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Oil IT Journal interview: Nelson Silva and Augusto Borella, Petrobras

Petrobras' chief strategy officer is planning for digital moonshots and disruption. Examples include robotic reporting, real time AI-driven pressure monitoring. Call is out for in-house and outside expertise.

Petrobras unveiled its business and management plan for 2018-2022 in December 2017 that includes a chapter on capturing the opportunities offered from digital transformation across the value chain, from geoscience, reservoir management, automation, artificial intelligence, big data and the cloud. Oil IT Journal interviews Petrobras' Nelson Silva (chief strategy officer) and Augusto Borella (general manager for digital transformation).

Oil IT Journal - What role does digital transformation play in your strategy?

Silva – Our 2018-2022 business and management plan introduced three new strategy target areas, preparing for a low carbon future, an increased focus on the digital transformation and evaluating and mastering financial risk.

Oil IT Journal - Lets focus on N° 2, the digital transformation.

Silva – Sure. We currently have a lot of initiatives across the company from upstream to downstream. These are coordinated from a central unit, the digital transformation area with the objective of minimizing bureaucracy and increasing speed of development. A huge effort has gone into understanding what is going on across the company, mapping many independent initiatives to form a clear picture of what we already have. We also have looked elsewhere, at what other oil and gas companies are doing and what other industries are up to in the field. We are now in the final stages of collecting these lessons-learned and are developing our final proposal to the board. Meanwhile, the digital transformation is ongoing, as we consolidate our activity, avoiding competing initiatives and conflicting efforts.

Oil IT Journal - Can you give some examples?

Silva –We are targeting the 'moonshot.' We are seeking disruption! Usually, folks do not have the time for this kind of thing. We are not only targeting incremental change although that will continue. We are looking at agile teams and methods as well, to reduce drastically the time-lapse between exploration and first oil. We are not talking about down to six months or a year – we need to be able to compete with US shale.

Oil IT Journal - OK – but that goes way beyond digital.

Silva –Yes it does, but the digital transformation is really about doing business differently and it does go beyond just 'digital' transformation. It is about using all available technology differently. People at the coal face don't have time to do this kind of thing.

Oil IT Journal - OK, so how are you going about it?

Silva –A good question. But that is why we call it a moonshot! We will be giving targets and challenges and providing an environment where our engineers can try things and where they will be free to fail too. We live in a risk-adverse industry, so we need to test things that are not usually tried. Think back a couple of decades, before the iPhone and other modern technology marvels, and you can see that we all now behave completely differently.

One specific idea addresses the huge resources we devote in complying with government agencies' queries. This currently involves a big head count. Why can't we replace these with intelligent robotics that exchange information with robots at the agencies?

Oil IT Journal - You mean machine-to-machine reporting?

Silva –Yes. We are prototyping continuous machine-to-machine communications and discussing this with the federal government which is very receptive. As you know, recent Brazilian history has been plagued with corruption issues and we see this as a means of avoiding such problems in the future.

Another field is seismic imaging. This currently suffers from an excessively long workflow. It can take a year to process and interpret a large survey. We want to shorten this down to minutes! There are many other similar opportunities for similar 'moonshots' in oil and gas. Of course they might not all work! No Limits!

Oil IT Journal - We have reported on a few initiatives to use machine learning to go straight from raw seismic data to a reservoir model. Is this the kind of thing you are looking at?

Silva – Exactly. We are under pressure to compete and shorten the time to market. Data science is very important. And it also has potential application in the field of safety, in maintenance and in predicting equipment failure before it occurs. Another use case is knowing where people are and controlling access and operational behavior. AI and analytics can help with asset integrity, doing stuff on our behalf.

Oil IT Journal - Any noteworthy conventional earlier projects to report?

Borella – Yes. For instance, in our R&D center we have developed an image recognition/processing system that can identify and track people in video imagery. We also work with drones for data acquisition and imagery – including underwater. We also developed a state-of-the-art control room for real time drilling operations which has a machine learning layer on top. One example is our PWDA (pressure while drilling analysis), a real-time data visualization platform that was developed to support drilling but that can be applied in other areas. The platform monitors real time pressure data from sensors on the rig and an artificial intelligence algorithm receives and interprets the data. This warns of possible operational problems and drilling performance issues. Since mid-2014, Petrobras has tracked the results from the program showing almost $100 million of losses have been avoided with the use of the platform.

Oil IT Journal - Who is doing this work – do you work with Brazilian R&D orgs?

Silva – We have 1,500 engineers in our own R&D center, our primary source of know how and brain power. But yes, we are in the process of selecting out technology partners. We will have partnerships with technology firms and consultants along with our own resources. We are also seeking expertise in-house. Our early internal announcement on the new digital structure brought a great response, different from the usual structure announcement. Lots of young people in the company said, 'we want to be part of this!'

SIRIUS researchers, Schlumberger and Statoil are developing a digital geological assistant for prospect evaluation.

Exploration geologists are, apparently, 'limited by their reasoning capacities!'

Sirius*, the Norwegian R&D establishment is working on a Digital Geological Assistant (DGA) in collaboration with Schlumberger, Statoil, NTNU and Sirius' parent, the University of Oslo. The researchers realized that straightforward geoscience workflows were already digital. Others were unsupported by digital tools, particularly where knowledge is experience-based and intuitive and where images and analogies are used, for instance, in understanding the geological history of a prospect.

Sirius researchers suggested that work done on 'knowledge representation and formal methods' might be applicable. They used gaming technology to produce a working prototype which was well received by Schlumberger (which had just announced its 'cognitive' Delfi environment.)

The ongoing project is to develop a geological reasoning engine to enable formal description of a prospect's geological history amenable to automated reasoning. This will combine 'massive computing power with formal methods of analysis and a logical understanding of how things and ideas in geology interact.' Exploration geologists are said to be 'highly skilled but are currently limited by their reasoning capacities.' Geological analysis is complex, 'an automated tool could help generate more accurate assessments of prospects.' More from Sirius.

** Centre for Scalable Data Access in the Oil and Gas Domain.*

Editorial - Blockchain is bullshit!

Oil IT Journal editor Neil McNaughton looks into some proposed use cases for blockchain. Many require supervisory control from a 'permissioning' authority. At which point, blockchain serves no useful purpose at all.

In French there is a wonderful expression, '*l'esprit de l'escalier*.' Imagine, you just left a society dinner where a subject dear to your heart was discussed at length. You felt you had

something very important to say but could not quite formulate the *bon mot*. As you go down the stairs, your repartee comes to you - but too late! The opportunity to shine has gone. Happily, this is not a problem for the editorialist who is in the enviable position of meeting you all on a regular basis. So, at the risk of boring you, this is what I wish I has thought of last time.

It was not exactly the last time, but it was last year in issue N° 238 where I was skeptical about blockchain. But not perhaps skeptical enough. Some of you may see me as rather outspoken. Actually, I often regret not having put stuff more forcefully. I rely too much on understatement that I think is lost, especially on non-English speaking readers. So just to make things perfectly clear, **blockchain is bullshit***!

Let's unpick a couple of proposed use cases for blockchain. First, blockchain has been proposed to stop forgery in the high-end art world. The idea is that an auction house or gallery would record each sale in a blockchain ledger that was sharable worldwide and available to all subsequent buyers and sellers to check the art work's lineage and provenance across the years. So far so good (although the notion that the system will operate worldwide for all time may stretch the imagination). I allow that the system as described will faithfully record all transactions.

The problem arises when you try to equate a 'transaction' with a physical object – the work of art in question. What happens if one dishonest owner decides to sell a forgery at some future date and keep the original work on the wall of his dacha? All is fine as far as the blockchain goes. All subsequent buyers get a forgery that checks out according to the blockchain. The cheater gets to keep the original *and* his money. The blockchain may stop him selling it again in the immediate term, although it could go on the black market for a substantial amount, especially once folks have read and digested this editorial. In a few hundred years, with perhaps several re-forgeries 'verified by blockchain' and sold-on, nobody will have a clue where the original piece is or who has been cheating along the way. The work may even later be 'rediscovered' by an expert, *sans* provenance and might reacquire great value.

I can hear you object that the digital transaction could be tied to the physical work of art by some sort of RFID chip or other smart device embedded in the work of art. But this is just going back to 'technology' which is much like the artist signing his *oeuvre*. The debate as to whether a signature or RFID chip can be falsified is orthogonal to the blockchain issue. It is no longer the blockchain that provides the mechanism of trust.

Another example, blockchain in green energy trading. The idea is that 'green-certified' electricity can be bought and sold on an exchange with blockchain 'guaranteeing' greenness. This seems even more far-fetched. At least an art work is unique. But electricity? Why can't an unscrupulous owner of say a coal mine and a wind farm pass off electricity from the former in a blockchain-certified transaction? This is a question I put to Evan Caron, the founding partner and MD of a blockchain-based green energy trading system, Swytch. Caron offered the following, '*The verification layer and asset system registration will verify the energy quantity and validate it against the type of technology used. Machine learning and artificial intelligence are used to determine if the energy source or source data is corrupted or had levels of irregularities*.' In other words, trust again comes from stuff that is external to the blockchain.

Blockchain has also been proposed for the exchange of contracts. In this issue we report on one such initiative from SAP and IBM to develop a blockchain-based joint venture accounting solution. One approach to this is the Ethereum Smart Contract,which has a mechanism for registering a contract alongside a blockhain. Maybe this is a less bullshit use case than some, I'm not sure. What I do know from my days as a consultant in an earlier digital transformation is that legal was the last department in the company to join the corporate network. I suspect that they will be similarly reluctant to turn their contracts over to some 'open yet secure' environment. Already, the Smart Contract world has seen some of its technology retired for security issues. The Smart Contract has been touted as having the potential to 'cut lawyers out of the process altogether.' That, as they say, is not going to happen.

