Highlights

PNEC Houston

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Blockchain in Energy

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Firestone Fire

NEXT IN OIL IT JOURNAL, IOT IN OIL & GAS, AMSTERDAM

EdgeX - the *real* IoT?

Linux Foundation's new internet of things/edge computing framework 'is not YAPP.' Dell-backed interoperability framework sets out to 'deliver interoperability and drive digital transformation.'

The Internet of Things has spawned a huge amount of hype. It has also given rise to a number of competing 'platforms.' Without any claim to exhaustivity, we have reported lately of IoT offerings from Altizon, C3IoT, DNV GL, IFS, GE, Siemens and Yokogawa*. Proliferating platforms raise serious issues for operators who risk being locked in to a proprietary environment.

At the 2017 Hannover Messe tradeshow, the Linux Foundation threw its own IoT platform into the ring with the launch of the EdgeX Foundry, a project to '*build an open framework for IoT/edge computing and an ecosystem of interoperable components that unifies the marketplace and accelerates enterprise and Industrial IoT.*'

Current IoT offerings are said to deliver business value, but 'widespread fragmentation and the lack of a common framework' are hindering adoption and stalling market growth. The current complex landscape and the variety of components has created 'paralysis.'

Linux Foundation IoT head Philip DesAutels told Oil IT Journal, '*Initially EdgeX is focused on industrial, facilities and enterprise use cases. For the future, we envision a compact version of EdgeX to target the consumer space. EdgeX is not YAPP**, it will work with any and all protocols, IP-based, proprietary, wireless and wired. We already have demonstrated interaction on the same gateway between Bacnet, Bluetooth, Serial, Zwave and more. The previous IoTX project, now inside EdgeX, provides protocol-to-protocol interoperability.*'

Linux Foundation executive director Jim Zemlin added, '*The Internet of Things is dependent on an ecosystem that can deliver interoperability and drive digital transformation. The EdgeX Foundry will unify the IoT market around a common open framework and an ecosystem of companies offering interoperable plug-and-play components.*'

Interoperability between community-developed software will be maintained through a certification program.

Dell is seeding EdgeX Foundry with source code from its 'Project Fuse' IoT stack, including microservices and some 125,000 lines of code.

EdgeX founder members include AMD (not Intel), Yokogawa partner Bayshore Networks, Canonical/Ubuntu, Dell, FogHorn (another Yokogawa unit) and Opto 22. The Object Management Group is an EdgeX 'affiliate' but not The Open Group, host of ExxonMobil's IoT-esque process control framework. Visit the EdgeX Foundry on GitHub and read the release at the Linux Foundation.

* The FT IoT 'Big read' (27th June) estimated 300 platforms!

** Yet another protocol project.

Statoil establishes IT CoE

Center of Excellence and NOK '1 to 2 billion' investment to accelerate digital technology deployment and global leadership through 2020.

Statoil is to set up a digital center of excellence and has published a roadmap of seven corporate digitalization initiatives for implementation over the next three years. CEO Eldar Sætre said, '*We aim to be a global digital leader within our core areas and are stepping up our efforts to capture opportunities provided by the rapid development of digital technologies.*'

The seven core areas are 1) safety, security and sustainability, 2) streamlining of work processes and reduction of manual input, 3) tools for subsurface data analysis, 4) data-driven well delivery, 5) field of the future, 6) production optimization and 7) improved decision-making tools.

Statoil acknowledges that the oil industry already makes extensive use of IT but current 'rapid technological developments' as creating new opportunities in analytics, robotics and automation.

Sætre concluded '*Digitalization can help improve the safety and security of our operations, both by means of data that provide us with a better decision-making basis, and through reduced exposure in risky operations.*'

The CoE includes dedicated units for data analytics, machine learning and artificial intelligence. Statoil will recruit for the CoE both internally and externally.

'Digitalization,' from Harry Nyquist to the 'edge' of the internet

Neil McNaughton tires of digital, digitization, digitalization and disruption. In this back to basics tutorial, he explains how a stream of digital data is actually only a model of reality which may or may not be fit for purpose. Aligning *data* across the internet of things is only half the story.

You might be forgiven for thinking that today, just about every measurement is 'digital.' A watch shows time in digits. Music streams across the internet in digital MP3 files and so on. Although if you are a music buff, you will know a bit about err.. bit rates … and the difference between a scratchy sounding MP3 file and a CD. At the root of time and sound, indeed just about any measurement, there is the continuous 'analog' variation of a parameter that needs to be sampled and turned into a string of numbers. This is not quite as easy as it appears. The manner in which analog is turned into digital determines how the real world is perceived by those using the digital version. It is a good idea to understand how the conversion has been achieved before blindly treating the 'digital twin' as the unadulterated truth.

It is usual to speak of the digital to analog conversion process as 'sampling.' While this is not wrong, it only tells half the story. The process of digitizing is a process of *modeling*. How it is done affects how well the digital version will represent reality and how useful it will be for a particular purpose.

Analog-to-digital conversion was invented by electronic engineers and assumes that the parameter of interest, the signal, varies in such a way that the sampling campaign can be designed to capture all significant changes in the signal. There is a big 'gotcha' in this approach as follows.

Suppose that the 'signal' to be digitized is the length of the day as judged from observations of the position of the sun. Imagine that our observer was a bit lazy and just checked the position once a day, at 12 noon. He or she might conclude that the sun never changed its position, its 'frequency' would be zero and its period infinite. Suppose now that the observer took a reading just a little bit more frequently, say, for the sake of argument, once every 23 hours 56 minutes. He or she would then conclude that the sun was moving slowly backwards, returning to the same position after a year! To capture the sun's true frequency, you need to take at least two observations per day, spaced 12 hours apart. Anything below two samples per cycle gives the wrong frequency, a phenomenon known as 'folding' or

'aliasing.' For more on this you need to visit Harry Nyquist who first described the problem.

To avoid having embarrassing 'folded' frequencies polluting the digitized data, seismologists and engineers apply an 'anti alias' analog filter before sampling to remove all frequencies that would otherwise 'fold.' National Instruments has a good page explaining this. Incidentally, a search on NI.com for 'Nyquist' returns some 2,000 references! For a geophysicist, an engineer sampling the electrical output from a device on the 'internet of things,' frequencies higher than the fold either do not exist or are not important. High frequencies are often thought of as 'noise.'

The Nyquist/folding phenomenon is not limited to the time domain. Folks who make maps from discrete point measures of topography, gravity measurement or radar altimetry should filter out the higher spatial frequencies although I'm not sure that this is always done. It's perhaps more usual to 'filter' by contouring the data into a smooth representation afterwards. While this is probably not best practice, it does implicitly acknowledge that high spatial frequencies don't exist. If, from a 100km x 100km per data point survey across the alpine chain, you contrive to contour in Mont Blanc, the Matterhorn and the Monte Rosa then you are either making things up or interjecting what is called 'prior information.' We will come back to 'prior' and 'making things up' in part II of this tutorial/editorial series*.

