be needed. Most drilling and production personnel would be able to perform their duties onshore, drawing on information from an expanded array of sensors and collaborating with a few platform workers via mobile video cameras. Fewer platform workers will mean less transport to and from the platform, minimising transportation costs, and reducing risk. Improved one-way visibility will increase production by enabling earlier and better intervention. Specialists can be mobilised earlier and can multi-task better among many wells, many fields, and many assets. Improved bi-directional visibility increases production by enabling better collaboration with remote, traveling specialists.

How to do it
The following are some steps that oil and gas producers can do to take full advantage of wireless technology today and tomorrow. Survey the entire company to determine who has need for wireless technologies and how the need plays into the business strategy, examining at every point the strategic trade-offs between improving asset availability and asset utilization. Design a technology architecture that will encompass all stakeholders, including operations, safety, security, maintenance, and information technology. Create a policy manual that sets clear criteria for implementing a wireless solution. Select and purchase hardware and software that is proven, scalable, and capable of understanding diverse protocols. Prior to implementation, conduct an RF site survey to identify wireless signal paths and sources of potential interference. Build ongoing maintenance, support, and optimization services into the plan. Creating unified systems management is not just good practice; companies that attempt to implement more than a few tactical solutions without a unifying plan are taking a great risk. Few companies have the resources to maintain staff necessary for all of these steps, especially because demand for specialists with relevant skills is very high. As such, outsourcing to one of the emerging specialist firms may be the most cost effective strategy for companies that want to enjoy the benefits of wireless networking most immediately with the least risk.
New ways of working

No matter how well constructed the systems management architecture, tapping the full potential to increase oil and gas production and reduce costs will require fundamental changes in the way in which oil and gas production teams collaborate.

This includes improved collaboration on normal production and drilling tasks along with collaboration on entirely new solutions for managing challenges such as flow assurance, equipment behavior, and major weather disturbances, enabled by unprecedented visibility into operations.

Instead of just reacting better, the new visibility will enable teams to work smarter.

Deployment of additional sensors to drive more proactive solutions augmented by voice and video enables more collaborative and effective wireless networking on an offshore production platform.

The approach is to manage all standards and associated security as a single, harmonised fabric in meeting production challenges.

Safety and security

Wireless equipment used on an offshore platform must have certification for operating in environments in which sparks from electronic equipment could cause harm.

Equipment such as portable video cameras, wireless transceivers, and associated sensors must have EX hazardous environment classification.

The VisiWear installation in ConocoPhillips’ giant Ekofisk platform in the Norwegian continental shelf, for example, uses EX-rated wireless video cameras. But the greatest threat to the wireless security is not malicious attack, but interference from overlapping wireless networks.

Environmental or accidental RF noise, broken RF equipment, dynamic changes in the characterisation of the RF site, and the range on non-compatible RF devices generally available all can interfere with the performance of wireless networks.

Prevention of such problems must be engineered into the network from its inception, and must be covered by an enterprise-aware security and management model.

Adding to the challenge is the fact that effective wireless networking on an offshore production platform will require a combination of wireless standards. One size does not fit all.

Standards

There are many different systems for wireless communications, with different power consumption, cost and data rate, ranging from 1G / GSM to WiMax and satellite.

The wireless industrial networking alliance (WINA) has developed guidelines for harmonising the diverse wireless network standards required, and enabling the various networks to keep traffic separate and transfer data between networks only when the architecture requires.

Companies such as Invensys, with its wireless technology partner Apprion, are applying the WINA model in products and engineering services that help offshore producers to design, secure, and manage offshore the lifecycle of offshore wireless installations.

The approach is to manage all standards and associated security as a single, harmonised set.

Fitting wireless communications on an offshore oil platform
Escondido uses PA Production Center software

www.productionaccess.com

South and West Texas oil and gas operator Escondido has selected Production Access’ Production Center software to manage its production reporting process.

Escondido will use the software to manage its production reporting process, rather than using spreadsheets as it was doing previously.

The software provides all the information that all departments need, from a single database.

This means that all employees can access the latest up to date information, and if any information is changed by one department, then all other departments have the information updated.

Escondido says that using the new software will reduce a significant duplication of effort.

“Professional resources are hard to secure,” says Bill Deupree, president and CEO of Escondido. “Getting the most effective work products in their hands is a key to leveraging all of our assets.”

Escondido was founded in 2004, and has drilled 50 wells since 2005.

Meanwhile Production Access reports that its first quarter results show a significant increase in revenue over 2006, with four new license sales in the quarter.

Operations Center 4.8 software has been released, with version 4.9 due out later this summer.

The company has also put training Webinars on its website, explaining how users can make the transition to using the system from spreadsheets.

