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Future of integrated ops

ConocoPhillips engineer sees domain silos, proliferating analytical tools, spreadsheets and PowerPoints as roadblocks on path to integrated operations. OVS proposed as key enabler.

Speaking at the [IQPC Digital Oilfields USA](#) conference in Houston this month, Drew Lafleur, (ConocoPhillips) showed how integrated operations (IO) has the potential to 'increase knowledge and improve the bottom line.'

IO sets out to produce a step change in safety, efficiency and job satisfaction while 'setting the foundation for growth and continuous improvement.' The potential for data and digital tools to enhance production and improve economics is widely touted but, Lafleur asks, 'With all the data we collect, and all the tools we have available, why isn't this problem solved?'

There are several obstacles on the road to IO. Industry still spends too much time on data mining, QC, integration and on building tools. The silo effect still works counter to a proper alignment of different groups' work. There is still a large duplication of effort, each team has its own data, analyses and versions of the truth. Industry generally adopts a 'reactive' rather than a proactive posture, largely due to the fact that identifying and fixing problems is time intensive. Even a simple business query like 'How much does my well produce?' may involve multiple software tools and (still) spreadsheets gathered in the field. Moreover different systems may well return different answers. Variance of 30-50% is not uncommon. In drill planning, methodology from different groups may make it hard to align schedules. Production optimization is particularly fraught as a complex

system of multi-variable equations must be solved to identify the rate-limiting factors.

Engineers like to innovate but you have to ask, 'does the organization need 15 versions of the same analysis tool?' Some hard decisions must be made as to whether anyone should be allowed to do any analysis in any platform in any way desired!

Too often, clean data is kept in engineers' personal spreadsheets while critical findings are delivered as a PowerPoint. Companies need to capture such knowledge in systems of record so that it is ready for re-use by others. We need to harness the

innovators to solve the next problem, not the last one over again. And we need to persuade them to build upon the efforts of others.

The key enabler for ConocoPhillips' integration effort is the One Virtual Source desktop application from [OVS Group](#). OVS has been baked into ConocoPhillips Innovative asset management toolkit, a portal into apps for well performance improvement, flow optimization opportunity evaluation and drilling and completion best practices. To date, 3,400 data fields from 19 sources have been integrated and efficiency gains of 20-30% have been achieved. OVS' marketing slogan is, appropriately enough, 'escape from spreadsheet captivity.'

PTC bags Kepware

\$100 million 'internet of things' deal sees Mathcad developer hook up with process control data aggregation boutique.

Needham, MA-headquartered Parametric Technology Corp. (PTC) is to acquire [Kepware Technologies](#), a process data aggregation specialist whose flagship Kepservers has been deployed on several high-end oil and gas developments including the Queensland Curtis LNG export terminal.

PTC is a software house with a significant oil country presence via its Windchill design tools and [Mathcad](#) engineering package (Oil ITJ Nov 2010).

Both companies are targeting the Internet of things movement: Kepware with its industrial data forwarder for Splunk plug-in and PTC' ThingWorx platform.

The acquisition will see Kepware's products integrate the ThingWorx machine learning platform which is, *inter alia*, a component of GE's 'brilliant manufacturing' program.

PTC is paying approx. \$100 million for Kepware plus up to \$18 million contingent on future 'strategic initiatives and financial results.' Privately held Kepware's 2015 revenue was approx. \$20 million. Childs Advisory Partners acted as financial advisor to PTC. More from [PTC](#).

NASA's IM/data science. A quick comment on COP21

In our action-packed last issue of 2015, we bring you an exclusive report from the SPE Petroleum Data Driven Analytics dinner where Richard Doyle explained how NASA manages its (very) big observational systems data. Somewhat surprised by the deliberations of COP21, editor Neil McNaughton struggles to understand what its 'success' actually means.

As we enter 2016, my notebook is bulging with unused but interesting material. So this month, in place an editorial, I bring you our report from the SPE Petroleum Data Driven Analytics (PD2A) technical section dinner held during the 2015 Houston ATCE where Richard Doyle, manager of information and data science (I&DS) at the national space technology program of the Jet Propulsion Laboratory (JPL) gave the keynote address.

The I&DS program's 'punchline' is to take a lifecycle perspective of the context and data from NASA's observational systems. Examples of such include NASA's Mars Rover missions, but also the US Department of Defense's intelligence gathering and even monitoring of an infant in pediatric care. In all of these situations, locally acquired data is pushed to a remote location. The data pipeline can be long and may involve data loss or corruption. Archived data may be compromised. Doyle observed that oil and gas shows a similar pattern with data captured at remote locations where transfer and management present similar architectural challenges.

So what are the challenges for big/observational data? It may arrive too fast for communications systems to transport. As an example, when a spacecraft lands on Mars, the whole process is over in less time than it takes for a radio communication to round trip to earth. Remote control becomes impossible and an autonomous capability is required. Elsewhere, for example the Square Kilometer Array radio telescope currently under construction will collect too much data for practical storage and archival. In such situations it is necessary to make up-front decisions as to what observations are worth keeping. This will involve some kind of a 'quick-look' analysis and early stage data triage. There is likewise the risk of a similar capacity shortfall all along the data pipeline. Multiple formats and standards make it hard to collate data from different systems. If big data is the challenge, data science is the solution. Data science includes the whole gamut of artificial intelligence and machine learning but also data curation a.k.a. 'data wrangling.' A seminal 2013 book Frontiers in massive data analysis

describes many of the techniques used and in particular emphasizes the need for the reproducibility of published results. Reproducibility is emerging as a 'critical path challenge' in the big data movement. A study from the US National Institute of health found that 80% of big data derived results are not reproducible! Implementing data science requires 'cross-over' people. Folks with competency in science, math and IT are worth their weight in gold. Data provenance and confidence are important but reproducibility means a complete description of how results were achieved. NASA's data pipeline traditionally involved a linear flow from operations, through data science and into a data archive. A key component here is the 12 petabyte data archive managed by NASA's Earth Science division. This is built atop of the NASA developed object oriented data technology (Oodt) store, now an open source Apache project.

However such a linear workflow actually compromises a holistic, end to end view of systems whose complexity and richness may not be completely captured. NASA is looking beyond these workflows into the future of data science. NASA manages multiple collections of data from its various missions (water, ocean, CO2 etc.). These leverage the Oodt framework to capture, analyze and integrate data.

Examples include the rapid identification of signals in time series data from the airborne visible/infrared spectrometer program, Aviris. The techniques have spilled over into healthcare where they are used in histology. Another is the Palomar transient factory which uses optical astronomical observations to look for large objects (meteorites, comets) that are heading for earth! Data visualization has shown spectacular drought-related subsidence (70cm in 7 years) in California's central valley where voluntary restriction on water use means that a 'brown (lawn) is the new green.' Climate scientists and CO2 modelers also use Oodt. The detection of Mars 'dust devils' in real time, an example of the use of up-front/quick look processing to reduce communication bandwidth.

Graph-based tracking/logging of the data path is used to suppress unimportant

details. Credit assignment and goal-based reasoning provide context to interpretations. Planetary data system supports all NASA missions with a petabyte archive of data. The Oodt information model that describes data and use cases has been key to success. Model-based engineering is used to derive specific use cases. This involves sitting down with the subject matter experts, even though they'll think you are wasting their time! You need to build an ontology – although using the term itself can be a turn-off. Enter the PDS4 standard that is to be used on the 2017 NASA/ESA BepiColombo mission to Mercury. JPL has teamed with its Caltech parent to offer a massive open, online course (Mooc) distributed data analytics which has been watched by 16,000 people.

