Oil IT Journal

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IN THIS ISSUE

Upskilling the workforce

In IT and technology deployment, education and training is a slow learner! Learning tech guru suggests some fixes with an open source initiative from the IEEE.

Speaking at the 2003 **AMG Immersive Technology for Oil & Gas Summit** Jennifer Rogers (**PeopleAccelerator** and IEEE Learning Technology Standards Committee) addressed the ongoing need to 'upskill' the workforce. Fast forward to the tail end of her presentation, where she cited research from the US Chamber of Commerce Foundation's T3 Innovation Network that found that 'Technology and data are disrupting nearly every industry for the better – except education and the workforce.' Rogers believes that there is a 'wealth of diversity and talent in the workplaces of today' but that organizations fail to 'visualize, harness and develop this capability strategically'.

Back in the early noughties, SCORM, the Sharable Content Object Reference Model, set the standard for immersive technology in training and competency management. The Society of Petroleum Engineers competency management tool also merits attention.

Today, there is a need for more integration and interoperability across diverse ecosystems. This is being addressed in the IEEE P9274 Standard for Learning Technology, an 'open source initiative connecting people, actions and objects and the adaptive immersive experience'. The xAPI describes a JSON data model and a RESTful web service for learner experience data tracking and access. Rogers cited her own research on Standardized risk mitigation measurement in extended reality environments utilizing the IEEE experience API (xAPI) standard. She also cited work done by WarpVR of dropped object risks and Veracity Tech's LRS.

The IEEE 1589 standards for an augmented reality learning experience model has been leveraged by Oxford Brooks University researchers in a paper on Learning Analytics in Augmented Reality, a blueprint for an AR/xAPI framework.

Rogers observed that the internet of things is fueling the need for anticipatory learning that blends operational data with an individual's capability profile to provide 'AI-enabled, personalized intervention and operational competence – again leveraging the xAPI protocol. More from the IEEE Advanced tech for humanity workgroup and follow Rogers on LinkedIn.

In an email exchange after the event, Rogers kindly provided us with more information on the IEEE standards and their use in several commercial products. We have included this information as a contributed paper on the Oil IT Journal website.

Kitware ParaView

Teratec presentation highlights the TotalEnergies-backed open source high performance data manipulation and visualization engine.

Kitware's ParaView open source data visualization engine was the subject of a recent webinar hosted at Teratec, France's high performance computing competency center. ParaView is described as 'open source software for science and artificial intelligence applications'. The cross-industry toolkit, originally developed by Sandia National Labs is often deployed embedded in other applications. Today New York-headquartered Kitview is responsible for maintenance. TotalEnergies is both a supporter* and user of ParaView where the toolset is used in big data visualization across seismics, micro CT core scans/digital rocks, reservoir grids, Lidar studies and combustion simulation.

Kitware's François Mazen presented the ParaView community which now sees over 300k downloads per year. The per-month code commit chart is rising steadily and has seen some 150k commits since 2000 for a total 1.6 million lines of code. ParaView sits at the heart of an ecosystem of data science tools including PyTorch, OpenXR, Jupyter, Trame and others. Web and workstation GUIs are available as is a batch mode (ParaView Python) for tasks such as machine learning-based surrogate modeling. ParaView performs the basic functions of scientific data analysis, feature extraction and vizualization.

ParaView's windowed GUI allows real-time investigation** with machine learning surrogate models, PyTorch ingests model surfaces into ParaView where the parameter space can be explored 'live'.

** Most recently, TotalEnergies has financed the development, by Jonas Lukasczyk of an integrated node editor in ParaView and an OSPRay-based photorealistic material editor.*

*** For more on developing and viewing the results of deep learning surrogate models in ParaView check out the KitWare blog.*

Houskeeping

Editor Neil McNaughton reflects on changes to Oil IT Journal delivery mechanisms over the past couple of decades, offering recommendations on incorporating the Oil IT information archive into a content management system using the RSS API and on using the onsite search function. But you can still also just read it – cover to cover, every issue!

It has been a while since we did any introspection here at Oil IT Journal. A couple of subscription cancellations (unbelievable I know) led me to think that some folks are not getting the best out of the Journal. And that maybe we are not doing our best at getting our message out. So here is a short explanation of why the Journal is the way it is today and an invitation to you all to speak up, tell us what you think so that we can raise our game.

Oil IT Journal has changed quite a bit since it first published in 1996 as a tabloid style paper-only publication. We went online with essentially the same information around the turn of the millennium. The website was developed at that time using html frames which gives it a quaint, old style look. In fact html frames were deprecated almost as soon as we implemented them for various reasons which I won't go into. We stuck with them in a contrarian way for the simple reason that frames gave us a

performant GUI for minimal effort. We also made a bet against the W3C deprecators and figured that there were too many users of frames for the browser developers to abandon them. A bet that holds true so far. In short we went with the 'if it ain't broke, don't fix it' approach. Had we done otherwise we would no doubt have had three or four major upheavals to the GUI in the past 24 years, and our code would look like the dogs dinners that lurk behind many 'modern' website. But I digress.

Having undergone our 'digital transformation' in 2000, one of our major clients suggested that we implement an RSS Feed. I had no idea what this was at the time but it seemed pretty straightforward and was duly coded-up. I'm not sure how important this was to the original requester. But it is still there, updated with every new issue. There is the paid-up full text feed and a public headlines feed. A reader recently suggested that we 'change the delivery mechanism, from password protected PDF to Yammer posts'. My understanding of Yammer is that it can plug into an RSS Feed so that might be a good repurposing of the venerable RSS format. If you have a library or run a document management system, get it to point to the RSS Feed and populate your repository. You can also go to either our corporate or public sitemaps page and scrape these for direct access to the text payloads.

Many of you (but not enough!) use the search function that is provided in the main menu. Just to make thinks clear, we do not allow Google, Microsoft, OpenAI or anyone else access to the last couple of years of Oil IT Journal. So the onboard search will bring up more useful stuff than Google or ChatGPT! Paid-up subscribers are of course at liberty (in fact we recommend it) to index our content for their own usage.

Today the size of the Journal has increased significantly over the old tabloid. I like to think that there are folks out there who still read it cover to cover. Maybe the 'renaissance' man/woman that was supposed to be the key driver to the digital oilfield of the noughties. Interoperability across different disciplines has been an (elusive) holy grail of IT since we started out. We try to fill that gap with an 'interoperability' of understanding between upstream, operations and so on. So my advice, plug the whole thing into whatever content management system you have in-house but also, read it all, cover to cover. You will be a better person!

NAP on the Digital Twin

National Academies tome 'Foundational research gaps and future directions for digital twins' provides great boosterism for the digital twin while warning that the 'publicity around digital twins and digital twin solutions currently outweighs the evidence base of success'. But all that's not going to stop US academia from pitching full-tilt into the trendy trope with notably, a validation, and uncertainty quantification (VVUQ) approach.

The US National Academy of Science and Medicine has published a book (also available as a free PDF download) titled 'Foundational research gaps and future directions for digital twins' a 150 pages oeuvre emanating from a Committee of the same name that is based on work supported by the Department of Energy, Office of Science and other US orgs. The digital twin (DT) is defined as 'a set of virtual information constructs that mimics the structure, context, and behavior of a natural, engineered, or social system (or system-of-systems), is dynamically updated with data from its physical twin, has a predictive capability, and informs decisions that realize value'. The bidirectional interaction between the virtual and the physical is 'central to the digital twin'. This rather optimistic definition is further backed by what, if it did not emanate from such an austere body, might be considered advertising puffery, viz. 'Digital twins hold immense promise in accelerating scientific

discovery and revolutionizing industries'. 'Digital twins can be a critical tool for decision-making based on a synergistic combination of models and data'. Crucially, the DT possesses 'a dynamic nature that goes beyond what has been traditionally possible with modeling and simulation, creating a virtual representation that evolves with the system over time'. 'A digital twin is more than just simulation and modeling'. Needless to say, realizing such phenomenal future potential will require research, lots of it, hence the need to identify the many 'mathematical, statistical, and computational gaps' that will need to be filled.

