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IIoT in Oil & Gas

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IVAAP microservices

INT rolls-out microservices-based back end. CEO Olivier Lhemann reveals the technology under-the-hood and the potential for interoperability with other frameworks such as GE's Predix.

Houston-based INT, purveyor of software 'widgets' that are widely used by major upstream software vendors and by in-house oil and gas company developers has announced Ivaap* a new microservices-based back end for its geoscience and engineering data visualization and analysis solutions.

The Ivaap framework is designed to connect to multiple data streams such as a Witsml server. Developers can aggregate, analyze and display well and other data from multiple sources including Int's own GeoServer. Ivaap is cloud-enabled and 'network-secure' for remote collaboration. Microservices technology, which favors lightweight, componentized software over monolithic applications is cloud-friendly and scalable for concurrent processing, performance and high-availability. INT's compact widgets are well-suited to the microservices-style architecture.

INT CEO Olivier Lhemann told Oil IT Journal, 'Ivaap is organized as a suite of services that are easy to discover and use. Ivaap leverages Hateos which enforces the inclusion of hyperlinks within its web responses. The structure of a Witsml data source, a LAS file or a SQL database can easily be explored by following the links returned by a request.'

'This means that rather than enabling interoperability through the definition of new standards, microservices offer tools that other developers or partners can use to solve their problem.'

'We use the Akka Framework to package our microservices so that they are highly concurrent, secure and resilient. Our customers can use other technologies to augment the functionality of the platform and integrate with their own services.'

Another early-adopter of microservices is GE whose Predix leverages a suite of 'discoverable' microservices. While cloud-deployed microservices are clearly of interest to IT, the big question for the business is whether they can will really enhance interoperability between software components from different vendors. We asked Lhemann if Ivaap would ease interoperability with, say, GE's Predix. He replied, 'We have limited experience with Predix but as it is based on Pivotal's Cloud Foundry, Predix applications deployed to the cloud will access external resources via the Open Service Broker API, launched last December. Eventually, Open Service Broker could be a good bridge between Ivaap and Predix. We are not quite there yet, but this seems like a good way to proceed in the future.' More from INT.

* INT Visualization and Analytics Platform.

Flutura & JAG

Retired C-level execs (including former ConocoPhillips chairman Archie Dunham), leading VCs back Cerebra AI's push to oil & gas.

Houston-based Jerry Allen Group (JAG Resources) has partnered with AI-focused startup Flutura to 'accelerate the revolution' of artificial intelligence and the industrial internet in oil and gas. The partnership focuses on the use of Flutura's flagship Cerebra IIoT platform.

JAG Resources is a group of retired energy sector leaders who chose to remain active by mentoring start-up companies bringing 'innovation, disruptive and transformative technologies' to the energy sector.

JAG advisor Archie Dunham (retired ConocoPhillips chair) said, 'Competitive advantage in the energy marketplace will go to forward thinking players who invest in artificial intelligence capabilities like Cerebra. In oil and gas, the risk of digital inaction is greater than the risk of failure.'

Cerebra allows advanced diagnostic algorithms for equipment health 'episode' detection and provides OEMs with the ability to scale value added offerings across equipment classes.

Flutura is backed by 'leading' venture capital firms Vertex Ventures of Singapore, Lumis Partners of Connecticut and Silicon Valley's The Hive. More from Flutura and JAG resources.

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Computing with light!

An announcement from MIT researchers on breakthrough computing using 'photonics' highlights the potential for analog devices in artificial intelligence. Editor Neil McNaughton recalls earlier work using light to 'image' seismics. Unfortunately no longer a 'politically correct' use case for MIT!

Early on in my career I was a young geophysicist in the head offices of a major EU oil company. One day there was a commotion in room near mine and soon the 'next big thing' was unveiled, an optical bench for analyzing seismic data. This remarkable tool shone a laser beam through a 35mm slide (remember them?) of a seismic line. The light then passed through a lens which focused the beam to a point. No surprises there. But what was mind blowing (to me at least) was the fact that the information, the pattern of light at the focal point, represented a Fourier transform of the seismic image. For those of you who have not come across Joseph Fourier's *chef d'oeuvre*, a Fourier transform splits information into its frequency components. A spectrum analyzer if you like. This laser optical bank split seismic into its spatial (rather than temporal) frequencies.

This seemed to me rather fanciful until the machine's champion began sliding optical gratings and wedges into the device at the focal point, demonstrating just how powerful a filtering device this was. You could remove any directional component in the slide and bring out features 'hidden in the data.' It was so powerful that it may have brought out some features that were not there at all.

I later realized that this was not exactly the 'next big thing' but the last, having been developed a decade earlier by United Geophysical and sold as the LaserScan. In the 1960s, (before my time!) this device was of interest to seismic processors, even though digital processing was already well established. Digital geophysics was invented a decade earlier (yes, in the 1950s) at MIT's Geophysical applications group, MIT-GAG. But the laser/analog device was capable of instant processing at a higher resolution than would have been practical with the digital technology of the time. Some examples of LaserScan are given in Ernie Cook's 1965 paper on geophysical operations in the North Sea and another by John Fitton and Milton Dobrin in the October 1967 Geophysics.

My next encounter with non digital, analog devices, does not have anything to do with this editorial, but it was so clever and I doubt that I'll ever have a better opportunity to talk about it so here goes.

In the mid 1970s GPS did exist but it was not very good. In fact although it was widely adopted, the first sonar-doppler aided marine GPS systems were a step back from radio navigation. Of which there were many competing systems. One of these (unfortunately I can't remember what it was called and can't find any references), used an analog delay line and a radar type chirp that was broadcast over the air. The signal was also sent, as an acoustic surface wave across a solid-state device. The distance travelled across the device (at the speed of sound) was selected so that it took about the same time as the radio waves travelling to shore-based beacons (at the speed of light). By cross-correlating the returning radio signal with the output of the delay line, the time of travel (and hence the distance from) the shore-side beacon could be measured very accurately. At least that was the idea. If my memory serves me well the navigation service was not in operation for very long as the GPS brigade got their act together soon after the system was introduced and the rest is history.

You may be wondering what the point of all this is in today's age of digital 'big' data. Well, a recent paper in Nature Photonics, 'Deep learning with coherent nanophotonic circuits' by Yichen Shen et al. from MIT describes the use of an optical, analog computer to perform artificial neural network (ANN) 'deep learning.' Seemingly, today's computing hardware, despite 'significant efforts' is 'inefficient at implementing neural networks.' Just as the digital computers of the 1960s weren't up to some geophysical processing tasks. And the solution may again be computing with light.

As an aside, this kind of photonics is not to be confused with quantum computing which is also touted as solution for ANN. Quantum computing is not as far as I know yet feasible. MIT's 'photonics' optical computer just uses regular light, no quanta, not even digital pulses.

MIT's optical ANN promises an enhancement in computational speed and power efficiency over state-of-the-art electronics. The researchers have demonstrated the concept with a programmable nanophotonic processor featuring a cascaded array of 56 programmable Mach–Zehnder interferometers. The system was trialed on a 'typical' ANN-style problem, speech recognition where it performed reasonably well, scoring a 77% accuracy.

Commenting the breakthrough Shen said that the architecture could, perform ANN calculations much faster and using less than one-thousandth as much energy per operation as conventional electronic chips. Energy consumption by the way is a big issue in high performance computing. 'Light has a natural advantage in doing matrix multiplication, dense matrix operations are the most power hungry and time consuming part of AI algorithms.'