~

I know that I said last month that I would comment on the outcome of the COP21 21 deliberations. This is harder than I thought as apart from its universally acclaimed 'success' it is hard to see exactly what has been achieved. Kevin Anderson provides an interesting take in Nature. It is about CCS but *not* about fossil! But to my mind, the most illuminating commentary appeared in a cartoon in the local satirical magazine, the Canard Enchaîné. One dude says, 'They just reached agreement on global warming! And gasoline prices are down.' His buddy replies, 'Ain't life good!'

 @neilmcn

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Interview - Urvish Vashi, Paradigm

Paradigm's VP Marketing spoke to Oil IT Journal about the new 'App Exchange' for Geolog users and developers. The exchange acts as a user-drive forum for innovation with the best apps feeding back into the main product. The Tcl interface reflects a DevOps-inspired return of the script!

How did the Geolog app exchange begin?

Geolog, Paradigm's well log and petrophysical flagship is used by all the larger oil and gas companies for its core science capabilities and usability. Users appreciate its ability to handle large numbers of wells and its capacity to act as a platform for custom development. Users have written thousands of apps using the Geolog API for a wide range of activities, from data loading to formation analysis. These developments have in fact been the source of much customer-driven innovation and we decided to channel this effort into an online exchange for innovation.

So this is Paradigm's equivalent of Schlumberger's Ocean app store...

Not exactly. This is a free exchange for Geolog scripts, not an e-commerce site. The exchange started with a handful of submissions and is now filling up with user-driven innovation. What we are doing is similar to the way Facebook has open sourced its '6-pack' network switch that it has contributed to the Open compute project. We also perform some basic inspection and QC of submissions and in some cases distribute compiled code.

What's different with the exchange?

The Exchange lets users share innovations in a more structured way, adding to and building on top of Geolog or other apps. In some cases this may influence our own product development.

Any examples?

Saudi Aramco has used the Geolog API to develop a suite of extensions for shale gas interpretation and evaluation. Aramco then offered these to Paradigm in exchange for their ongoing development and support. These modules have been rolled-up into the Geolog Shale Module.

What programming language and operating systems are supported?

Geolog runs on both Windows and Linux and the apps are programmable with Tcl scripts. Most users are on Windows. I'm not sure about the ratio of script development platforms.

Will this extend to other Paradigm products?

We have open APIs for other Paradigm products. Users have developed their own modules for Skua/Gocad and Earth Decision. A lot of customers are using the

APIs. We have a relationship with Mira Geoscience which offers Gocad scripts for use in the mining vertical and with Kidova for use in environmental/soil remediation. We don't have an exchange as such for these other tools but this is where we see things going, building on a vibrant community.

Since Paradigm acquired Mincom (Geolog's developer) back in 1999 has the software been retrofitted?

Yes it has been reengineered to integrate with Epos for well tie QC and other tasks. But it also runs as a stand-alone product.

Did the Tcl interface come from Mincom?

Yes it was already there in the Mincom product. It is the standard interface for Geolog and also can be used with Skua/Gocad although they also have C/C++ interfaces.

Is this a return of the script?

In some ways yes. You should check out the DevOps movement where scripting is increasingly used to automate tasks.

The Critical Component

New publication from the American Library Association addresses the difficult but necessary task of tagging documents with meaningful metadata and unique descriptors. Competing standards (Digital object identifier, ISSN Road, EPUB, Dublin Core) are evaluated in an insightful analysis.

The Critical Component* (TCC) – standards in the information exchange environment by Todd Carter et.al. is a publication from the American Library Association. It is therefore firmly on the side of a classification-metadata-indexing approach to information retrieval as opposed to today's free-for-all Google-type search.

Rigor in classification comes at a cost. As Mark Bide states in a chapter on basic standards concepts, 'metadata is not hard to understand but can be hard to implement. Such discipline can feel antithetical to real life concerns .. huge bases of existing legacy data may be unsuitable for conversion. However, machines deal badly with ambiguity. For business to work, well designed metadata and identifier standards are essential.'

This of course begs the question which standard to use? Our quick scan through TCC suggests that this is quite a challenge. Even in the relatively constrained space of the library, standards, and standards organizations are legion. TCC does a good job of enumerating them and outlining the background of ISSN, the standard for books and periodicals, DOI, the digital object identifier, and Dublin Core. TCC is a fairly dry book but even here matters get somewhat heated. A standards war seems to have taken place between the DOI community and Dublin Core, which gets a bit of a kicking for its 'vagueness and ambiguity.' The ISSN Road directory of open access scholarly resources gets a plug as a test bed for outputting ISSN as linked data in XML. The EPUB 3 publishing standard gets a chapter to itself.

Oil and gas has its own standards for much of its business processes but could perhaps benefit from some of the core concepts that the librarians advocate. How unique descriptions are attributed to digital objects, to the identity (of authors and companies) and how access and entitlements are managed are all very pertinent to the exchange of seismic and well data.

On the downside, when we came across what seemed to be a novelty, the mention of 'indexes' on page 7 we and turned to the back to look it up but TCC has no index! A curious omission. 'Indexes' by the way is a typo. Finally, TCC strongly recommends participation in standards which are invariably volunteer efforts. More on Dublin Core on page 10 of this issue.

* ISBN 978-0-8389-8744-5.

Petroleum Geology of North West Europe conference, London

Alternative activity (lithium, CO2 EOR, geothermal) for oil wells and geologists caught in the downturn. AGR Tracs' 'disposable' grids. BP on redeployable 4D seismics.

The Petroleum geology of north west Europe conference held in London earlier this year heard some interesting ideas from Jon Gluyas (**University of Durham, UK**) on alternative activities suitable for the geologist stuck in the downturn. Gluyas takes inspiration from the 'upcycling' movement whereby discarded objects or material are reused to create a product of higher value than the original. What does the oil industry throw away? Pore fluids, produced water and solutes and heat. Global estimates of produced water range from 10-40 billion tonnes. Some is reinjected but most is disposed of at the surface. A lot of the water is hot. The North Sea Ninian field has a 30MW generating potential. Globally, there is up to 4 ½ terawatts of power up for grabs.

Produced water is often seen an environmental problem but maybe we are

missing something. Brines from Arkansas' Smackover formation contain lithium, an increasingly important metal in today's industry. Gluyas estimates that at much as 22,000 tonnes of Lithium are going to waste here. Lithium rich brines are present in the Paris basin and in Gluyas' own County Durham.

CO2 is another underutilized resource. Used to enhance recovery, CO2 has already added a billion barrels Texas' production and has huge potential in the North Sea where 'the seven most significant projects could deliver over a billion barrels of extra oil. Moreover, CO2-based oil and gas enhanced recovery 'could reduce carbon emissions by about 10%.'

AGR Tracs' Mark Bentley argued against current 'grid centric' workflows

and in favor of 'disposable grids' and sedimentary process models as offered in tools such as Geomodeling's Sbed and Paradigm's GeoChron which represent 'an elegant mathematical framework for sedimentary geology.' Using 'representative elementary volumes' in non-sequential workflows will allow interpreters to iterate across seismics, petrophysics, static and dynamic models to address the 'curse of the best guess' by 'modeling for discomfort.'