But how exactly is the DT different? 'The DT digital twin is distinguished from traditional modeling and simulation in the way that models and data work together to drive decision-making'. This leads to a DT taxonomy of data-rich twins running on 'heavily empirical numerical models' and 'data-poor' twins with a mathematical-model-centric approach. Blending the two approaches will 'advance hybrid modeling approaches that leverage the synergistic strengths of data-driven and model-driven digital twin formulations'.

That is all probably easier to say than to implement and indeed the authors warn in the introduction, 'the sentiment expressed across multiple committee information-gathering sessions is that the publicity around digital twins and digital twin solutions currently outweighs the evidence base of success'. Moreover, 'it is challenging to separate what is true from what is merely aspirational, due to a lack of agreement across domains and sectors as well as misinformation'. But the difficulty in 'separating the aspirational from the actual' is used as a justification for a major research program to 'realize the potential of digital twins' through an 'integrated research agenda that advances each of the key digital twin elements and [provides] a holistic perspective of their interdependencies and interactions'.

DT verification, validation, and uncertainty quantification (VVUQ) is a particular focus area that is required to track the evolution of the physical counterpart of the DT in real-world use conditions including changes in data collection, noise and more. The VVUQ concept has its roots in work on computational models (i.e. simulators as codified by the ASME). Other research 'gaps' include a lack of VVUQ standards for AI/ML, best practices for VVUQ in DTs (here the Department of Energy's predictive science academic alliance program was cited), multi time scale modeling, multiphysics, VVUQ of hybrid and surrogate models, data 'ethics' and more. A justification for the research into DTs is 'because it gives an identity to the virtual representation' which 'should receive investment and sustainment in ways that parallel investment and sustainment in the physical counterpart'.

This is all very well, but today's 'physical counterparts' already include much of the IT that the DT targets. The NAP study is curious in that it fails to examine prior art in the modeling and simulation space in any depth. Process plants have for years used simulators offline to train operators and design and test the plant. Real time control with 'feedback loops' is likewise nothing new, but 'process control' is only mentioned once, en passant, and OT/operational technology not at all. In Oil IT Journal's observation of the marketplace, we see existing simulation software being simply rebranded as a 'digital twin'. In Neil McNaughton's rather jaded editorial in our last issue he railed against top-down EU research funding that decides upfront what will be researched and funded, saying that this approach is 'more like the monolithic culture of the Soviet Union than Silicon Valley'. With some 160 US researchers signing off on this publication, it would seem that things are pretty much the same on the other side of the pond. On the other hand, the scope of the NAP study is so broad that researchers will be able to carry on with their pet projects with a minimal re-jig of their nomenclature.

Letter to the Editor

Jean-Claude Dulac, formerly with EarthDecision/Paradigm, writes in response to a recent Oil IT Journal Editorial. For years, multiple and ongoing IT 'evolution' has brought little in terms software progress or cost savings.

Your Editorial ('Container vs. Content') prompted me to think about the evolution of software development I lived through while I was working at EarthDecision/Paradigm and where things have been going since I left. IT evolution in the past 30 years has changed the development and deployment landscape. Is it for the better? On one side, the technology stack that software vendors have to deal with is increasingly complex. On the other hand, companies are working with the same, or a reduced number of developers. Thus the time and resources available for enhancing core product functionalities is small, meaning that our industry has not seen much innovation in the past 30 years.

To this architecture evolution, we have to add the cost of adapting to different E&P standards such as Rescue, Witsml, Prodml, Resqml and now OSDU. The latter follows an identical IT-driven architecture evolution (from file to servers to the cloud) but it has not brought any new data types (except possibly for seismics*).

Meanwhile, this IT evolution has allowed oil companies to move the IT complexity to the cloud and outsourced software providers. But this has not resulted in cost savings. If anything, costs have increased. Another technology evolution is the arrival of higher-level languages like Python, which provide much-needed abstractions to the complexity below. But this comes with an increased run-time cost, perhaps as much as 75 times the cost of running the same thing in C thirty years ago. With generative AI comes another coding revolution, but only if you do what thousands of other developers are doing, which does not solve our industry's unique coding problems.

Since his many years developing geomodelling software for Paradigm (now an AspenTech unit) Dulac started his own company, Next-Shot LLC. Next-Shot offers a new 'constrained forward stratigraphic modeling' method that is said to 'reduce the time and complexity of geomodelling while generating more realistic geological and flow models'.

** For more on the topic of OSDU's seismic data types see the OSDU Update elsewhere in this issue.*

OSDU update

Oil IT Journal continues to attempt to grok OSDU with mixed success. Member meeting presentations? Private. Data standards? Variable. Progress reported on R3 milestones, CCUS coverage and workflows. The Oil IT inside track – extricating OSDU from the clutches of the CSPs.

Presentations please!

We have been pestering the folks at OSDU via the official channels, hoping to get access to presentations made at the member meeting and more information on the workings of the 'open subsurface data universe' than can be obtained from down-in-the weeds of the labyrinthine Git repository.Our first query, 'can we access the presentations?', was answered after two months deliberation with a 'no'.

What are the standards?

Our second, more of a troll perhaps, 'what standards for seismic and well log data are considered canonical for OSDU*?' fared better. The official response is *'The OSDU Forum seeks to identify and recommend for use valuable 'data formats'. For some types of data, there will be a single recommended data format along with guidelines about version, dialects, and quality rules. Where this is not the case, the Forum will recommend multiple data formats for a given type of data (each with guidelines), noting the reasoning, such as a high volume of current and historical usage. The intent in such cases is to enable companies to have the platform convert data to a more desirable or more performant format as a by-product of platform ingestion.'* So now you know.

** We were thinking of OpenVDS from Bluware for seismics and the Baker Hughes Universal Well Log format, both of which have been reported as central to OSDU.*

R3 Milestones

Our next stop in our ongoing quest for OSDU enlightenment was as usual, The Open Group website where we see that OSDU R3 recently passed 'milestones' 21 and 22. Work on new gravity and magnetic data types has begun along with multiple bug fixes and enhancements for seismic, rock and fluid sample analysis and reservoir. M22, out in January 2024, continued to extend the coverage for the above data types along with new work on earth modeling and legal agreements. The latter includes a new domain schema to support documenting a well license and its life cycle with relationships to business associates, developed in collaboration with PPDM. More in therelease notes for M21 and M22.

CCUS

A further OSDU development was on show at last year's Open Group Summit, subtitled 'Delivering a Sustainable and Secure Tomorrow where Chris Gabriel (AWS) and Jane Wheelwright (Dynamic Graphics) presented on the OSDU and The Open Group's Open Footprint Forum's efforts in the realm of Carbon Capture, Utilization and Storage (CCUS), the subject of a new OSDU 'harmonization' group.