And, one might say, of geophysical imaging. In fact the MIT team expects other applications in signal processing. If it wasn't so politically incorrect these days, they might have added 'and in seismic prospecting for oil.' But MIT-GAG is of a long-forgotten past. MIT's current Energy Initiative, MITEI, is an altogether greener thing, even if though it is funded by oil and gas companies.

By the way, after the knock-off device across the corridor from my office was installed, I would occasionally sneak across the corridor and peek into the laser room. I don't recall it being used much. In fact I think if was one of those things that you buy, use and couple of times to amaze your friends and then forget about. A bit like my Panono!

🐦 @neilmcn

Oil IT Journal interview, Mark Bashforth, Ikon Science

Ikon Science CEO Mark Bashforth and CTO Denis Saussus discuss working smarter at $50 oil, collapsing engineering and geoscience silos and the return of geophysics to shale drilling.

What's it like being an upstream software boutique in the downturn?

MB Everyone did fine at $120 oil! Times are hard for many but in my experience, mid-sized specialists like Ikon suffer less in the downturns than others. I joined Ikon in February when founder Martyn Millwood Hargrave was looking for a commercially minded person to drive future growth. Martyn is still chairman. We are now coming strong out of the downturn and are lean and in better shape than our main competitor*! We are nimble and can react quickly to our clients in IOCs, NOCs and large independents who come to us for rock physics, quantitative interpretation (QI) and our JiFi joint inversion.

Where do you see growth coming from?

MB The rebound in North America is strong. Companies are seeing the green shoots of returning OPEX and a resurgence of research money. The EU is OK, Asia Pacific so-so. Overall the demand is for software which is always a more robust business. Services are not so strong.

What is driving the renewed interest from operators?

MB Although oil price is important, what really matters is long term price stability. Clients won't invest if the oil price yo-yos up and down. A realistic range is around $50 for the next 12-18 months. Demand is picking up, especially for unconventionals. At $120 there was no time to think and analyze. At $50 operators have to work smarter on where to drill, how to drill and how to maximize recovery. This is where

Ikon comes in. Working faster is not enough. Operators need to change from the cookie cutter approach, take a step back and analyze their workflows.

But this goes against the factory drilling paradigm. How do you convince the engineers?

MB We see the silos as collapsing. Asset team managers want more control. They increasingly look holistically across the business and are bringing the different disciplines together, including geophysics.

DS Geopressure and geomechanics on their own did not have much impact on unconventionals at $120. Some analysis was done 'just in case' but then the factory drilling approach came along. Geophysics was replaced by statistical drilling. But now, at $50, you can only can drill so many wells and companies are looking for that extra edge. The pendulum has swung back re geophysics, geomechanics and QI. Now this stuff 'may be worth a shot!' There is no silver bullet here, but Ikon has slowly added value to the methodology. Our software is a differentiator. The larger upstream software vendors have built 'elephant' platforms that can do anything but do nothing very well! These folks are feeling the pain now as they see drop in maintenance revenue. Ikon created the rock physics market which is now in every company's workflow. JiFi is a step change, bringing-in fracking and integrating geology and geophysics. Our real time pore pressure predictor gets closer to the driller with practical workflows and the application of high-end science.

How do you cohabit with the big guys?

DS We have a collaboration deal with Schlumberger to bring key functionality into Petrel. There is now a large group of Petrel users interested in RokDoc. It has been a win-win.

How do you approach geophysical number crunching?

DS Our platform is Java-based so we run on Windows and Linux. We also have support for MPI so our number crunching can run on clusters. We are in the process of a move to the cloud, extending our parallel processing capability. Industry is generally very slow to move to the cloud. But last year saw a change, especially with smaller operators. A couple of US operators have outsourced all of their IT. Landmark's DecisionSpace has been on the cloud for a couple of years. Schlumberger is moving slowly that way and will bring us along. It is not really our role to initiate such a move for operators.

MB Oil and gas as a whole is a laggard in technology adoption. We need to stop these risk-averse ways of looking at technology. Yes, our industry is unique but not so unique that it can't learn from others. Many oils actually make their own software. Would they be happy if Ikon drilled wells? It doesn't make sense!

More from Ikon Science.

* After the interview, CGG (whose Jason unit is an Ikon competitor) filed for protection from bankruptcy in France and other jurisdictions.

Getting data right - don't model, argue!

O'Reilly's free book advocates abandoning data modeling in favor of Tamr's DataOps.

Getting Data Right (GDR), tackling the challenges of big data volume and variety is 77 page free book apparently without sponsorship so where's the catch? We looked the gift horse in mouth and noted that the GDR is published by Tamr. Otherwise the seven co-authors provide an interesting narrative around big and not so big enterprise data. Tom Davenport immodestly proposes his own 'law' thus, 'The more an organization knows about a particular business entity, the less likely it is to agree on a common term and meaning for it.' This leads to 'corollaries,' viz, 'A

manager's passion for a particular definition of a term will not be quenched by a data model specifying an alternative definition,' and 'consensus on the meaning of a term is achieved not by data architecture, but by data *arguing*. 'Data modeling doesn't often lead to dialog, because it's not comprehensible to most nontechnical people.'

Other authors offer similar pithy, if hard to execute, advice: Michael Stonebraker on data curation and the data lake where we learn that data ingestion to the lake involves converting XML to CSV (*and*

that's a good thing?) Ihab Ilyas advocates 'humans in the data cleansing loop' and the 'judicious involvement of experts' and reference sources. Michael Brodie writes on the 'fourth paradigm' of data science with an interesting use case of CERN's Atlas project. Andy Palmer introduces the next big thing 'DataOps.' James Markarian advocates replacing sluggish old ETL with snazzy 'data unification' *à la* Tamr. So there was a catch, but quite an interesting read all the same!

Divestco's mapping 101

Calgary geoscience data managers society presentation on Esri and other GIS solutions.

Speaking at a recent gathering of the Calgary geoscience data managers society, Divestco GIS guru Terry Steinkey gave a useful 101 presentation on the fundamentals of mapping. Steinkey ran through the essentials of geodetics the relative merits of different projections and datums, along with a plug for the essential work of the EPSG. 'Issues,' like 200m plus errors in positioning, can easily result from a misuse of projections.

GIS was invented by Canadian Roger Tomlinson and is today a 'multi billion dollar' industry. Popular GIS applications include Esri which can be extended with modules such as Divestco's own GeoCartaGIS for Arcview, adding G&G functionality. The 101 includes a brief exposé on the different Esri data formats the shapefile and geodatabase.

The free and open source QGIS, 'less aesthetic and harder to learn than Esri' is nevertheless a 'direction that many organizations are taking.' Google Earth Pro (GEP) is a 'great starting point' for web-based mapping. GEP development has now curiously been taken over by Esri and 'they are not doing a good job!' Perhaps because Esri has its own ArcGIS Online web mapper with a freeware edition. But this is 'more for fun than production.' Serious work needs an upgrade to (a paid) ArcGIS Server.

Statoil's total uncertainty management program complete

Emerson/Roxar embeds results of multi-year R&D in commercial release of Tempest/Enable.