BP's Mel Ball provided an update on the Clair field's repeat seismic acquisition. The technology has evolved from a 2005 permanent array proof of concept to a redeployable solution implemented in 2015. Redeployable is considered as the most cost effective way of achieving the desired receiver geometry, repeat frequency and variable areal coverage.

Flotek on back foot following FracMax fracacs

Bronte Capital CEO - FracMax data 'does not compute!'

In a presentation to the 2015 Stephens Fall Investment Conference in New York, Flotek president and CEO John Chisholm defended the company's FracMax flagship data analytics and visualization toolset. FracMax is described as a 'powerful interactive sales tool' that provides access to 25 million well records that illustrate the 'results and profitability' associated with Flotek's Complex nano-fluid (CNF) technology.

Last month, John Hempton, chief investment officer at Bronte Capital Management, posted a critical and lengthy

blog which analyzed the data that FracMax uses. He found 'several problems' viz: production data did not match that which was reported to the RRC, the data 'appears to have been adjusted' and various other numbers appeared to be in error. Hempton concluded that 'the data ... does not compute' and may have been altered to make the well that uses its product seem more productive than wells that do not. Flotek stock halved on the post.

Chisholm presented an analysis of Hempton's criticism that recognized errors in three of the wells analyzed that had been

misinterpreted by Flotek. The errors however 'do not change the conclusion that the CnF well outperformed the non-CnF wells.' Flotek further noted that its client Sabine Oil & Gas continues to use CnF on its completions, 'an indication that Sabine's internal data show compelling benefits from the technology.' To be on the safe side, Flotek has appointed a team of independent verifiers check the accuracy, transparency and credibility of FracMax and its database. The team is to report early in 2016.

ISS Connectivity MD - 'WITS is 99% of the market'

Ammolite RT builds remote drilling operations centers around ISS DeviceLink IoT technology.

Calgary-based Ammolite RT is using DeviceLink, Industrial internet of things technology from ISS Connectivity, to connect Wits* based field devices to its 24/7 drilling operations support center which allows Ammolite to centrally monitor the drilling process in real-time. Ammolite CTO Dave Smith said, 'The first generation of our service allows us to collect, view and report on data received from any Wits device onsite, enabling senior drilling technicians to provide real-time drilling guidance remotely.'

Ammolite's 'expertise as a service' covers auxiliary operational support for fully-manned drilling operations and active management and supervision of reduced personnel operations.

Oil IT Journal asked ISS MD Adam Strynadka why the integration centered on Wits rather than the more modern Witsml protocol from Energistics. He replied that a similar question arises when arbitrating between OPC Classic and OPC/UA. 'Wits and OPC classic are both 1980s binary technologies as opposed to more modern

Witsml and OPC/UA. But 99% of real world active projects today use Wits. In Alberta, Wits has been widely adopted and the existing standard probably has another 30 years of useful life. Indeed the same can be said for Classic OPC as operators now have the option of upgrading the older standard by using IT-derived messaging protocol such as IBM's Mqtt. Having said that, ISS plans to support Witsml as it achieves adoption.'

* *Wellsite information transfer standard.*

SPE Petroleum Data Driven Analytics

Schlumberger's 'idempotent' workflows - Viagra® for petrophysicists? Stanford analyzes Marathon shale data with on functional PCA. Peltarion Energy's Frac Forecast. Exxon leverages EU Saigup rule mining/market basket study. Apache - machine learning now 'reliable technology' à la SEC.

With all the enthusiasm surrounding big data and analytics it would be reasonable to presume that the Petroleum data driven analytics session at the Society of Petroleum Engineers Annual Technical Conference and exhibition was were the real action was. The PDDA session was quite well attended with nearly 100 present, perhaps not quite enough to support the current big data hype!

Schlumberger's Vikas Jain reported on the fruit of three years R&D on data-driven well log analysis. Today's log data is 'big,' with large spatial, temporal and multi-well datasets, some with more than 100 dimensions. 'Traditional' interpretation workflows use lab and core data to train generic regression models. But this kind of sequential approach is sub optimal as we can only comprehend a small number of measures so we use data reduction. Also generic models may not be applicable everywhere. Ideally we should mine the whole dataset but this is a non-trivial exercise as a high level of domain expertise is required to mine data in a meaningful fashion and produce reproducible results. Enter 'next generation' petrophysics described as a 'packaged idempotent* workflow.' Data-derived classification and regression models are baked into the workflow. For instance, fluid distribution and facies can be obtained by classifying NMR signatures, analysis of LWD data gives a gas fingerprint and rock facies classification from spectroscopy, bringing petrophysical expertise to the end user—[174735](#).

Ognjen Grujic (**Stanford University**) has trialed data mining on a large shale dataset provided by Anadarko to forecast production and ultimate recovery. This is a 'tricky' problem and the speed of development means there is not enough time for a geomodeling approach. A novel 'functional principal component analysis' approach was used to derive decline curves for various combinations of fracturing, geology, number of stages and so on. Geography and frac parameters were most influential, geology and log-derived TOC less so. The main tools used were the 'R' statistical packages DiceKriging and FDA—[174849](#).

Luka Crnkovic-Friis gave a thinly-veiled commercial for **Peltarion Energy's** Frac Forecast a 'deep learning' based approach to geology-driven shale estimated ultimate recovery (EUR) prediction. Deep learning is used in speech and image recognition, tasks which are hard to do with an equation. Input was an 800k point dataset of geology (thickness, poroperm and TOC), well data and production logs. The approach is claimed to halve the error in EUR, down from 66% to 33%. If geology changes prior knowledge can be added, possibly from pilot wells. Peltarion is seeking a partner to develop the technology—[174799](#).

Today's computers make it easier to run very large numbers of simulations to study the impact of geology on recovery factor. But as Satomi Suzuki (**ExxonMobil**) reported, the conventional approach can still take too long – particularly to analyze the results. An alternative approach was suggested by the EU-backed Saigup project which used association rule mining (as used by Amazon and others to solve the market basket problem). The technique reduces the problem space. It was shown for instance that 80% of 5 spot/500m spaced wells have high EUR and/or high recovery was observed for down dip progradational geology and high aggradation angle. Further investigation compared environment of deposition with fault patterns—[174774](#).

Rigorous conventional reservoir studies are time and labor intensive and rely on subjective assumptions and sparse data. Sarath Ketineni (**Penn State**) has used artificial neural nets (ANN) a.k.a. soft computing to minimize geological uncertainty. ANN expert systems map complex relationships in the data automatically. A seismic data cube, some well data for training are input to the net and the output is synthetic well logs at any location. One trial involved 13 3D attribute volumes, well logs, completion and production data. Matlab's ANN functionality was used on part of data set for training. The results as presented were underwhelming although 'very good agreement' was claimed—[174871](#).