Workflow

Blogging on the OSDU Forum, Shell's Dietmar Mueller noted a problem with earlier workflows and projects, the need to create and share data collections within project teams. This is being addressed in the OSDU Project and workflow services (P&WS) capability group, which is expanding use cases by incorporating 'essential functionality for interacting with data', a.k.a. a 'system of engagement'. While OSDU exposes some mechanisms for application integration, there are gaps, notably a lack of agreement as to how existing mechanisms should be consistently used across workflows and applications, avoiding 'polluting' systems of record with temporary working data and ensuring that datasets that need to be changed by other applications are done so 'in a controlled way'. The P&WS workgroup is said to be 'central to realizing the full value and potential of OSDU'.

Breaking free from the CSPs

Oil IT Journal perceives OSDU as a somewhat information retentive organization. Mueller's 'gaps' may hide a more fundamental issue which was suggested recently in Neil McNaughton's cheeky 'OSDU: What is it actually for?' editorial. To try and understand what is really going on we have had

to activate unofficial channels where we think we have learned the following. The early development of usable OSDU instances has been dominated by the cloud service providers. This means that to use OSDU, you have to sign-up and (maybe) pay Google, IBM, AWS or Microsoft for use. Given that the original intent of OSDU was to free-up the end user from a hegemonic SLB or Halliburton, a shift to a CSP hegemon is considered a less than ideal place to be. So, the next big thing in OSDU is an attempt to pin down the CSPs and ensure that what is available – locally or in the cloud – is a truly 'open' version of the platform with minimal lock-in from costly CSP-provided bells and whistles. How is this to be achieved? One avenue being explored is containerization with the development of an OSDU 'baremetal' instance running in either Docker or a MiniKube container. This will enable developers to work on identical OSDU instances locally which can then be deployed in the cloud without either breaking the bank or inviting too much CSP lock-in. All of which is very nice but given that the CSPs have been driving a lot of OSDU to date, they may not be quite so keen to be pushed back into the role of simple provider of CPU cycles. As ever in the industry's long time search for interoperability, there's 'many a slip twixt the cup and the lip'.

SPDM year-end online conference 2023

RGU: ChatGPT 'underwhelms' in geoscience. GeoSapien geoscience data discovery research tool announced. Ikon: From 'magic' PowerPoint arrows to ML-powered data management. Katalyst: DM projects 'fail to add value' - more 'GLAM' required.

The **Society of Professional Data Managers** online year-end event for 2023 had the theme of 'Energizing data management, disruptive or newly native?' Paul Cleverley, founder of Flare Solutions and now a professor at Aberdeen's **Robert Gordon University**, set the scene with a talk on 'being confident in data in a world of generative AI'. ChatGPT has been shown to be plagiaristic and inaccurate which may lead to an loss of trust. As an example, ChatGPT was easily tricked by mineralogists on Mindat into providing a detailed report on an imaginary mineral, Eotvosite. Large language models are 'just probabilistic engines' that provide a 'most likely word' with no understanding. But it gets worse. ChatGPT use cases break the 'laws' of data management concerning data discoverability and provenance. To date, LLM uses in geoscience have produced underwhelming results.

Companies are now trying to augment LLMs by including their own in-house text corpuses. This is the domain of 'Retrieval augmented generation (RAG) models have been reported as generating more specific, diverse (?) and factual language than the standard. Cleverley's field is pre-LLM natural language processing (NLP) which leverages techniques such as tagging text chunks, and adding metadata to responses, a.k.a. 'NLP enrichment'. People still want key word search. LLMs do not replace Google-like search. Also LLMs are 'truthy', instinctively true but with no recourse to facts!

Cleverley has carried out research into geoscientists' opinion of Generative AI, particularly leveraging RAG. Geoscientists ranked various AI and non AI geological statements for veracity. The survey suggested that NLP-enriched AI bests Generative AI. For RAG, the ranking of text chunks before applying AI was shown to have a significant impact on the result. More on the study in Cleverley's LinkedIn post.

Cleverley cited work done by the Geoscience World organization on data discovery. Working with Kadme, GSW has developed a text embedding model around its massive cross-society geological corpus. The free GeoSapien geoscience data discovery research tool, is to be opened to the public in 2024. Cleverley concluded that by developing digital literacy, we can combat the loss of trust that

LLMs have brought. His work at RGU is investigating the links between data management culture, literacy, thinking and the use of AI.

For Chris Hanton (**Ikon Science**) data management principles have not kept pace with changing workflows. Successive oil price shocks have caused a drastic drop-off in data management personnel and now, the data science 'monster' has arrived on the scene. Hanton asked, 'are processes the problem?' Consultants do a lot of the grunt work … but this may be of 'uncertain quality'. In the perfect world of PowerPoint, data architectures connect data sources to a central store with 'magic arrows'. In reality this involves 'a huge amount of work'. Data management processes need to be automated but the reality is that 'they do not scale'. Lots of expert knowledge is needed. Until now! Enter Ikon Science's Curate that provides 'machine learning-powered data management', a.k.a. Generative AI for the subsurface. Curate's ConversationAI chatbot goes beyond plain ChatGPT with contextual chat about subsurface documents and computer vision for image extraction. This leverages free libraries such as EasyOCR and YOLO for segmentation of core photos. Imagery is classified with ViT ML for outlier detection. Hanton concluded that while data and workflows have changed a lot over the pas 15 years, the need for clean trustworthy data as great as ever. Data management automation is key along with the judicious application of AI/ML.

In the Q&A, Hanton was asked what role the data manager plays today. He replied that the DM provides 'fundamental subject manager expertise'. To which there was pushback from an attendee who reported that, 'Many new data managers lack subject matter expertise, either within the business function or the industry. Instead they have generic skills. This is a big concern. Data managers need to understand what the data is so they can manage it well'.

Jess Kozman (Katalyst) reported that today, many data science initiatives fail to add value, probably due to a combination of resistance to change, barriers to collaboration, access control, cyber security and data privacy. Even in 'digital first' organizations, 70% of digital transformation efforts fail to provide a positive return on investment. Digital natives in the energy industry are frustrated as their expectations are not met, variously down to a lack of culture, appropriate technology and the necessary change management. Meanwhile, data management is left to a few 'wizards', disenfranchising the rest! A Katalyst survey found data governance scoring on average worst, putting it 'at the bottom of the heap!' 'Underpinning all of the hot shot technology we want to is this shaky foundation!'

Kozman reprised his work on the DataFit organization as previously covered in Oil IT Journal. The DataFit philosophy as developed with Curtin University's Future of Work Institute attempts to balance the three 'capitals', human, organizational and social with data fitness. A new acronym, 'GLAM', for Generative algos, LLMs, AI, ML recognizes that everyone has a role in data, 'just like safety'. It should no longer be the field of 'just a few experts'. To turn everyone into a data wizard will need a huge investment in training. The Three Capital model has now been embedded in the Data Workflow Methodology published in the peer-reviewed Data Centric Engineering Journal, after validation in the resource industry. Kozman's research has shown that self-identified data roles have a lower barrier to adoption that a top-down data governance framework. Digital natives' expectations are for a 'more accountable, trusting and sharing culture that would provide enhanced digital data democratization'. While an understanding of the full data lifecycle and data governance practices is ranked high in importance, this is 'seldom demonstrated in practice'. Kozman's team is now working to aligning the data roles in the workflow with work product components on the OSDU platform, with reference to the large volumes of data generated by continuous real-time monitoring of CCUS projects. The study will be presented at the upcoming SPE/AAPG/SEG Carbon Capture, Utilization, and Storage conference.