Emerson's Roxar unit has completed its 'Total uncertainty management' program, a joint venture with Statoil that addresses history matching, uncertainty management and 'quantification' across the reservoir characterization workflow. TUM has informed major updates to Roxar's Tempest/Enable history match application notably with the addition of ensemble Kalman-filter based history matching that

is said to have given 'a marked improvement' in statistical accuracy.

Other TUM spin-offs include an application connector for chained workflows and the implementation of an 'ensemble smoother' that is 'particularly successful in handling the production effects seen on 4D seismic.' All TUM developments are now available in the commercial 8.0 release of Roxar Tempest.

The joint venture has also enabled deployment of TUM methodology on clusters and in the cloud, said to be essential for larger integrated workflows.

Roxar's Kjetil Fagervik said, 'In field development plans, investment or divestment proposals, accurate forecasting, uncertainty and financial risk management are some of the industry's greatest challenges.'

3ESI-Enersight presentation on reliable technology and software

SEC's 'reliable technology' reporting rules open a route to increased reported reserves.

3esi-Enersight has just published a position paper on the use of 'Reliable technology in SEC reserves reporting' authored by John Lee (Texas A&M). Lee is in a good position to explain the niceties of the SEC's regulations since his stint as an 'academic engineering fellow' at the SEC where he was principal architect of the modernized reporting rules.

Reliable technology 'must be based on sound scientific and engineering princi-ples, and must 'lead to the correct conclusion the vast majority of the time.' Lee's thesis is that reserves estimation

techniques, including software, can meet the criteria for reliable technology providing a developer can back it up with 'extensive field evidence.'

Most operators don't have the resources to pioneer reliable technology and should let vendors do the heavy lifting and propose novel technologies that enhance accuracy. While tried-and-true methods may meet current reporting rules, new software-based reporting 'can increase PUD estimates in unconventional resources, by expanding proved area well beyond immediate offsets and increasing reserves

with more favorable aggregation of individual well EURs.' Smart companies will take advantage of reliable technology to increase reported reserves using software that others have developed and validated as meeting the SEC's rules.

Lee's approach is curious in that it equates 'reliable' with larger. One might have thought that using 'reliable technolo-gy' could occasionally prove disappoint-ing! More from 3esi-Enersight and our October 2009 editorial on the 'perfect storm' of reliable technology and shale reserves.

Baker Hughes, IHS Markit, CMG team

Partnership promises 'new level' of G&G/engineering solutions. CMG's healthy 2017 results.

CMG, IHS Markit and GE unit Baker Hughes have announced a technology alliance to 'deliver a new level' of geoscience analytics and engineering solutions to the upstream. The partnership sets out to offer a 'new choice' for integrated workflows spanning geological characterization, reservoir modeling, production data analysis and reservoir flow simulation. Software in the alliance

includes IHS Kingdom, Baker Hughes JewelSuite and CMG's reservoir suite of simulation software. The collaboration is to deliver 'new levels of insight and efficiency for integrated geoscience analytics.'

IHS' Russell Roundtree said, 'Our customers want options, not inflexible, closed systems, to stay agile in these difficult times.' Baker Hughes' Martin

Brudy added that the alliance would optimize connectivity and provide 'adaptable, scalable and solutions.'

CMG recently reported its fiscal 2017 year -end results which are pretty spectacular for an upstream software house in the downturn. As of March 31, 2017, CMG had an enviable $63.2 million (Canadian) in cash, no debt and an $822.6 million market capitalization.

Software, hardware short takes …

Blue Marble Geographics, Dynamic Graphics, Roxar, Halliburton, Hexagon, Kadme, LandWorks, Sintef, Quorum, NIST/CU, Rock Flow Dynamics, Terrasciences, TrendMiner, SpectraLogic.

Blue Marble Geographics' Global Mapper 18.2 introduces 3D digitizing and connectivity to Amazon web services. The SDK includes support for Amazon's cloud-based simple storage service, 3D fly-through and improved display of vector features and models in the 3D Viewer.

Dynamic Graphics has released CoViz 4D V9.0 with quantitative visualization and analysis functions targeting reservoir engineering. DGI's WellArchitect 5.0 adds functionality for directional drilling including clearance scans, data display in differing projection systems and Witsml feed ingestion.

Emerson/Roxar has announced RMS 10.1 with enhanced seismic-to-flow simulation workflows, integrated decision support and integration between domains.

A new publication from **Halliburton** 'Digital transformation for oil and gas production operations' introduces 'Voice of the Oilfield' technology. VotO's high level architecture spans downhole instrumentation, Landmark's Field Appliance IoT connector and DecisionSpace Production 365 running in the cloud*.

Hexagon has announced the Smart digital asset collaboration module for its Intergraph flagship. SDA-C helps owner operators build a digital asset model in the cloud during the project phase for use later in operations and maintenance. SDA-C was a joint development with a 'major owner operator.' Other 'cloud ready,' SDA modules are planned.

Kadme's Whereoil 4 promises a 'wealth of new capabilities' including faster spatial search, flexible GUI configuration options and new well log QC and visualization.

LandWorks has announced V5.5 of its land management suite which now 'fully supports' the Esri ArcGIS Online and Portal platforms.

Sintef has released V 2017a of MRST, the Matlab reservoir simulation toolbox. The free software can be downloaded here. MRST updates include support for multi segment wells, inflow control devices and sensitivity analysis of input parameters.

Quorum has announced myQuorum Land-on-demand, a cloud-based edition of its land management suite for small and mid-sized E&P companies.

A team from **NIST/CU** has 'launched' a 'Comb and Copter' system to map atmospheric gases around oil and gas facilities. The C&C comprises a ground-based laser and drone-mounted sensor that analyzes absorbed light to identify gasses in near-real time.

Rock Flow Dynamics' tNavigator 17.2 adds a new network designer module and 3D seismic interpretation functionality with manual and autotracking and time to depth conversion.

Terrasciences has released LAS Probe, a freeware utility to inventory and QC curves in multiple LAS files. LAS Probe is available for Windows and Linux.

TrendMiner 2017R1 adds support for large companies operating across multiple sites with different historian/MES systems to gain analytics insights without changing their existing systems. Tags from a variety of historians can now be indexed and searched within a single analytics environment. TrendMiner ships with connectors for Wonderware Historian, OSIsoft PI, Honeywell PHD, Yokogawa Exaquantum and AspenTech IP21.

SpectraLogic has published its Digital Data Storage Outlook 2017, a useful 25 page guide to data storage hardware trends.

* See also our coverage of Halliburton's 'Open enterprise architecture' in 'More from PNEC' on page 9 of this issue.

Consortium corner

OTM's Geomechanics Initiative. DNV GL standardizing subsea processing. US DoE's $20 million for oil and gas R&D. TNO's field optimization benchmark Round 2. SEG teams with Kudos.

OTM has launched the Geomechanics Initiative to address geomechanical challenges such as pore pressure prediction, wellbore stability, fracture and fault seal analysis and compaction and subsistence. A survey found strong support for the initiative although some expressed concerns over other private consortia that fail to share IP and 'only open the doors after a safety or an environmental issue.' OTM plan one meeting per year and a public website to promote the initiative. Project reports and updates will, curiously, be held private.

DNV GL's JIP on standardizing subsea processing has moved into Phase 2. Phase 1 saw completion of a functional description of subsea pumping. Phase 2 will deliver standardized guidelines. JIP members include Aker, GE, OneSubsea and TechnipFMC alongside operators Shell, Statoil and Woodside.