Now what happens if frequencies above the fold *are* important. Consider the popular meme of equipment monitoring. Sensors on rotating equipment likely will return the same value of say oil temperature, RPM or whatever for very long time periods. Such slow variations can be captured and transmitted accurately with a low bandwidth network. But what if the analytics tells us that a malfunction is preceded by a very high frequency event, the noise made by an oil pump blowing a gasket, or the clicking of a worn bearing as happened to me on my bike recently. To record all the data at a frequency high enough to detect such rare events would require much higher data rates that that needed to faithfully capture normal operation. If you need millisecond

sampling for the extraordinary and the ordinary is happy with one sample per day you have just multiplied your bandwidth, processing and storage requirements by a zillion!

What to do in such circumstances is part of 'edge computing,' the subject of this month's lead. Transient events can be recorded locally at a suitably high frequency in a local loop. If a value goes above some threshold, the loop containing the data can be sent over the wire. This implies of course more local 'smarts' at the edge and likely across the network too. Much more sophisticated scenarios can be envisaged, with machine learnings (about bearing failure noise patterns and such) deployed 'at the edge' so that all that comes over the wire is a succinct 'crank bearing fault' message (we are assuming the connected bike here).

Note however that the more smarts in your edge processing, the less access you have to real 'internet of things' data. Combine this with kit (sensors and smarts) from multiple vendors each with their own 'land grab' smarts and you see why the Linux Foundation's idea is a necessary but probably not sufficient condition for interoperability. The problem is not just about aligning data protocols, it is also, and more profoundly, about aligning models of reality. A harder, if not impossible task!

* but likely not for the next issue.

🐦 @neilmcn

Oil IT Journal interview, Ken Evans SAP

SAP VP and global head of oil and gas on the digital transformation, automation and how collaboration with GE is breaking down engineering/ERP silos. Evans thinks that realizing blockchain's potential needs more R&D. SAP announces a new 'digital transformation navigator.'

Can you summarize your recent keynote?

It was basically a status check on the digital energy revolution. We have been talking about digital in oil and gas for a couple of years (even we both know that the industry has been digital for much longer that that!) What is new is the context, in particular the automation perspective. Last January the World Economic Forum published an authoritative report on the importance of digital transformation with a chapter on its impact on the oil and gas industry which demonstrated a potential value at stake of $1.6 to 2.5 trillion.

Indeed!

Yes, and similar findings were discussed and reported at Davos last year. The takeaway is that digital has arrived in oil and gas, the strategy has been validated. For operations, the next big things are automation and predictive maintenance. But automation is different today. It used to be about keeping equipment running within safe limits. Now companies are rolling in economic optimization and the entire business context, driving IT/OT convergence in the brave new world!

OK this is plant and process automation but what of business process automation. Isn't that closer to SAP?

Sure. But automation now crosses business and engineering. I was at GE O&G in Florence where Matthias Heilmann (GE oil and gas chief digital officer) and I spoke of the need to collaborate on this.

Neither SAP nor GE can do this independently. You need to connect the supply chain, the financials and the scenarios. This is how the WEC paradigm gets translated to oil and gas.

We heard GE's side of the story at Florence. What is SAP's take here?

It's all about automating the business and automate processes at the edge to keep equipment running. A large rotating machine may get a signal to 'call home,' but the action to be taken needs more than the engineering data. You need the overall business context before you can take a decision. What are the cost implications of a shut down? What will the business outcome be? What people and skill sets do you need? Where are the spare parts, how much will it cost to ship? All this is our bailiwick of a high-level business model. GE's strength is at the machine level but not so much at understanding how *all* of the equipment works together, how it all fits together to achieve the overall business outcome. This is also where the analytics and big data come into play, and rolls up into an automated business process.

What of culture? Don't engineers' eyes glaze-over when they hear talk of SAP?

Sure. I'm an engineer and we do tend to 'glaze-over!' We used to do our own discounted cash flow using standard costs and so on. But things are moving on. Now we can work with live information, true costs and the real business context. Breaking down the silo boundaries

remains an issue for sure. We address this by showing people how these benefits could be achieved. From board room to shop floor. The SAP Digital Boardroom lets you drill down through the data achieving complete process transparency. The engineers still may not care, but they don't really need to know, they just have to provide the data!

What's next on the horizon?

We heard from Jens Strüker* (see next article) on blockchain. There is a lot of interest in this technology which is still in its infancy but moving up the great expectations part of the hype curve, even if the energy involved in transmitting all the blockchain information around may be problematic. The punchline for us is how can we clarify our guidance. We don't just go to market with choices. We will be doing a lot of research ourselves and will come up with a recommended position on the technology. Likewise for the move to cloud, we propose standard business process, automation efficiencies and a drive towards an industry-wide business process standard. After all, why do you even want to create and check an invoice at all? All could be done with an instant and secure cash transaction. The move to the public cloud requires similar guidance on process standardization. I wound up my keynote unveiling the next big thing for SAPphire, the Digital Transformation Navigator. The promise of S4/Hana suite is to deliver all of the above and get to a new, simpler world.

SAP, StromDAO, EU/STOA, Stanford's Energy Web Foundation

Interest in blockchain reaches fever pitch in EU and US.

Speaking at the recent SAP in oil and gas conference Jens Strüker of the *Institut für Energiewirtschaft* described blockchain as having the potential for disruption, 'as the energy broker becomes obsolete.' Blockchain could rationalize the 'enormous complexity' of the electricity grid. In oil and gas blockchain will streamline the supply chain providing proof of origin of documents and data and help manage small-scale cogeneration units. A poster child for the technology is StromDAO a German 'autonomous, distributed electricity provider' that user

the Ethereum blockchain to transact 'GrünStromJetons,' renewable energy certificates. On the downside, blockchain is slow and uses an unconscionable amount of … electricity!

Earlier this year **STOA**, the EU's Parliamentary Research Service published a report titled, 'How blockchain technology could change our lives.' The 22-page report covers, *inter alia*, currencies, digital rights management, protecting patents and 'at last' supply chain transparency and accountability.

The 'permissioned' blockchain that limits access to a group of approved actors will likely be of interest to the corporate world.

Another blockchain development was the recent creation of the 'Energy web foundation' by **Stanford**, **Engie**, the **World Energy Council** and the **Rocky Mountain Institute** amongst others. EWF is to identify and assess blockchain use cases in the electricity sector, to build a software infrastructure, and train an ecosystem of users and developers.

Lux scrapes knowledge from SPE's OnePetro resource

Graph analysis of co-authored papers shows collaboration of service companies and operators.

Boston headquartered Lux Research has repurposed the Society of Petroleum Engineers' OnePetro document portal to identify key 'data points' hidden the 23,000 oil and gas research papers, and to reveal top industry trends. The report, 'Making use of metadata: analysis of over 20,000 oil and gas technical papers*,' is said to have 'identified the research focus and partnering approach of the most innovative oil and gas companies.'

A network map of co-authored papers shows how collaboration between service companies and operators has evolved. Schlumberger, which published the most papers, led with six connections in 2012, and maintained its lead while growing to 14 connections in 2016.

* Lux's Ryan Dolen told Oil IT Journal, *'This wasn't a joint venture with SPE but they were aware that we were interested in their data. We did not have access to the actual papers themselves, only the publicly available information on their website.'*

For another under-the-radar use of OnePetro re-read our 2016 editorial on the history of AI in oil and gas.

NIST floats Industrial Ontologies Foundry

Multiple, overlapping domain ontologies would benefit from an upper level 'foundry' approach.