Many Production Access customers use the system as a step up from using spreadsheets.

Paras Consulting reveals new image

www.paras-consulting.com

Paras Consulting has introduced a new logo to reflect the company’s move from being a traditional advice only strategic management consultancy, to additionally helping clients implement its recommendations.

“We now offer a complete service, from defining client needs, developing sustainable strategies through to delivery and implementation,” says Paras managing director Hamish Wilson.

The new logo uses Paras’ ‘wave’ symbol and incorporates it into a multidimensional marble symbol, along with the words “Define, Develop, Deliver”.

Paras is the software news

Dave Wallis joins EC e-business initiative

www.ofs-portal.com

Dave Wallis, European Representative of oil and gas electronic purchasing service OFS Portal, has been invited to become a member of the advisory board of the ‘e-Business With’ group.

e-Business With’ is an initiative launched by the European Commission and industry in 2001, which monitors and analyses ICT developments and their impacts on the European economy.

It has published e-business impact studies for over 20 sectors of the European economy, as well as reports, pocketbooks and databases.

Energistics holds first annual member meeting

www.energistics.org

Energistics held its first Annual Member Meeting and Reception in Houston on March 8, 2007.

More than eighty members and prospective members took part in presentations focused on Energistics strategy and open data exchange standards.

Highlights of the meeting included presentations on the business value associated with the adoption and deployment of Energistics’ flagship standards, WITSML and PRODML.

DJ Johnson of Landmark spoke about the 40+ WITSML imbedded software solutions now available to the industry and the operational efficiencies gained in the Norwegian sector of the North Sea through the use of WITSML.

BP completes automation of monthly allocations with P2

www.p2es.com

P2 Energy Solutions reports that BP has put together an automatic budgeting system on its deep water Gulf of Mexico operations, using P2 Energy Solutions’ Enterprise Upstream software.

Budgets / financial allocations are made at the same time operations are going on, rather than in the conventional way (when for example budgets are made for the future year, based on last year’s data).

This means that operational decisions can be better tuned.

There is an Allocation Processing Model (APM) which can interface with the oilfield data gathering and processing software.

The oilfield is particularly complex, with many subsea tiebacks, and different parts of the production system having different owners, and different royalty rates / thresholds.

The system can also be used to accurately distribute production, revenue and processing costs between joint venture partners and other oil companies using the same facilities.

It can be used to help customers meet Sarbanes-Oxley reporting requirements.

BP began the project in 2006, aiming to increase the reliability, integrity and auditability of its allocation process.

The improved accuracy and reliability of the results has led to increased integration and reliance on them, P2 says.

NeoFirma launches online collaboration tool

www.neofirma.com

Houston online services company NeoFirma has launched Operations Master, a suite of online software tools and information services for the upstream oil and gas industry.

It is using CapRock’s standard broadband package, with guaranteed data speed of 144 kbps to 256 kbps.

It has a tool for communications between employees, employees of partner companies / vendors, with all information encrypted and protected as good as banks do.

It has tools to put together reports, draw charts, and create spreadsheets, for production, exploration status, drilling / completion, workover / maintenance logs, and prospects.

Partner companies can submit information electronically, without the hassle of being granted access to the host companies main corporate intranet.

There is a tool to securely store documents called WeilVault, with is archived daily.

Customers include Crosstree Energy Services, Banks Information Solutions, Inc., Carr Environmental Group, Inc., and Haas Petroleum Engineering Services, Inc.

The system is put together for each customer so that it reflects their corporate identity and has their logo on every page.

The service is priced per well.

Customers particularly like the fact that they can use the system without having to employ their own IT staff, NeoFirma says.

Surface software news
Implementing document management

EMC Documentum recently installed and expanded company-wide content management systems at BP, BG, Anadarko, PetroCanada, Hydro, and also some of the world’s largest state owned and non state owned oil and gas companies. Here’s how they did it.

Management of unstructured content is becoming a considerable part of the overall cost of oil and gas exploration and production, as the number and type of content spirals upwards, due to new regulatory requirements, and contracts and projects of ever increasing complexity.

EMC Corporation, based in Massachusetts, USA, with their Documentum Enterprise Content Management suite has got portable, closest anyone has got to an enterprise wide solution, with enables unstructured content to be managed and made available over company intranets.

The company now claims to be the market leader in oil and gas enterprise content management systems, and claims it is growing faster than all other vendors.

“We have enterprise level content management solutions at the vast majority of oil and gas companies worldwide,” says Peter Hodge, oil and gas marketing solutions development manager.

The system also puts together workflow systems which track who has worked on each document and what they did. It can make sure a document has the required approvals before being published, and can remind people if they need to make input to a document, such as a contract.