The **US Department of Energy** is to invest $20 million in new oil and gas research projects. Target areas include increasing recovery from unconventional oil and gas wells and preventing offshore spills and leaks. The funding is said to support the Office of Fossil Energy's efforts to ensure 'environmentally sustainable' domestic and global supplies of oil and natural gas.

Dutch R&D outfit **TNO** has developed a field development optimization benchmark challenge under the auspices of its ISAPP research program. The benchmark is based on a reservoir model for the fictitious Olympus field. Following-on from the 2008 Brugge challenge, Olympus adds the complexity of optimizing wells placement. Download the challenge models here.

The **SEG** has teamed with Kudos*, a private organization that claims to 'help researchers ensure their publications get found, read and cited in a world of information overload.' Kudos aggregates metrics on a published paper and 'maps outreach activities against those metrics.'

* Nothing to do with Strava!

GBC IIoT and digital solutions in oil and gas, Amsterdam

Shell's Tacit digital initiative. McKinsey, 'fix oil and gas economics with digital.' IIC on elusive IoT standards. IHS on digital 'pockets of excellence.' Statoil's GoDigital/CoE. Petronas' downstream digital roadmap. Maersk on Predix and 'edge' analytics. Baker Hughes' Remote Operations Services. Movus' FitMachine. Honeywell's Connected Plant. Gazprom/Rostelecom team on an 'Open partnership for the industrial internet of things in oil and gas.'

GBC* is an established conference organizer for the downstream. The IIOT & Digital Solutions for Oil & Gas event held in Amsterdam last month was its first venture upstream. Kari Jordan provided a keynote introduction to **Shell**'s Tacit IT initiative. Digitalization is changing the energy industry and helping the world decouple global emissions from economic growth, notably with the internet of things, machine learning and big data/analytics (BDA). Shell has many IoT experiments running and a small team working on cognitive computing. Shell's data represents a 'huge untapped source of richness.' Shell is running robotics proof-of-concept trials and also has a team working on blockchain. Jordan thinks that blockchain, which has no central authority, 'may change current thought process around business models.' Shell's iScope virtual reality geoscience center got a plug as did Honeywell's operator training simulator for the Prelude platform. Analytics in Shell is 'quite mature,' but there are still questions as to how to incorporate these developments in future plants.

McKinsey's Sverre Fjeldstad made the bold claim that digital can be used to 'fix the economics of oil and gas,' whose business model 'has been destroyed in the last decade.' Since the 2015 downturn, companies have done an excellent job of restoring margins by squeezing suppliers, making employees run faster and by 'losing the gold plating.' But this is not enough in a lower for longer oil price scenario. In particular, shale oil 'has not been profitable since 2014.' Future progress will come from digital and advanced analytics in predictive maintenance and 'a lot of other use cases.' McKinsey has applied BDA to several years of control room parameter historical data. Machine learning was applied to a 500GB data set to identify five 'themes' of settings that made for periods of high production. Predictive models promise a production hike of '1-2%.' Having said

this, Fjeldstad observed that plugging real time/ad hoc analytics back into operations was 'a few years away!'

The conference theme, the Industrial Internet evokes standardization. Stephen Mellor of the **Industrial Internet Consortium** (IIC) opined that while it was relatively easy to standardize the bottom of stack, the hard part is to standardize higher up in the stack, above operating systems and communications protocols. The search is on for commonalities across verticals where there is a need for global standards.

> *'Unfortunately, companies like to embrace, then extinguish their own standards, as do nations !'*
>
> Stephen Mellor,
> Industrial Internet Consortium

Unfortunately, 'companies like to embrace, then extinguish their own standards as do nations.' There are different international IIoT standards across the US (NIST), Japan (UiT acceleration consortium), China (CAICT) and the EU (AIOTI). Mellor offered the IIC's Track & Trace testbed as an example of what could be achieved. This involved a joint venture between Airbus and Bosch to leverage IoT-enabled tool tags such that less time was wasted looking for tools! Having said that, Mellor revealed that 'the IIC is *not* a standards organization!' The IIC will 'establish frameworks, evaluate existing standards, identify requirements and propose them to standards bodies such as ISO.'

IHS Markit's Oscar Abbink pushed back the digital time line to the 2004 CERA White Paper that introduced the 'digital oilfield.' DOF program starts peaked in 2006 with the expectation of up to 20% savings in OPEX. Poster children included Kvaerner's unmanned 'Subsea on a Stick' facility and real time reservoir management as practiced by Chevron in Kern River. Big data is not exactly new. There are already 'pockets of excellence' in the industry which may spread with the next wave of digitalization. This will see 'convergence around a core of data-driven analytics and optimization.'

Einar Landre traced **Statoil**'s GoDigital program that kicked off early in 2016. GoDigital's premise was that there were

'threats and opportunities' in the digital space which could impact unsustainable, post-downturn margins. This led to the creation of a digital center of excellence in March 2017. The CoE is now operational and ready to deliver the digital roadmap. The roadmap derived from 38 'lighthouses,' idealized future states that provide direction. GoDigital uses a bottom-up approach, 'top-down involves more politics than you need.' The next step is to select a technical platform for BDA and to 'develop a new mindset for an unmanned world.' Statoil wants to stay profitable, even at $30 oil.

Shahrul Rashid and Jefferi Bin Kamarudin presented **Petronas**' digital roadmap for the downstream. Today there may be up to 45,000 instruments in a refinery, keeping operations safe. Petronas' refinery of the future program envisages an integrated operations and maintenance center with data captured to the Petronet cloud database. A Nagios-based dynamic risk analysis and early warning system was co-developed with Near Miss Management also ran. 'dSCE,' a digital toolkit for operations and maintenance leverages Petronas' pervasive wireless network and handheld devices providing information at workers' fingertips.

Asger Klindt presented **Maersk Drilling**'s work towards a common IIoT platform to support a digital twin of a drilling rig to support predictive maintenance and drilling productivity enhancement. Maesrk could not find an off-the-shelf IoT solution and so has engaged with GE to develop a solution around Predix and SmartSignal. Predix is not suited to offshore low bandwidth Vsat communications so Maersk is working on 'edge' analytics on the rig. *Earlier this year Maersk was reported to have deployed Maana's knowledge graph at its shipping business*.

Hatem Oueslati showed how **Baker Hughes** (now a GE company) is using real time downhole data in its Remote Operations Services. Here, cross functional teams compare real time and historical data and analytics. A modern rig can produce over a terabyte/day. Big data support leverages Cassandra along with

Energistic's Witsml, ETP and global log curve mnemonics. Data analysis and performance benchmarking is performed with the BHI Signals platform.

While others presented somewhat high-level approaches to the IIoT, Greg Harris's presentation of **CD Power**'s use of Movus FitMachine was more pragmatic. CD Power supplies electricity generators to onshore drillers. These are now monitored with Movus' FitMachine, a hockey puck sized, self-powered magnetic device that transmits vibration and temperature into Movus' Google/TensorFlow-powered AI engine. Machine behavior is learned in a couple of weeks from which time, the system issues alerts if machine health deteriorates. Movus's 'zero IT' footprint receives software updates over the wifi network. Five have been fitted onto CDP LNG compressors too.