Full physics modeling is a rigorous but computationally intensive approach to the evaluation of system response. Surrogate

models provide an approximation of full physics models and can be used in uncertainty quantification. Srikanta Mishra (**Battelle**) compared experimental design (ED) and Monte Carlo (MC) simulation strategies for building such surrogate models. The Battelle study evaluated a reservoir's potential for CO2 storage from nine inputs (reservoir thickness, caprock, poroperm, injection rate and so on). A full compositional simulation was performed with CMG's GEM simulator. Various techniques (Box-Behnken, augmented pairs, latin hypercube, maximum entropy) were trialed as ways of choosing starting points for full physics simulation. For larger numbers of factors 'you might as well do MC'. Kriging also ran. Maximum entropy won out over Box Behnken while augmented pairs was the worst performer. Screening data for 'heavy hitters,' data points that bias the results, is important—[174095](#)**.

Apache Corp.'s David Fulford argued that machine learning can now be considered to be reliable technology*** for evaluating unconventional well performance which today is poorly understood. Pressure transient propagation can take years. While engineers need to forecast, their tool of choice (decline curve analysis) has an implicit bias. Apache uses Bayesian machine learning to account for bias and 'always converge on the true answer.' Markov chain analysis with the Metropolis-Hastings algorithm was applied to data from the Bakken/Elm Coulee field. Hindcasts of cumulative production showed that IP30 was no predictor of EUR. Hi proppant loading increases initial production but EUR is not affected. Is ML reliable technology in the sense of the SEC? Fulford believes it is, 'Our approach shows all of the necessary criteria for its consideration as reliable technology'—[174784](#).

* a.k.a. *blinding with science!*

** See also our report (Vol 20 N° 7) on *Battelle's EluciData Hadoop/NoSQL big data engine*.

*** *Important (and contentious?) terminology in the context of reserves reporting.*

2015 Esri EU Petroleum User Group, London

New Esri 'Platform' game changing geo-information server. Apache trials GIS on Hadoop. Engie on enterprise GIS in the downturn. Tullow's African Story map. BP reports serendipitous spin-off from One Map portal. Voyager for BG's GeoPortal. Halliburton struggles with massive editing job.

Some 240 delegates from 107 companies attended the 2015 Esri EU [Petroleum GIS conference](#) held in London last month.

While down on last year's peak, the headcount is pretty good for crisis times. Speaking of which, Esri has introduced a 'Fellows' program offering free access to its software to developers laid off in the downturn. Fellows can join a mentoring program to teach young professionals about the desktop and maybe learn something about Facebook themselves!

Esri's [Petroleum users group](#) (PUG) is celebrating its 25th anniversary and now claims 4,000 plus members. Danny Spillman kicked off the plenary with a spin through Esri's latest technology offering, the Platform, billed as a 'dramatic change for ArcGIS.' The three tiered offering spans a 'geoinformation' server providing access to multiple-data types (full motion drone video feeds, Hadoop, 3D, database, real time and image). A portal provides security and access control for 'apps' running on various endpoints. A short video showed poster child Shell's deployment of the platform as used in its common operating picture for operations and oil spill response. On the desktop, ArcGIS Pro heralds a new multi threaded 64 bit edition. An [ArcGIS Earth](#) app, to be released real soon, now offers Google Earth like viewing of 3D* data. Esri is offering Windows developers a route to cross platform support with a [Xamarin](#)-powered WebApp Builder. This was used by the UK DECC regulator to develop an off-the shelf app showing expiring licenses and summary production data. The tool is also used by Exprodat in its [Exploration Analyst Online](#). Spillman opined that development should be 'configure first and customize later if needed.'

In a video reprise of his presentation to the US PUG earlier this year, Bruce Sanderson described **Apache Corp.**'s trial combination of big data and GIS. Apache was having trouble with the 'old recipe' for GIS whereby data is assembled for an analysis and then (maybe) stored as a flat file. A couple of years ago, Apache began using the [ArcGIS GeoEvent](#) processor to track vehicles during well servicing operations. While the results were promising, it was proving difficult to retrieve historical data streams. Apache

decided to checkout Hadoop's potential and, with help from Esri's big data specialist Mansour Raad and consultants [ITNexus](#). A petabyte of data was migrated to an in-house Hadoop cluster and stored as CSV files. Various open source tools (Hive, Sqoop, Spark) were used under control from ArcGIS. Esri's Python interface ArcPy was used as the glue to link the Hadoop big data store with the GIS system. Some of the code is available on Esri's [GIS tools for Hadoop](#) GitHub repository. The project was so successful that Sanderson started looking for big GIS data and found that by analyzing its vehicle tracks, it could identify wells that were in the wrong place or which were not being serviced. Sanderson believes that as sensors multiply, this data will swamp traditional GIS solutions. Esri's Danny Spillman added that today, we make maps about the past, but that soon, big data analytics will let us 'make maps about the future.' Other big data types are exemplified by satellite and AIS ship tracking data.

Meanwhile, traditional GIS is consolidating its position at the core of upstream IT. As GIS folks like to remind us, pretty well all data has some spatial component. But, as **Engie's** (formerly GDF Suez) Grahame Blakey observed, there is a non-negligible effort involved in managing it as such. There are many others in the subsurface 'playground,' Petrel, Petrosys, Kingdom, ArcGIS, Prosource (with its own 'weird' flavor of SDE) and others to consider. The Engie SharePoint portal is used to keep license related information. The key here is integration via GIS that is woven into an existing IT landscape. Along with the Esri tools, Safe Software's FME and Geocortex Essentials (see below) were used. The solution now provides web maps 'that look like maps,' from Engie's Gas Maps tool. This uses Oracle views on ProSource data. Engie is also building a digital atlas of interpretations. Maps can be generated on the fly and embedded in SharePoint. 'LinkToAsset,' Engie's operations dashboard adds 'self-service' business analytics with the [Logi Info](#) tool. The [Bootstrap](#) cross platform development tool also ran. The business benefits were clear, notably the ability to draft maps in-house. But with the downturn, there are far fewer

wells, down from 5-6 to one per year. There are fewer exploration areas and fewer maps and the company is in hunkering down mode, 'things are tricky.'

Esri supports field working as **Tullow's** Adam Smith described. Tullow operates in Kenya where rig moves have proved problematical. Field workers use the [Garmin Virb](#) to capture images and full-motion video which can later be embedded in a [Story Map](#). Reconnaissance of the Lake Turkana area used in-vehicle video and drones for risk assessment and in the search for water for drilling. Cellular coverage is absent so all work is performed off-line and synched later. Elsewhere, a mobile app, [Collector for ArcGIS](#) can be used to put mapping into the hands of field workforce. The Collector can also be used to capture accurate GNSS data with high-end devices such as the [Leica Zeno 20](#). A [Navigator for ArcGIS](#) app provides turn by turn navigation from road data collections 'your own StreetMap.' Also in the 'real soon now' category is [Workforce for ArcGIS](#) for field workforce optimization. This supplies operators with a task list, allowing for navigation to the next location and the use in context any of the above tools. A 'big brother' function tracks operator location and activity. Another mobile app, [Explorer for ArcGIS](#) allows mobile workers to sketch maps and to share maps for offline use.

Brian Boulmay related that when **BP** surveyed its user base, it was surprised to find four times as many users of Google Earth than any 'official' mapping package. Why? Because Google is easy to use! BP One Map set out to replicate this ease of use by exposing GIS functionality to all while hiding its complexity and arcane data management. First developed for the US onshore unit, One Map is now being rolled-out globally. Now that One Map has been rolled-out, BP is finding serendipitous synergies such as that between risk mappers and procurement. Another unexpected result was when the Castrol lubricant unit repurposed GIS-based competitor analysis to analyze its customer base. All thanks to the BP Portal. One outstanding issue is the multiplicity of 'postage stamp' interpretations that are generated by geoscience interpretation

systems. While these can be brought into the GIS system, true integration remains elusive.