Blockchain is a means of assuring the trustworthy exchange of a 'token,' bits and bytes if you like. The problem is the relationship between this token and anything else in the real world. This is also true for bitcoin whose relationship with real money is tenuous. You can't use a bitcoin to buy stuff in a shop. I also understand that it can be much easier to exchange real money for bitcoins than the other way around as exchanges may have more or less liquidity. Again, the connection between the digital token and real cash is not guaranteed by the technology but by the local exchange.

So why all the fuss about blockchain? I think that it is the promise of a connection between the digital and the real world. This is an IT obsession, as witnessed too by the romance of 3D printing. Blockchain is touted as tying all and any non-digital assets into the computer. But it doesn't. It needs some external agency such as a 'permissioning' authority to do this. Once that is in place, you don't need blockchain at all!

** For a best in class example of blockchain bullshit read the World Economic Forum's effusive post on, the Fourth Industrial Revolution and how blockchain is going to 'upgrade society's operating system.'*

@neilmcn

More from the 2018 IFPen DataSciEnergy event

Paraview - Total's a big viewer for big data. Données Brute applies game theory, data science to the energy transition. Total's random forest classifier bests the industry-standard approach to distillation column flood mitigation. IFPen uses a simple response surface for rapid evaluation of proposed well locations.

Mélanie Plainchault and Bruno Conche (**Total**) observed that as data sets get 'bigger,' users may overlook key information. This has made visualization and rendering a big research topic across seismics, core (digital rock), reservoir grids and LIDAR all of which can involve multi giga or terabyte data volumes. Total's visualization effort lies at the intersection of its computing and data science activities. The tool of choice is Paraview, a parallel visualization application developed by Sandia National Labs. Paraview has been used to interact with a 500GB post stack seismic dataset and with NNTU's 90 million cell Johansen grid, an open data

set from a North Sea CCS project. Paraview uses the HDF5 grid standard. Eclipse data files are converted using ResInsight's GRDECL utility. The INT Viewer also ran. Computer tomographic core scans are analyzed with Paraview's scripting capability and TTK, the open source Topology Toolkit.

Mathieu Anderhalt's '**DonnéesBrutes**' (raw data) startup is applying game theory to energy (renewables) asset management. Game theory applies to situations where there is imperfect information and many actors, such as utilities arbitrating between different electricity sources, buyers and storage possibilities. The technique studies a large, repetitive 'game,' with learning updates at each step until a 'Cournot-Nash' equilibrium is reached. Anderhalt is also working on a 'counterfactual regret minimization algorithm' to track regrets (buyer's remorse) from past plays and nudge future play away from regret-generating plays. Tools of trade include Kafka, Apache Storm for computation and Hive/Hadoop/HDFS for storage. All is rolled-up in a new 'Green Like You' solution that promises 'data science for the energy transition.'

Nathalie Behara (**Total**) has used a Random Forest classification algorithm to successfully predict flooding in a refinery distillation column from small changes in flow regime. Flooding is a serious problem. Once it reaches a runaway state, it can take several hours to get back to normal operations. Over a seven month period, some 77 flood events were studied. Previous empirical/first principle methods predicted floods but gave unacceptably high false alerts. Behara developed a data-driven model using SciKitLearn's Ensemble python module that outperforms the 'FCAP' empirical model. The systems is now being fine-tuned for on-site deployment.

Delphine Sinoquet (**IFPen**) presented the optimization toolset deployed in the IFP's Cougar JIP. These can replace an expensive fluid flow simulator with a simple response surface model and allow for what would otherwise be too compute-intensive approaches to sensitivity analysis. The approach is used in well location selection, moving a well around the response surface and observing the production forecast change. An IFPen tool 'HubOpt' uses SQA (sequential quadratic approximation), a technique that Sinoquet has previously applied in a reservoir characterization context.

Oil IT Journal interview: Michael Jones - Halliburton/Landmark

Landmark's senior director of alliances, partnerships and strategy provides an update on Landmark's OpenEarth initiative, now a 1700-strong developer community.

Oil IT Journal checked in with Halliburton/Landmark's Michael Jones to hear how its OpenEarth community platform has developed since we last spoke back in 2016.

Oil IT Journal – What has the take-up been for OpenEarth?

Jones – As of June 2018 we have some 144 active development projects – many private and some public – driven by an OEC Community of nearly 1700 users from 240 companies.

Oil IT Journal – Remind us what the selling point of the platform is.

Jones – Our research of other industries led us to set up the open platform, along the lines of the automobile industry's OAA global alliance that is bringing the Android platform to vehicles. We also realized that a successful platform needed to be open source and have support from the community, not just from a single vendor.

Oil IT Journal – What can Landmark do to persuade industry to work this way?

Jones – We already had an enterprise-scale platform in our DecisionSpace portfolio, which has ten years of R&D in connecting apps to data. OpenEarth would not have been possible otherwise. Now we are offering the platform along with the code base to the community so that they can interact with the platform as they wish. This has been a revolution for us!

Oil IT Journal – Really? Haven't we been here before with OpenWorks and its API?

Jones – Yes and no. The big difference is that now the community has access to the source code, notably to DSIS, the DecisionSpace integration server. Users also get a complete online development capability with 'continuous innovation/continuous deployment.' This is a unique offering that includes several open source development tools.

Oil IT Journal – This is quite a departure from Halliburton's previous stance!

Jones – We are a 'vendor,' and we have seen a degree of cynicism. We are keen to make it clear that others in the community that they own their own ideas and intellectual property. We have drafted a charter to set this out. We showed it to 13 majors, 12 signed up. Anadarko, Devon, Shell, Statoil, Total are on board. These companies organize the monthly meetings – we don't set or own the agenda. Companies can invite third parties to cooperate on what can be private or public projects. The platform will evolve as an open source project, enriched with microservices. There is no single technical authority.

Oil IT Journal – But as oils add their own IP, will they be more or less amenable to sharing what they are doing?

Jones – I think that the industry is undergoing a shift of gear in respect of open source software. Witness Microsoft's own embrace of open source.

Oil IT Journal – You mean Microsoft's land grab!

Jones – You could say that!

Oil IT Journal – The ultimate test of the platform will be if Schlumberger joins.

Jones – We are open, although mindful of anti-trust behavior. OpenWorks already does data exchange with Petrel. The community has asked repeatedly for Schlumberger to join. They are welcome as far as I'm concerned!

More from the OpenEarth community home page.

2018 PNEC E&P Data Management Conference, Houston*

ConocoPhillips on the 'million wells yet to be drilled in the US.' Total's data management revolution. Fixing Shell's data 'Tower of Babel.' DrakeWell, 'your data pipeline is your competitive advantage.' BP's GIS-enabled common operating picture. CGG on machine learning and document classification. Newfield's daily text crawler. Talus, 'don't put all your data online.' Shell, the Data Doc and sustainable petrophysical workflows. Enaxis defines the data lake. Wipro on the power of 'small' data management. Anadarko and Perigon's 'intelligent autoloader.' PDS' open source Witsml server.

The Petroleum Network Education Conferences (**PNEC**) annual E&P data management conference was acquired by PennWell (publisher of the Oil & Gas Journal) in 2013. PennWell itself was acquired by Blackstone-based event organizer Clarion just before the 2018 event. 2018 turnout topped 500.

ConocoPhillips' Greg Leveille sees data management as blending into analytics. As such, it makes up one of the two recent 'revolutions' in oil and gas, the other being shale a.k.a. the 'unconventional and analytics' revolution. We are living through a period of 'amazing change.' 90% of US wells are horizontal and the volumes found in the past ten years are mindboggling! There are maybe a million wells yet to be drilled into US unconventional targets with correspondingly massive future resources exceeding the 450 billion barrels of historical production. Data analytics are key to completion design, a multi-dimensional problem spanning production, geoscience, rock mechanics and more. ConocoPhillips has seen a 50% reduction in shale 'spud to spud' time with the application of analytics. Unconventionals represent a fantastic proving ground for new technology as experiments can be performed far more quickly than offshore. Leveille sees more digital/analytics progress to come. Another area of progress is automated drilling, 'removing the human from the drilling process,' leveraging technologies such as the instrumented top drive. Real time measurements can be related to historical data in microseconds for optimization. In conclusion, 'both revolutions are still relatively immature technically but already combine powerfully.'

Elodie Laurent reported on another 'revolution,' in **Total**'s data management. In the last few years, Total has re-tooled its data organization, introducing automation, tracking and auditing its processes, reviewing contracts and using more standards. The data management organization provides a single point of contact and a data gate 'dropsite' for well and seismics. QC'd data is available through a web portal for upload into Sismage (Total's in-house seismic workstation), Petrel, Geolog and its corporate databases. A SQL database tracks requests across the data workflow, adding comments and metadata. A 'QSY' app for SEG-Y seismic QC includes a maps and section viewer, 'a huge time saver.'

Leah Camilli was troubleshooting a massive spreadsheet containing data on **Shell**'s Brazilian unit and found critical data that had been overlooked. Also, different data was being used for the same objectives, a 'Tower of Babel.' Although users wanted 'another database,' this was the last thing they really needed. The crux of the matter was data visibility. Camilli deployed

Spotfire with Alteryx in background (this was later replaced with native Spotfire functionality). Spotfire now sees all original data through a common UWI linking its various corporate data stores. The solution provides Spotfire dashboard plots of lithology in 'a successful combination of the Spotfire toolset with embedded data management personnel. 'Tomorrow, AI may dominate the workplace but right now it's people interacting with people.'