What follows is a narrative derived from the **panel discussion** that wound up day one of the conference. A potential issue raised regarding BDA was that 'data scientists become insiders and get to know more about the business than anyone!' In a similar vein, BDA is more of a human problem than a technological one, if you want to access say HR data, the first question you will be asked is 'why?' Nobody wants to relinquish control over the data asset and such reticence to share information is 'a major cultural roadblock to change.' On the HR front, the risk of a shortage of data scientists recalled the scramble for cyber security specialists of a couple of years back. There again, there are a lot of smart math-trained people in oil and gas that could fill data scientist roles. Data ownership is also a vexed issue. 'If you have a GE turbine, is the data yours or GE's? For a major operator, the data is a part of its asset, even though it may be shared with GE such that they can improve and service the machine. Cyber security is getting increasingly risky as 'all the data eggs are in the same data lake/basket' instead of being spread across multiple legacy systems.

Christophe Romatier presented **Honeywell**'s Connected Plant, delivered from its UOP unit, a century old line of business that now 'makes over 60% of the world's gasoline.' Like GE, Honeywell recently decided to transform itself into an industrial software company. The connected plant offering is a digital twin of the plant with a big data engine inside. Connected Plant components include a Hadoop data lake and metadata model, Spark stream processing (time series

database) and Honeywell's cloud-based data historian.

Mikhail Korolkov (**Gazprom**) and Aleskey Kostrov (**Rostelecom**) presented their 'Open partnership for the industrial internet of things in oil and gas.' The combination of Russia's major gas producer (13% of world production) and the national telco are to deliver a platform for data analytics, IoT connectivity and a marketplace, starting in 2018. A Russian national cloud platform will provide connectivity to oil wells and production facilities for real time drilling monitoring, security and more. Gazprom plans to use the platform in future operations, starting with facility design in a virtual space. The model will then run as a prototype to check performance. The system is to support plug and play construction, model-based production optimization and self-diagnosing equipment. Target architecture centers on the digital twin. Korolkov observed that although Honeywell has a lot of answers, there is also a lot of hype around the digital twin. Specific use cases are still to be determined. The scope of the digital twin, how to keep it in sync with reality and its cyber security all need further thought.

In the ensuing **debate**, the issue of the intellectual property (IP) in the digital twin was raised. This is a recurring question and a subject of tension between owner operators and software vendors, curiously since, 'Operators have no mechanism for monetizing IP.' One major reported 'more negative than positive examples' of collaboration as the supplier got all the goodies and 'left us with nothing.' The perennial issue of information handover from construction to operations was raised. Construction may take place in a virtual space but the idea of this being carried through across handover is 'light years from today.' 'What exactly is the digital twin and how can we get there realistically?' This issue has plagued oil and gas but in one flagship rail project in the UK, 'everyone involved has access to all the data all the time.' The commercial world could learn a lot from this government-backed approach. Another speaker acknowledged that 'nobody has cracked this' stakeholders 'need to want to share.'

The chair invited speakers to give their evaluation of the state of the art of the IIoT, with a subjective scoring of technology and take-up. A major vendor opined that all are 'just starting.' Most have reasonably established DOF solution with sensors and are taking their first steps

in analytics. But nobody is running fully autonomous plant. Most are at stage 2 moving to 3 or 4 (out of 5). Most are just at the asset configuration stage, 'what do I have,' although companies in the power and other regulated sectors are ahead. The fact that majors work in silos represents both a problem and the potential for a big win. But with the downturn, budgets for research have been cut. 'Maybe more are at 2 to 3.' A major got a ripple of laughter when he opined that 'vendors are also at level 2.' 'Everyone knows how to get there but…'

Russel Herbert reported that **OSIsoft**'s PI System is used on some 1.5 billion real time data streams representing 45 million boe/day. Shell alone has 7.5 million connected devices performing 100,000 calculations/minute for 15,000 users. PI is therefore central to the first wave of the digital transformation and OSIsoft intends to stay ahead in the next wave of the cloud, BDA, integrated operations and mobility. Everyone is asking 'can't we do more with the data?' The answer is, yes we can! 80% of the value of analytics is at the operations level and involves data from counters, trends, pressure rising too quickly, how many times on and off. Here 'no advanced analytics is required.' Elsewhere (the 20%) run at the enterprise level, with the application of machine learning to time series data, blending data from maintenance, finance and maybe running in the cloud. Tagged historian data may not mean much outside of plant. This needs to be fixed upfront for digital initiatives, adding context and metadata to raw tags. All oils use multiple analytics solutions providers, SAP/Hana, Watson, Azure, and the OSIsoft Cloud. Such multiple connection points may pose a security risk. Another approach has data lakes sitting beside PI which adds complexity. Streaming analytics is hard because contextualization takes time although there are some successes. OSIsoft's recommended approach is, unsurprisingly, to have PI at the heart of the solution with all other digital oilfield tools working off of PI. Shell, ENI and Element Analytics were cited as users/partner.

* Visit the Global Business Club and the IIoT/Digital Solutions event home page.

Folks, facts, orgs ...

API, Aprim, Aveva, Berkana, BCCK, CSE Icon, Baker Hughes, Blackeagle, CB&I, CGI, ConocoPhillips, Dawson, DNV GL, Frontier Integrity, GSE, Halliburton, Helix, Merlin, New West, Offshore Technical Compliance, Occidental, Petrosys, P2 Energy Solutions, PPDM, QS Energy, RocketFrac, Carnegie Mellon/CERT, Stress Engineering Services, The Williams Companies, Statoil.

The **API** has named Megan Barnett Bloomgren VP communications.

Gary Baughman is CEO of Veritas Capital's **Aprim** unit.

Aveva has appointed Steen Lomholt-Thomsen as chief revenue officer. He hails from IHS Markit.

Tony Canfield is now VP engineering with **BCCK**. He hails from DCP Midstream.

CSE Icon has promoted Hoon Chew Toh to president and general manager.

GE's new **Baker Hughes** unit has named Lorenzo Simonelli, president and CEO, Jennifer Hartsock, CIO, and Matthias Heilmann, president and CEO, digital solutions. John Flannery is to become chairman and CEO of the parent GE when Jeff Immelt retires at year end 2017.

Gene Hallman and Armando Ferri are now respectively south and east regional directors with **Blackeagle Energy Services**.

Pat Mullen is now president and CEO with **CB&I**. He was previously COO.

Norbert Seimandi heads-up **CGI**'s new global center of excellence in Lyon, France.

ConocoPhillips has appointed Sharmila Mulligan to its board. She previously held senior roles at Aster Data, Hewlett-Packard and Netscape.

Dawson Geophysical has promoted Philip Lathram to VP IT and Tom Phillips to VP applied geophysical Technology.

DNV GL has appointed Ulrike Haugen chief communications officer. She hails from ABB.

Frontier Integrity Solutions has named Keyth Pengal as CEO and Bill Boyer to its board.

GSE Systems has elected Jack Fuller to its board.

Chris Weber is executive VP and CFO at **Halliburton**. He hails from Parker Drilling.

Erik Staffeldt has been promoted to senior VP and CFO at **Helix Energy Solutions**. Tony Tripodo becomes executive VP and senior advisor.

Matt Bowyer and Amanda Turner have left **Merlin Energy Resources**. Bowyer to take an MSc in renewable energy.

Erinn Broshko is now director and executive chairman of **New West Energy Services**.