KC Morris and Serm Kulvatunyou (NIST) recently floated the idea of an Industrial ontologies foundry (IOF). The authors observe that the current interest in using ontologies in industry has led to multiple 'overlapping and disjoint' standards initiatives. The researchers observed that 'nearly all projects in the European Union's Horizon 2020 Factories of the Future program have adopted ontologies as have the NIST's smart manufacturing and engineering projects. A NIST workshop late last year found a consensus that an IOF would be beneficial.

Current ontologies fall into two categories, either as a 'formalization of reality,' usually driven by 'visionaries or academics.' Elsewhere, ontologies are engineered to a particular need. While the latter are easier to deploy, they tend to result in a point solution that is not reusable. The workshop concluded that ontology development in industry would benefit from an IOF along the lines of the Open biomedical ontologies foundry or the construction industry's Building information model. The work is to continue as a joint NIST/OAGi collaboration.

MPI, the 'Once and future king' of parallel computing

Rice University presentation celebrates 25 years of open standard for HPC.

In a recent lecture at Rice University, Bill Gropp of the NCSA, honored the venera-ble message passing interface, MPI, as 'The once and future king.' MPI is a ubiquitous open source standard for parallelization on high performance compute clusters. It was and remains 'the dominant programming model for massively parallel scientific computing.' MPI underpins the world's fastest computers including China's Sunway TaihuLight 10 million core cluster and the NCSA's own Blue Waters.

Gropp looked to the future of HPC which is increasingly a race between heterogene-ous architectures (CPU/GPU..) and software and compilers playing catch-up. On the one hand, 'compilers can't do it all' as 'the number of choices that a compiler faces for generating good code can overwhelm the optimizer.' Guidance from a human expert is required. While the programming system must not get in the way of the expert, innovation at the processor and node level makes for complex memory and execution models.

Gropp concluded that single codebase portability is impossible, 'Just because it is desirable doesn't make it a reasonable goal, though it is an excellent research topic!'

MPI is 25 years old this year and will be celebrated with a symposium on '25 Years of MPI' to be held this fall at the EuroMPI meeting in Chicago. A complementary open source standard for HPC, Open MP is celebrating its 20th birthday this year as reported in Intel Parallel Universe.

IOGP clarifies stance on standards

Recent developments in standards space. JIP33 and 'Standards solution' announced.

A new position paper from the UK-based International association of oil and gas producers (IOGP) sets out the operators' 'position and key messages and standards.' Standardization is a top priority for oil and gas that can enhance safety, reliability and integrity of operations. Standardization is also key to tackle escalating project costs and delays. There are over 180 standards organizations including API, DNV GL, IEC, ISO, NACE and NORSOK. Operators also add their own learnings into a bespoke suite of technical specifications and practices. The IOGP's JIP33 has set out to harmonize such additional company requirements.

IOGP reports on several significant changes in the oil and gas standards landscape over the last few years. The American Petroleum Institute withdrew from leadership of ISO standards development in 2009 and a number of companies withdrew from ISO 'due to EU/ US sanction regulations in 2012.' The ISO leadership was picked up by The Netherlands.

To address trade sanction concerns, IOGP operates a 'standards solution' to maintain upstream ISO standards. Standards are developed in work groups and handed back to ISO for comments. The 'normative reference approach' of ISO supplementary standards is said to address IP and copyright concerns. An IOGP task force has been created to progress a list of operators' preferred standards, and to liaise with API, CEN and ISO to avoid duplication of work.

Software, hardware short takes …

Weatherford's IoT-based production optimization. AspenOne V10. PetroWeb EnterpriseDB. Petro Niche/Ninja. Dell's ArcGIS desktop appliance. Geophysical Insights' AASPI/Paradise. tNavigator on GPUs. OpenFlow Suite 2017. Global Mapper for Android. SciGraph linked open data resource.

Weatherford has announced 'ForeSite,' an advanced analytics/internet of things-based production optimization platform. Foresight is built on an OpenStack back end with an HTML5 GUI and provides bidirectional integration with in-house data marts, finance and data historians. Initial focus is on rod-lift systems with planned expansion to other forms of lift, well management and optimization at the reservoir and surface-facility levels.

V10 of AspenOne, **AspenTech**'s asset optimization flagship reflects an evolution 'from process optimization to asset optimization.' The new release integrates big data technology from the 2016 acquisition of MTell. New web-based Aspen basic engineering streamlines data integration in FEED preparation and improves collaboration across globally distributed teams.

PetroWeb's Enterprise DB 17.1 release adds forms-based data entry, audit trail and a new web-based management dashboard.

Calgary-based **Petro Niche** has announced Petro Ninja, a web/mobile app to streamline information exchange between the field and office.

Dell/EMC has rolled out (in the US only) an 'ArcGIS desktop appliance,' a collaborative effort between Esri, Dell, Nvidia and VMWare.

The 3.1 release of **Geophysical Insights**' Paradise machine learning based seismic attribute analyzer includes the AASPI library of spectral decomposition and geometric attributes.

One Stop Systems has rolled-out 'SkyScale,' Nvidia Tesla-based high performance computing as-a-service.

Rock Flow Dynamics' tNavigator fluid flow simulator can now runs on a GPU/CPU combination. The million cell SPE10 model saw a '2-3x' speedup on the latest Nvidia GPUs.

Beicip-Franlab has announced OpenFlow Suite 2017 with an enhanced GUI, productivity enhancements and a new ICD module for PumaFlow. FracaFlow's sub-seismic fault modeling is also improved.

Blue Marble Geographics has announced a beta release of Global Mapper for Android with GIS data viewing and field data collection using a mobile device's GPS.

The public datasets in **Springer Nature** SciGraph, a linked open data/knowledge graph of research projects, funding and publications, now contain 155 million facts. More data on citations, patents and usage is to follow, growing the resource to over a billion triples. SciGraph data, distributed as RDF data in 'N-triples' format, is released under a creative commons license.

2017 SAS Global Forum, Orlando

Devon on Hadoop-based deep learning for downhole video analysis. SAS uses FFT to perform asset analytics in real time. Petronas on production analytics-based forecasting. SAS OptModel optimizes Middle East oil products distribution network.

Devon Energy's Kathy Ball, speaking at the 2017 SAS Global Forum in Orlando, opined that the Industrial Internet of Things (IIoT) will radically change how humans, machines and infrastructure operate. While disruptive, the IIoT is to create new value streams including real time automated decisions and reactions that will 'massively improve' operational efficiencies. SAS, augmented with an open source software ecosystem for data science (Anaconda, R, Scala), provides a comprehensive analytical toolset. Ball showed how Devon trained a neural network to interpret downhole video logs and detect water inflow. Handling the large video dataset meant deploying Hadoop/deep learning tools 'not present in the market.' Pattern recognition was applied to a frame-by-frame breakdown of the video stream to spot changes in text annotation and imagery. The system automatically determined water inflow determine depths, time and orientation. Ball also touched on text analytics with

deep neural networks (using snazzy D3.js data-driven documents) and on pattern recognition in microseismic data. Paper SAS1341-2017.