Brian Boulmay provided an update on **BP**'s OneMap Esri-based geospatial data management system. BP's GIS platform has expanded beyond its original upstream focus to be used across the company, in shipping, pipeline, oil spill analysis and HSE. OneMap provides a 'common operating picture' for BP's 11,000 users, blending BP functional data, local system of record data and an individual's project data. Boulmay places GIS at the center of a hub, with geoscience, business intelligence and other domains at the extremity of the platform, 'location is key to everything.' In the Q&A, Boulmay agreed that this picture may be different for other user communities. For instance, while 'SAP is peripheral to us, and we are peripheral to them.' This is the advantage of the platform and shared/linked data approach.

Karen Blohm (**CGG**) reported on reevaluation work done for Kuwait Gulf Oil that included quick look interpretation of a diverse set of new and legacy data. Some 200,000 files without metadata were processed using AgileDD's 'iQC' machine learning automated document classification tool along with CGG's own PleXus application. The whole process ran in a cloud environment produced a 'good enough' deliverable in a 'previously impractical' time frame.

Scot Nesom explained that **Newfield Exploration**, as an unconventional player, sees a lot of data coming in daily. In 2017 this amounted to 600GB, 75 million documents and around 100TB of derived data. Nomenclature across this large and diverse data can be 'nuanced' leading some 90% of project time spent on finding and preparing data and a measly 10% on analysis. To rectify the situation, Newfield built a crawler that searches and indexes everything. The system uses metadata relevance 'boosters' and captures usage patterns to enhance subsequent discovery. Some 7.5 billion terms are indexed and refreshed every 24 hours. The PPDM reference model helped fix the nomenclature issues. Semantic layers have been built individual use cases, 'not the rigid taxonomies of Livelink.' Newfield has now 'flipped the 90/10 rule.'

David Morrison (**Talus**) observed that only 5% of corporate data is accessed, 'so why spend more to have it all online?' Data storage is costly and escalates with desired speed of retrieval. Paying millions for fast online systems doesn't make much sense when all the users need is data on their local workstation. The cloud is seen as making such problems disappear. This is true to some extent, as cloud providers have massive economies of scale. But if you move your data center to the cloud, the intrinsic costs will be about the same and you will need a very high speed link to the cloud. Data in the cloud may be cheap to store but costly to retrieve. Putting all your data online is taking a sledgehammer to solve a simple problem of visibility. The answer? Give geoscientists good data visualization and provide storage options to the data managers ... and checkout Talus' hybrid data storage offering.

Randy Petit (**Shell**) cited Thomas Redman, Data Quality Solutions' 'Data Doc' who has it that the key to data quality is to get it right first time. Fixing data once it's in the database is 'unsustainable.' The Data doc's rule of 10 is, if it costs $1 to capture, it costs $10 to go around the loop and fix when bad, and $100 when a decision is made on bad data. This philosophy has

informed Shell's 'sustainable petrophysical workflow' which implements multiple controls upstream at time of capture. The use of commercial software can make it hard to implement data quality controls. Shell has built its own dashboard to check new logs tested against multiple attributes. The dashboard executes monthly checks on the log database, to find and fix errors and perform root cause analysis. This has led to fewer 'out of control' situations and load time is now under a week. Logging contractor contracts also need tweaking to ensure incoming data quality.

Tommy Ogden (**Enaxis Consulting**) has been working with an unnamed supermajor on a GIS/data lake. But what is a data lake? For Ogden it is a heterogenous accumulation of relational databases, imagery, video, PDFs and other documents. All of which come from data 'tributaries that stream into the lake.' Users are allowed read-only access. Key to such access is the data catalog, which 'goes beyond an index with data definitions, formats and constraints.' The catalog allows a schema-on-read approach as opposed to the schema-on-write of the RDBMS. Access is provided to a refined data area for analysis by Spotfire/Tableau/SQL Server. Alternatively, data may be pulled into a 'user-defined' area for discovery and use by 'citizen data scientists.'

Mark Priest (**Wipro**) sees data management as (still) fighting an uphill battle. Management tends to switch off and customers come back at you fighting! This is a three decade-long issue, but why? To an extent this is down to the apathy towards 'over-hyped' data management and the perception that 'it's just IT.' In the aftermath of the 2014 downturn, we are all asked to 'do much more with less.' Enter 'small data management,' i.e. things that you can do without a budget! Keep your eyes and ears open to your customers' pain points. Learn the Windows PowerShell, Unix scripting, python, R, sed/awk. Count the hours spent on a painful process. Or just count things (and time stamp to establish trends). Start out by hooking an Excel table to a database and 'in a few hours you have a dashboard.' This you can use to identify data issues or to build a master table of who needs to see what data and link it in to the ActiveDirectory. Some zero-cost 'skunky' projects are still running six years later. Priest cited a home-brew clone of OpenIT that tracks the use of 'very expensive' software.

Chris Hanton (**Perigon Solutions**) reported on a core database project performed for Anadarko. Much legacy core data comes as non digital scans of imagery and reports. Also, when core or PVT data is digital, it can come in multiple vendor formats that change over time. Once data is structured, loading with a conventional linear data flow including QC results in 'many bottlenecks and redundancies.' Enter a new approach to data transfer. Lose the 'linear' transfer and go for 'quick efficient population' of clean data to databases and into analytics. Perigon supports 'intelligent autoloading/crowdsourced' data loading from a shared staging area. A generic query builder enables connections to any JDBC-compliant database. Anadarko's James Miller took over to confirm the poor state of Anadarko's data prior to Perigon's intervention. This was initiated following a top-level request from Anadarko's new advanced analytics and data science team. iPoint was chosen for core data consolidation, initially as a manual solution and later with bespoke bulk smart data loaders. This has seen a 80/90% success rate in integrating core data with master well header records for some 115,000 wells. Data is now available for analytics in tools such as Denodo and R, and for use in E&P interpretation packages.

Finally, a note from PNEC exhibitor **PDS** which has developed an open source Witsml server. This acts as a format converter from LAS, LIS, WITS to 'standard' Witsml as mandated by larger operators. Many smaller logging companies do not have the resources to do such transformations. The issue is all the more problematical as not all majors mandate the same version Witsml version, and the conversion is non-trivial.

The next PNEC conference will be held in Houston from the 21st to 23rd May 2019. More from PNEC Conferences.

** on-the-spot report.*

Equinor releases massive data set from decommissioned Volve oilfield

Open data supplied in Eclipse, OpenWorks, RMS and Witsml formats.

Equinor (former Statoil), along with partners ExxonMobil and Bayerngas have released a comprehensive dataset into the public domain covering its decommissioned Volve oilfield. Jannicke Nilsson, Equinor's chief operating officer, said, 'We believe that this data will be very useful and will further learning and experience transfer across industry and academia.' Discovered in 1993, Volve was shut down in 2016, having produced some 63 million barrels. Removal and decommissioning will be completed by the end of 2018. The field produced from the Jurassic Hugin formation at depths of around 3,000 meters.

The released includes production data, well design, completion string design, seismic data, well logs (petrophysical and drilling), geological and stratigraphic data, static and dynamic models, surface and grid data. The released data formats are in themselves of interest. These include some proprietary 'standards' (Eclipse, OpenWorks, RMS), some PDF reports and Witsml real time drilling data. The 7GB well data file contains a mixture of Ascii, DLIS, PDFs and TIF images. Volve students will be confronted with some serious data management issues before they start interpreting. All part of the learning experience!

Wall-to-wall machine learning for CGG GeoSoftware

PowerLog and Hampson Russel now expose open source ML functionality. CGG 'lifts-and-shifts' to the Azure cloud.

CGG reports extensive use of machine learning across its software portfolio. ML is used for a variety of 'mundane' tasks such as modeling missing log curves and identifying and flagging poor-quality data. The latest (9.7.2) release of its PowerLog petrophysical analysis software offers native machine learning and deep learning Python utilities, leveraging open-source technology in custom workflows. Likewise, the 10.4 release of HampsonRussell adds 'substantial' new ML functionality in its Emerge attribute prediction module. This uses a 'deep feed forward neural network' to the challenging task of density estimation in seismic inversion.

CGG is migrating all of its software products to the Cloud, first to Microsoft Azure and then to other cloud providers. An initial 'lift-and-shift' port is complete, now the company is working to scale-out CPU-intensive computations to take full advantage of the HPC capability of the cloud. CGG's new CEO Sophie Zurquiyah said, 'We are taking the lead in developing new workflows and capabilities that leverage the full potential of ML and the cloud.' More from CGG GeoSoftware.

Book Review: Intelligent Digital Oil and Gas Fields

A comprehensive guide to the digital oilfield from well-qualified specialists.

Intelligent Digital Oil and Gas Fields* (IDOF) by Gustavo Carvajal (**BP America**), Marko Maucec (**Saudi Aramco**) and Stan Cullick (**Rare Petro**) is a 350-page, information-packed resumé of the digital oilfield movement. The authors experience of the DOF began in the mid 2000s when, as specialists from Halliburton, they worked on Kuwait Oil's flagship KwIDF project.

An introductory chapter sets out the essential technological and business underpinnings of the DOF and provides a brief outline of major industry initiatives, Shell's Smart Fields, BP's Field of the Future, Integrated Operations initiatives from ConocoPhillips and Statoil and I-Fields from Aramco and Chevron.

Other chapters cover instrumentation, data conditioning (but not data management – see below), analytics, workflow automation and smart wells. These are pitched at a very accessible level and should be useful for giving students and domain specialists a good (if uncritical) view of the big picture. Coverage includes a fairly extensive top-level treatment of AI and machine learning in predictive analysis of equipment failure.