Neil Frewin (**BG Group**) and Ian Peebles (**Exprodat**) presented on the GeoPortal, a tool BG has developed to manage its knowledge and opportunities portfolio. The GeoPortal provides rapid access to raw (not interpreted) data for use in basin and play evaluation, play statistics and 'yet to find' estimation. Originally developed around SDE and ArcGIS Server, the system is currently being refreshed with the new Portal architecture. [Voyager Search](#) provides data discovery across BG's structured and unstructured data resources. Frewin demoed the map's time

sliders to see 'where was Shell re BG in the past?' which got a laugh. The system is now being extended to capture key decisions in email and elsewhere and to integrate with SharePoint and [Jive](#), a Facebook-like tool to record conversations and decision making history.

A strength of the PUG is that information is shared warts and all. Oliver Morris described the 'trials and tribulations' of **Halliburton/Landmark's** migration of its Neflex/Exploration Insights service to digital mapping. Neflex makes digital maps of prospectivity and depositional facies which are delivered in ArcGIS. Previously regional maps were hand drafted and digitized causing edge effects.

Neflex put a 60 person team on the editing job. A workflow transformation involved a £100k spend on ArcEditor licenses.

Initially this was too slow so a further £8k went on a new SQL server machine and 10 Gig Ethernet switches. The SDE databases required considerable tuning to accommodate the intense editing process, some 2,000 feature classes have to be managed and captured to the SDE. Active edits on SDEs are vulnerable to accidental modification. The conflict resolution tool is 'clunky,' regular backups are crucial.

** Although Esri's current 3D offering looks more like 2½D with Google Earth-like representations of buildings.*

Pipeline open data standards association user conference

Pipeline Week/GITA co-hosted event hears of 'next generation' PODS, Noah on 'smart,' projects for linear referencing and construction, TransCanada on ILI data, BSD on Iploca/Pods convergence.

Speaking at the Pipeline open data standards (Pods) association's 2015 user conference, now held jointly with GITA and hosted by Pipeline Week, Pods president Kenneth Greer (**Enable Midstream**) introduced a roadmap to a next-generation Pods association. Next generation Pods involves a revamp of governance, strategy and communications with members. The watchword, as befits an 'open' organization, is transparency with plans for something that is 'fundamentally different.' Current, pre-new generation projects are Alrp*, new construction (phase 2) and offshore.

The need for a technology revamp stems from the fact that currently, the standard is not applied consistently across member organizations, a handicap to interoperability. To achieve this, the Pods template is to be simplified and strengthened with a reduction in the number of core tables (Ppdm take note!). A new modeling language, Pipeline ML will leverage OGC geospatial conventions. New requirements from the US [National pipeline mapping system](#) will be addressed and a feature code library and data-loading solutions for ArcGIS and CAD are to be developed. Software behavior is to be constrained by common codes to promote interoperability and check conformance with the standard. Fast forwarding to December 2015, the next gen Pods [strategic plan](#) has been approved by the board and will be presented at upcoming [town hall/webcasts](#) in January 2016.

Jim Crompton from **Noah Consulting** (now an Infosys unit) argued that the downturn

is the time to make a case for 'standards-based agility.' While some companies are in survival mode, reducing activity and selling assets, others are engaged in strategic investing, picking up assets at fire-sale prices and preparing for better days. All are cutting costs, but which costs to cut? Crompton argues that digitization – smart pigs, intelligent pipelines – make good candidates for investment in the downturn. There are also plenty of reasons to continue with the standards effort even though barriers exist. But the business case for interoperability remains and is achievable through loose integration of existing standards. This requires a commitment from operators and compliance from vendors. Crompton wound up with a plug for the [Standards leadership council](#) which is working to identify areas of standards intersection and to avoid duplicate or conflicting standards.

Bruce Dupuis (**TransCanada Pipeline - TCPL**) described some of the challenges encountered using Pods 6.0 relational to manage in-line inspection (ILI) data in an enterprise environment. TransCanada was working with integrity specialist [Rosen](#) to implement a pipeline information management system (Pims) and found that the standards Pods ILI module did not meet its requirements for scalability, integration and centerline management. TCPL conducts over 100 ILIs per year and has over a billion records from its 650 km network. TCPL evaluated various options and decided to manage its ILI data outside of Pods. The new ILI module has some 13 primary tables with over 300 attributes and

has been designed to follow regular Pods conventions so that it could be re-inserted into the database at a later date.

Nichole Killingsworth (**BSD Consulting**) provided an update on the project for a new data standard for pipeline construction, a joint venture between Pods and the Geneva, Switzerland-based International pipe line and offshore contractors association (Iploca). The project sets out to expand the Pods model to accommodate the data collected and during the construction phase of pipeline projects. Phase 1 documentation completed in 2014. The ongoing phase 2 will add documentation to support the proposed data model changes and create workflow diagram to illustrate how data flows from each stage of construction. There is agreement that a new module is required for construction but there remain differences on how to store the data particularly with the impending 'next generation' model revamp.

John Linehan (**Wood Group Kenny**) reported from the offshore workgroup that is expanding Pods 6.0 to accommodate offshore-specific data objects. The project has received input from BP's 'Spatial golden build' (Oil IT Sept 2013). The team has reviewed sample datasets provided by Anadarko, BP and Genesis and has proposed some 40 tables or modifications to the existing model. The work is currently up for public comment and should be ratified in Q1 2016.

** ArcGIS Location Reference for Pipelines. More on this topic in our next issue.*

Folks, facts, orgs ...

EnergyIQ, Aegion, Ametek, Saudi Aramco, Chevron, EPRF, Energy Transfer Partners, Exova, EY, Hannon Westwood, Liaison Technologies, Lloyd's Register, MacGregor, Maersk Training, OFS Portal, MPG Pipeline, National Council for Science and the Environment, Oniqua, Calgary Scientific, PG&E, Shell, SSI, Stewart & Stevenson, Unique Group, Wild Well, Willbros Group, Ziebel.

Amelia Webster is now VP Support Services at **EnergyIQ**. She was previously with DrillingInfo unit Transform Software.

Bruce Sanderson is VP asset integrity management at **Aegion Corp**. He hails from Apache.

Dave Hermance succeeds retiree Preben Caroe as VP general manager of Ametek's measurement and calibration division.

David Cleary heads-up **Saudi Aramco**'s new research center in Detroit.

Michael Wirth is now VP midstream and development with **Chevron**. Pierre Breber takes his place as EVP downstream and chemicals.

Jeffrey Kissel is now a distinguished fellow of the **Energy policy research foundation**.

Marshall McCrea is COO of **Energy Transfer Equity** and Matthew Ramsey is president and COO of sister company **Energy Transfer Partners**.

Cliff McGuire has rejoined **Exova** as principal metallurgist at its EU oil and gas business.

Adi Karev is now global oil and gas lead at **EY** (formerly Ernst & Young). He hails from Deloitte Touche Tohmatsu.

Richard McGrath is CEO of ESIA's **Hannon Westwood** unit.