*SPDM, the Society of Professional Data Managers is a not for profit joint venture between **Offshore Energies UK** and Stiftelsen **ECIM**, organizer of the annual Haugesund data management conference. More from SPDM.*

Software, hardware short takes…

Emerson TopWorx DVR. Wearin's Brain. Sercel MetaBlue Land. Esri ArcGIS on Kubernetes. Cetron ResInsight 2023.12. Control Station DLS range. Copia DeviceLink. Cumulus Pro. Beicip EasyTrace 202https://septentrio.com3.1. Emerson/Fisher FieldView L2t. NV5 Geospatial EnviConnect. Rock Flow Dynamics tNavigator update. Septentrio AntaRx GNSS smart antenna.

Emerson's new TopWorx DVR Switchbox valve positioner that provides reliable open/close valve position feedback. The entry-level addition to the DV Series of valve position indicators combines a durable resin enclosure, compact size and a patented cam design engineered for harsh environments.

Wearin' a Conextivity Group unit, has announced the Wearin' Brain, an 'ultra-reliable' IoT fall detection and alert solution for lone workers. The device is attached to a worker's vest and includes an manual SOS button, an inertial fall detection sensor and GPS for location.

Sercel has announced 'MetaBlue Land' a data-driven solution for managing land seismic surveys. Used across the survey lifecycle from planning through acquisition to data delivery, MetaBlue integrates data from the Sercel survey portfolio including Mesa survey design and various receiver and vibrator acquisition solutions.

Esri has released ArcGIS Enterprise 11.2 on Kubernetes, leveraging 'cloud-native' software patterns to deliver high availability and scalability. A Kubernetes deployment is said to offer performance and high-availability. Kubernetes allows cloud-native storage services such as Amazon S3, Azure Blob, or Google Cloud to serve as an object store. Although Kubernetes has a different architecture from Windows or Linux, users are assured 'a familiar ArcGIS Enterprise experience'.

Ceetron has released ResInsight 2023.12 with improved grid and summary calculations and automation of multiple RFT plots. More in the release notes.

Control Station has announced a tiered range of Digital Lifecycle Solutions for industrial process optimization, reliability and sustainability. DLS builds on Control Station's PlantESP PID loop analysis, adding asset performance analytics at plant or enterprise-wide scale. More from Control Station.

Copia's GIT-based source code for process control now includes a 'DeviceLink' function to detect program modifications at the machine level. DeviceLink highlights code changes between backups and sends alerts in-app or via email.

Cumulus Digital Systems has released Cumulus Pro, a self-service quality assurance technology that allows construction and maintenance projects to enforce standard operating procedures, upskill new workers, and track field work quality. Cumulus Pro is compatible with any manual work activity and uses AI to build field-ready workflows that allow supervisors to validate that 'work is done right the first time, every time'.

Beicip-Franlab has announced EasyTrace 2023.1 with multiple enhancements to the well and seismic trace analysis package including the 'storage of synthetic CDP in dynamic traces' along with multiple other enhancements and bug fixes. More from Beicip-Franlab.

Emerson's new Fisher FieldView L2t liquid level controller pairs with an electrically-actuated control valve to maintain ideal oil country separator levels. The new device is said to save energy and maintenance costs by minimizing valve movement, and by simplifying the level measurement and control processes. More from Emerson.

NV5 Geospatial has announced EnviConnect, a new component of its Envi geospatial ecosystem. Envi Connect makes image data and raster processing workflows accessible to non-experts.

Rock Flow Dynamics announces new functionality from recent tNavigator releases. The simulator has seen multiple physics and chemistry functionality for CCUS projects. Geomechanics now incorporates thermal effects (thermoporoelasticity) in geomechanical modeling. Geology and Model Designers now implement a version control system for collaborative working. The Material Balance Analyzer sees the addition of isothermal compositional MBA models. More from Rock Flow Dynamics.

Septentrio has announced the AntaRx GNSS smart antenna for machine automation, a high-performance GPS/GNSS receiver and an antenna in a single ruggedized housing. The unit delivers high-accuracy real time kinematic (RTK) positioning down to the centimeter level. The versatile offering includes inertial navigation system integration, dual antenna mode and 4G cellular communications. More from Septentrio.

The Quantum Decade

New edition of IBM's forward looking publication on quantum computing reports on a new 1,000 qubit machine heralding a quantum tipping point. Quantum is (still) 'set to disrupt chemicals and petroleum'.

The forth edition of IBM's 'The Quantum Decade', a.k.a. 'a playbook for achieving awareness, readiness, and advantage' kicks of with a few FOMO* warnings to 'leaders who do not understand and adapt to the Quantum Decade' who will 'find themselves a step, or more accurately, years behind' the competition. IBM foresees a 'profound computing revolution that could significantly disrupt established business models and redefine entire industries'. Indeed with a reported hike, in 2023, to a 1,000 qubit machine, IBM is now calling a 'quantum tipping point'. The latest Quantum Decade reprises endorsements from BP's Richard Debney and Doug Kushnerick (formerly with ExxonMobil) and Woodside that appeared in the 2022 edition.

IBM considers that quantum computing will 'fundamentally disrupt' the landscape of the chemicals and petroleum industry'. Quantum computing use cases include modeling of unconventional reservoirs and 'eventually' seismic imaging. Back in 2019 we asked TotalEnergies' Henri Caldera for potential QC geophysical use cases. He opined that full waveform inversion was a possibility 'but easily 5 to 10 years out'. It would seem like there is some slippage from the earlier date. Today, IBM is offering access to 100+ qubit IBM Quantum processors to 'explore practical industrial problems'. A 'concept rendering' portrays a 100,000-qubit 'quantum-centric' supercomputer that is expected to be deployed by 2033. More from IBM.

** Fear of missing out.*

Folks, facts, orgs…

RelyOn Nutec, LF Energy, EPC Audubon, Texas Rail Road Commission, BP, DNV, Forum Energy Technologies, Foster Marketing, Geospace, ISN, NOV, OPC Foundation, OSDU Forum , Oceaneering, Oxford Flow, CSA Ocean Sciences, Petrofac, Petrosys/Interica, BP, Technip Energies, Tellurian, W Energy, Datagration, Hexagon, Research Data Alliance.

Colin Leyden has been promoted to MD at Aberdeen, UK-based safety training and competence management specialist **RelyOn Nutec**.

Alex Thornton has joined **LF Energy** as Executive Director, focusing on recruiting new contributors from energy stakeholders and 'growing the open source tech stack needed to complete the energy transition'.

Kevin Pitts has been promoted to President of EPC **Audubon Field Solutions**.

Cesar Saldivar has joined the **Texas Rail Road Commission** as chief administrative officer, overseeing HR and Training. He was previously at the State Auditor's Office.

Steve Tanghe has joined **BP** as Systems and Transformation Engineer. He was previously with Datum 360 and held the RDL Admin position at CFIHOS.

DNV has promoted Jamie Burrows to head of its Carbon Capture, Utilization, and Storage (CCUS) unit.

Forum Energy Technologies has appointed Leslie Beyer to its board. She was previously CEO of the (US) Energy Workforce and Technology Council.

Anna Scordos-Brooke is now VP PR at oil country marcom boutique **Foster Marketing**.

Stephen Jumper has joined the **Geospace** Board. He hails from Dawson Geophysical.

In a planned leadership transition, **ISN** has named Brian Callahan CEO and Joe Eastin executive chairman.

Patti Melcher has been appointed to the **NOV** Board of Directors. She is a managing partner at energy-focused private equity firm EIV Capital.