Predicting equipment failure is a poster child of the analytics movement. **SAS Institute**'s Adriaan Van Horenbeek showed how to do it using R along with SAS asset performance analytics. Vibration signals are a key indicator of asset health. Spectral analysis is used to identify failure modes, currently an offline, manual process. Using a fast Fourier transform, this can be done in real time, comparing frequency domain fingerprints with NASA's prognostics data repository. Paper SAS527-2017.

Vipin Gupta showed how **Petronas** forecasts production in the age of oil and gas big data. Production forecasts based on data analytics, aka technical potential (TP) forecasts, are better able to capture the patterns created by past behavior of wells and reservoirs. TP is more than the 'monotonous,' straight lines of

conventional decline curve analysis. The shift from DCA to TP involved standardizing definitions and a 'systematic and focused review' of processes that previously were not transparent. TP combines science and the statistical art, Petronas applies ARIMA and UCM to process raw time series data from Schlumberger's Oil Field Manager. Pareto analysis also ran. Benchmark results showed that 80% of the fields had a sub 20% error in the estimate. Paper SAS0563-2017.

SAS Institute's Shahrzad Azizzadeh presented work performed by an unnamed Middle Eastern oil products company that has used SAS OptModel to optimize its 230 million liters/day distribution network and avoid bottlenecks. To handle large numbers of potential failure scenarios, a Benders decomposition algorithm was implemented. Paper SAS0681-2017.

More presentations on the SAS Forum homepage.

PNEC E&P Data and Information Management 2017

Teradata's historical perspective on analytics. Shell's 'ESSA' data automation. Total deploys Resqml. PPDM WIAW-as-an-ontology. Energistics' Witsml 2.0. ConocoPhillips on AI and the auditable data pipeline. Devon's 'Sifter' well log manager. Statoil's 4D seismic data lake. ExxonMobil on Agile/DevOps. Huvr on the drone 'data dilemma.' EP Energy on 'killing' traditional data management.

Duncan Irving (**Teradata**) kicked off the 2017 PNEC conference with a 'historical perspective on business analytics,' from the labor saving and decreased 'time-to-insight' that business computing, from the late 1940s on, brought to resource planning, supply chain intelligence and the elimination of non-productive time. Irving's thesis is that such data-driven transformation was principally a feature of low margin, highly competitive businesses. Oil and gas has been largely insulated from such pressures thanks to high oil prices.

The situation is changing now and the need for cost control and high process visibility has revealed a gap between the business and IT capabilities and a feeling that the business operates 'despite, rather than in tandem with IT.' In oil and gas, operational technology, petrotechnical and other disciplines are siloed by point software solutions and databases. Leveraging insights across the different domains remains a 'significant data management challenge.' Operations are plagued with 'brittle' data architectures, poorly contextualized interpretations and the lost data lineage. A new approach to data management is needed.

Enter the 'curated data lake,' a combination of software and hardware technologies that enables access to all a company's data, from a seismic trace up. The data lake requires a new management paradigm as well, Irving advocates the creation of chief data officer and a team of analysts used to working in a data-driven paradigm. Most importantly, industry needs to move away from the 'unsustainable' way it procures analytical capabilities as point solutions or outsourced capabilities.

Cora Poché provided an update on **Shell**'s technical data management initiative that includes a control framework describing how the TDM discipline is managed and also, ESSA, a program to 'eliminate, simplify, standardize and automate' operating procedures to reduce time and costs and enhance data quality. One Essa program targets subsurface data, now addressed with a 'front-office,' co-located with business assets and a central 'back-office.' Key locally-executed tasks are

being re-assigned to the central data operations center where they can be streamlined and optimized with a lean approach. Well headers, logs and commercial data have proved amenable for back office loading to the Shell corporate repository. Likewise seismic archival, spatialization of navigation data and potential field data loading.

Francis Morandini described how Energistics' Resqml standard is now a key component of **Total**'s proprietary, in-house developed 'Sismage' CIG* geoscience interpretation suite. Resqml leverages the Energistics transfer protocol (ETP) to provide file-less data transfer using web sockets, streaming data over the network from one application to another. ETP also facilitates data exchange in and out of the cloud. ETP adds a unique identifier to data sources to unambiguously tie data objects together. Data is defined in schemas and 'serialized' using Apache Avro. Serialization means that a rich Resqml data object can be turned into an XML string and transmitted over the wire. ETP also hides database and architecture dependencies, making for services that are independent of the physical representation of the data. Total is now considering using ETP to drive cloud-based data exchanges and broaden adoption across the Sismage-CIG platform. Total has developed a Resqml plug-in for Sismage using the gSOAP toolkit and the FesAPI, an open source, multi-language Resqml library from F2I Consulting. The work has unveiled some issues with the Resqml protocol which will be addressed in a future release. Morandini encouraged others to join Total in support of the Resqml initiatives and to take part in Energistics SIGs to ensure that their own developers will not be troubled by missing Resqml features. In general, Resqml has proved stable and provides robust functionality and can support new capabilities as they are developed.

Mara Abel from the Federal university of **Rio Grande do Sul**, Brazil reported on an ambitious attempt, carried out with help from IBM, to recast the PPDM 'What is a well' document as an ontology-based standard using the web ontology language OWL. At issue is the fact that the concept

of a well changes according to who is producing data. Geologists, reservoir engineers, drillers and managers each have their own viewpoint. The PPDM Wiaw document sets out to provide a common ground with definitions of key well components. While these have progressed understanding of the well lifecycle, Mara's group wanted to see if an ontological analysis of the Wiaw concepts could lead to an even more rigorous set of definitions that would be amenable to machine-to-machine interactions. The Wiaw concepts were formalized into a domain ontology, leveraging the BFO upper ontology. The OWL definitions and Wiaw concepts can be downloaded for visualization in the ontologist's modeling tool of choice, Protégé. The modeling process revealed certain 'ambiguities, conflicts and vagueness' in the Wiaw definitions. Mara noted in conclusion that the ontological analysis 'was carried out without the support of authors in clarifying the meaning of the concepts.' It is hoped that feedback from the PPDM standard authors will bring clarity in how the definitions have been interpreted and extend the formalization to include axioms that currently limit the application of ontology in exploration.

Jay Hollingsworth explained how **Energistics**' latest standards, in particular Witsml 2.0, are now based on the common technical architecture. This allows for information on the trustworthiness of data to be transferred in real time, along with the bulk data. The new data assurance object is designed to make data 'auditable, traceable, and fit for purpose.' While the new functionality does not address the issue of data quality, it does provide support for 'processes and rules that standardize data management, simplify data gathering for data analytics, and help reduce software development life cycles.' Information on sensor data precision, calibration and other parameters can be included in the transfer. Rules may be determined by the values of the data itself or may be defined by company policy. As an example, a company may mandate that well location information must be provided as a WGS84 latitude, longitude pair. Energistics is now working on a

blueprint to help companies realize the full potential of the new data assurance object.

Joanna Reast works in **ConocoPhillips**' Analytics innovation center of excellence (the AICoE) that was founded in 2014 to support data science initiatives. In parallel with this, an enterprise data curation function was established to streamline data collection for the AI/machine learning effort. Curating data for analytics requires different processes and skills from traditional data management. New skills include discovering and evaluating new data sources and steering a path between regulations on the use of personal data. When a source of interest has been found, a sustainable and auditable data pipeline is created into the analytics environment. Data sources of interest include in-house data warehouses, competitor databases, vendor portals and application data stores.