Hmong Vang is 'chief trust officer' at **Liaison Technologies**' Alloy platform.

Following John Wishart's resignation, **Lloyd's Register** COO Alasdair Buchanan is interim energy business stream director.

Høye Høyesen is to lead Cargotec unit **MacGregor**'s new advanced offshore solutions division, a merger of two Norway-based units.

Jacob Petz is MD of **Maersk Training**'s new 'state-of-art' simulation facility in Houston.

Mimi Stansbury joins **OFS Portal** as SVP control and administration following Randy Dutton's retirement. Yvonne Pham is now marketing manager.

Dan Murphy is now quality assurance manager at **MPG Pipeline Contractors** in Houston.

Michelle Wuman is to succeed retiree Peter Saundry as executive director of the **US National Council for Science and the Environment**.

Founder and CEO Andy Hill has resigned from **Oniqua Intelligent MRO**. Executive VP Steve Herrmann is interim CEO.

John O'Malley is the new CEO of **OpenLink** following Mark Greene's retirement. Greene continues as an independent director.

Bruce Wallace is VP of **Panton**'s production data center. Ross Bohnstedt is director of business development, Yan Liu is principal data scientist and Roger Cao is senior data scientist.

James Henry has rejoined **Calgary Scientific** as CTO and executive VP products. He comes back from Sinindex Solutions.

PG&E has named Jason Wells as SVP and CFO. He succeeds retiree Kent Harvey.

Maarten Wetselaar is director of **Shell**'s integrated gas unit and member of the executive committee.

Robert Holder has joined **SSI** as US sales account executive.

Stewart & Stevenson has named Anthony James Davis as its Chief Executive Officer and a member of its Board of Directors.

Sales Manager, Egon Oltmans, is to lead the **Unique Group**'s new facilities in Riyadh and Dammam in Saudi Arabia.

Steve Nas is now regional manager of well control engineering at **Wild Well** Asia-Pacific. Chris Murphy is senior director of Asia-Pacific operations in Kuala Lumpur.

Miller Williams is chairman of **Willbros Group**. Mike Fournier is CEO. Former chair and CEO John McNabb has decided not to stand for re-election.

Francis Neill is now CEO at **Ziebel**. He hails from EV Cam.

Done deals

Aveva abandons Schneider deal. Altran bags Tessella. Hercules Offshore sails out of Chapter 11. CGG gets support for restructuring. BGS behind new UK Energy Research Center. Exova invests in Italy.

Aveva's attempt to acquire **Schneider Electric**'s Invensys software unit (OITJ Vol 20 N°7) has come unstuck. A terse communication from Schneider announced that the discussions ended as 'no agreement could be reached on terms.'

Data scientist **Tessella** has been acquired by the **Altran Group**, a provider of 'innovation and high-tech' engineering services. Tessella will henceforth operate as a 'world class center' for data science and analytics.

Hercules Offshore has completed its financial restructuring and emerged from Chapter 11. Funding of a new \$450 million senior secured credit facility has been completed. President and CEO John Rynd said, 'With the support of our new investor base, we look forward to execute on our strategic goals through the current industry downturn and thrive in the next upcycle.'

Cash-strapped **CGG** has achieved investor support for its proposed capital increase. French government arm Bpi France and IFP Energies Nouvelles are supporting the

initiative and Total is asking for shareholder approval in order to contribute 'up to' €35m.

The **British Geological Survey** has announced a £180m investment from government and business in an 'Energy Research Accelerator.'

Exova is investing €1.4 million in a new laboratory in Padova, Italy.

SMi Conferences - Oil & Gas Cyber Security

CERT-UK on cyber resilience. CiSP security portal. Imperial College on plethoric UK cyber initiatives. Most incident down to 'latent conditions.' Energy and utilities losses put at \$13 million a year.

Speaking at SMi's [Oil and gas cybersecurity conference](#) in London last month, Chris Gibson, director of [CERT-UK](#) told of the government's work with the oil and gas sector on 'cyber resilience.' Cert acts as an incident management center and provides support and education. The threat landscape is evolving as Scada systems are now 'internet facing' and although easier to use, are more susceptible to attack. Increasingly sophisticated industrial control systems are getting harder to secure. Ironically, older systems are 'probably easier to lock down.' It can be hard to secure employees' own equipment in the face of the 'bring your own device' movement exposing workers to mobile malware.

There is no magic bullet, but Gibson summed up the basic tenets of cyber security as follows – know, log and analyze your network traffic, install patches as they come in, and provide clear guidance to staff as to what they should and should not do. CERT-UK works with the energy sector via CiSP, a joint government and industry initiative that shares threat intelligence.

Chris Hankin (Imperial College) enumerated various UK cyber R&D programs for ICS risk analysis ([Mumba](#)), resilience ([Caprica](#)), threat evaluation ([Sceptics](#)) and others. While there is a real need for operations technology-targeted security, the fact 'appears to have escaped many in the C-suite.'

Awais Rashid ([Lancaster University](#)) followed up with a potted history of recent incidents. While human error is widely recognized as a problem, most incidents are due to the exploitation of what [James Reason](#) described as *latent conditions* (design-induced mistakes) rather than *active failures* (real errors).

On the subject of human error, Bernadette Palmer of the [Security Company](#) reported that most advanced attacks rely on exploiting human rather than system flaws. There is no point spending millions on defense if your staff can be tricked into giving away their credentials. The energy and utilities sector suffered the highest losses from cybercrime although it wasn't very much, a mere \$13.2 million!

GE Predix big data/IoT for RasGas LNG

'World first' claim for asset performance management system tuned to LNG.

Following a successful pilot, RasGas has signed a letter of with GE to apply its [asset performance management](#) (APM) solution across its liquid natural gas operations in Qatar. The APM embeds GE's [Predix](#) big data/advanced analytics solution and targets reliability, equipment maintenance and productivity.

GE's chief digital officer, Bill Ruh said, 'APM solutions meet a current gap in the LNG industry where raw data is currently isolated and at different locations. With Predix, information from several years of operation in various locations can now be integrated to strengthen predictive and corrective capabilities.'

RasGas' use of Predix is claimed as the 'world's first and only' industrial data and analytics solution for LNG. The Predix cloud solution is projected to extend the life of RasGas assets and lower operating costs.

Electrolab rolls out non-virtual tank gauge

New digital sensor captures levels and temperature data and provides high-level shut-in function.

In the digital era of soft sensors and virtual gauges it's reassuring that some folks are still making meters that actually measure stuff. Boerne, Texas-based Electrolab is one such outfit that has just announced a new [Model 2100](#) digital level sensor (DLS) with a high level shut-in function.

The 2100's patented sensing technology captures up to two fluid levels and eight temperature measurements in the same tank with a single sensor. A dedicated safety circuit ensures accurate high level and 'high-high' protection. The intrinsically safe unit is certified as class I,

div 1 Group D for hazardous locations. Patent pending 'oleophobic' treatment mitigates paraffin and asphaltene buildup. The system meets Category 3, API STD 2350 (4th Edition 2012) requirements for mitigating the risk of environmental exposure to petrochemicals.

Altair open sources PBS Professional

Workload manager contributed to Open HPC stack.