Following Mike Bryant's retirement after 22 years of service, the role of Secretary of the **OPC Foundation** is now held by Alexander Allmendinger.

The Open Group **OSDU Forum** has elected the following to its operating management committee: Ian Betts (Shell), Richard Mohan (ADNOC) and Dariusz Piotrowski (IBM). Jane McConnell (Spinning Yarns) has been re-elected as Forum Vice Chair.

Following Mark Peterson's retirement, **Oceaneering** has promoted Hilary Frisbie to Senior Director, Investor Relations.

Faris Churcher has been appointed business lead Gas & Energy Transition at **Oxford Flow**.

Greg Fulling has joined **CSA Ocean Sciences** as Senior Project Scientist. He hails from the US Bureau of Ocean Energy Management .

Aidan de Brunner has joined **Petrofac** as Non-Executive Director.

Mike Zyglicki has joined the **Petrosys/Interica** leadership team as VP Americas. He hails from S&P Global Commodity Insights (formerly IHS Markit). Zyglicki is a keen runner and completed the 2023 San Antonio half marathon in 1hr 56min.

Murray Auchincloss has been appointed "**bp**" chief executive officer. He was previously interim CEO.

Note: After the abandoned 'Beyond Petroleum' transformation, BP's marketing department first returned to just "BP". More recently, the supposedly trendier "bp" was rolled-out, although there is some confusion as to the canonical form. In the body of the Auchincloss release it is "bp" but the official corporate footer has "BP p.l.c.". After a year or so of accepting "bp", the Financial Times has reverted to the more sensible and readable "BP". Oil IT Journal will follow this usage. How long before BP abandons its typological folly?

Technip Energies has made the following appointments: Naïla Giovanni to Chief Digital and Information Officer (ex Vallourec Group), Marco Villa to Chief Business Officer (formerly COO) and Loïc Chapuis to COO.

Tellurian has named Martin Houston, co-founder and VC, to Chairman of the Board of Directors. Co-Founder Charif Souki will no longer serve as an executive or officer or hold any managerial responsibilities but remains as a board member.

Rohit Chhabra has joined **W Energy** as chief product and technology officer. He hails from Omnigo Software.

Deaths

Michael Stundner, a pioneer of AI in oil and gas has died. He was the founder of DecisionTeam (bought by SLB) and **Datagration**. More in James Brady's LinkedIn post.

Melker Schörling, **Hexagon**'s principal shareholder and long standing chairman has passed away. More in the release.

The **Research Data Alliance** has announced the premature passing of Sarah Jones, an esteemed member of the RDA Council, former member of the Technical Advisory Board and RDA community member since 2014. More from the RDA.

Standards stuff …

IOGP/Energeo on marine seismic operations. IOGP offshore positioning systems. CHIFOS on alignment with IOGP JIP 33. PIDX releases ETDX Scope 3 reporting standard to supplement WBCSD Pathfinder Framework. Cenelec to work on CCUS standards. ISO published AI management standard and two new climate standards. Open Geospatial Consortium kicks-off GeoZarr workgroup. Object Management Group rolls-out SysML2.

The **IOGP** in association with the Energeo Alliance (formerly the IAGC) have just published 'An overview of marine seismic operations', a.k.a. IOGP Report 448. The 70 page report covers seismic surveying in exploration and monitoring of producing fields and in future offshore CO2 storage projects.

The **IOGP** has also published Report 624-02-02, Guidelines for calibration and verification of offshore surface survey and positioning systems, a companion to its earlier Report 624-02-01 on technical specification. The document provides a common industry technical specification for surface positioning sensor and system calibration and verification, during mobilization and on an ongoing basis. Coverage includes the Online Survey and Positioning System, Global Navigation Satellite Systems, Attitude and Heading Reference Systems and Inertial Navigation System.

A position paper from **Chifos**, a.k.a. the IOGP JIP 36 investigates alignment with its big brother, IOGP JIP 33. Cfihos is said to be foundational to the development of the JIP 33 Information Requirements Specification (IRS) and procurement data sheet. Alignment of the two is desirable to enable interoperability and to give a 'clear line of sight from Cfihos classes and attributes to the JIP33 specs. More in the video (!?).

PIDX has announced a Production Release of the ETDX Scope 3 Emissions Reporting Standard. This followed a Successful POC involving some 5,000 purchases, a $14 million spend and a Carbon footprint of around 3 million kg CO2e. Work is underway to attach ETDX to the WBCSD* Pathfinder Framework V2.0 whose emissions data exchange guidance has a broader cross industry scope.

** World Business Council for Sustainable Development.*

The **Cenelec** standards body is to develop standards for carbon capture, utilization and storage (CCUS) under CEN/TC 474, a new technical committee. CEN/TC 474 will build on existing ISO/TC 265 standards, supplementing them with 'homegrown documents tailored to the needs of European stakeholders'. The first TC meeting was held early 2024 in Brussels.

ISO, the international standards organization has published a new standard to 'help businesses and society at large safely and efficiently derive the maximum value from their use of artificial intelligence'. ISO/IEC 42001, the 'world's first AI management system standard' provides an integrated approach to managing AI projects, from risk assessment to effective treatment.

ISO has also announced two new climate standards. The climate change management standard, ISO 14068-1 outlines a standardized approach for achieving and demonstrating carbon neutrality in the transition to net zero. ISO/TS 19870 provides a mechanism for assessing the greenhouse gas emissions of hydrogen pathways.

The **Open Geospatial Consortium** has kicked-off the OGC GeoZarr Standards Working Group to develop a Zarr encoding for geospatial gridded data. Zarr is a cloud-native data format for n-dimensional arrays that enables access to data in compressed chunks of the original array. Zarr facilitates portability and interoperability on both object stores and hard disks.

The **Object Management Group** has rolled-out Systems Modeling Language (SysML2), heralding a 'new era of model-based systems engineering' by facilitating increasingly complex model design via improved precision, expressiveness, consistency, usability, interoperability, and extensibility.

AMG Future Downstream Automation Summit 2023

Chevron on digital twin hype and the promise of generative AI. Veerum's digital twin targets productivity gains. Eastman Chemical on 'people as the uncommon assets' and on escaping the POC purgatory. Shell unleashes the power of AI on operations.

Brent Railey (**Chevron Phillips Chemical Company**) set out to demystify digital twins, starting with a historical taxonomy of the DT. Designs, digital and scale models existed before the DT term was invented. Later, CAD/CAM drawings, 3D models and mathematical simulators came along. But the true DT came with more recent digital transformation that brought standards-based asset models, virtual reality, real time data and 'contextualization' for AI and machine learning applications. Railey sees three classes of DT. Asset hierarchies, visual reality-based and mathematical/physical simulators. Each of these brings benefits and challenges. The asset model brings together disparate systems but is challenged by data size and cost of maintenance. Visual DTs are great for operator training and (some) work planning – but these are costly to build and (again) maintain. Mathematical DTs are also used in training, for scenario planning and as a prerequisite for autonomous control. But again these are hard to develop, require multiple proprietary software tools and (yet again!) are tricky to maintain. Chevron's experience of the DTs is that the whole field is clouded by marketing claims. There is a lot of hype around AI, machine learning and Industry 4.0! While the concept has been around for several years, DT technology is immature and evolving. 'There are competitive battles going on in the marketplace'. Railey recommends keeping an open mind, 'there is a lot of shiny stuff, but also a lot of noise' and, tellingly, 'your current investments can still provide value'.

After the event we asked Railey for his thoughts on Generative AI. He provided the following.