The company recently made an agreement with Microsoft to integrate its EMC Documentum software with Microsoft SharePoint portal, so customers could access documents in EMC via the SharePoint portal.

Oil and gas companies using EMC Documentum include BP, BG, Anadarko, Chevron, ENI, Total, Norsk Hydro, Saudi Aramco, and Halliburton, to name a few.

Also Kvaerner Oil and Gas, Norsk Hydro, PEMEX Exploracion Y Produccion, Petroleos de Venezuela, Petro-Canada, Reliance Petroleum, Sinopex Corporation, Tesoro Petroleum Corporation, RepsolYPF, and Yukos Oil Corporation.

“All of these customers have been using EMC Documentum for several years and routinely expanded its use making it more widely available across their companies,” says Mr Hodge.

Typically, oil and gas companies have some structured content, including database, enterprise resource planning data, customer relationship management and supply chain management.

But there is plenty of information which is typically not structured, including drilling approvals, geological reports, contracts, health and safety documents, regulatory approvals, technical specifications, field development plans and economic evaluations.

Anadarko

Anadarko Algeria recently installed a Documentum electronic document management system, to make its documents instantly available at any Anadarko office.

A typical exploration or production project for Anadarko involves 400,000 documents, including AutoCAD drawings, technical specifications, contracts and correspondences.

Many of these documents are created and held by contractors who only give them to the company at the end of the project. It was not unusual for Anadarko to receive whole truckloads of paper documents that needed to be managed and stored.

The company found it very hard to identify and control multiple document versions or enable efficient sharing and search.

Now, contractors transfer documents to Anadarko with metadata that can be easily mapped to an existing repository.

Employees can search for and retrieve documents from any Anadarko location and hold by contractors who only give them to the company at the end of the project. It was not unusual for Anadarko to receive whole truckloads of paper documents that needed to be managed and stored.

PetroCanada

PetroCanada has recently installed a Documentum system, so that documents could be instantly available to employees whenever they were.

When documents were only held on paper, employees could only access documents by fax when on the road, and that would involve someone else in the office finding them and faxing them.

This was a particular problem for the Surface Land Contracts group, which would travel extensively and meet landowners to renew oil rights leases, and would need fast access to all kinds of lease agreements.

Documentum created a system enabling contracts to be made available over the intranet.

PetroCanada has used Documentum since 1997, but it decided to extend its company content management platform to support the intranet.

Before, only the IT group could update internal web content, which was creating something of a bottleneck in how fast new content could be uploaded.

Now, over 5,000 intranet users can access over 100 internal websites.

The intranet is also made available to contract partners, such as engineering process control companies. This helps the company make sure that joint projects run more smoothly.

Employees can also search for and find information much faster on the new intranet.

Global oil company

In another project, a global oil company (which would not allow its name to be published but is described as the world’s largest non-governmental producer of oil and gas) wanted to harmonise 100 separate websites into one.

It has developed many different websites over time, providing information such as product and material data sheets, information on licensing the company’s technologies, locations of roadside service stations, and information about dealer opportunities.

The company had tried several times before to force all content through the corporate site, but found this led toexploding IT costs, and slow publishing time, and lots of old information on the website.

Documentum built an organisational hierarchy for the corporate site which served its different business units, creating custom templates for the different workflows of each group.
IBM and Aker Kvaerner are working together to provide condition monitoring services for the oil and gas industry. We spoke to Aker Kvaerner’s vice president for concept and technology, Erik Erdal, about what this means.

IBM and Aker Kvaerner have embarked on a project to work together to provide condition monitoring services to the oil and gas industry. The service combines Aker Kvaerner’s competence in equipment maintenance with IBM’s competence in gathering and managing the data.

The service will initially be for rotating machinery, including generators, pumps and compressors. Typical Data being sent will include vibration, temperature and oil pressure.

It will focus initially on platforms in the North Sea and Norway, but ultimately the program will be provided internationally.

Aker Kvaerner also hopes to be able to monitor static equipment, such as for corrosion, although the technologies to monitor corrosion remotely are not yet advanced enough for this to work.

Aker Kvaerner cites a recent study by the Norwegian Oil Industry Association (OLF), estimating that NOK 250bn increased revenues could be achieved using integrated estimating, although the technologies to monitor corrosion remotely are not yet advanced enough for this to work.

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The company had reduced its number of websites from over 100 to just five: the corporate site, and four partner and supplier portals.

Publishing time for the corporate site dropped from five weeks to three days.

Contractor web services were virtually eliminated, saving the company $500,000 annually.

The company now plans to use Documentum software for storing, controlling and distributing thousands of documents related to large capital projects.