Altair is to open source PBS Professional. The high performance computing workload manager will be integrated with the Linux Foundation's Open HPC stack. PBS Pro was originally developed at NASA's Ames Research Center and was acquired by Altair in 2003. Altair chairman and CEO Jim Scapa said, 'Our goal is for the open source community to actively participate in shaping the future of PBS Professional. The community's

contributions combined with our own R&D will accelerate exascale computing initiatives across the board.'

Integration with the Open HPC stack will be performed as a joint initiative with Intel. The [open source licensing option](#) of PBS Pro is planned for release mid-year 2016. Early access is available for 'select partners' for testing. The plan is for both commercial and open source licensing.

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Sales, deployments, partnerships ...

OvationData, Quantum, ABB, Actemium, TomTom, Aker Solutions, CGG, Claxton, LR Senergy, Esri, SAP, FleetCor, Addovation, IFS, Petrofac, Intergraph, Kalibrate, Lifteck, NavPort, Schlumberger, RigUp, OFS Portal, Chase, P97 Networks, NESAs, Texas AEP.

OvationData has chosen **Quantum's** StorNext storage platform for its new cloud service.

ABB has been awarded a contract by Trans-Anatolian Natural Gas Pipeline for a its 800xa process automation system.

Vinci unit **Actemium** is to implement **Intergraph's** 'smart' engineering design solutions across its major projects.

TomTom Telematics and Shell are to offer EU businesses a 'complete fuel management solution,' integrating EuroShell Cards data with TTT's WebFleet.

The **UK department for international development** and Germany's **BMZ ministry** are to train east African engineers for work in oil and gas. The five-year project targets Kenya, Uganda Tanzania and Mozambique.

Aker Solutions has won an initial NOK 3.2 billion 5-year frame agreement for maintenance and modifications services at on BP's offshore Norway fields.

OMV has signed a 3-year frame agreement

with **Aptomar** to deliver its integrated field monitoring services.

CGG has acquired a global onshore gas/oil seeps data set from **Gas Consult**. The data will be incorporated in a new edition of Seep Explorer.

Claxton and LR Senergy are to offer a managed offshore decommissioning service.

Esri is teaming with **SAP** to integrate its ArcGIS technology with SAP Hana.

BP Products North America has extended its contract with **FleetCor** to provide commercial processing and management of its fleet card products.

Heartland and Pinnacle have launched a point-of-sale system for petroleum retailers that complies with the EMV chip-card based payment standard.

Addovation is now a certified reseller of **IFS** in Sweden and Norway. IFS is to deploy its enterprise service management solution on the Microsoft Azure cloud.

Petrofac has renewed its license to Intergraph SmartPlant for use on its global

engineering projects.

EFR-Group is to implement **Kalibrate** location solutions at its 1,200+ fuel retail locations in France, The Netherlands and Belgium.

Lifteck and Shell are to jointly develop Lifteck's patented gas drive pump, an artificial solution that harvests reservoir energy.

NavPort has partnered with **Schlumberger** to offer production and completion data from Studio WorldMap and the Petrel platform.

RigUp has joined the **OFS Portal** community.

Chase and P97 Networks have launched a mobile payment solution combining P97's PetroZone with Chase Pay. P97 has also teamed with **SAP** to integrate with its vehicles network running on SAP's 'Hana cloud platform for the internet of things.'

The **US National energy services association** and the **Texas alliance of energy producers** are to unify their membership.

Standards stuff - Dublin Core special

Metadata standards group hears from Schema.org, Skos and DC application profile protagonists.

We devote this month's 'standards stuff' section to a short report on the oft-cited but little understood Dublin Core metadata standard whose 2015 user conference was held recently in São Paulo, Brazil. While DC's scope is broad, it is practically a 'meta' meta data organization, its roots are in text and semantics with some scope creep into scientific metadata.

Richard Wallis ([DataLiberate](#)) presented on Schema.org, a 'general purpose vocabulary for describing things on the web.' Schema.org was launched in 2011 and is backed by Google, Bing and Yahoo. It uses a simple RDF* syntax to capture document type, title and provenance of web resources for machine readability. The extensible protocol is (embryonic) [auto.schema.org](#) to standardize CO2 emission reporting. Schema.org is widely used to complement domain-specific vocabularies and as an enabler of 'semantic search.'

Paul Walk of [Edina](#), the center for online/digital expertise at the University of

Edinburgh advocates pragmatic development, leveraging DC in 'application profiles.' These consist of data elements drawn from one or more namespace schemas that developers can combine and optimize for a particular application. Examples of such include the '[Rioxx](#)' metadata profile for tracking of open-access research and funding that cherry picks properties from DC and the NISO open access metadata profile along with a few terms of its own. Walk warned though that Rioxx serves to help institutions to comply with UK policy on open access, 'not to provide general interoperability!'

Yue Zhang ([Drexel University](#)) showed how semantic metadata is used in materials science with an ontology for metals developed in the W3C's Simple knowledge organization system, Skos. Semantic ontologies support information retrieval and discovery, interoperability and linking of related resources. [Drexel's Materials science metadata infrastructure initiative](#) adapts [Hive**](#), the 'helping

interdisciplinary vocabulary engineering' technology, to metals research. Again, Skos was the tool of choice along with machine learning algorithms such as KEA++ and MAUI. Checkout the [Drexel demonstrator](#).

Juan Antonio Pastor Sánchez ([Murcia University](#)) also uses Skos to build controlled vocabularies. Public Skos datasets cover economics, social sciences, Dewey Decimal classification, the Library of Congress' vocabularies, geographic place names and many more fields, notably a proposed international standard nomenclature for science and technology. A [Datahub](#) repository offers a collection of Skos repositories. A couple are peripherally related to oil and gas but do not appear to be very up to date. Those wishing to use Skos should check out the W3C guide to '[Data on the web best practices](#).'

* *Resource description framework.*

** *Not to be confused with the Apache Hive data warehouse.*

Aveva unveils innovations as Schneider deal unravels

Total E&P's Viztool. Shell's handover standard. 'Hyperbubble' laserscan solution. E3D in the cloud.

The 320 customer delegates at the 2015 [Aveva World Summit](#) held recently in Dubai heard Aveva CEO Richard Longdon provide an overview of the proposed acquisition of the Schneider Electric software business and the 'exciting' synergies that would result. The deal unraveled shortly afterwards (see page 8).

Back at the Summit, Total E&P Norge presented 'Viztool,' an engineering data visualization and information management system developed for the North Sea Martin Linge field. Viztool components include Prodom, Total's Documentum based document management system and Aveva Net.

Shell announced the Owner Operators Forum that is setting out to 'define and prioritize information standards requirements for industry and the standards bodies,' with a special mention for its own Capital facilities information hand over specification (CFIHOS – Oil IT September 2013).

Aveva CTO Dave Wheeldon introduced new products in the engineering software house's line up. Aveva's latest laser scanning solution now includes 'Hyperbubble,' that connects individual scans in a 3D rendering of the whole site. The latest release of Everything3DTM now allows scan data to be included in the

3D model, 'giving context to combined greenfield and brownfield environments.' Now production drawings can blend laser data and modelled information. Aveva Experience was also announced, a free cloud-based training resource. Registered users will get hands-on access to E3D running in the cloud. The show also saw the formal launch of Aveva's Engage decision support application, demoed on an 84-inch, 4K [Microsoft Surface](#) touch screen.