The workflow automation chapter covers all bases but suffers from an issue that permeates IDOF. The authors share the Society of Petroleum Engineers' reluctance to name to a piece of software. This misguided avoidance of 'commerciality' is curious. Is all software 'commodity?' Can a book about the digital oilfield be written without mentioning the PI System?

The topic of data management is touched on in the introduction but poorly developed elsewhere in IDOF which may well reflect the state of the art! The introduction has it that in the early days, oils though that the DOF was 'simply IT or data management,' while 'it is so much more.' It is indeed, as Oil IT Journal has demonstrated since well before the DOF was dreamed-up. Shame you forgot to mention that guys! No hard feelings though, IDOF is a major undertaking and significant contribution to the DOF literature. A must-read for all practitioners.

* Elsevier, 2018 ISBN 9780128046425.

Software, Hardware Short Takes

INT, Schlumberger AspenTech, Coreworx, Epsis, Flare Solutions, SeisWare, Geologic Systems, GeoTeric, Geovariances, Halliburton, Hexagon, NETL, Osisoft, Cougarstone, Ikon Science, Roxar, Thermo Scientific, Peloton, Yokogawa.

INT has announced IVAAP 2.0 with new data connectors for OSIsoft PI, Peloton Wellview and generic Witsml. IVAAP now also supports GeoJSON.

At the OTC, **Schlumberger** introduced OptiWell, a new well construction performance service. Curiously, the announcement made no mention of the Delfi 'cognitive' E&P environment and its first 'DrillPlan' app. By way of explanation for the marketing oversight, Schlumberger told Oil IT Journal, 'OptiWell does use the Delfi environment to provide real time drilling analysis and increase operational efficiency.' At the time of writing though, the OptiWell landing page remains silent on Delfi!

AspenTech has released the Aspen Edge Connect and Aspen Cloud Connect products in the latest, 10.1 release of AspenOne. The Connect portfolio creates an IoT infrastructure where analytics and machine learning applications link to a 'high-performance data environment' on premise or in the cloud.

Coreworx Release 8 introduces Coreworx Connect, a secure hub where project teams can share 'official' data with clients, partners and contractors. The solution avoids the risks of third party access to the company network, or of copying and emailing project information to outside systems.

An upcoming release of **Epsis**' TeamBox collaboration solution adds interoperability with SAP and Microsoft Excel workbooks. Controlling access to Skype and Adobe Acrobat has been simplified.

Flare Solutions's Sirus, the third generation of its oil and gas information management platform adds 'intelligent search and analytics,' with search across multiple information sources. Sirus' deploys SAP's Orient DB graph database, augmented with apps for tagging, searching and managing information.

'Geophysics by SeisWare' V 10.0 has rolled-out with new interpretation functionality and an SDK.

Geologic Systems' GeoScout V 8.7 includes a new data analytics module, ownership analysis upgrades, proprietary production integration and new FracFocus data integration.

GeoTeric has announced 'Validate,' an interactive forward modelling tool designed for the 'everyday interpreter.' Validate models geological scenarios to see how they influence the colors in an RGB blend. Validate is a part of Geoteric's 2018.1 release and was developed in a joint industry project involving VNG, Spirit Energy, Lundin BHP and DEA.

Geovariances has announced UncerTZ, a geostatistical time-to-depth conversion toolset. UncerTZ will be delivered as a plug-in to Isatis.neo, scheduled for release early 2019 and promises 'sophisticated new methodologies' integrating multiple sources of uncertainty.

Halliburton's DecisionSpace Production Engineering and Production Insights add analytical dashboards and production engineering capabilities to the DecisionSpace Production portfolio. The new tools integrate economics and reservoir information to solve production challenges. Optionally, the software can be delivered from the Halliburton iEnergy cloud.

Hexagon has announced 'Xalt,' a new IoT platform that facilitates the creation of 'autonomous connected ecosystems' that 'connect the physical world with the digital.' Xalt promises enterprise integration, cloud orchestration, data visualization and artificial intelligence 'everywhere.' Xalt is now the 'cornerstone' of Hexagon's strategy for industry-specific solutions that integrate sensors, data, and software to create 'smart digital realities.'

The **US NETL** has release a global oil and gas features database as an ArcGIS geodatabase. A technical report on the resource is also available.

A new release of **OSIsoft**'s PI Integrator for Business Analytics focuses on preparing operational data for training machine learning algorithms. The new streaming data capability feeds into Azure or other cloud platforms, stream-processing engines, data lakes and warehouses. PI Integrator 'slashes the painful work of data prep,' currently the 'Achilles heel of digital transformation.'

Calgary-based startup **Cougarstone Solutions** is developing 'Abandonless,' an automated well abandonment workflow leveraging **OVS Group**'s One Virtual Source platform. Initial focus is Alberta with its comprehensive public data set and public interest in the issue. Cougarstone is seeking to further the project in a consortium.

The 6.5.3 edition of **Ikon Science**'s RokDoc flagship adds 4D reservoir modelling and the 'Theseus' knowledge management system, 'opening the door to large-scale machine learning and artificial intelligence data applications.'

Emerson's **Roxar** unit has released version 8.2 of Tempest, its reservoir management package. The new release adds 'Big Loop' extensions and improved third party integration. Tempest's Enable uncertainty management and history matching module now supports the Nexus and CMG simulators along with cluster queueing systems such as LSF, PBS and UGE. The Tempest More simulator adds support for LPG and natural gas liquid production.

Thermo Scientific's new AutoXP flow computer doubles as a smart multivariable transmitter, providing a common platform for multiple oil and gas applications. The ruggedized/ATEX flow computer addresses downstream, midstream and upstream used cases for gas and liquid production. Bluetooth connectivity allows users to access the instrument remotely without exposure to hazardous materials. The device is compatible with the Thermo Scientific AutoConfig software platform with updated standards for hydrocarbon measurement calculations.

The 10.3 release of **Peloton**'s WellView enhances drilling data import and analysis. Witsml or LAS data can be imported and combined with real time drilling data. A multi curve tool allows depth-based logs from multiple wells to be compared for analysis and planning. Peloton has also announced a software as a service (SaaS) hosted edition of its drilling portfolio.

Yokogawa has announced 'OpreX' for 'profit-driven operations' in process industries including oil and gas. OpreX combines Yokogawa's domain knowledge with applications developed in its KBC Advanced Technologies unit. The solution was originally developed for refining and petrochemicals and is now extending into LNG applications. Profit-driven operation is the first solution to bear the OpreX brand, which is to unify all of Yokogawa's industrial automation products. The flagship solution also embeds Yokogawa's 'synaptic business automation' concept of co-innovation with customers.

Capital facilities information handover standard face-to-face meeting

Enthusiastic CFIHOS attendees hear from parallel initiatives (Mimosa, DEXPI, EPIM-STI) and on owner-operator deployment issues.

Speaking at a recent meeting of the USPI-NL led Cfihos (capital facilities information standards) meeting in Bougival, France, Alan Johnson of **Mimosa** presented a parallel engineering data standards effort, Mimosa's ISDD (industry standard data sheets) destined for a similar use case, supplying XML or JSON data to a 'digital business ecosystem' crossing owner-operators (OO), engineering and procurement contractors (EPC) and the supply chain. This, like Cfihos, requires a long-term agreement between operators and suppliers as in the automobile industry. ISDD 'could be used to generate Cfihos-data sheets.' Along with Mimosa, Cfihos has recorded expressions of interest from other related standards organizations DEXPI and EPIM STI.

Josh Vincent outlines **Chevron**'s trial Cfihos implementation which has revealed various issues with the reference data library (RDL) and shortcomings in documentation. However, Chevron's engineering project systems maybe be ready for use mid 2019. Co-presenter Vic Samuel stressed that roll-out mandated a stable release of the standard, 'users don't want radical change just after an implementation.' The other issue is that most stakeholders already have their own 'pretty good' standards. All will (would?) have to change to align with a new common cross industry and which will 'probably be not as good as what we've got already!' Vincent observed that there is 'no obligation' to use (Cfihos) post handover. Many properties are not relevant for a maintenance system. Samuel noted the 'excitement' around Cfihos but 'we need more on board from the supply chain to reach a tipping point in relationship between vendors and OOs.'

Cfihos chair Anders Thostrup (**Shell**) noted the special case of the brownfield asset where information is 'a mess' waiting to be tidied-up with Cfihos. Alan Johnston added that a (non-Cfihos?) Yokogawa/SAP/BP proof of concept on brownfield data enrichment is underway.

USPI-NL director Paul van Exel is in the process of signing memoranda of understandings with DEXPI and EPIM-STI and is in discussion with the UK-based IOGP whose JIP 33

addresses many of the same issues as Cfihos. Since JIP 33 shares some of the same OOs as Cfihos, cooperation and perhaps alignment of the two initiatives would appear desirable. But aligning with yet another 'parallel' initiative is not going to speed Cfihos progress.

While there are stumbling blocks, the Cfihos initiative does have an enthusiastic and growing following in both OOs and EPCs. More from USPI-NL.

Upstream Intelligence's Data-driven drilling and production conference 2018, Houston

Quantico's AI-derived logging while drilling. Energistics and drilling data standards. Flow Works/Lavoro for Hess' tank automation. DataGumbo's blockchain for smart contracts. WERCIA, artificial intelligence and ESP failure.