Offshore Technical Compliance has appointed David McCubbin as COO and Dan Phelps as director, compliance inspection services.

Occidental has appointed Cedric Burgher as CFO, replacing retiree Chris Stavros. Burgher hails from EOG Resources.

Scott Tidemann is now CEO of **Petrosys**.

Scott Key is chairman of the board with **P2 Energy Solutions**. Fritz Smith is chief revenue officer. Both come over from IHS Markit.

Margaret Barron has rejoined the **PPDM** association as chief, professional development.

Shannon Rasmussen is VP engineering at **QS Energy**. He was previously with Citrine Energy.

RocketFrac Services has appointed Ron Spoehel as chairman. He was previously with NASA.

Carnegie Mellon University's Software Engineering Institute has appointed Bobbie Stempfley to director of its CERT division. She hails from Mitre Corp.

Stress Engineering Services has hired Brian Weaver as sales manager. He was previously with GE Oil & Gas.

The Williams Companies has appointed Chad Zamarin senior VP strategy, succeeding retiree Frank Billings. Zamarin was previously with Cheniere Energy.

We're hiring

Berkana Resources is looking for a manager for its new Calgary office.

Statoil is to recruit 'more than 50 skilled workers annually' to maintain competence and capacity on the Norwegian continental shelf.

CGI aims to recruit 250 experts over the next two years in Lyon, France.

Done deals

Altair/Carriots. BP Ventures/Beyond Limits. RSI/Corys. 3ESI-Enersight/Energy Navigator. Ensco Atwood. Honeywell/Nextnine. AFGlobal/Advanced Measurements. Sofbank/OSIsoft. Teradata/StackIQ. Vela/Petrosys. Tibco/Statistica. Trimble/Network Mapping Group.

Altair has acquired **Carriots**, developer of its eponymous internet of things platform.

BP Ventures has invested $20 million into Caltech AI/cognitive computing boutique **Beyond Limits**. BPV's Meghan Sharp is to join the BL board.

IFP Training unit **RSI** is to merge into French process simulation boutique **Corys**. The combined company will be owned 50% by AREVA, 25% by EDF and 25% by IFPT.

3esi-Enersight has acquired **Energy Navigator**.

Ensco has acquired **Atwood Oceanics** in an all-stock transaction.

Honeywell is acquiring **Nextnine** whose ICS Shield cyber security solution will be added to its Connected Plant offering.

AFGlobal has acquired Key Energy Services' technology development and controls system business unit **Advanced Measurements**.

Japan's **SoftBank** has acquired a 'significant minority interest' in **OSIsoft** from early investors Kleiner Perkins, TCV and Tola Capital. OSIsoft backer, Mitsui keeps the stake it acquired in 2016.

Teradata has acquired **StackIQ**, a developer of a 'bare metal' software platform for the cloud.

Vela has acquired **Petrosys**.

Tibco is to acquire data science specialist **Statistica**.

Trimble has acquired **Network Mapping Group**, adding data modeling and 3D visualization to its energy solutions portfolio.

More from PNEC Data & Information Management

Shell/Flare 'redefine' standard search model. Halliburton's 'open enterprise architecture.'

PNEC always offers rich pickings for the data and knowledge managers and we had to leave out a couple of interesting presentations in our report last month. Joel Graves and Paul Cleverley (**Shell** and **Flare Consultants**) are 'redefining' the standard information search model for oil and gas. The standard model leverages natural language processing, geo-referencing and taxonomies to retrieve 'pages of lists of records, documents or websites.' Shell is now working on a 'transformational approach' that adds neural network-based analysis of large text corpuses to identify geological analogues and to progress 'from finding to understanding.' Instead of building a database of field analogues using traditional manual techniques, these can now be built automatically from textual data.

In the last couple of years some 120 North American upstream outfits went bust leaving debt pile of $80 billion. In this context, Jody Winston and Shashank Panchangam presented **Halliburton**'s 'Open enterprise architecture' that is set to 'solve E&P's biggest challenges.' Their thesis is that E&Ps are undergoing a generational change that shows the 'folly' of doing business in the same old way. Changes are so pervasive that companies must come together to solve computational infrastructure challenges, software development and deployment. The cost of proprietary and closed systems will drive companies toward solutions that reduce existing high cost IT infrastructure, overcome the obstacles of proprietary databases and eliminate siloed applications. How? Well on the one hand, 'software is eating the world,' but it is not proprietary software where vendor lock-in is a concern. Rather it is cloud-based, open source software like the Berkley data analytics stack. This itself is built on a constellation of open source tools - Apache Mesos, Alluxio/Hadoop and Apache Spark. Roll-in stateless programs based on a REST API and an open source database like Apache Cassandra. Cost savings from migrating to open source in the cloud are expected to be significant. The authors cited GE Oil and Gas as an oil country poster child for the approach.

More from PNEC.

Blockchain news

Natixis/IBM/Trafigura on Hyperledger. BP/ENI/Wien on BTL Group's Interbit. Xpansiv Data's digital feedstock on GEM OS. IBM/Energy Blockchain Labs on Hyperledger.

Natixis, **IBM** and **Trafigura** have announced a blockchain solution to support trade finance for US crude oil transactions. The distributed ledger platform, built on a 'permissioned' version of the Linux Foundation's open source Hyperledger Fabric, captures major steps in crude oil transactions into a blockchain, ensuring improved transparency, enhanced security, and optimized efficiency. All parties share the same ledger and can track the status of a transaction, from the time a new trade is confirmed and validated, to when the crude is inspected, delivered and the letter of credit cancelled.

Following a successful trial, **BP**, **Eni Trading & Shipping** and **Wien Energie** are going live with a **BTL Group**'s 'Interbit,' 'proprietary, private' blockchain-based energy trading platform. BTL is inviting other energy companies to join in the six month 'go-to production' phase which will see the launch of a commercial version of the energy trading solution, linked into live environments. BTL is also working on the applications of its technology in other contexts. EY partnered on the pilot.

San Francisco-based **Xpansiv Data** has announced the 'world's first' Digital Feedstock for commodity markets. The proof of concept used production data from Wyoming-based natural gas producer Carbon Creek Energy to create a digital representation of CCE's plant atop of Xpansiv's registry and marketplace applications. These run on Gem OS, a blockchain interoperability platform that works across protocols including Ethereum, Hyperledger and more. Xpansiv now generates its 'digital feedstock' at thousands of CCE's 'frack-free' well sites daily.

IBM and Beijing-based **Energy Blockchain Labs** have rolled out the 'world's first' blockchain-based green asset management platform based (again) on the open source, openly governed Hyperledger Fabric.

Survey finds all US manufacturers lag on digital

BP as Siemens' poster child for 'revenue re-invention.'

A new publication from Siemens, 'The race to a digital future, assessing digital intensity in US manufacturing,' divides the digital enterprise world into two camps, 'efficiency experts' and 'revenue re-inventors'. Both use digital technologies to improve productivity and efficiency, but the latter is 'leading the way in exploring how digital transform business models and unlock new markets.'

In a somewhat oblique citation to a publication from Tessela, Siemens kindly places BP in the latter camp, thanks to the 'new technology' of the BP Well Advisor (Oilit Jan 2013). Siemens surveyed some 200 US companies across five industrial sectors including oil and gas. All sectors 'have significant progress still to make as they move toward a digitally enabled future.'