**State oil company**

Another state oil company which would not reveal its name (it is described as the ‘world’s largest oil producing company’) used Documentum to manage over 2 million pages of electronic contracts, spanning fifty years and representing billions of dollars of revenue.

Using Documentum, all two million pages of contracts were scanned, including system specifications, materials standards, quality certifications and photographs.

**IBM / Aker Kvaerner condition monitoring tie-up**

IBM has been involved in condition monitoring in many other industries, including the airline industry, and can apply this expertise here.

The set-up is designed to be ‘future-proof’, as one thing that we can be sure of, is that the amount of data will escalate over coming years, as the oilfield gets more digital.

Aker Kvaerner will provide the engineering expertise, and will develop decision models which will indicate if a maintenance task needs to be completed.

All of the data is put in a database. Over time you can get information about how the different pieces of equipment perform over time, and when the optimum point is to perform maintenance tasks is based on the data.

Aker Kvaerner will explain what range the data should be in, and at what point the alarm should go off. The net result will be a maintenance program based on the actual condition of the facility which again will reduce the maintenance scope as well as reduce number of non-planned shutdowns.

This knowledge can then be extended to installations of the same equipment on other platforms.

Ultimately, oil companies will run the maintenance of their own equipment.

**A bigger system**

Aker Kvaerner believes that the system should be just one component of a more broader maintenance management system, such as its Technical Integrity Management Services (TIMS).

TIMS has five components: technical condition and analysis; maintenance engineering, condition monitoring; technical safety; and non-destructive testing / inspection services.

"What’s important for me is that CBM is a part of a larger package - which includes other components - of maintenance and preventive maintenance,” says Mr Erdal.

"Maintenance engineering and condition monitoring is very much linked together,” he says.
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• Data and Knowledge Management initiatives are driven in ExxonMobil to form a coherent strategy for the management of upstream technical data

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Production data out of spreadsheets

Production Access of Houston is on a mission to persuade independent oil and gas companies to get their production data out of spreadsheets and into integrated production management software. We asked VP Jeff Chestnut how this would work.

We all know that having good production information is critical to making the best operational decisions. But too often, historical information is not easily available to engineers because the information is stored in hard to locate paper files, or the previous engineer has left the company and taken the knowledge with him, or it is all on Excel spreadsheets hidden somewhere on the network.

Production Access has a mission to persuade independent oil and gas companies to capture daily information and store it in a central data warehouse, with special production management software, properly indexed for future understanding.

Over time, this data warehouse will build to become a centre of knowledge that does not reside only in hard-to-access paper files and with individual engineers, and is available to everyone in the organisation.

For example, drilling engineers can access data about previous drilling information, they can use to select the optimum bits and mud to use in their drilling operations.

The software can collect data from the field, either automatically via interfaces with SCADA equipment, or manually using a handheld device in the field.

Data is then synchronised with the office system and immediately available to managerial support teams that use the information.

Problems with spreadsheets

Over the past ten years computers have got faster and more powerful, but this has led many oil and gas companies to make more use of spreadsheets.

While they are good at putting users in better control of calculations and manipulations of data, they have proved cumbersome in sharing information with others who need the same information.

Companies developed a multitude of point by point solutions that forced core information to be handled multiple times in a variety of formats and ways.

Meanwhile, the lack of standard naming conventions and identifiers on assets created a major obstacle to having an enterprise-wide view of the information on assets. There was not a way to expediently correlate information, other than manually.

"Large efforts were required to generate quarterly reports, which involved finding, compiling and editing information aggregated from a variety of sources and systems," he says.

"And, as the information originated from multiple sources, the process was error-prone, in addition to being labour intensive and time-consuming."

"The ability to tie information together and communicate between systems and departments was still missing," he says.

Accounting

Having an integrated system makes it much easier to track volumes of production for regulatory and accounting requirements. The software manages the complex business rules involved in hydrocarbon allocation and reconciliation, and integrates with the accounting software.

It also enables tracking of delivery through multiple sales channels, which is hard for traditional accounting packages to do.

"Integration of well records with accounting exposes details of AFE (authority for expenditure) cost, supporting drilling programs and revenue forecasting," he says.

This kind of capability offers the ability to set flags on specific expense items being incurred daily, such as daily production cost, budget vs. actual, actual daily spend exceeding pre-set limits, and variance from revenue forecast.

"In general, on the cost side, better management of AFEs is afforded in an integrated reporting environment," he says. "Such an infrastructure will also foster accountability and audit ability."

Drilling information and workflow, from AFE generation and approval to well completion and workover, is a critical source of operational and financial information.

Relevant information at drilling can be entered once and immediately made available to users throughout the company through morning reports.

For example, after completion going into production, all the well information is there, meaning there are no delays waiting for data for approvals.