Back to school

IHRDC, Opito, Weatherford, Maersk, AspenTech, Foster Wheeler, Schneider Electric.

IHRDC's [Competency Management System](#) has been approved by the Offshore petroleum industry training organization (Opito) as meeting its standards for evaluating employees' education and training.

Weatherford has teamed with Maersk to offer scenario-based training for critical wells using Weatherford's OneSync simulation software.

Safe Software's new [FME knowledge](#)

[center](#) provides tutorials, sample workspaces and articles.

AspenTech has partnered with **Seoul National University** to provide [localized training](#) for process engineering graduate student internships and other initiatives including joint research and development programs.

Some 100 students at the **Institut Teknologi, Brunei** just completed Amec/Foster Wheeler's second annual oil and

gas [training program](#). Graduates hailed from the engineering department, the school of business and school of computing and informatics.

Schneider Electric and the US National energy technology laboratory have developed [EyeSim](#), a 3D, immersive, virtual reality tool that provides visibility of plant equipment conditions during operations for 'informed' efficiency and safety decision making.

Foresight review of resilience engineering

Lloyds Register Foundation report struggles to bring 'emerging field' to life.

A free 54 page report from Lloyds Register Foundation summarizes the outcome of a workshop on 'resilience engineering' (RE) held earlier this year at the Stevens Institute of Technology, Hoboken, NJ. The 'emerging field' of RE sets out to enhance the safety of life and property through improved resilience of engineered structures, systems, organizations and communities.

Resilience describes the emergent (*sic*) property or attributes that allow systems to withstand and adapt to disruptive events by preserving critical functionality. Quantitative metrics of the resilience of socio-technical systems are not well established and standards and processes are still emerging. New technologies can provide opportunities but also threats to resilience.

Globalization, uncertainty, demographic change and an excessive focus by managers around current status are identified as challenges to resilience. A lack of incentives, capacity, education and training programs, effective communication, and parameters to characterize resilience, are also identified. You can read some 54 pages in a similar vein in the [LRF Report Series: No. 2015.2](#).

Siemens internet of things plugs into Hana cloud

Simatic 'Connector Box' extends Siemens cloud for industry offering.

Siemens has announced an addition to its Siemens cloud for industry (SC4I) that is to underpin new internet of things business models. The new kit is a '[connector box](#),' a Simatic IPC-based gateway that transmits machine and system data securely into the SC4I platform that is built on top of SAP's

Hana cloud. The device connects machines and systems to the cloud via a manufacturer and protocol-independent connector.

SC4I supports the development of web services-based applications in an 'open' eco-system. Current examples include a fleet manager and a visual data analyzer.

The functionality will also be integrated into other products in Siemens' portfolio of digital factory and industrial communications solutions.

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Oracle unveils internet of things orchestrator

Ellison, 'SAP, IBM are nowhere in the cloud.' IoT fix for 'challenged' asset-intensive industries.

Speaking at the [Oracle Open World](#) conference, held recently in San Francisco, chairman and CTO Larry Ellison described the move to the cloud as a generational change, the like of which has not been seen since the advent of the personal computer. Ellison believes that most all software will be cloud based in ten years or so. Oracle started work a decade ago with a rewrite of all its applications in the [Fusion project](#). Oracle's cloud credentials contrast with those of its main competitors. According to Ellison 'The world's largest ERP company has nothing in the cloud, nor does IBM. We never see them!' Ellison's address concluded with a plea for next generation security. 'We are losing too many cyber battles – although not yet the war.' Security should always be

as low in the stack as possible, 'An encrypted database is more secure than apps that encrypt.'

In her presentation on JD Edwards' vision for asset-intensive industries including oil and gas, Louise Farner described the challenge facing these verticals as more and more nations enter the 'super-aged' category where more than 20% of the population is over 65. By 2030, all of Western Europe and North America will be 'super-aged' according to the UN, making the aging workforce a structural problem. Technology and automation is set to plug the gap, in particular the internet of things where a new [internet of things orchestrator](#) (IoT) is used to connect smart devices, sensors and RFID tags to enable 'pre-emptive maintenance.'

The Java-based infrastructure adds enterprise-level security to raw sensor data and provides a rules-engine designer to feed conditioned data into any JDE EnterpriseOne application – running *naturellement* in the cloud.

The JDE unit is also working on a management of change solution that embeds the [OSHA 29 CFR 1910.119](#) standard for process industries in a 'broad solution' for HSE audit and inspections and more. Other ongoing research targets integration of 'wearables' to support proximity based tracking and transactions, vocal query of enterprise information and delivering hands-free guidance in 'high cognitive overload situations.'

Repsol deploys IHS emission reporting toolset

Pressure from regulators and activist investors behind EMI-Sphere development.

IHS reports that its client Repsol has implemented an enterprise scale monitoring and reporting system built around IHS' [Environmental Performance Solution](#).

Repsol was under pressure from local and EU regulators as well as from ESG investors* and wanted to implement reliable and credible environmental management processes.

Legacy processes for calculating air emissions were disparate, labor intensive and time consuming. Each facility had its own reporting processes involving cut and paste from multiple source systems including OSIsoft PI, laboratory information management systems and production systems. This involved 'hundreds of

spreadsheets' and manual tasks performed by HSE staff. The system was error-prone and provided only limited visibility across the company.

Repsol HSE IT specialist Víctor García Rodríguez said, 'We needed all our HSE information in a single system so we could have a corporate-wide view of compliance. We kicked off a major project, EMI-Sphere, and selected IHS' Sphera/Esuite solution for our enterprise-level environmental information management system.'

EMISphere launched in 2012 with implementations at two facilities in Spain, monitoring air, water and hazardous waste from refineries and providing visibility on HSE performance. The solution has now

been deployed at five more downstream facilities and performs a million calculations daily and stores 5 million emissions calculations annually. This has also improved production and scheduling, validating and applying rules and calculations to process data in an auditable, transparent way. EMISphere received an 'excellence award' at IHS' Spectrum event last month. Other awards went to Saudi Arabia-based petrochemical company S-Chem and to Siemens.

** Environmental, social and governance a.k.a. sustainability and ethical 'activist' investors.*

Lux Research rolls out 'Risk' analytics for energy supply chain

'Resource intelligence for system knowledge' tool for complex supply chain analytics.

Boston, MA-based Lux Research has released the '[Resource intelligence for system knowledge](#)' (Risk) platform, a tool that helps companies understand and manage dependence on critical natural resources. According to Lux, companies with complex supply chains can be exposed to unexpected risks and/or miss valuable opportunities due to their dependence on natural resources. Resource scarcity, price volatility, and increased social and environmental pressure all

threaten supply disruption and unplanned price spikes. But for many, the impact of resource dependence remains hard to evaluate.

Risk integrates more than 200 data sources on subjects like land use, water needs, and energy into a decision-support system to visualize value chains in a geospatial context. Lux VP analytics Ory Zik said, 'Natural resource dependence is one of the biggest risks that companies face. Risk helps benchmark operations from the

perspectives of profitability, resilience and sustainability. The toolset shows where substitution strategies can be implemented and suggests where innovation will have the most impact.'

Zik told Oil IT Journal, '*One application of the platform is to analyze energy as a supply chain and to understand exposure to coal and carbon emission. Our team of data scientists has built a spatial-temporal, dynamic network topology to analyze the entire North American electric grid.*'