Sales, deployments, partnerships …

FME, Logic Solutions, IFS, Anticip, MiX Telematics, Coreworx, EPIM, ATEA, Weatherford, HighWire, IT Vizion, Katalyst, CGG Geoconsulting, OvationData, Seeq, Inductive Automation, Stress Engineering, DeepMar, Total, Capula, TrendMiner, Wood Group, Librestream.

A presentation by Todd Buehlman at the recent **FME** International User Conference heard how **Logic Solutions Group** uses FME to automate loads and enrich data for oil and gas clients, notably BP's Lower 48 Onshore unit where 'cumbersome' IHS and Drillinginfo data has been QC'd and loaded into Esri Geodatabases.

Norwegian drilling contractor Songa Offshore has implemented the **IFS** IoT business connector to make internet of things data captured across its oil rigs accessible from its IFS Applications suite.

France-headquartered **Anticip** has won a three-year contract to provide its Tracking EyeDefend geolocalization services to Luloil's operations in Irak. Anticip was founded by former members of France's GIGN, an elite tactical gendarmerie unit.

C&J Energy Services has deployed **MiX Telematics**' fleet management solutions for over 3500 vehicles drilling support vehicles. MiX Fleet Manager is 'ELD-ready' and supports FMCSA requirements.

Saudi Aramco has renewed its contract for **Coreworx' Interface Management** for an extra five years. Coreworx has been used on $60 billion worth of projects in the Kingdom since 2011 including oil and gas, infrastructure and new city builds.

Norway's **EPIM** joint industry body organization has awarded the contract for its EPIM ID identity and authentication service to ATEA. EPIM ID will provide accounts management and authentication services and ensure secure internet access to EPIMs applications.

Gazprom Neft has signed a five-year technology cooperation agreement with **Weatherford** to 'further develop current business relationships and collaboration between the companies.'

The Geological Society of London's new website for its Lyell Collection of journals and books was developed atop **HighWire Press**' JCore platform.

IT Vizion's Operational Excellence solution is now available on the OSIsoft Marketplace. Vizion OE extends PI System infrastructure and system of record by analyzing PI System data and reporting operational bad actors.

Katalyst Data Management has signed its first major well data (i.e. non seismic) iGlass project, a 'paper to digits' initiative to scan and classify well files from some 20,000 US Lower 48 wells.

OGA, the UK regulator has awarded **CGG GeoConsulting** a contract to supply it with digital well products. These are used internally by OGA and will be released to the public domain via the OGA's website to be used freely by E&P companies looking for new prospects on the UKCS. CGG has also extended its contract for PTT E&P's dedicated processing center for an extra three years.

PGS has extended its seismic trace management service agreement with **OvationData** out to 2023. The deal covers cloud data storage and management of PGS' global seismic library. OvationData also provides remastering of legacy data to modern high-density media.

Seeq has added connectivity to **Inductive Automation**'s 'Ignition' scada system, allowing users of Seeq Workbench to 'wrangle' process data into insights, improved asset availability, product quality and process efficiency.

Stress Engineering Services has teamed up with **DeepMar Consulting** to expand its existing upstream service offerings. The integrated team will provide analysis, testing, materials, real-time health monitoring, predictive forecasting, efficient work flow processes and operational guidance.

Total has kicked of round 2 of its 'Plant 4.0' start-up incubator program, designed to accelerate use of digital technology in industry. The call is out for innovative solutions in leak detection, corrosion monitoring, non-invasive flow measurement and valve position displays.

PI System integrator **Capula** is to provide support and expertise for **TrendMiner** users in the United Kingdom and Ireland

Wood Group has teamed with **Librestream** on 'eXpert' a remote collaboration video link for oil and gas.

Standards stuff

OMG and ISO announce (different) blockchain standards! EU Commission's Internet of Energy. ISO 14224 reliability standard. NIST's NBDIF big data framework. Energistics' Resqml 101.

The **OMG**'s Cloud Standards Customer Council has published a paper defining a standard reference architecture for blockchain applications.

ISO is also in on the act with the announcement of 'new blockchain international standards in pipeline' (read 'in *the* pipeline!') The ISO effort is conducted under the auspices of ISO TC 307 with ISO Australia's Craig Dunn in the chair.

The **EU Commission** recently held a 'high-level meeting' to 'leverage interoperability to create the internet of energy.' The IoE is to build on ETSI/Saref, the smart appliances reference ontology and OneM2M, 'the global initiative for IoT standardization.'

A recent meeting of **NEN**, a Dutch standards body, co-hosted with Shell heard from the ISO ISO/TC 67/WG 4 work group for reliability and cost-related standards in the petroleum and other industries. The group presented a revised ISO 14224 standard for reliability and maintenance data and a new ISO 19008 cost coding standard.

The **US NIST** held its second Big data public workshop last month to promote NBDIF, a 'vendor-neutral, consensus-based, technology-independent' big data interoperability framework. *That should be easy enough!*

Energistics has put its recent webinar providing a 101 introduction to the Resqml reservoir data interoperability standard online. The presentation was made jointly by Energistics COO Jana Schey and BP's Lisa Towery. Energistics also recently published a case study of 'lean, automated reporting powered by Witsml,' co-authored with IDS.

Pipeline software news

DNV GL Pipeline Evaluation Portal. SNAM's €200 million digital transformation. Hexagon/Leica's Captivate Pipeline solution. Schneider on integrity management. Splunk for major.

DNV GL has announced the Pipeline Evaluation Portal to 'connect pipeline expertise with real-time data.' The PEP was inspired by a survey of 700 plus worldwide pipeline professionals that found that '61% believe most pipeline failures could be avoided by investments in new technologies' and '67% say the oil and gas industry needs a new way of monitoring pipelines.' The PEP exposes DNV GL's models, data and probabilistic assessment tools to customers through a web browser. The first application ready for testing via the portal performs interactive lateral buckling assessment.

In its in-house publication Perspectives, **DNV GL** reports the use of data science to improve Italian **Snam**'s gas transport and to 'progress from preventative to predictive' integrity management. Snam is investing over €200 million in a five-year digital transformation and is looking to export its technology to worldwide gas operators through a new global solutions unit. Field staff now use about 1,000 tablet computers under the company's SMART gas (*Sistema Manutenzione Rete Trasporto Gas*) maintenance system. Data collected in the field on construction and maintenance operations and from field instruments is now available for analytics in real time. Information is fed back to field workers on a 'need-to-know' basis.

Hexagon announced a 'pipeline solution to end all pipeline solutions' aka the 'industry's first end-to-end fluid solution' at its recent HxGN Live event in Las Vegas. Turns out that the end to end solution is limited pipeline *survey*. It comes from the Leica Geosystems unit which has rolled out 'Captivate Pipeline' to streamline tracking and reporting of pipeline surveys. CP includes a bar code reader to collect pipe attributes and is integrated with Blue Sky's Dash pipeline survey software.

Lars Larsson (**Schneider Electric**) has authored a 14 page, informative white paper, Pipeline integrity: best practices to prevent, detect and mitigate releases.' The paper covers advanced technologies that enhance pipeline integrity, particularly computational pipeline monitoring (CPM) with reference to the 2012 API RP 1130 standard. CPM methods in use today include line balance techniques, real-time transient modeling, monitoring and statistical analysis of pressure and flow and acoustic monitoring.