Ron Clymer presented **Devon**'s 'Sifter' well log management solution, an in-house development around components from IHS (LOGarc), Perigon Solutions (iPoint) and EnergyIQ (TDM). The Devon Sifter is a log quality assurance methodology that captures a log's confidentiality, vintage and provenance, runs files through a common suite of business rules and quarantines failures. Sifter performs a triage function to send logs into the appropriate LOGarc instances, keeping for instance, MWD sourced data separate from wireline or interpreted logs. iPoint's curve alias tables assure consistent tagging of logs. Sifter also interface with Microsoft Outlook to capture contextual metadata in emails. The environment now feeds QC's data into Halliburton/Landmark's DecisionSpace Geoscience interpretation environment and the underlying Open-Works data store. The DecisionSpace Integration Server now provides 'near real-time' data integration, bulk loading and automatic versioning. OpenWorks also delivers Sifter-derived source context information to end-users. Another beneficiary of the Sifter-curated data set is Devon's data and analytics team which can now access regional scale well information in a Hadoop data lake, over 10 million files and 80 billion rows of curve data.

Teradata's Jane McConnell picked up the data lake theme with a demonstration of the use of *ad hoc* analytics to investigate how different parameters influenced the repeatability of 4D, permanent ocean bottom seismic monitoring. (*We reported from last year's ECIM conference on Statoil's* 4D monitoring tests *with Teradata*.) Along with the seismic data

itself, other data streams of interest included rGPS positions of the air gun array, gun fill time, air pressure and the exact fire time for each shot. Additionally, multiple dGPS systems provide per-second positional data of streamers, ship's heading and speed. All making for a true 'big data' set, in a wide range of data formats. In addition 'hind cast' weather data was obtained from a third party provider along with yet more spreadsheets and observers log data. All this was mashed up using a combination of SAXification and nPath to look for hidden patterns in the data using Sankey graphs. The search turned up trumps, allowing for further optimization of the shooting operations. McConnel warned that, while in other branches of analytics, a correlation may be a sufficient basis for a business change, in scientific disciplines, especially in high-cost or safety critical industries, it is necessary to demonstrate the underlying physical cause of a correlation. To do this requires an interdisciplinary team of data scientists, computer and domain specialists.

Gabriela Bantau described how **Exxon-Mobil** has evolved an 'agile,' process to develop a user-friendly front end to 'all available' data sources. The process known as 'DevOps,' involves coding, testing and releasing software prior to monitoring and evaluation of user behavior and fitness for purpose. Results of the evaluation are incorporated into the following development cycle. Exxon sees IT's role in oil and gas as changing, from 'system-centered' to 'user-centered' design. An internal 'data accessibility' project involved the creation of a front-end to the corporate repository to serve as the primary mechanism for data loading, visualization and export to engineering and geoscience applications, enabling the retirement of a number of legacy applications and workflows. The old ExxonMobil mindset was to develop a tool and 'let the users figure out for themselves how to use it.' Consumer technology has forced a rethink. Today's services and solutions should be 'seamless and simple' as they are in users' day to day lives. Key DevOps paradigms leveraged in the process were the minimum viable product, the Kanban agile framework and a scrum methodology. All of which allows users to be directly engaged with the development process, speeding development and cultivating trust between users and the project team. One takeaway was that the project did not adhered strictly to any of the above methodologies but rather combined appropriate facets of each.

Robert Albright (**HuvrData**) is 'solving the drone data dilemma! Drones, aka unmanned aerial vehicles are used today in mapping and surveying pipelines and facilities. Sensors on drones create considerable data volumes, maybe over 25 GB/day which presents considerable data management challenges. Huvr has partnered with EdgeData to apply machine learning to analyzing drone imagery in near real time. While ML shows promise much more development is needed. Tests on wind turbine blade imagery show promise although images need to be flown in a very repeatable manner. Current accuracy is 'about 85%.' Huvr has also performed corrosion inspection of Hyundai's Gusto P10000 ultra-deepwater drillship. Although some drone contractors claim 'intrinsically safe' hardware, Albright advises caution, 'There are no Intrinsically safe drones that I am aware of!' Moreover, guidelines and best practices for UAV use in industrial settings are nascent. Albright advises users to work with the industry on these, particularly through Stress Engineering's Drone Users Group.

Last year, Chris Josefy (**EP Energy**) advocated 'small' data management. He now wants to 'kill' traditional data management! While all strive for good data delivery, it is the 'how' that is the problem. The 'traditional' model as exemplified by the Data governance institute's DGI Framework is highly formalized with committees, councils, data stewards, policies and definitions. Instead, Josefy argues for 'stealth data govern-ance.' Instead of creating new positions, 'identify those already doing the work and add accountability and expectations.' That way anyone can be a data steward and the tools of the trade are those you already have. *Josefy's presentation reminded us of a much earlier advocate of 'non tradition-al' upstream data management. Back in 1998 we* reported *from an earlier PNEC where Unocal's Marion Eftink introduced the concept of 'back-door' data manage-ment with a similar objective.*

More from PNEC.

* *Chaîne Intégrée Géosciences.*

Folks, facts, orgs ...

Aveva, Baker Hughes, Barco, BCCK, Borets, Transocean, Hunter Group, Enerflex, Energy Pipelines CRC, Enservco, Geological Society, Halliburton, Hexagon, Ikon Science, Lloyd's Register, Michael Baker International, Protiviti Digital, Savanna, Schlumberger, Spectris, ST9 Gas+Oil, Weir, Williams, W&T Offshore, Alberta Energy.

Steen Lomholt-Thomsen is now chief revenue officer at **Aveva**. He hails from IHS Markit.

GE unit **Baker Hughes** has named Lorenzo Simonelli president and CEO. Jennifer Hartsock is CIO. Maria Claudia Borras is president and CEO oilfield services and Matthias Heilmann is president and CEO digital solutions.

Mike Benson has been appointed US national director of sales at **Barco**. He was previously with WTS Paradigm.

BCCK has named John Peterson director of business development for Houston/Gulf and Rocky Mountain Regions. He joins BCCK from STV Energy Services.

Christine Barkley joins **Berkana Resources** as senior scada application specialist. She hails from Enterprise Products.

Borets has named Bill Faubel senior VP business development and sales.

Andrew McMahon is now senior geophysicist at **DataRe-Source**. He was previously with Paradigm.

Transocean's Julian Soles is chairman of DNV GL's rig owners committee.

Middelborg's Vegard Urnes is interim CEO of **Hunter Group**. Eirik Bergsvik is chairman of the board of the Dwellop unit.

Maureen Cormier Jackson and Kevin Reinhart are now members of **Enerflex** board of directors.

Fariba Mahdavi has joined the **Energy Pipelines CRC** staff as research officer.

Ian Dickinson is president and CEO at **Enservco**, succeeding retiree Rick Kasch. He was previously president and CEO of Premier Oilfield Equipment.

Richard Hughes is executive secretary of the **Geological Society of London**.

Jeff Miller is president and CEO with **Halliburton**. Dave Lesar continues as executive chairman.