Edward Dew introduced **Quantico Energy Solutions**' Q-Log logging while drilling solution that computes rock properties (unconfined compressive strength) and input drilling energy (mechanical specific energy) from a real-time direct feed of surface collected EDR data and MWD gamma ray measurement. Q-Log predicts density, porosity, and acoustic velocity at the drill bit. The solution is claimed to allow maximum ROP and provides early detection of drill string and bit dysfunction such as differential sticking. The software generates formation evaluation logs without the need for logging tools.

Darryl Fett (**Total**) presented on the challenges of getting good data. 'Good,' of course, needs to be taken in context and with a view to the job in hand. Issues to be considered include time synchronization, sensor calibration, location and telemetry lag. Other key issues include metadata capture, contract language, mnemonics and the lack of standards. Or perhaps that should be an excess of standards. Fett cited the OGDQ, the operator's group on data quality, the SPE Drilling Systems Automation Technical Section, the IADC Advanced Rig Technology Committee, the DSA Roadmap, Energistics and the OPC Foundation.

Jay Hollingsworth (**Energistics**) observed that drilling data 'won't move in real time among vendors without some standard.' Here the primary standards are OPC-UA and WITSML with OPC-UA for on-site closed-loop control and WITSML for one-way data transport from the field. Both protocols interoperate. Energistics support the SPE DSATS initiative and has joined the DSA Roadmap Phase 2 and is 'committed to stewarding whatever standards the DSA community produces.'

Cliff Summers described **Hess**' use of a solution from Flow Data to automate its tank data collection and management. Flow Works implemented Lavoro's QLogiX and WellPadWorks. The hardware-agnostic, Linux-based solution provides low cost, direct integration with Hess' on-site Rockwell scada and provides configurable data retrieval options including a PDF ticket emailed to pre-defined users. WellPadWorks includes WiFi, Ethernet and Modbus connectivity and a fully functional PostgreSQL database. Its reporting utility provides 'unprecedented' access to production data for analysis, at a cost of approx. $15,000 per site.

Andrew Bruce explained how his **DataGumbo** startup is using blockchain to exchange 'smart contracts' between users of SAP, JD Edwards, Oracle and QuickBooks. Data Gumbo recently signed with Diamond Offshore Drilling for the provision of a 'blockchain drilling service.' The BDS provides an 'immutable platform for the optimization of well construction activities' across the supply chain. Earlier this year, DataGumbo signed a partnership deal with Carnrite Group, a Houston-based management consultant.

Vikrant Lakhanpal explained how **Wercia**, the Well engineering research center for intelligent automation, at the University of Houston is using data science to find order in the chaos of oil and gas data. Lakhanpal, who also works with **Proline Energy Resources**, has been using Wercia's data smarts to predict ESP failure in ESP (electrical submerged pumps). Data from an accelerometer on the motor is fed into a 'calculation box' that converts acceleration to 'jerk intensity.' Empirical mode decomposition of this data provides advanced warning of failure. Looking to the future, Lakhanpal sees machine learning, IoT and AI playing increasing roles but warns, 'automation, Analytics, IOT, Blockchain alone will neither solve the problem nor reduce costs.'

More from Upstream Intelligence.

Apache 'PI AF is the language of Apache'

Comprehensive Asset Framework deployment links international Cygnet/WonderWare scada systems to remote operating center. AF powers artificial lift optimization and completions design.

Speaking at the 2018 OSIsoft PI World Conference in San Francisco, Kelly Sherrill related Apache's business transformation that has the PI System as its strategic operations technology, infrastructure and analytics platform.

Apache 19,000 wells are located on the Permian basin, the North Sea and Egypt. A 'going digital' project saw the deployment of an enterprise PI System that built on an existing CygNet and Schneider WonderWare scada environment. The new standardized OT infrastructure has improved performance in drilling, completions, and production.

Tools of the trade include PI Vision 4.0 for key data and the PI Asset Framework (AF). AF, along with its SDK is now considered to be 'the language of Apache.' Over 10 million rows of data were imported into the PI system which has some 600,000 active tags. These feeds into a remote operations center.

Use cases include artificial lift optimization where PI AF underpins a portfolio of displays and reports. A completions tool offers frac analytics and offset well monitoring. Sherril acknowledged Apache's partnership with RoviSys in developing components of the system.

Read this and other presentations on the 2018 PI World conference homepage.

Electrification of Norway's offshore industry. Siemens BlueVault. PG Flow Solutions electric pumps.

Equinor (ex-Statoil) burnishes environmental credentials. Siemens unveils BlueVault battery systems for offshore at OTC. PG Flow Solutions' e-pumps for Aker BP's Valhall Flank West.

Statoil cements its transmutation to a new, greener identity as **Equinor**, with a proposal to electrify three North Sea platforms currently powered by gas turbines. The transition could cut CO2 emissions from Troll C and the Sleipner area by more than 600,000 tonnes per year.

Equinor also announced the commencement of cable laying operations that will supply electricity to its Johan Sverdrup new build that is to be 'best in class' for CO2 emissions. Bundled with the 200 kilometer power cable is a fiber optic cable for communication, monitoring and 'when required,' remote control of parts of the Johan Sverdrup field's operations from the shore. Electrifying Johan Sverdrup will save another 400,000 tonnes of CO2 per year.

In a similar greenish vein, at the 2018 OTC, **Siemens** unveiled its BlueVault energy storage solutions for offshore operations. The lithium-ion battery ensures continuity of power and minimizes carbon dioxide emissions. Siemens is to open a 'fully robotized and digitalized' plant in Norway to manufacture energy storage technologies for marine and offshore oil and gas applications.

Aker BP, on behalf of the Wellhead Platform Alliance, has awarded PG Flow Solutions a contract to supply a number of pump systems to the Valhall Flank West platform. The unmanned VFW platform will be fully electrified and designed to minimize the need for maintenance activities.

2018 WIB Seminar - safe and secure operations in the digital transformation

EU process industry operators hear from DSM on digital transformation in the process industry. NAMUR chair on standard promising 'security by design.' ExxonMobil on recent cyber attacks. DNV GL floats MECADA meter calibration and data analytics project.

The Netherlands-based WIB (*Werkgroup voor Instrument Beoordeling*) is a 40 member company-strong association of operators from the EU process industry with around 25% in oil and gas. The theme of the 2018 WIB Seminar in The Hauge earlier this year was, 'safe and secure operation in digital transformation.' WIB chairman, **DSM**'s Alex van Delft outlined digital transformation in the process industry. Digital transformation implies a shift from

datacenter to the cloud, from silos to ecosystem and from process-driven to data-driven. These beg questions as to the readiness of operators to allow for control in the cloud, for cooperation across the silos and the use of a more open architecture. And then there is the security question.

Erwin Kruschitz (**Anapur AG**) sees security as a prerequisite for digital transformation. Kruschitz heads up the Namur WG 4.18 work group on automation security. Current process security is a complex process involving patch management, firewalls, authentication and more. Kruschitz advocates a new 'security by design' approach leveraging the Namur NE 153 'Automation Security 2020 - design, implementation and operation of industrial automation systems.'

ExxonMobil's Anneke Vemer enumerated some recent cyber attacks on the process industry from Stuxnet (2012) to Trisis/Triton in 2017. The latter, a targeted attack on Triconex SIS controllers, was described in a Schneider presentation at the S4x18 ICS/SCADA conference in January 2018. Vemer went through the many facets of what needs to be done to assure cyber security. There is however no silver bullet!

Aliene van der Veen introduced the **DNV GL**-led Mecada (metering and calibration data analytics) joint industry project. The idea is to benchmark an operator's meter population against the same type of meters installed at dozens of other sites worldwide. van der Veen does not envisage a 'black box,' but plans to include expert review of the analytics. Meter drift can have a financial impact if an operator is under-measuring and missing revenues. An early warning allows an operator to take the meter out and recalibrate. On the other hand, if no significant errors are found, a meter may be left in operation for an extended period, saving recalibration cost. More from WIB.

Safety first

DNV GL on State of Safety in 2018. CSB reports on continuing 'deficiencies' in offshore safety. PRCI analyzes inline inspection technologies. DNV GL studies wellhead fatigue. IOGP on oil and gas construction site safety. New safety kit from Electrolab and Det-Tronics.

In its 'State of Safety 2018' report, **DNV GL** reports that 'close to half (46%) of senior industry professionals believe that too little has been invested in safety in recent years.' Unfortunately, less than a third (28%) are to increase safety spending in 2018. On the plus side 40% of respondents believe digital tools and technologies have already improved safety. Digital solutions can compensate for human error, the main cause of 60-80% of industrial accidents. Digital systems help manage and disseminate information. In which context, the report rather curiously cites BP as stating 'there is no standard and global approach to managing engineering information and data ... which leads to a lack of clear accountability and responsibility for managing critical engineering information.' The report includes a plug for DNV GL's MyQRA quantitative risk assessment service and its ISRS international safety rating system.

The **US Chemical Safety Board**, in its 2017 annual report states that hot work is one of the most common causes of worker deaths among incidents it investigates. The CSB disseminated lessons learned and best practices to prevent worker deaths around storage tanks containing flammable materials. The CSB also looks back to the Macondo disaster, observing that ten years later, 'there remain significant deficiencies in human and organization performance that must be addressed to prevent future accidents, a number of our recommendations to Federal agencies remain unimplemented.'

The US **Pipeline Research Council International** has produced a summary of its analysis of recent recommendations from the **National Transportation Safety Board**'s investigation of the 2010 Marshall, Michigan, incident. The PRCI report compares various in-line inspection (ILI) tools and technologies including tool tolerance, the probability of detection and of identification. The study compared some 50,000 crack features identified through ILI technologies and with in-ditch non-destructive examination results. The report provides operators with 'detailed step-by-step procedures for evaluating the effects of interacting corrosion and crack threats on the integrity of pipelines.'