Generative is a different approach to AI. It is excellent at analyzing unstructured, textual or image data and classifying it, and extracting structure out of it. It can facilitate the building of an asset digital twin, for example. It can simplify finding information about the equipment or process that the digital twin represents. It's really new on the market, and applying generative AI is a rapidly evolving and changing process. Things have drastically changed in a matter of six months. In the summer, the discussion was really around fine-tuning large language models. Embedding the knowledge you want the model to know in the model. Today it is about retrieval augmented generation and using the model for its skills and providing information to it in the interaction. So think about any documentation about equipment, start up, shut down procedures, engineering drawings, manufacturer specifications, electrical diagrams, etc. It's a hard thing to keep those things organized in a way that they're accessible and retrievable. This technology can do a lot of the legwork in organizing the information, as well as answering questions from a user based on the documentation.

We are not sure how much of this Railey might classify as marketing 'noise' but Trevor MacMaster (**Veerum**) proposed the DT as offering a 'clear path' to achieving huge productivity gains, cost and

emissions reduction and improvements to core business KPIs. Veerum's DT is placed at the 3D Model/Visualization part of Railey's DT taxonomy. MacMaster's talk was titled 'how to work visually with DTs'. Veerum's 3D DT's REST API provides connectivity with multiple source systems (Aveva, Hexagon, Maximo, SAP end more) for 'seamless user navigation between systems'. ExxonMobil is a user. More from Veerum.

Damon Shackelford's (**Eastman Chemical**) thesis for successful innovation is that 'time and money are common assets but people are uncommon assets'. An interactive user interface allows users to develop their often overlooked innovation soft skills. Shackelford illustrated this with some imagery from Squint. To develop people's soft skills, 'behavioral scientists are your best friends'. They can help with management of change, telling the right story and help escape 'proof of concept purgatory'. Technology choices help too. At Eastman, 'Everybody loves using the Xbox controller to navigate the VR model'. This is used to walk through the plant to avoid safety issues such as where contractors are still welding. The new software handles views and equipment navigation 'with ease', onboards new contracting partners in VR and is a powerful training aid and skills check. Finally 'we keep our SMEs available globally and not wear them out with travel!'

Partha Chatterjee explained how **Shell** is 'unleashing the power of AI across' its oil, gas and chemical operations. Data is the 'elixir' of life in the modern world and represents the currency of the digital economy. 'Clean Data is the truth, it is not a conjecture or hypothesis'. In the context of AI, a partnership with domain experts is required to capture the best rules and build ML models. As these learn from more data, they can feed-back and challenge human experts. Robotic process automation translates business processes into simple rules, eliminating errors and increasing reliability. Natural language processing and generative AI help with a variety of tasks, including drafting emails, essays, code, and more. The digital twin also got a mention. Chatterjee wound up with a quote from operations research guru Russell Ackoff who said, of aligning people and process, 'we fail more often because we solve the wrong problem than because we get the wrong solution to the right problem'.

The next AMG Future Downstream Automation Summit will be held in Houston on the 19th November 2024.

Facility Lifecycle 3D Model Standard

USPI NL's rolls-out V1.1 of its FL3DMS (now 'L3Dex'), 'foundation for the digital twin'.

A recent USPI-NL presentation puts some flesh on the bones of the Dutch standards body's FL3DMS, the Facility Lifecycle 3D Model Standard a.k.a. a 'foundation for the digital twin'. FL3 is an industry standard for 3D models as used by owner operators in their contracts with EPCs and to optimize the return on investment in a 3D model. FL3 will enable the creation of a digital twin of an asset for use in capital project execution and subsequently throughout the asset lifecycle. Owner operator participants include Equinor, BP, ExxonMobil, Shell and TotalEnergies*.

Oil IT Journal readers will note a certain overlap of this activity with similar efforts from IOGP/Cfihos and the CII/AWP. The former, along with DEXPI, are cited as a 'MoU partners' while CII/AWP, Standards Norway and BuildingSMART are 'planned partners'. FL3 is intended to fill the gap between build and operations where the 'native 3D model and data is rarely maintained and often not used to its full potential'. The 2023 Release 1.1 of FL3 covers specification deliverables and the business case. An Excel spreadsheet has been developed for managing the model. Work is now underway on Release 1.2 with an updated specification document and scope and ownership revisions. The project is using

the same logical modeling method as Cfihos while adding a separate model for 3D content. Data requirements to enable advance work packaging are being developed in collaboration with CII AWP.

At the meeting, participants voted for a name change to the project from FL3DMS to L3Dex. Dropping the F will allow scope expansion beyond 'Facilities' in the expectation that this might increase the 'still limited' number of participants. The 'ex' extension refers to the project's embedded 'experience, excellence and data exchange'. Henceforth L3Dex will be used for both the project name and deliverables.

** The following are also involved EPCs: McDermott, Baker Hughes, Technip Energies. Software Providers: Aveva, Bentley, Hexagon, Talent Swarm. Service Provider: Digital Construction Works.*

Sales, partnerships, deployments

Upstream: Geoteric AI for Petronas. tNaigator for Santos CCUS. Landmark digital twin for Libra consortium. Equinor/SLB 'most autonomous well'. SLB/Nabors drilling automation. *Operations:* Cognite AI ROCR for Celanese. Optime Subsea remote controls for Equinor. Survey Groupe/Samp for Trapil. KBR selects Sharecat for BP H2. Vissim spill detection for Aker BP. WEG drives for Al Yasat Petroleum. *CCUS, geothermal:* Expro partners with Di. Inpex contract to Expro. Northern Lights MoU to SLB. *Miscellaneous:* BP/Blueprint Digbox for BWT Alpine F1. Cavu/PT Samson trains ExxonMobil Cepu. Cumulus Digital analysis of Boeing's missing bolts. Upwing prints parts with Velo3D.

Upstream

Petronas has acquired a license to Geoteric's AI Faults and AI Horizons technology to help 'digitize and decarbonize' its exploration effort.

Santos has integrated **Rock Flow Dynamics**' tNavigator suite into its subsurface workflows across the E&P & CCUS value chains. tNavigator provides reservoir simulation, static and structural modeling and coupled thermal and geomechanical workflows, said to be 'crucial' Santos' CCUS initiatives.

The Petrobras-led Libra consortium has engaged **Halliburton/Landmark** to develop a digital twin of the Meroa pre-salt field system in Brazil. The 'integrated and dynamic' digital twin of the production system includes the reservoir, wells and subsea network to enable asset characterization, proactive reservoir monitoring, and operations planning and optimization. The Mero unitized field is operated by Petrobras, in partnership with Shell Brasil, TotalEnergies, CNPC and CNOOC, with Pré-Sal Petróleo SA representing the Government in the non-contracted area.

Equinor and **SLB** claim to have drilled the 'most autonomous well section to-date'. This was achieved at Equinor's Brazilian Peregrino C platform where '99% of a 2.6-kilometer section' was drilled in autonomous control mode, enabled by a combination of SLB's DrillPilot, DrillOps, Neuro and DrillPlan.

SLB has also signed a collaboration agreement with Nabors for the at-scale adoption of drilling automation solutions. Clients will be able to deploy their rig control systems on either SLB's Precise or Nabors' SmartROS rig operating systems.

Operations

Cognite announces the 'beta launch' of a generative AI-powered remote operations control room at the Celanese facility in Clear Lake, Texas. The ROCR leverages Cognite's Data Fusion Industrial DataOps platform.