Actual production volumes can be compared with predictions to analyse the productivity of the well, and the costs can be tracked to identify possible savings.

"On the revenue side, hedging strategies are more profitable as the accuracy of production forecasting, production reporting and allocations increases," he says.

Managing maintenance

An integrated data system is useful in managing maintenance, because there is plenty of data which can indicate the level of health of the well.

This includes tracking failure data and histories on most types of down-hole equipment, viewing failure trends to develop proactive solutions, capturing field completion data, monitoring budgets, delivering daily completion and workover reports, and creating wellbore diagrams automatically.

Engineers can use this data to decide the best schedule for well workovers.

"By looking at production over a period of time the cause of failures can be identified by systematically looking at the system and correlating events. For example it may be that one driller is more expensive than another, but the data shows that their wells perform better, making it economical to use them."

"One company reduced field costs by 5 per cent by having an engineer focussing on preventative analysis to reduce failures," he says.

"Engineers can do anything he likes to achieve that objective but he can make more effective decisions because he had the right information about failures through the software."
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**Oracle's approach to data management**

We have all heard that upstream professionals can spend half of their time managing data. We asked David Shimbo, Senior Director for Petroleum Solutions with Oracle, how he thinks this time could be reduced.

Upstream exploration and production professionals spend up to 50 per cent of their time sorting out data, accessing data and cleansing data. "We have all heard that upstream professionals can spend half of their time sorting out data, accessing data and cleansing data. Oracle thinks this can be reduced to 25 per cent. Oil and gas companies are getting pretty good at providing software applications for everybody to do their normal work." For example a drilling engineer on an offshore oil platform today will have no problem accessing his drilling software. The problem emerges when he wants to find out information that requires the integration of technical, operational and financial data. "When will the barges with drill pipe arrive, what is happening with the drilling mud, what is the current actual vs. projected budget and what other reservoir intervals can this well be completed in?"

He needs to access other people’s software applications and the data which goes with them, and that is where the challenge arises. "A typical scenario is when staff know the information they want is available somewhere in the company, in some software application, but just don’t have the time and energy to access it."

Or people start going back to putting together their own private spreadsheets, rather than go through the trouble of trying to access live data from the company database. The number of different databases (Oracle, SQL Server, Access, flat files) being used in the oil and gas industry has proliferated a great deal over the past 4 or 5 years. It’s not surprising that nearly all oil and gas companies have active projects to make their data easier to store, manage, access and modify. The focus of these projects is to provide composite information from multiple data sources via a unified desktop.

**Oracle**

Oracle databases are used by over 750 oil and gas companies, and hold around 90 per cent of all oil companies’ data, the company estimates. It has been rapidly building its oil and gas division over the past few years, with staff with an intimate knowledge of both IT and oil and gas.

For example, Mr Shimbo was previously a petroleum engineer and geologist, with a masters degree in petroleum engineering, and has worked for companies including Exxon, BP, Halliburton and IBM. "The company has been taking on a lot of people like me because we recognize that we need to understand what the line-of-business operations managers need,” he says.

The company has a lot of expertise in how to build an E&P data management framework and make this information available safely and securely around the company. The focus of this solution uses service oriented architecture and an open, scalable framework.

**Proprietary or open source**

Mr Shimbo believes that oil and gas companies have a choice between using proprietary data models, which can make it very expensive to change database supplier should the company ever wish to, and open source data models, such as the Public Petroleum Data Model (PPDM), which enables a company to keep its options open.

Proprietary data models include Landmark’s PetrolBank and Schlumberger’s Seabed. Companies choosing the open source option still need a database company such as Oracle, but they can change database companies much more easily because the data will be in PPDM format which will work with many different databases.

The PPDM data model covers many different aspects of subsurface data, including seismic, geologic, engineering and operational data. The PPDM data model was designed by PPDM members including ExxonMobil, Chevron, BP, PetroCanada, Schlumberger, PEMEX, PVDA, and ARAMCO.

Companies typically take the PPDM model and adapt it to their needs, doing company specific extensions.

**Data hub**

Around the core data model, companies can build their own “data hub,” with workflows, business intelligence, and different ways of working with the data (eg dashboards, PDAs and cellphones). This data hub can integrate seismic data, geologic maps, engineering information, financial data, SCADA systems, real time well data and safety systems.

The “business intelligence” layer is particularly interesting at the moment, Mr Shimbo says, because it creates new ways to look at composite data sets from E&P applications, operational systems and ERP systems. The business intelligence layer can be customized for each user’s needs and creates a powerful analysis tool for end users.

**Everything integrated**

So are we heading towards a holy grail of everybody’s work being reduced to moving from screen to screen on their computers, with all information they need at their fingertips, all data being typed into boxes, and no spreadsheets or e-mail in sight?