A new recommended practice from **DNV GL** RP-E104 updates findings from a joint industry project that analyzed wellhead fatigue. Previous wellhead fatigue analysis conducted by different industry players has produced 'diverging results.' The new RP seeks to improving quality and consistency in the analysis.

The **IOGP** has produced a safety recommended practice for contracted work performed at oil and gas fabrication sites. While injuries and fatalities have reduced significantly over time, 'they are still too common.' IOGP Reports 577 and 597 provide recommendations to owner operators and engineering contractors.

A new, integrated high level shut-in safety feature is available on all **Electrolab** Model 2100 digital level sensors. A single sensor can provide two levels and eight temperature measurements in the same tank and a dedicated safety circuit ensures accurate high and high-high level alarms. The device can be supplied an explosion proof housing.

Det-Tronics has published a white paper explaining how to integrate fire and gas safety systems with process control. 'Using a certified, fire and gas safety system that can communicate appropriate messages to the process control system during an event is vital to the safety of a facility and its inhabitants.' However, 'specifying and integrating these two systems is no simple matter.'

Machine learning detects integrity issues in subsea video

Clarus Subsea's iCUE leverages historical dataset of corrosion imagery.

Acteon unit Clarus Subsea Integrity has announced 'iCUE' an app to detect integrity anomalies in inspection videos taken of subsea assets such as subsea risers, pipelines or moorings. iCUE uses machine learning to identify corrosion and other defects in video footage obtained from ROV surveys.

Clarus provides subsea integrity engineering services and claims to have amassed a 'vast' knowledge base of subsea anomaly detection, monitoring and remediation. Its image base of corrosion and other anomalies provided a labelled dataset for the machine learning classifier. iCUE now provides operators with accurate identification of dangerous conditions that might otherwise go undetected. A 10x speed-up over human review is claimed.

Integrity managers can use the app to trend anomalies across multiple inspections conducted throughout the asset's life and assess the risk/rewards of a possible extension for an asset that is approaching the end of its original design life. The company is now working on a real-time version to enable detection while surveying.

Folks, facts, orgs ...

CMG, American Gas Association, Aqualis Offshore, ARMA, Arundo, Atwell, BCCK, Berkana Resources, C-Innovation, Chemical Safety Board, DNV GL, Equinor, ExxonMobil, Flotek, University of Western Australia, Geovariances, Global CCS Institute, Houston Exponential, Hunter Group, IFS, IOGP, Lazard Bank, Ikon Science, Energistics, Northern Trust, Oilfield Helping Hands, OspreyData, PPDM, CGG, Quorum Canada, Schneider Electric, Seeq, Siemens, SmartUQ, Steelhead LNG, Sure Shot Drilling, Teradata, Texas Railroad Commission, Wellsite, Williams, Wireless Seismic, ExxonMobil, Kosmos Energy, SensoLeak.

CMG President and CEO Kenneth Dedeluk is retiring. He is succeeded by COO Ryan Schneider.

President and CEO Dave McCurdy is to retire from the **American Gas Association**. The board is searching for his replacement.

Mark Cassidy is now country manager at **Aqualis Offshore**'s office in Doha, Qatar. He hails from Global Maritime (Egypt).

Ryan Zilm, elected last year as President, begins his term at **ARMA**. Bill Bradford has joined the company as president-elect.

Sheila Varjassy, Senior Account Executive, is to lead **Arundo**'s new office in Calgary.

John Killingsworth is **Atwell** VP Operations, Oil & Gas. He hails from Universal Pegasus.

Kevin Blount has been appointed COO at **BCCK**.

Chris Paul is now Senior Consultant at **Berkana Resources**. He hails from Gulf Oil.

C-Innovation names Shaun Lazenby as commercial manager. He was previously with Subsea 7 I-Tech.

Kristen Kulinowski is to serve as the US **Chemical Safety Board**'s 'interim executive authority.' He replaces Obama appointee Vanessa Allen Sutherland who has resigned.

Klas Bendrik joins **DNV GL** as chief digital transformation officer. He hails from Gartner.

Shawn Bennett has been appointed deputy assistant secretary for oil and natural as at the DoE **Office of Fossil Energy**. He was formerly with the Ohio Oil and Gas Association.

Former BP Group VP Anne Drinkwater and Capita CEO Jonathan Lewis are now members of **Equinor**'s (ex-Statoil) board of directors.

ExxonMobil has announced the retirement of Michael Dolan as senior VP and Malcolm Farrant as VP HR. Farrant is succeeded by Tracey Gunnlaugsson.

Flotek has named David Nierenberg to its board.

Fraser Bransby has been named Fugro Chair in Geotechnics at the **University of Western Australia**.

Jean-Paul Roux is now chairman and CEO of **Geovariances**.

The **Global CCS Institute** has opened a London office. Fiona Nicholls and Marghanita Johnson are 'community and stakeholder engagement associates.' Bruno Gerrits is senior client engagement lead in Brussels.

Russ Capper is to lead the recently established nonprofit **Houston Exponential**. HX is the combination of three earlier initiatives, the Mayor's Technology and Innovation Task Force, the Houston Technology Center, and the Greater Houston Partnership's Innovation Roundtable.

Hunter Group has appointed Erik Frydendal to CEO/CFO and Sujoy Seal as COO.

Jonas Persson is now Chairman of the **IFS** Board of Directors succeeding Lars Wollung who stays on as director. Peter Bornschein has been appointed general manager of China. Raymond Lam, Bornschein's predecessor, takes on a business partner development role in South East Asia.

IOGP technical director, John Campbell is to retire. Diana Khatun has joined as committee manager. Alex Segall is now technical editor. Roel Nicolai has stepped down from the geodesy subcommittee to chair the Dutch Society for the History of Geodesy.

Mark Sooby and Harris Ghozali are now **Lazard Bank** MDs for the global oil and gas sector. Both hail from Deutsche Bank.

Lev Vernik, author and rock physics expert is now **Ikon Science**'s scientific advisor.

Chevron's Kimberly Boone has been named to the **Energistics** board of directors.

Northern Trust has promoted Leslie Tipping to its oil, gas and mineral management team.

Bill Markus is the first executive director at **Oilfield Helping Hands**, a non-profit that helps oilfield families in financial crisis.

Jeremy Bingham is chief revenue officer and Barrett Cousins VP services at **OspreyData**. Both were previously with Capgemini.

Pat Rhynes has retired from his role as senior instructor with **PPDM**.

Philippe Salle is now Chairman of **CGG**'s board. CEO Sophie Zurquiyah was also appointed director.

Roy Queener has been promoted president of **Quorum Canada**. Following the Entero acquisition, Mike Lake is president of Entero's Mosaic unit and Steve Robb is VP Sales at Quorum Canada.

Shonodeep Modak is CMO North America at **Schneider Electric**. He hails from GE's Industrial Solutions business.

Mike Purcell is now head of **Seeq**'s EMEA office. He hails from OSIsoft.

Ignacio Diaz has been appointed CEO of **Siemens** Mexico, Central America, and Caribbean succeeding Louise Goeser who has left the company.

SmartUQ has appointed Doug Hollett (Melroy-Hollett Technology Partners) as a new adviser.

Corey Goulet is now VP, pipeline at **Steelhead LNG**. He hails from Tundra Energy Marketing.

Rick Barrett is now CEO at **Sure Shot Drilling**. He was previously President and CEO of Blackeagle Energy Services.

Oracle retiree Joanne Olsen has been elected to **Teradata**'s board of directors.

Wei Wang has been appointed executive director of the **Texas Railroad Commission**.

Ryan Henderson has joined **Wellsite** as executive VP.

Nancy K. Buese (Newmont Mining) is now an independent director at **Williams**.

Wireless Seismic has named Lionel Lhommet as chairman succeeding Gary Jones who has stepped down.

Jeff Woodbury is to retire as **ExxonMobil** VP investor relations and secretary. He is succeeded by Neil Hansen.

Joel Allard is now senior geoscience data administrator at **Kosmos Energy**.

Israeli **SensoLeak** founder and CEO Shoshi Kaganovsky has moved to Houston to bring its AI-based pipeline leak detection software to the North American market.

Sales, partnerships, deployments ...

Accenture, AGR, GE, Altair, Arundo Analytics, Acteon Group, Aspen Technology, SAP, EnergySys, ENGlobal, GEP, INOVA, Innoseis, Kongsberg Maritime, Extractive Industries Transparency Initiative, Open Government Partnership, Halliburton, OSIsoft, Amazon Web Services, Percepto, KBR, Radix, Seeq, Siemens, PSE, Siemens, Evonik, Total, Google, Technical Toolboxes, Metegrity, eDrilling, WEX, S-Cube.

Saipem has awarded **Accenture** a five year master service agreement to support its global digital transformation program.

AGR is to provide Sasol its P1 and Cost Tracker software services under a Software as a Service (SaaS) agreement.

GE's Flow Simulator software is now available through the Altair partner alliance program.

Arundo Analytics and **Acteon Group** are teaming on subsea machine learning applications leveraging the Arundo Enterprise platform.

Aspen Technology has joined the **SAP** PartnerEdge Program. The Aspen Mtell solution is now available from the SAP App Center.

Bharat Petroleum Corporation Limited is to deploy **Aspen Technology**'s AspenOne engineering, manufacturing and supply chain software across its refineries.

Following its 2017 agreement with BP America, the first implementation of **EnergySys**' hydrocarbon accounting system has gone live. **Elite International** now represents EnergySys in the Asia -Pacific region.