Equinor has awarded Optime Subsea a contract for the delivery of its Remote Operated Controls System to its Rosebank deepwater field. ROCS transforms the installation of production tubing in subsea wells by eliminating the need for umbilicals.

Survey Groupe, a 3D reality capture boutique and Samp, a digital twin specialist are developing digital twins of Trapil's pipeline system and terminals. Trapil can now offer customers Samp's 'Shared Reality' solution that uses AI and 3D streaming technology to link technical documents (inventories, drawings, diagrams, etc.) with 3D reality capture. Trapil operates a 4,700 km hydrocarbon pipeline network in France.

KBR's Integrated Project Management Team has selected **Sharecat**'s software as a service platform as a component of BP's global hydrogen program. Sharecat will enable digital collaboration between suppliers, contractors and the owner operator through the feasibility, construction, commissioning and start up phases of each project. More in the release.

Aker BP has contracted technology supplier Vissim to implement an upgraded oil spill detection solution at multiple fixed and floating installations on the Norwegian continental shelf. The radar-based oil spill detection system utilizes upgraded image processing technology, increasing sensitivity, and machine learning-based classification of detected phenomena.

Al Yasat Petroleum Operations Company, a joint venture between ADNOC and China National Petroleum Corporation has contracted with WEG for the provision of medium voltage variable speed drives to power electrical submersible pumps at its Belbazem development. WEG's MVW01 G2 drive provides up to 16,000 kW of power.

CCUS, geothermal

Expro has 'renewed and expanded' its partnership with Bakersfield, CA-based **Di Drill Survey**, a provider of high-end HPHT logging, gyro survey and magnetic ranging for complex well abandonment services. Expro's high temperature Kinley caliper and downhole camera product lines are used by Di Drill to service geothermal operators in the western US. The agreement now includes Expro's Octopoda annulus intervention solution.

In a separate deal, **Expro** has won a contract from Inpex for the supply of tubular running services. Expro's Rotary Spider system will be deployed for carbon capture and storage at the Kashiwazaki Clean Hydrogen/Ammonia demonstrator.

The Northern Lights carbon capture joint venture, along with **SLB** (formerly Schlumberger), has signed a memorandum of understanding with **Microsoft** to 'optimize integrated cloud-based operational workflows'. The deal include a CCS extension of SLB's Delfi platform and the use of the Microsoft Azure cloud.

BP has repurposed **Blueprint Power**'s 'Digbox' building electricity monitoring hardware to track real-time power consumption at BWT Alpine Formula One Team's Enstone, UK site in what is described as an attempt to 'help with its net zero journey'. The metering hardware and data analytics portal will reducing energy consumption and to provide guidance on 'lower cost, zero carbon solutions'. Blueprint Power is a 'bp' company.

Safety specialist **Cavu International** has partnered with **PT Samson Tiara** in securing a contract for the provision of coaching, workshops and support to ExxonMobil Cepu, Indonesia.

A recent 'Work Done Right' podcast heard speakers from Cumulus Digital Systems, Boeing and Shell analyze the recent near-catastrophic January 5 Alaska Airlines flight which lost a door plug shortly after take-off. The incident shines light on industrial work quality and on 'critical and error-prone' bolted joints.

Upwing Energy is leveraging **Velo3D**'s metal additive manufacturing solution in its manufacturing process. Laser power bed fusion of Inconel 718 is used to manufacture 'challenging' components in Upwing's subsurface compressors.

Done deals

DeepOcean bags Btwn. EIG acquires Ocyan. ENGlobal regains Nasdaq compliance. Canada OK's Forum's Variperm acquisition. Luna buys Silixa. Spectris sells Red Lion Controls. VAST now a $9 billion company

DeepOcean has 'boosted' its digital subsea offering with the acquisition of digital transformation company Btwn (pronounced 'between') AS. Sandnes, Norway based Btwn specializes in replacing manual processes with automated solutions. The company collaborated with Aker BP on a drilling simulator and onshore collaboration center. DeepOcean is owned by Triton, an EU mid-market sector-specialist. More from DeepOcean.

In a $390 million deal, **EIG** is acquiring Ocyan Participações SA, a Brazilian solutions provider to the offshore oil and gas industry, from its current owners Novonor and the Brazilian Development Bank. Ocyan operates four FPSOs through a 50/50 joint venture with Altera Infrastructure. Washington, DC headquartered EIG is an institutional investor in energy and infrastructure with $23.0 billion under management. More from EIG Partners.

Following a December 2022 Nasdaq 'notice', **ENGlobal** has now regained compliance with the Nasdaq minimum bid price requirement and is now eligible for continued listing on Nasdaq. More from ENGlobal.

Forum Energy Technologies has received approval from the Canadian Competition Bureau to proceed with its acquisition of Variperm Energy Services. The deal involves a $150 million cash consideration and 2 million shares of FET's common stock. More from FET.

Luna Innovations has acquired UK-based Silixa, a provider of distributed fiber optic sensing solutions. The purchase price consists of a $21.5 million upfront cash consideration and up to an additional $16.5 million in earnouts payable in 2025 upon the achievement of certain performance milestones. The transaction was funded with a portion of the proceeds of a White Hat Capital Partners

investment in Luna. Silixa investors included Lime Rock Partners, Chevron Technology Ventures and Equinor Ventures. More from Luna.

Spectris has sold Red Lion Controls to HMS Networks for $345 million, completing a portfolio rationalization envisaged in 2019. Red Lion provides software and hardware solutions to access and visualize data from disparate assets using the industrial ethernet. More from Spectris and HMS Networks.

Nvidia-backed **VAST Data** has secured $118 million in Series E funding, raising its valuation to $9.1 billion. Investors included Fidelity Management & Research Company, New Enterprise Associates, BOND Capital and Drive Capital. VAST's data platform powers AI and GPU-accelerated data centers and was deployed by **Down Under Geophysical** in a flash-based, parallel file system. More from Vast Data.

Going, going … *green*

Emissions: IOGP on methane quantification. MIT - carbon removal as time machine. GE CERius emissions management. Open Footprint Forum issues RFP to developers. SLB's new methane monitor. Qnergy on new EPA venting regulations. Scepter/Aerostar's high altitude balloon monitor. *CCUS:* CGG delivers GoM GeoVerse study, signs with C-Questra. SLB rolls-out screening solution. *Sustainability:* CGI, Google Cloud and the UN's 'sustainable planet'. IOSCO on greenwashing and dubious sustainability claims. Ipieca 'sustainability goals progress is off track'. ISG on EU sustainability investment. *Hydrogen:* European Commission unveils terms for hydrogen bank.

Emissions

IOGP Report 661 Recommended practices for methane emissions detection and quantification technologies – upstream offers 72 pages covering best practices for technology selection and deployment. IOGP also provides a technology filtering tool, data sheets and decision trees that allow operators to make informed decisions when selecting technology.

Casey Crownhart, writing in the MIT Technology Review, weekly climate newsletter, suggests thinking of carbon removal technology as a 'time machine'. Fossil fuels release greenhouse gases 'by the gigaton', but the process can be reversed with carbon removal which can notionally 'turn back the clock'. Some 36.8 billion metric tons were released in 2023 from fossil fuels. In the face of which, a measly 10,000 metric tons were removed by carbon capture. To make this 'easier to understand', MIT has figured that current efforts at removal are rewinding the carbon clock by 10 seconds every year. The (unrelated?) MIT Energy Initiative is supported by Chevron, ENI, Equinor, ExxonMobil and Shell.