Mr Shimbo doesn’t think so. He observes that geoscientists and geophysicists tend not to have any process they stick to and are very intuitive in their geologic analysis, so workflow software would not probably work well for them.

Reservoir engineers on the other hand often follow strict engineering processes and use standard engineering tools, so workflow tools work very well, he says. Mr Shimbo recommends against putting together strict workflow software which takes users from screen to screen, because of its inflexibility. "As the needs of the user change, you don’t want to get locked into an inflexible, non-scalable architecture," he says.

“If we embrace very much open standards, open systems, we can change workflows, customize user interfaces and fully utilize service oriented architecture.”

"It will also include data migration activities entailing the identification of legacy data and data that must be included or considered in the implementation." Testing and user acceptance activities will begin once the customer has accepted the system as it has been configured. A test environment is installed and configured in the customer’s offices. This configuration mirrors the applications that will be eventually deployed." After deployment, there will be a period of training, which is key to ensuring the return on investment in the system and should be planned from the outset.

"Experience has shown that knowledge retention is most successful when the user community begins using the software immediately after training."
SPE's Digital Energy Conference, in Houston April 11-12th, continued the industry’s discussion about how to combine people, process and technology. Our technical editor Keith Forward was there.

Talking about the cross over of roles, he asked if it was easier to train an IT person to drill a well or a petroleum engineer to use a computer? The answer is obvious, he said; just look at other industries for example medicine, surgeons.

Shell
Charlie Williams, chief scientist well engineering and production for Shell, talked about Smart Fields development and the need for control systems to optimise production to increase recovery rates to nearer 35-40%.

Want recovery of 35-40 per cent - Charlie Williams, chief scientist well engineering and production for Shell.

Need to decide which assets to digitise first - Ricardo Beltrão, general manager, production and digital oilfield, Petrobras.

At first we were trying to convince the assets that this was a good idea, now there is a queue and we have to prioritise for the most appropriate projects,” he continued.

Mr Beltrão talked about three pilot projects they have just finished. "The perception is there are hidden costs such as maintenance but there are also lots of gains.

"Offshore we have a lot of opportunities but technology can be too expensive. Onshore we don’t have to convince asset managers because they realise it is worthwhile. We need to gather more data from pilots; we have already done the easy part, now we are facing more complex fields."

USC
Iraj Ershaghi, Professor and director, petroleum engineering, University of Southern California, talked about an initiative involving closer integration between industry and university departments, which he said currently send out graduates who have not completed a single course in digital field technology.

Mr Ershaghi runs C2Soft, the Chevron-funded Center for Interactive Smart Oil Field Technology at USC. The centre runs a master’s program in petroleum engineering specialising in smart oilfield technologies.

"There is insufficient IT training at universities, young engineers used to have mentors but now there are all 55 and have no idea about IT,” said Mr Ershaghi. "Young engineers need to be trained in useful skills and that includes smart field technology.

"There is a need to involve people early through master’s programmes in smart oil fields.

"We need to try and make it compelling for the workforce and introduce knowledge transfer through cross training, delivering change in a way that eases adoption. We need to introduce virtual classrooms, remote learning centres and collaboration on projects, setting up more links with universities."

He said there was insecurity based on changing roles; it was no longer enough to have expertise in one area without understanding how it affects other disciplines.

Petrobras
Ricardo Beltrão, General Manager, Production and Digital Oilfields, Petrobras, talked about various projects which began in 2006.

"We try to align technology with assets, selecting pilots to face different challenges," he said. "Leadership is the key to success, working through committees to align units with the main goals of the company through sponsorship by higher management."

"We need to try and make it compelling for the workforce and introduce knowledge transfer through cross training, delivering change in a way that eases adoption. We need to introduce virtual classrooms, remote learning centres and collaboration on projects, setting up more links with universities."

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Petrobras
Ricardo Beltrão, General Manager, Production and Digital Oilfields, Petrobras, talked about various projects which began in 2006.

"We try to align technology with assets, selecting pilots to face different challenges," he said. "Leadership is the key to success, working through committees to align units with the main goals of the company through sponsorship by higher management."

"We need to try and make it compelling for the workforce and introduce knowledge transfer through cross training, delivering change in a way that eases adoption. We need to introduce virtual classrooms, remote learning centres and collaboration on projects, setting up more links with universities."

He said there was insecurity based on changing roles; it was no longer enough to have expertise in one area without understanding how it affects other disciplines.
are using new imaging techniques, new drilling techniques; it is now economic to use snake wells and smart wells. The snake well concept was developed back at once," Mr Reddick talked at the Iron Duke Brunei field, which consists of a series of pockets in an area 28 metres thick, two kilometre long and 300 metres wide. In the upper part of the reservoir there is a layer of natural gas whose pressure drives the oil to the well, requiring accurate drilling to avoid hitting it. Using drills that can be steered with high accuracy, in conjunction with software that generates detailed models of underground geology and reservoirs, snake wells can be steered along complex horizontal paths hitting pockets with an accuracy of around two metres.