Hexagon has named Ben Maslen as chief strategy officer. He hails from Morgan Stanley.

Ikon Science has appointed Pieter Gabriels to head up business development and client relationship management in Australasia. Mehdi Belrhalia is business manager for Middle East and India. Fareed Mushtaq is business development manager for Asia Pacific.

The Alan Turing Institute/**Lloyd's Register** Foundation's £10 million program in data-centric engineering has added Catalina Vallejos, Chris Oates, Din-Houn Lau, Franz Kiraly, Ricardo Silva, Sebastian Vollmer and Weisi Guo as group leaders.

Jeff Clevenger has been promoted to Senior VP and design and build lead at **Michael Baker International**.

Jonathan Wyatt is to lead the newly launched **Protiviti Digital**.

Lyle Whitmarsh has been appointed President of **Savanna**.

Juan Carlos Picott heads-up **Schlumberger** Production Technologies's center of excellence for chemicals.

Mark Williamson has been elected non-executive chairman at **Spectris**, succeeding John Hughes who steps down.

Chris Buckley has launched Houston-based **ST9 Gas+Oil**, offering a portfolio of products, services in support of drilling, completion and production operations.

Weir Oil & Gas has named Ronan Le Gloahec MD EMEA region. He was previously with Welltec.

Stephen Bergstrom is chairman of the board at **The Williams Companies** replacing Kathleen Cooper who becomes chair of the nominating and governance committee.

W&T Offshore has promoted Janet Yang to VP corporate and business development and James Hersch to VP Geosciences.

Death

Petroleum data management pioneer and chairman of the PPDM board from 1996 to 2009 Arthur Boykiw died earlier this year. Boykiw worked with Dome Petroleum, PetroCanada and was most recently VP information services at Alberta Energy. Read his obituary on the Calgary Herald website.

Done deals

Mocana, GE Ventures, Hunter/Badger, Dwellop, Hexagon, MSC Software, Flotek, National Oilwell Varco, Brüel & Kjær Vibro, Setpoint.

San Francisco based Mocana has raised $11 million in new funding to develop its security solutions for industrial control systems and the internet of things. **GE Ventures** participated in the funding round which brings the total amount raised to $93.6 million. Grand View Research predicts the IoT market will be worth $933.62 billion (*note the precision!*) by 2025. Mocana is an EdgeX Foundry (see this month's lead) founding member.

Hunter Group (formerly: Badger Explorer ASA) is to acquire **Dwellop AS**, in a 185 NOK million cash and paper deal.

Dwellop develops low cost products and technologies for enhanced oil recovery. Hunter/Badger is still working on its autonomous robotic drilling system, first announced in 2008.

In an $834 million deal, Intergraph parent company **Hexagon** has acquired **MSC Software** developer of computer-aided engineering and simulation software.

Flotek Industries has sold its drilling and production technologies segments. Drilling was acquired by **National Oilwell Varco** for a 'final consideration' of $17 million, subject to normal working capital

adjustments. Production was sold to an undisclosed buyer for $2.9 million. The deal has reduced Flotek's pro-forma debt from $50 million to approximately $27 million.

Brüel & Kjær Vibro has completed the acquisition of US-based vibration technology platform **Setpoint**. Setpoint's PI-system based condition monitoring technology is used to optimize operation of oil and gas rotating and reciprocating assets.

Going, going … *green*

Baker Institute on cost and risk of green. Energy Futures Lab announced.

An [analysis](#) by Jim Krane (Rice University **Baker Institute**) finds that 'commercial activity in fossil fuels is increasingly at odds with global actions to reduce the threat of climate change.' But fossil fuels provides over 20% of GDP in two dozen nation states. Current commitments to reducing emissions might mean forgoing $100 trillion in revenues by 2050, representing '*disruption to global affairs, undermining national budgets and corporate balance sheets while exposing stakeholders, including pension holders and ordinary citizens in resource-exporting states, to myriad risks.*' Oil is less exposed to environmental pressures than coal and gas because of its role in transport. 'Only' one third of current conventional crude oil reserves would need to be abandoned to meet climate change targets, as opposed to half of gas and 82% of coal. Coal is already very exposed having lost a combined 31,000 jobs and $30 billion in share value since 2010 in the US*.

~

Alberta's energy system is at the center of 'complex, fragmented and divisive debates' including disputes over market access to Alberta's oil, disagreements about climate change and controversy over community health. **Natural Step Canada**, **Suncor**, **Shell** and others have established the [Energy Futures Lab](#) to accelerate the development of a 'fit for the future' energy system. EFL director Chad Park stated, '*Energy issues are not as black and white as they seem, and Alberta has a very different story to tell. With polarized debates about energy as a backdrop, more people are joining us here in the very colorful middle ground and working together to find ways for Alberta to lead in the transition to a low carbon future.*'

* *Not so in [China though](#)!*

Patent *potpourri*

Vesmir's smart depopulation. WesternGeco/ION settlement. IBM gives up 'stupid' patent.

Vesmir, creator of [PetroDE,](#) has been awarded [US Patent No. 9,594,773](#) for its 'smart depopulation'-based large dataset mapping technology. The patent covers a 'pattern-retaining' method for displaying 'big' geographic datasets. 'Smart depopulation' adjusts the resulting display such that 'only literally a fraction' (sic) of the data requested is actually shown. The algorithm was developed by Dylan Herron.

A final order from the District Court in regard to **ION**'s patent litigation with **WesternGeco** means that ION has to pay WesternGeco an additional $5 million above the $20.8 million paid earlier.

All will be relieved to learn that **IBM** has given up on its 'out-of-office' [email patent,](#) lampooned by the **Electronic Frontier** Foundation as a 'stupid patent of the month.' EFF attorney Daniel Nazer described the patent as 'abstract, obvious and absurd.'

Siemens MindSphere IoT platform

KeepSecure app. AWS/Bluvizion partnership. MindSphere Rockect Club. Plug and play MindConnect.

At the 2017 Hannover Messe, Siemens showed off its MindSphere internet of things platform. One new app is 'KeepSecure!,' a management console for automation and control systems which helps detect potential threats, security breaches and anomalies more quickly and provides possible fixes and security patches. New MindSphere partners include Amazon Web Services which provides cloud infrastructure and other services. [Bluvision](#) also demonstrated its software-based indoor location technologies and MindSphere-based performance monitoring solutions.

Siemens is to launch the '[MindSphere Rocket Club](#)' later this year to support fledgling MindSphere startups.

On the hardware side, Siemens announced the plug and play Ruggedcom RX1400 router with 'MindConnect' MindSphere connectivity. MindConnect takes OPC UA or S7 inputs and translates them into MindSphere. The new system targets, *inter alia*, the oil and gas vertical. A dev kit, the 'MindConnect Lib' will be available later this year. Also new are 'northbound' and 'southbound' APIs for integration of third party developments.

Cushing upstream energy income index quits!

Bankruptcies, de-listings cause MLP tracker to be terminated.

In what could be taken as a sign of the times, Swank Capital and Cushing Asset Management have 'terminated' the Cushing Upstream Energy Income Index. The index tracked the performance of publicly traded US royalty trusts and upstream energy master limited partnerships (MLP). The decision to terminate was based on the fact that the number of potential index constituents has 'declined significantly' since inception. The decline is down to industry consolidations, bankruptcies and de-listings amongst upstream Master Limited Partnerships (MLP) and non-MLP royalty trusts. The Index was terminated on May 31, 2017. No price or total return index levels will be published henceforth. Other Cushing Indices are not affected.