ENGlobal's government services unit has been awarded two modifications to existing contracts, totaling approx. $15 million, for fuel supply chain and IT related services from the US Department of Defense.

Chevron is to use **GEP**'s SMART procurement software, a cloud-native source-to-pay platform, in its global digital procurement.

INOVA has delivered its Quantum wireless seismic sensor network and iX1 software, developed in collaboration with **Innoseis**, to Mitcham Industries.

Kongsberg Maritime has been awarded an extended agreement to provide SAS technology solutions for phase 2 of Equinor's Johan Sverdrup North Sea development.

The **Extractive Industries Transparency Initiative** and the **Open Government Partnership** have signed an agreement covering 'transparency and open government' in natural resource management.

Okea has awarded **Halliburton** a well construction services agreement including software in the iEnergy cloud.

OSIsoft and **Amazon Web Services** are to offer the PI System on AWS.

Enel has deployed **Percepto**'s Sparrow drone system at its Torrevaldaliga Nord power plant in Italy. The multipurpose drone platform support operation and maintenance activities at the site.

KBR has won a FEED and program management services contract from Saudi Aramco and SABIC for its integrated crude oil to chemicals (COTC) complex in Saudi Arabia.

Radix and **Seeq** are teaming-up to deliver advanced analytics solutions to their customers.

Siemens and **PSE** are to collaborate on model-based solutions by combining PSE's Gproms APM technology and Siemens automation and digitalization offerings for the process industries.

Siemens and Bilfinger SE are stepping up their long-standing cooperation, using Siemens Comos Engineering & Maintenance Platform across Bilfinger's many sites and subsidiaries around the globe.

Evonik has signed a technology partnership agreement with **Siemens** to develop an asset life cycle data model which will be fully integrated into Siemens Comos software portfolio.

Total and **Google** have partnered to use artificial intelligence to recognize faults on seismic images. The aim is to increase efficiency and provide a preliminary interpretation.

Technical Toolboxes and **Metegrity** are to provide workflow automation solutions for midstream pipeline operators.

Shell has used **eDrilling**'s WellSim/HiDrill 'digital twin' solution, on its North Sea Tyttebaer prospect.

WEX has been awarded a contract to issue and operate Shell's commercial fleet cards in the US and Canada.

S-Cube has delivered its 3D seismic velocity models and XWI toolbox for use on Chevron Australia's Jansz field.

2018 SAP in Oil & Gas, Lisbon

1000 plus attendees hear from Peter Maier on dual trends of greening of energy and digitization. Digitization means a shift to the cloud, whether public or private, hooking into SAP Leonardo Internet of Things and catching the train to microservices. SAP scope grows, although at least one major client warns of risk of spreading too widely. Fedem acquisition now blended with O&M offering as digital twin.

SAP has a huge footprint in oil and gas as witnessed by the 1,000-plus attendance at the 2018 SAP in Oil & Gas conference held earlier this year in Lisbon, Portugal. We see a tension between SAP as ERP (or even just accounting) and its expanding scope across the oil and gas software and business landscape as outlined in the oil and gas solutions map. Some, like PDO are accompanying SAP in its scope creep across the oil and gas landscape. HANA was cited as key to Andeavor and SASREF's digital refinery deployments and in Statoil's 'digital twin' of an offshore platform. On the other hand, Shell appears reticent to the expanding scope, warning of the 'risk of spreading too widely.' In a different dimension, on the IT side, there is another tension between the big (monolithic?) ERP app and the promise of shiny new 'services.' Today, all new SAP development is 'based on cloud-first API microservices.' While it is unclear where industry-at-large stands on this, Shell is pushing for microservices as we reported in our last issue and Galp Energia reports a shift to the new services/API/Devops paradigm. Following the 2016 acquisition of Tronheim-based Fedem, SAP's extensive operations and maintenance portfolio has transmogrified into a 'digital twin' offering.

In his keynote, Peter Maier, **SAP** head of energy and natural resources, spoke of two challenges, for SAP and the world at large. The first is the green revolution. SAP has joined Bill Gates' breakthrough energy foundation 'to 'invest in a carbonless future.' SAP is also a partner in the EU Horizon 2020 'Flexiciency' program covering retail market energy services. The second challenge the rate of change in the IT world and the need to combine a 'system of innovation' with a 'system of record,' the heart of the digital transformation. Here, SAP is 'co-innovating' with different industries whose digital priorities are driving an agenda that encompasses IoT, machine learning, analytics, big data and (the inevitable) blockchain. Maier complimented Accenture for its recent announcement of its 'Intelligent Enterprise' platform, a line of business solutions running on HANA. SASREF and Andeavor got a shout for their digital refineries, providing 'real time visibility of profitability, cost control and operations/IoT.' SAP is piloting blockchain for e-bill of lading, DT, 3D printing, real time settlement and bidding. Finally, Statoil's digital twin of an offshore production platform is enabling predictive engineering intelligence for the data-driven enterprise.
Deployment is a recurring question with options spanning on-site, a hybrid cloud or the public cloud. The latter can be Azure, Google, Amazon, or SAP's own cloud. Maier nudged folks in the direction of a public cloud deployment as 'the private cloud offers limited flexibility.' Some companies struggle with the deployment issue, 'don't give us options, give us guidance.' SAP's Transformation Navigator does just that guiding users through the labyrinth of options. The intent is for the Transformation Navigator to provide a peek into the future, showing what products are in the pipeline and where they may fit into your portfolio.

The debate that followed illustrated some of the tension we mentioned in our introduction with Shell's Frank Westerhof describing the ERP function as 'parity' while seeking to differentiate its own operations elsewhere. Maier pointed out that best practices in and around ERP may not be in oil and gas. SAP can seek these out and embed them in the platform. Westerhof observed politely that 'SAP needs focus too, there is a risk spreading too widely. You need the courage to say this is what we are not going to do!'

In his keynote, Carlos Costa Pina from Portugal's **Galp Energia** addressed digitalization as a key component of the company's business transformation. Galp retains its oil and (especially) gas focus but now spends 'up to' 15% of capex on renewables. The company is revising the relationship between IT and the business 'to be less rigid.' The changes include Devops, an 'API friendly' environment, a customer-centric view of data and increased business unit governance of IT. This involves 'blurring the boundaries' and reducing central IT's control of spend. Galp has some 200 IT initiatives under a new IT master plan covering big data/analytics, mobility and a new IT operating model. One initiative involves AI and big data applied to Brazilian pre-salt exploration, said to add a potential $14 billion of revenue at if it comes good.

Stephan Parthier, from German utility **Uniper** was up next, speaking on the 4th Industrial revolution, where 'everything is connected' and data is the foundation of cyber-physical systems. Data is underutilized today. Uniper is consolidating its legacy data to the cloud and focusing on the user experience. A dashboard from Enerlytics supports the new business model with an all-digital business to business (B2B) transaction environment. Accredited third parties can access Uniper's PI system from the portal. A workflow management GUI has been developed with SAP Fiori, hosted in the SAP cloud. Another use case under study is blockchain as in the Quantum joint venture (with Total, Engie and others). Parthier opined of blockchain that 'I can't say how market proof the technology is.'

Patrick Miller (**Archer Energy Solutions**) admitted that 'computer security makes folks cringe.' But since 'data is the new oil' and 'disruption is the new normal' security becomes a prerequisite. Miller came close to offering a counsel of despair, warning that operational data acts like a magnet for the bad guys. Moreover, 'you can be secure and not compliant and vice versa.' Regulations prescribe actions not attitude. Companies need to change and manage behavior as they do in the safety area. More despair comes from the thought that your adversaries, especially if state backed, have people, money and time. 'You are outgunned. A determined adversary, perhaps a competitor, will get in.' Attackers likely have a long-term view with perhaps a five year attack plan. A proven security solution is based on science and years of operational experience. Reduce your exposure, if equipment (like a printer) is not vital for operations, get it off the network. Operational islands are a good idea but beware that even an air gap is really 'just a speed bump.' Resilience is a different from prevention. Since systems will fail, you need an incident response and recovery plan to develop your security 'muscle memory.'

SAP's new head of oil and gas, **Benjamin Beberness**, reported increased deployment of S/4 Hana, the Leonardo Internet of Things and blockchain. SAP is offering 'Leonardo accelerators for oil and gas' providing predictive engineering insights from a digital twin, a cloud-based IoT solution. SAP is also working with IBM on a blockchain for joint venture accounting. Today, all new SAP development is 'based on cloud-first API microservices.' These let you pick what SAP functionalities to use and mix and match with third party APIs (if they have one!). SAP's

cloud is not a 'paving of cow paths' and will not be a 1:1 copy of existing systems. The first industry-specific cloud services are planned for year-end 2018 with minimum support for the upstream segment. The shift to the cloud is driven by a Shell/Exxon consortium.

Ali Amri and Oman Iman Juma Nasser Al Wahaibi showed how **Petroleum Development Oman** has leveraged SAP Easy Document Management to plan and visualize its drilling sequence business process. PDO has a comprehensive SAP landscape. The company operates some 40-60 rigs and drills 650 wells per year. The drilling sequence is managed as a network in SAP with rigs managed as work centers. Previously, drilling sequence change requests involved a 'long and complex process.' SAP has allowed a business process management approach spanning drilling, manpower allocation and data management.

Eugenio Moya presented on SAP's connected assets and the digital twin. SAP's Leonardo IoT embeds technology acquired in 2016 from Trondheim-based Fedem. Fedem develops simulation software that 'uses Newton's physical laws to bridge IT and the real world through virtual models.' Shortly after the Lisbon event, SAP demonstrated a network of its digital twins at the Hanover Messe. Leonardo blends first-principle physics based and machine learning derived models. The solution supports the facility lifecycle, from design, build, handover operations and turnaround. OSIsoft is a partner. SAP's VORA big data hub also ran, as did the edge gateway from DELL/EMC.