"On one asset at Iron Duke, we achieved 15% additional production and a 2 year delay in water breakthrough using snake wells which are now a proved concept." He is increasingly using collaborative environments to improve teamwork and sharing of information. He said that real-time drilling operations centres are already connected worldwide, so that is possible to shift operations to another centre in the event of an emergency, such as during hurricane Katrina.

Mr Shell talked about Shell's operational excellence planning cycle which operates on a yearly basis. "We need to evaluate opportunities so that they can be aligned with production plans. Smart projects are not so different, there still has to be a value proposition, a business case to be evaluated so that the best projects naturally rise to the top."

"The people element is often forgotten," he noted. "We need to integrate smart concepts into daily work processes, implement a smart decision process. Then it will be easier to deal with the crew change, to propagate experience and create an information flow to new inexperienced people."

"How can we drive a passion for smart concepts? We maintain a group of IT professionals who champion innovation."

"Back in the late '80s we had to stop because IT guys can not drive change by themselves. Now there is a better understanding of the need for smart systems. Basically we have to deliver what people need to be successful."

**BP**

Phiroz Darukhanavala, VP and CTO of digital and communications technology, BP, talked about the, "tremendous opportunities and successes that will go to those who develop hybrid work skills, IT and operations. Neither side will have an automatic edge," he said, "and it will impact how we develop ourselves, who is recruited and how they are trained; jobs will be more rewarding, bridging two worlds far into the future."

"IT professionals and engineers traditionally worked in two different worlds," he said, but this is no longer true and an effective 'resinarian's worker' will have to be able to go back and forth with ease. "The industry is facing a do or die situation," he said. "Expertise must be better utilised, remote collaboration will and must happen because it will have advantages. Don't think this won't happen soon, before you retire. Change is not new."

He talked about the rapid growth of digitalization and how the industry was being swept up by advances that are resulting in a huge increase in data. "With the deluge of data the question is how do we manage it? A data flood is almost as bad as a data drought and probably more expensive for the industry."

"Seventy percent of seismic data is underused and fifty percent of the seismic logs from one of the largest oil fields ever discovered were discarded unused," he said. "We need to harness this data in future and make use of it to influence business decisions."

"Real time is not fast enough," he continued. "We need to operate in the realm of predictive analytics, instead of reacting to information predicting outcomes."

"We need to work more collaboratively, so that experts wherever they are can focus on a particular problem. Distributed decision making is one of the keys."

**BP Field of the Future**

Chris Reddick, technology unity leader in BP's exploration and production technology group in the UK, talked about implementation of his company's Field of the Future (FoF) program, which is focussed on leveraging real-time or near real-time data to improve both short term operational performance and long term recovery. "It will take ten years to reach the goal of oil and gas."

"Communications, hardware, advanced collaborative environments (ACEs) and introducing standards that have been used to retrofit existing assets, these are the fundamentals," he said.

He said there were a number of challenges, not least being that it has to be demonstrably focussed on the highest value opportunities in BP's portfolio, and that the content of the program has to be seen as adding value to the business.

"Both of these challenges require deep engagement with the business around the question of value - how it is defined, accessed and measured," he said.

Further, since BP's program is impacting a number of its business units simultaneously, it is important that all lessons learned from the implementation of this program are shared as rapidly as possible. "In many cases these lessons are not simple extensions of current practices but rather a very significant shift in the way of working which will have profound and lasting impact on BP's operations," he continued.

"We think it is important to be able to explain how technology supports the E&P strategy, increasing moving forward production and managing decline."

"I don't see the point if it just allows us to produce existing wells more efficiently, it has to add a reserve base. In the long term it can add 5%, that's a billion barrels to our reserve base," he said.

**Value proposition**

Discussing the value of a project can be a difficult proposition, he said, as the concepts are relatively new to some so the potential sources of value may be unfamiliar. "A complicating factor is that such programs are sometimes described in terms of infrastructure and technology without always clear identification of the business benefits that they are leveraging," he said.