Sales, deployments, partnerships …

Commvault, IFS, Intergraph, Microsoft, KBR, IBM, Xvision, Cegal, Patrick Connolly Associates, ABB, IBM, OSIsoft, Software AG, QED-I, Barco, HPE, Capgemini, IBM, Kongsberg, Stress Engineering, Mitsubishi, Orbital Gas Systems, Petrosoft, SAP, TechnipFMC, TrendMiner, Wex Card, Wood Group.

PGNiG is to implement **Commvault**'s data platform for end-to-end data management and backup.

IFS is to provide its IoT Business Connector to Songa Offshore to make drilling and operations data available to its IFS ERP application.

Intergraph PP&M and **Microsoft** are teaming to deliver 3D engineering and design combining Microsoft's HoloLens with Intergraph Smart 3D.

KBR and **IBM** have partnered to develop digital solutions for the hydrocarbons Industry.

Xvision Software has launched FieldAP, a '100% cloud-based' technology that provides digitalization to offshore field development.

Cegal has teamed with **Patrick Connolly Associates** on the Blueback 1D stochastic seismic Inversion (ODiSI) technology.

ABB has added an **IBM** Watson/Internet of Things cognitive capability to its ABB Ability industrial platform.

OSIsoft has partnered with **Software AG**, combining operations data with SAG's digital business platform for analytics, machine learning and IoT development.

AmecFW unit **QED-I** has extended its global master service agreement with BP. The deal includes support for QED-I's GoTechnology software.

Dumstruct is to include **Barco**'s OpSpace in its control centers.

BASF has selected **HPE** to develop one of the world's largest supercomputers for industrial chemical research at BASF's Ludwigshafen locale.

Capgemini has deployed its 'EnergyPath' cloud-based SAP S/4Hana solution to C&J Energy Services.

Galnaftogaz has selected **IBM** Control Desk to manage IT assets across its network of gas stations, convenience stores and cafes.

Kongsberg Maritime and **Stress Engineering Services** are teaming on integrated services, systems and support for offshore drilling and FPSO clients.

Mitsubishi has announced cyber-attack detection technology for critical infrastructure, commissioned by the New Energy and Industrial Technology Development Organization and delivered by the Control System Security Center.

Orbital Gas Systems has been awarded a further contract by DNV GL under the UK National Gas Network Innovation Competition. The companies will study the distribution of bio-methane in the UK's network. Orbital provides sensor technologies, including the GasPT.

Petrosoft is to integrate SAP Business One with its Enterprise cloud-based solution.

ExxonMobil has awarded **TechnipFMC** a contract for engineering, manufacture and delivery of the subsea equipment for the proposed Liza deep water project.

Total has selected **TrendMiner**'s predictive analytics software to facilitate self-service analytics and process performance optimization of its Refining and Chemical Segment.

Wex Card Australia has signed a ten year deal with Chevron to deliver a fuel card processing platform across the far east.

Wood Group has signed a 10-year master services agreement to deliver conceptual engineering, FEED and other services to Chevron.

Standards stuff

Troika's free SEG checkers. Energy Web Foundation. PPDM compliance for Target. OPC UA .NET stack. C++ coding standard. OGC Geoscience standard. POSC/Caesar ISO15926 pump lifecycle. XBRL Assertion Sets. IFRS pocket guide. ETSI's SmartM2M IoT reference ontology.

Troika's free SEG-D_r3.1 and SEG-Y_r2.0 format checkers are to be hosted by Energistics. The source code has been given to Stewart Levin at Stanford.

Stanford, Engie, TEPCO, World Energy Council, and the Rocky Mountain Institute have created the **Energy Web Foundation** to build a blockchain-based software infrastructure for energy.

Target Energy Solutions has achieved 'gold' level compliance with the PPDM Association's 3.9 upstream data model for its Meera master data repository.

Microsoft has announced the OPC UA .Net Standard Stack and contributed the C#/.NET source code to the OPC Foundation. The 'open-source' implementation is available on GitHub. The .NET standard library technology is said to be a platform-independent dev kit

capable of running apps on Linux, iOS, Android and Windows. Microsoft is pitching OPC UA as 'the interoperability standard for Industrial IoT.'

The **Software Engineering Institute** has released the 2016 edition of the SEI CERT C++ coding standard.

OGC is seeking comment on the draft charter of a proposed geoscience domain working group, an open forum in to develop and promote technologies for geoscience data description and sharing, a joint effort with the **International Union of Geological Sciences**.

POSC/Caesar's ISO15926 organization has issued a new web-based document illustrating the 'lifecycle of a pump' from design to operations and maintenance. The graphical modeling, while not for the

fainthearted, neatly illustrates the use of FranzInc's Gruff triple store browser.

A public working draft of the **XBRL** Assertion Sets 2.0 specification, a means of embedding business validation rules in an XBRL taxonomy, is now available.

The **IFRS Foundation** has published its 2017 Pocket Guide to IFRS standards, the global financial reporting language.

The **European Telecommunications Standards Institute** has ventured into the domain of the Internet of Things with the publication of technical specification 103 264 V2.1.1 aka 'SmartM2M, Smart Appliances – a reference ontology and oneM2M mapping.' *An easier read than ISO15926!*

Cyber security round-up

Ponemon Institute, NIST, PAS, BSI, Software Engineering Institute, Rand, Red Hat, Leidos, W3C, Owl Computing, IBM, Atos, Siemens.

A Ponemon Institute study found that 68% of oil and gas companies had at least one security compromise in the past year. Only one-third of cyber managers rated their cyber readiness as 'high.'

Recent cyber reports from NIST include Report 8151, on reducing software vulnerabilities; Special Publication 800-184 on recommendations for post-incident tactical recovery and strategic mitigation for the longer term; Draft Special Publication 800-190 on security in Docker-style application containers. More from NIST's new Computer security resource center.

ICS cybersecurity solution provider **PAS** has released a new version of it Cyber Integrity software with a new ICS baseline functionality to monitor configuration changes.

BSI, the German federal office for information security has completed an in-depth security analysis of OPC-UA. While the study concluded that OPC-UA 'does not contain systematic security vulnerabilities,' shortcomings were noted in the reference implementation in that a) protection against replay attacks is missing, b) memory leaks can be used for denial of service attacks and

c) documentation on security functions in the communication stack is lacking.

The **Software Engineering Institute** has published the fifth edition of its 'Common Sense Guide to Mitigating Insider Threats a free, 175 page resource replete with recommendations.

Rand has published a 133 page free guide 'The life and times of zero-day vulnerabilities and exploits,' recommended reading in these times of WannaCry and Petya! The study is based on a dataset of over 200 vulnerabilities and provides recommendations as to what needs to be done when they are discovered.

Red Hat's OpenSCAP 1.2 has been certified by NIST as a configuration and vulnerability scanner Red Hat Enterprise Linux 6 and 7-based systems.