Big data specialist **Splunk** reports on the use of Splunk Enterprise to manage and monitor tens of thousands of pipeline field devices deployed across an unnamed US energy company's 50,000 mile pipeline network. Log data from Schneider Electric OASyS DNA and other scada systems are amenable to capture into Splunk's big data lake where a variety of analytical techniques raise alarms.

Jaspersoft for IDS DataNet

Blog posting traces reporting software's evolution from Flash to Tibco's HTML5-based solution.

In a recent blog, Colin Dawson reports on IDS' use of TIBCO Jaspersoft as an 'embeddable' reporting, visualization and query engine for use in its drilling reporting solution IDS DataNet. DataNet has, to date, reported on over 150,000 drilling operations on nearly 500 rigs worldwide.

An early version of DataNet was built on Flash. When this was deprecated a few years ago, IDS carried out a 'lengthy investigation' into embeddable technologies before deciding on Tibco's Jaspersoft with its HTML5-based visualization and multi-tenancy. JasperReports was an additional bonus, speeding DataNet report generation tenfold.

IDS is now recreating legacy reports in Jaspersoft Studio and creating custom visualization widgets for wellbore schematics, histograms and more such that customers can run DataNet visualizations on their own data. IDS sees the DataNet as helping operators automate manual work by, for example, moving from Microsoft Excel to web-delivered data management.

Tibco also reports use of Jaspersoft in GE's Software & Analytics offering although it is not so clear that this is still leveraged in Predix.

OpenInventor on Occulus. News from the HoloLens front

High-end virtual reality for Occulus and HTC Vive. IFS, Worley Parsons' 'mixed reality' trials.

The 9.8 release of Thermo Fisher Scientific's **OpenInventor**, out around September 2017, will support virtual reality application development on the HTC Vive and Facebook's Oculus Rift headsets. These currently predominate in the market. Both combine immersive visualization, sensors for user displacement detection and controllers for manipulation. Open Inventor adds high quality rendering and high-level generic objects to extend support for data manipulation.

Microsoft's **HoloLens** 'mixed reality' headset promises a blended view of the real and digital worlds. The kit is currently only available in a 'developers' edition at prices of $3,000 to $5,000.

IFS has developed a proof of concept HoloLens application that adds a holographic overlay to enterprise data from its IFS Applications industrial ERP flagship. Field service personnel can view holographic data overlain on the real-world object being inspected.

A joint venture between **Worley Parsons**, **CGI** and 3D software boutique **Taqtile** has announced Manifest, a HoloLens/Azure field inspection and maintenance solution integrated with Microsoft Dynamics 365.

HoloLens does not yet have an end-user edition. This, according to SlashDot and blogger Brad Sams, is because Microsoft canceled the second version and is now working on an 'even more advanced' iteration to be available in 2019.

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Microsoft's Red Carpet, more PI in the sky

Mitsubishi Hitachi leverages OSIsoft-Microsoft incubator in power plant digitization.

This is not an oil and gas tale but Mitsubishi Hitachi's collaboration with OSIsoft and Microsoft on a new digital platform for thermal power plant operations is perhaps the shape of things to come for the downstream. Mitsubishi's Tomoni digital platform provides 'soup-to-nuts' support for power plant operations that minimizes unplanned downtime and ups asset performance.

At the 2017 Hannover Messe earlier this year, Mitsubishi/Hitachi Power Systems announced that Tomoni was to join the 'Red carpet incubation program' (RCIP), a joint venture between OSIsoft and Microsoft that uses OSIsoft's PI Integrator for Microsoft Azure to 'automatically clean, prepare and transmit' PI System data to Microsoft's cloud.

Oil and gas operators may identify with OSIsoft's Prabal Acharyya who commented, 'Data preparation is a necessary first step in analytics, but it consumes inordinate amounts of time and energy. [This collaboration] will accelerate cloud-based advanced analytics solutions for the power industry.' RCIP is said to reduce the burden involved in data preparation, lowering the total time, cost and energy consumed, as compared with traditional data analytics methods and business applications. Joseph Sirosh VP of Microsoft's data group added, 'RCIP bridges the OT-IT gap and helps customers get valuable insights from the PI System and Cortana Intelligence.'

Microsoft Internet of Things Central

Plug and play OPC connectivity simplifies IoT solutions. Quorum as Azure IoT poster child.

Microsoft has announced the IoT Central, a software-as-a-service (SaaS) offering to 'reduces the complexity of internet of things solutions. A preconfigured IoT solution, providing plug and play connectivity from OPC UA and classic devices into the Azure cloud, was unveiled at Hannover Messe earlier this year. Another IoT novelty from Microsoft is Azure Time Series Insights, an analytics, storage and visualization service for billion-event scale cloud data. Azure Stream Analytics for edge devices makes it possible to perform streaming analytics 'at the device level.'

Poster child for Microsoft's Azure IoT is long time partner and oil country software house **Quorum**. Quorum reports that today's 'the rate of innovation far exceeds what traditional technology infrastructure can handle.' Cloud computing is imperative to achieving IoT scalability. Quorum has retooled its oil and gas field operations toolset to run as service (but not a 'microservice!') in the Azure cloud.

If you fancy taking the IoT for a test spin, the June 2017 issue of Microsoft **DevNet** **Magazine** provides step by step instructions for deploying Microsoft's IoT solution to for remote monitoring and predictive maintenance with using a DIY testbed comprising a USB camera, a Raspberry Pi device* running the Windows 10 IoT Core OS and controlled from a remote Windows workstation.

* *A bare-bones computer for enthusiasts that usually runs a Linux-based OS.*

ThinAnywhere, 'we're back!'

Ten year exclusive deal with Schlumberger expires. Remote visualization now selling direct.

We have not heard much from Houston-based Mercury International Technology's (MIT!) since the October 2007 deal which gave Schlumberger exclusive rights to its remote visualization technology, ThinAnywhere. Last year, MIT renegotiated the deal. The exclusivity clause has gone and MIT can now sell ThinAnywhere direct again.

To entice users back into the fold, MIT has rolled out a new release of TA with functionality which will be exclusive to those who sign a new maintenance agreement. Customers who have service agreements with third parties (notably Schlumberger) will not benefit from the new goodies. These include RHEL 7 support, new compression that doubles graphics performance, mobile licenses and support for Java 3D OGL as used in Landmark's latest release. For Windows, TA now includes the above new features plus a new Windows 10 client edition. More from MIT.

Implico rolls-out OpenTAS at Gunvor Ingolstadt refinery

Tank truck filling continues as new terminal management system is paged-in.

Software and consulting company Implico has deployed its OpenTAS terminal automation solution at Gunvor's refinery in Ingolstadt, Germany. The upgrade was performed as the refinery continues in normal operations. One by one, Implico decoupled each loading bay from the legacy system, upgraded the hardware and field equipment (with help from Actenium) before putting the bay back on stream. Implico also set up development and acceptance testing systems during the migration period. This allowed the software company's developers to test the nuts and bolts of the new functions beforehand and verify compatibility of hardware and software.

Implico's Volkmar said, 'We also took the opportunity to replace the old data interfaces. Gunvor now uses a new XML format for data exchange which will improve data communications in the long run.' OpenTAS' provides manufacturer-independent communication with DCS/PLC systems.

OpenTAS leverages FLEXX, an EU XML-based standard for downstream oil data exchange that is aligned with PIDX' petroleum industry e-commerce protocol.