"Clear documented successes require a clear baseline from which to measure improvement. BP takes a twofold approach. First it works with the business units to identify value threads that are enabled by Field of the Future, design new work processes and piloting technologies to implement them. Next, it works to develop and mature new work flows so that eventually they can be incorporated into BP's 'Common Process' system. Some of the areas in which real-time data can impact production are: Sand management - the ability to bean up sand prone wells more quickly and to operate them consistently closer to the limit of sand free production. Efficiency - distilling models of wells and facilities to improve both production efficiency and capacity. Surface equipment monitoring - reducing planned and unplanned trips to equipment by measurements of equipment run time and health monitoring. For example, better sand management through sand alerts resulted in a 1-3% improvement. Using slugging management, reducing the percentage of time flow is unstable resulted in 1-2% improvement in production. "We need to look at leveraging real-time data for a small number of high impact opportunities for several aspects of the business at once," Mr Reddick said.

"Value can be evaluated from the ground up under a common framework. We have to go after a small number of value strands relentlessly to get them embedded within the business."

"It will take ten years to reach the goal of a billion extra barrels; we need number of things to go well, a number of things that only go well, a number of things to go wrong," he said.

Further, since BP's program is impacting a number of its business units simultaneously, it is important that all lessons learned from the implementation of this program...
are growing exponentially, fed by a mounting array of sensors, ERP systems, instrumentation multimedia and other unstructured data,” said Paul Stone, technical director, BP.

To unlock some of this value, BP have launched a predictive analytics initiative, investigating pattern recognition techniques that find correlations and relationships in large data sets.

Recent advances in computing power coupled with more sophisticated applications, easy-to-use interfaces and easier access to data have made predictive analytics a more valuable, practical tool for wide scale corporate adoption.

With more data available from sensor enabled applications, predictive analytics presents an opportunity to make all aspects of field operations more efficient and effective.

Using data driven models to predict future events implies a number of things, foremost that there is a pattern in the data that can be associated to a particular event and that the pattern can be detected in a time frame to allow the business to act.

“By analysing large volumes of historical data and having associated various patterns to known events, the business is then able to monitor present data and watch for those patterns as indicators of future outcomes.”

“It is worth considering the difference between this and a first principles model based on physical equations.

“A physical equations model requires a significant understanding of the processes involved, and can therefore take significant time to build.

“A data driven model simply looks for patterns, and it is not necessary to understand why a particular pattern correlated to a particular event to use this to drive predictions.”

Data driven models will not replace physical ones, but they can offer advantages in certain cases, where speed of implementation is important and where understanding the causality in a system would be too expensive or time consuming.

“Data models can even lead to such an understanding through revealing areas of correlation to investigate.

“A significant advantage is that data models can be tolerant to occasional bad data. For instance, in the event of a sensor failure, the predictive analytics model can predict the reading of the sensor had it been working from other sources, and thereby avoid a potentially unnecessary shutdown.”

A downside often mentioned is that because predictive methods rely on historical data they struggle when the situation being monitored moves into unknown territory. This is true, but techniques exist for current data to be continually analysed to recognize new patterns and update the model.

“When a good understanding of the underlying physics of the system is known, this can augment the data driven approach.

“We believe that data driven will not replace the physical one, but they can offer advantages in certain cases, where speed of implementation is important and where understanding the causality in a system would be too expensive or time consuming.”

“Data driven models do not have to 100% perfect, they have to tip the advantage in favour of the business and making the decision; they have to be right more than not and more often that was previously the case in the absence of the technique. In these cases there can be a clear business benefit to data driven predictive analytics.”

Implementations

BP has been exploring the use of predictive analytics across a variety of its business operations.

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Implementations

BP has been exploring the use of predictive analytics across a variety of its business operations.

Third party vendors were engaged to undertake the proof of concepts and resulting trials, targeted at specific business applications areas.

“A significant cause of production loss across BP’s operations is through equipment downtime. Increasing uptime of the installed equipment base can have significant positive impact on revenue.”

BP selected a product from a leading supplier of predictive analytics software applied to condition monitoring.

“The predicted value of the sensor in question can then be compared to the actual value measured and a discrepancy suggests that the equipment has moved away from normal operation.”

“If say there were thirty sensors being monitored, the software will look at all thirty sensors together and can use twenty nine of the sensors to continually predict what the thirtieth sensor should be reading under normal operating conditions.”

“One benefit of this approach is that the software can discover real problems more closely. An issue with simple trending of an individual sensor is that alarm and alert levels have to be set with quite high margins.

“For instance, if the power to a piece of equipment is increased one would expect vibration also to increase and this would be normal. Alert levels would have to be set above this increased level to avoid false alarms. However this situation may not then provide a warning to a problem when power has not been increased.”

“Knowing a machine’s behaviour has deviated from normal allows for immediate inspection, and the deviation itself may be characteristic of the problem developing, allowing it to be resolved before a failure, or at least more quickly repaired.”

Virtual Metering

BP has been working with another vendor that provides software that monitors well conditions while the well is on test and the flow rates of gas, oil and water recorded.
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