A short briefing paper from **Leidos** finds that corporate security is likely get worse before it gets better. Over the past year, 2 billion records were compromised due to 'lax security and a lack of enterprise commitment to protect customers.' As IoT devices proliferate, 2017 'will be worse than 2016.' US lawmakers need to 'sharpen their knives.'

The worldwide web consortium's **W3C** has published its Security disclosures best practices, a template for protecting users and applications from fraud, malware, and computer viruses.

Owl Computing's OPDS-1000 'data diode' has been selected by an unnamed multinational oil and gas exploration company to protect oil and gas exploration equipment in the field. Data from a PI historian, OPC, files, syslog messages and remote screens transited successfully through the one-way communications link.

IBM has announced 'IBM X-Force Red,' a team of experts that help clients 'take a more programmatic approach to security testing.' A cloud-based X-Force Red portal provides an end-to-end enterprise-class testing capability. IBM has also published its Threat Intelligence Index (registration required) describing 2017 as 'the year of the breach!'

Atos has teamed with **Siemens** to help customers establish an integrated first line of defense against industrial cyber-attacks. Siemens has also signed a cyber security partnership with Darktrace to fast-track deployment of its AI-based 'Industrial immune system' cyber defense platform to the oil and gas industry.

Chemical Safety Board investigates fatal Firestone explosion

Luminent and CartoPac technology deploys to site of leaking natural gas flow line.

The US Chemical safety board (CSB) is investigating a home explosion caused by a nearby leaking gas well in Firestone, Colorado. The explosion led to two fatalities and one serious injury. Preliminary information indicates that the Anadarko-operated well was no longer in service, but an 'uncapped flow line' came within several feet of the home and was the likely source of the explosion.

Local KDVR TV reported that the Colorado oil and gas conservation commission (COGCC) had found more pockets of methane trapped underground near the site of the explosion. Investigators said the explosion was caused by gas entering the home through a cut, abandoned flow line. Anadarko has closed some 3,000 wells in northeastern Colorado as a precaution.

The methane pocket was mapped using technology from Luminent and CartoPac. The 'tiered' technology and services solution is designed to help operators comply with flowline inspection requirements, notably the COGCC May 2, 2017 Notice to Operators on flowline inspections.

Bluefin SAP BW/4 Hana for Noble Drilling

Proof-of-concept deployment of drillers data warehouse in the cloud.

Mindtree unit Bluefin Solutions has delivered a 'world's first' proof-of-concept for SAP BW/4Hana to driller Noble Corp. Bluefin worked with Amazon web services to implement SAP's 'next-generation' data warehouse application. The 2 terabyte Hana instance was provisioned in the

Amazon cloud 'in under an hour.'

The Hana deployment also shrank Noble's database from 700GB to 100GB, speeding up backups and automating many reporting tasks. Noble's data modelers can now work on the database without disrupting

the business and end users can access real-time data without help from IT. More from Bluefin.

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Data management matchup - miners vs. upstream

Datum360 blogger opines that oil and gas leads the field in data management.

Conventional wisdom has it that oil and gas is a laggard when it comes to, well, anything that the 'wise' party is selling. Upstream data managers will be pleased to learn that, according to Peter Natham, oil, gas and process engineers have put a lot more thought into data management than the miners. Natham is well-placed to compare the two verticals having moved across from mining to oil, gas and process data specialist Datum360.

Consistency in data capture requires a data standard. For engineers, this means using the concept of a 'class.' (Assiduous readers will recognize that we are in engineering and construction rather than geosciences!)

The class concept is said to be 'widely accepted' in the process industries and is now being considered for industry-wide standardization in the context of 'BIM,' building information management.

Natham wound up with a plug for the Cfihos initiative. The potential for the mining sector is that all borehole data could be described in a class library and shared across different stakeholders. Moreover, 'without the class approach, there is no mechanism to instantaneously gauge the completeness of a dataset.' *Comment – if the RDL is a recommended practice for mining boreholes, it is curious that it has not seen much take-up in oil and gas drilling!* Read Natham's blog here.

Floktek signs 'cognitive' reservoir deal as suit dropped

FracMax fracas finished. IBM Watson Explorer deployed in Reservoir Cognitive Consultant.

Flotek Industries' 'FracMax fracas' we reported on back in 2015 is over. The authoritative Law360 reports that a Texas federal judge has thrown out the investor suit against Flotek, finding that '*statements about the accuracy of an app the company used to promote its drilling fluids supported only a slight inference of corporate wrongdoing.*' District Judge Alfred H. Bennett agreed saying the shareholder allegations amounted to 'negligence at the worst.'

Subsequently, Flotek has announced a global agreement with IBM to develop a 'cognitive reservoir performance system' for oil and gas. The new system will use IBM's Watson Explorer technology (as deployed by Woodside) to analyze Flotek's proprietary oilfield chemistry research, client-contributed data and publicly reported sources from completion and production to 'reveal insights and identify new approaches to enhance well performance.'

The new service, Flotek's Reservoir cognitive consultant (RC2), will use machine learning to search and analyze 'troves' of historical and experiential data from client wells in real-time to discover critical trends and insights. Flotek CEO John Chisholm said, 'RC2 will identify specific challenges facing our clients through prescriptive chemistry technology designed to deliver measurable, transformative results.' More from Flotek.

MSC Software simulates Pioneer's rigs

ADAMS multi-body dynamics simulator tuned with real world drilling data.

Pioneer Natural Resources has commissioned a bespoke edition of MSC Software's 'Adams*' multibody dynamics simulation platform to address drilling 'operations, dynamics and dysfunctions.' MSC Software (a Hexagon unit) has worked in simulation since 1965 when it was awarded the original contract to commercialize NASA's Nastran finite element analysis package.

Now Adams is being customized to the requirements of the oil and gas industry. The simulator will allow users to vary drill string components, operating parameters, wellbore geometry, lithology and control algorithms to understand their effect on drilling dynamics.

Pioneer CTO Chris Cheatwood said, '*MSC has a proven track record of providing physics-based dynamic modeling to automotive and aerospace. This is a unique opportunity for us to help bring the same capability to US onshore independent operators. The software allows us to simulate drilling an entire well from start to finish, monitoring*

parameters we've never had access to before. We can test multiple well design and compare the results side-by-side to select the optimal configuration.'

Pioneer is helping MSC refine and validate the software by gathering real-world data using sensors on the drill string to acquire 'ground truth' measurements to verify and improve the models.

* Analysis by digital simulation of analog methods.

Fiber optic sensing association announced

New industry body to promote emerging technology with technical library.

Fiber optic specialists including Astro Technology, Corning, Fotech, OFS, Omnisens and OptaSense have launched FOSA, the Fiber optic sensing association. FOSA's goal is to educate industry, government and the public on the benefits of fiber optic sensing technology. Fiber optic sensing is described as an 'emerging technology' that uses light to remotely measure acoustics, temperature and strain. The technology is used to detect pipeline leaks, vehicular and foot traffic, digging and unsafe temperatures. Fiber optics are used today to monitor thousands of miles of power lines, pipelines, international borders, critical infrastructure and facilities.

FOSA executive director Thomas Cohen said, '*This new organization will educate key players in all sectors and promote awareness of fiber sensing technology to help accelerate the use of this critical technology.*'

For more on fiber use cases see the FOSA technical paper repository.