Finally, SAP is releasing a 'Model company service for oil and gas' a 'ready-to-run, comprehensive reference solution supporting core line-of-business processes across the value chain.' The solution can optionally be augmented with Accenture's AIEP intelligent enterprise platform. More hands-on folks can tweak the combined solution with Accenture's Liquid Studio rapid application development studio.

*The SAP in Oil & Gas event is co-hosted by **TA Cook**. More from the conference home page.*

IBM and SAP plan a blockchain-based joint venture accounting solution for oil and gas

New solution for billing reconciliation and settlement issues said to speed reconciliation. But may cannibalize SAP's own JVA package.

IBM Services and SAP are 'planning to develop' a blockchain-based joint venture accounting system for oil and gas. According to the release, 'the solution expects to improve (sic) reconciliation and settlement times between operators and non-operators.' Blockchain is proposed as a solution to perceived JV accounting issues such as billing and settlement discrepancies that increase reconciliation complexity time. Blockchain is said to be 'the perfect solution' to the JVA 'problem. The solution will be built atop of SAP' 'Leonardo' digital innovation system using the open source Hyperledger Fabric blockchain.

Oil IT Journal readers will be aware that we are skeptical as to blockchain's true usefulness (see Neil McNaughton's editorial). But there is another aspect to SAP's use of blockchain, in

that it is a technology that would cannibalize other solutions, notably SAP's own JVA solution. We were also underwhelmed looking through the agenda of a recent 'blockchain in oil and gas' conference at which the majority of the presentations had nothing to do with blockchain. IBM and SAP are serial announcers of improbable technological advances, witness the 2017 announcement from IBM and SAP's Ariba unit of a proposed combination of procurement, Leonardo and the 'cognitive' IBM Watson! To which we now presumably need to add 'and blockchain.'

Done deals ...

DTN, Energy Management Institute, ENGlobal, AB Riley, Halliburton, OspreyData, Houston Ventures, P2 Energy Solutions, iLandMan, Whitehawk Advisory, Evangeline Securities, Uptake, Asset Performance Technologies, Google, SEC.

Minneapolis-headquartered **DTN** has acquired **Energy Management Institute** (EMI), a provider of energy education and training services to major oil companies, power, natural gas marketers and others.

ENGlobal Corporation's board of directors has initiated a review of strategic alternatives including mergers, buyback of public shares or the purchase or sale of specific assets. AB Riley has been engaged as financial advisor.

At **Halliburton**' s annual meeting, held in Houston in May 2018, stockholders elected all twelve nominees to the board of directors and ratified the selection of KPMG as principal independent public accountants for 2018. An ' advisory resolution' on executive compensation was not approved, the first time such a proposal has not passed.

OspreyData' s 'expert-augmented,' AI-based optimization platform for oil and gas has raised $5 million in a Series A funding round led by **Houston Ventures** with participation from existing shareholders. OspreyData' s technology addresses artificial lift optimization with the early detection of key problem states.

P2 Energy Solutions has acquired **iLandMan** in a 'strategic growth initiative.' iLandMan adds lease acquisition and land management to the P2 portfolio. **Whitehawk Advisory** and **Evangeline Securities** advised iLandMan on the transaction.

Uptake has acquired **Asset Performance Technologies** and its library of industrial equipment failure data, expanding its customer base across oil and gas and other asset-intensive industries. APT's hosted Preventance APM software has failure mode information for some 800 equipment types. The solution is deployed by industrial customers in their maintenance programs. The library will now integrate Uptake's industrial AI and IoT portfolio. Clients include SABIC, and Suncor.

Google has announced a new server for US Securities and Exchange data, a BigQuery database containing years of SEC data including notes to the accounts.

Standards stuff

Energistics Online, IOGP USBL pilot, OGC MapML, OMG/OPC map between DDS and OPC-UA, W3C DCAT dataset exchange/Web of Things, SEC's Bauguess on machine readability, XBRL ruleset for filing validation/Arelle open source EDGAR front end.

Energistics, the upstream oil and gas standards body, has added 'Energistics Online' to its website, an interactive set of documentation covering its data-transfer standards and components of the Common Technical Architecture. Users can also download the whole resource for use offline.

The **IOGP**'s Geomatics Committee is to develop common industry specification for the calibration and verification of ultra-short base line positioning systems. This pilot project will also assess the need for calibration standards for other offshore survey systems such as multibeam echosounders, heading sensors and motion reference units.

OGC, the **Open Geospatial Consortium** is investigating MapML (map markup language) in its innovation program. Although there has been a push for an open spatial data infrastructure and much data is already available on the web, currently access to such resources requires specialized client software. Enter MapML, an HTML-like hypertext format for interactive map content. OGC and W3C have launched a 'Maps for HTML' community group with native browser support for MapML as the 'ultimate goal.'

Object Management Group has published a draft specification to link its IoT DDS connectivity standards with the **OPC**'s Unified Architecture, OPC-UA. While there are solutions that bridge between DDS and OPC UA, these are based on custom mappings and cannot be relied to work across vendors and products. The new specification overcomes this situation by defining a standard, vendor-independent, configurable gateway that enables interoperability and information exchange between systems that use DDS and systems that use OPC UA.

New resources on the **Pipeline Open Data Consortium**'s website explain PODS Next Gen/7.0 in ten FAQs along with a 'technical deep dive' into Next Gen. PODS also reports progress on its In line and offline inspection data management project. The project is to capture ILI historical data in a relational or geodatabase implementation of the PODS 7.0 schema.

The **W3C**'s Dataset Exchange Working Group has published a first public working draft of DCAT, its data catalog vocabulary, an RDF vocabulary for interoperability between data catalogs on the Web. W3C has also issued its 'Web of Things' specification, its vision for the IoT.

In a recent presentation, the **SEC**'s Scott Bauguess stressed the importance for the agency and its user community of machine readable financial reports. The SEC's EDGAR database serves some 1.5 billion documents filed by public companies with the SEC each year. Today, 85% of the downloads are made by 'bots,' not humans. The Commission is currently applying machine

learning methods to detect potential market misconduct. Many of the methods are open source and easy to implement for those trained in data science. Bauguess opined '*There is no need to rely on proprietary solutions, captive vendors, or complicated third-party support for data analytic success. This freedom has fueled the rapid innovation at the SEC, and I suspect also among your organizations*.' A recently proposed rule will mandate reporting companies to file in Inline XBRL, a protocol that supports both human and machine readability.

The **XBRL** US Data Quality Committee (DQC) has approved its 6th 'ruleset' for validating filings prepared using the US GAAP Financial Reporting Taxonomy and the IFRS Taxonomy. The rules, along with Arelle, a free open source client for the SEC's EDGAR data, are available on GitHub.

Worth a mention

Inductive Automation on Oracle's changes to Java roadmap. Blue Marble's Beginners Guide to geodesy. Siemens Industrial Knowledge Graph. Explor super high density seismics. Litigation: Teradata vs. SAP. Total/Chesapeake vs rights holders, WellDog vs. Aussie 'pirates.'

Inductive Automation's twin bloggers Carl Gould and Colby Clegg warn about the sweeping changes to the Java roadmap that Oracle is making. Oracle has made the decision to remove applets and Java Web Start from future versions of Java, essentially removing the web-based deployment mechanism for desktop applications. Oracle is also transitioning to a faster release model, with a new major version every six months, which will allow it to modernize the Java ecosystem more quickly. Read the IA blog on how Inductive Automation is coping with the changes and why Java remains the development environment of choice for many. A white paper about the changes is also available from Oracle.

Blue Marble Geographics has produced a Beginner's Guide to Geodesy, explaining geographical coordinate systems, datums and bearings. The Guide provides a brief introduction to geodesy along with an outline of issues involved in managing GIS data. An useful resource for beginners and a refresher for more experienced users and developers.

Siemens has announced an Industrial Knowledge Graph powered by Metaphactory and Amazon Neptune. The tool appears to be deployed in Siemens own plant information management with the multi-location assembly and manufacture of wind turbines as use case. Product information is mapped in the knowledge graph across a data integrity dashboard. Expert-defined rules in SPARQL assure data quality. The FOAF (friend-of-a-friend) graph also ran. Amazon recently announced the 'general availability' of Neptune with enthusiastic support from scientific publisher Pearson.

Canadian seismic contractor **Explor** claims a record for a 'PinPoint' ultra high density 3D seismic data survey. Seismic data over a 'small area' of an oil sands prospect was acquired at a staggering 100 million traces/km2 at full offset with minimal environmental impact.

Finally on the more litigious side of the business, **Teradata** has filed a suit against **SAP** alleging a 'decade-long campaign of trade secret misappropriation, copyright infringement and antitrust violations' At issue is an alleged misappropriation of Teradata IP in the developed of SAP HANA.

A Texas Court has rejected efforts **Chesapeake** and **Total** to dismiss claims filed by mineral interest owners over 'sham' transactions associated with royalty payments. The mineral owners argued that the wellhead sale of gas between Chesapeake and Total affiliates should be disregarded when calculating royalties since the practice qualifies as a 'sham transaction' under Texas law. The dispute is now likely going to trial.

WellDog has filed a '$100 million' law suit in respect of a 'multi-year conspiracy between insiders that led to the theft of its Australian subsidiary.' The insider 'pirates' allegedly improperly acquired WellDog's business assets out of bankruptcy when they formed a company, **Qteq Pty Ltd**.

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