GE has released CERius, a carbon emissions management and reporting tool 'linked to your net zero emissions strategy'. The CERius system of record helps energy companies reduce carbon emissions by automating greenhouse gas data collection and providing insights and suggestions for abatement.

The Open Group's Open Footprint Forum reports significant progress on building a standard data model for emissions and related open source tools to ease adoption. Notably, a white paper on

Enabling Effective Emissions Data Management and Sharing has been has been published. The OFP also recently issues an RFP for a modelling tool for its emissions data model.

SLB's New Energy unit has also announced a 'next generation' methane point instrument, a self-installed continuous methane monitoring system that enables low-cost, mass deployment of accurate and continuous methane monitoring. More on the small, durable, 'plug-and-play' tool here.

Qnergy has launched a corporate program to help oil and gas minimize the cost of compliance with the EPA's methane ruling. More than a million process controllers (pneumatic devices) venting methane are now subject to the EPA's final OOOOb/c ruling. Qnergy's plan is to replace these methane-powered valve controllers with its patent-pending compressed air pneumatics devices. For off-grid applications Qnergy provides a free piston Stirling engine (FPSE) to power the controllers. The program promises easy deployment across the entire asset base without changes to site architecture. More from Qnergy.

Working with ExxonMobil, Scepter is using stratospheric balloon technology from Aerostar to track fugitive methane emissions regionally. The high altitude platform provides continuous, near real-time detection of methane emissions during daylight hours over a vast area of the Permian basin. The ballon sits approximately 60,000 ft. over Poker Lake, NM. Scepter is now working with ExxonMobil to form a large constellation network capable of monitoring oil and natural gas operations around the world.

CCUS

CGG has delivered the eastern phase of its GeoVerse Carbon Storage Gulf of Mexico Study. A westward extension is slotted for delivery in Q1 2024. The studies provide an accurate and independent map-based assessment of carbon storage opportunities coupled with a desktop-ready well database and web-based visualization dashboards.

CGG has also signed a 'commercial cooperation agreement' with EU CCUS operator C-Questra to 'accelerate the development of certain carbon storage projects'.

SLB (formerly Schlumberger) has announced a carbon storage screening and ranking solution to reduce site selection risk. The solution uses both technical and nontechnical data to provide a detailed assessment of the capacity and economic viability of storage sites. More from SLB.

Sustainability

CGI and **Google Cloud** have launched the United Nations Industrial Development Organization Sustainability Planet Platform, a 'data-driven source for countries to identify sustainability challenges such as air pollution, rising temperatures, and flooding'. The SPP will enable member states and others to view UNIDO's projects and partnerships along with industrial development statistical data. The platform blends data from CGI's Sustainability Exploration and Environmental Data Science (SEEDS) program, Google Cloud's Earth Engine and UNIDO's global project data.

The **International Organisation of Securities Commissions** (IOSCO) has published a paper on dubious activity and claims made in the 'burgeoning' sustainability space. IOSCO has identified a number of critical challenges, including data gaps, transparency issues, and varied regulatory approaches across jurisdictions. All in an area that should benefit from cross-border comparability. Despite ongoing efforts by various jurisdictions to confront these challenges, greenwashing persists as a formidable market concern. It poses inherent risks to both investor protection and the overall

integrity of financial markets. IOSCO underscores the need to cultivate cultures that champion best practices in sustainable finance. To foster trust in sustainable finance, IOSCO recently endorsed the International Sustainability Standards Board's (ISSB) standards, IFRS S1 and IFRS S2, emphasising their suitability as a global framework for transparent, effective reporting of ESG data. More in the IOSCO report.

The UN high-level **Political Forum on Sustainable Development** (HLPF) was held last summer. Participating organization Ipieca reported back with insights for the oil, gas and alternative energy industry viz… 'Progress towards most of the SDGs is off track, with many of the Goals moderately to severely off track'. Ipieca suggests fixes including accelerated climate action and outcome-based investing from the private sector. The full report can be read here.

A new **ISG** (Information Services Group) Provider Lens reports EU oil and gas majors to be 'juggling security and sustainability' with carbon capture, utilization and storage (CCUS) a 'cornerstone of the continent's net-zero strategy and the target of significant investment' with multi-billion-dollar plans announced. The EU has allocated $3.3 billion for CCUS innovation and development along with an EU-wide carbon storage infrastructure. Another EU-wide target aims for an annual CO2 injection capacity of 50 million tons by 2030. More on the 2023 ISG Provider Lens Oil and Gas Industry – Services and Solutionsreport for Europe from ISG.

Hydrogen

The **European Commission** has published the terms and conditions for the upcoming Hydrogen Bank, a key support mechanism for hydrogen offtakers in Europe. A pilot auction, with a budget of €800 million from the ETS Innovation Fund, tool place in November 2023 during the EU Hydrogen Week. The facility is intended 'to compete with the US Inflation Reduction Act and China'.

CO2 Capture and Storage

CATO, the TNO Netherlands-backed organization for carbon capture and storage, hears from the UK CCS research community and from the Netherlands Porthos and Aramis projects.

Speaking at the 2023 CATO* members meeting, Carys Blunt (U Sheffield and the UK CCS Research Community Network) outlined the UK Government's 2020 'Ten Point Plan for a Green Industrial Revolution' which set out an aim of establishing CCUS in two industrial clusters by mid 2020s, with four sites by 2030, capturing up to 10 Mt of carbon dioxide per year. The UK's The Industrial Decarbonization Challenge (IDC) is disbursing £170 million, principally as co-funded FEED studies. A further £1bn CCS Infrastructure Fund, is planned to support capital expenditure on CO2Transport and Storage networks and industrial carbon capture projects. The 2023 Spring budget confirmed funding for two clusters and announced a further £20 billion available for early deployment of CCS. Today, UK CCS is at an 'advanced stage' with two CO2 pipeline clusters moving toward Final Investment Decision. More detailed regulatory work is needed as described in the UK CCS REsearch Community's best available technology website. Work is also required on the 'quite complex' free market business models. The community is said to be 'excited' to be participating in the EU Horizon R&D program as a 'fully associate member'.

Sytze Ferwerda (**Publieke Zaken**, an NL public affairs advisory) outlined the Dutch Porthos project to capture and store CO_2 under the North Sea. The project is said to be cost effective with a break-even subsidy of under €100 per ton CO_2 (compared to €300 for geothermal and €400 for biomass).

The project is key to the development of a hydrogen economy. Alongside Dutch state entities, partners include EBN, Gasunie and the Port of Rotterdam Authority. Porthos 'customers' are Air Liquide, Air Products, ExxonMobil and Shell. The 2.5 megaton/year project received a €1.3 billion final investment decision shortly after the CATO meeting. Construction will begin in Rotterdam, with the system expected to be operational by 2026.

A companion 'Aramis' project is being run as a public-private partnership with members TotalEenergies, Shell, Gasunie and EBN. The Aramis offshore pipeline will have a capacity of 22 Mtpa an has achieved the EU 'Project of Common Interest' status. Aramis is Expected to be operational from 2028.

More on government support for CCS in the Netherlands here. More presentations and information on the CATO website.

** CATO is an abbreviation of 'CO2 Afvang, Transport en Opslag' (CO2 capture, transport and storage).*

DISC Show & Tell

Norway's energy stakeholders collaborate on digitalization, industrialization and standardization.

DISC, an ongoing collaboration between Norwegian operators and technology providers has come just out of stealth mode with a 'Show & Tell' event hosted by the **POSC/Caesar** organization. DISC, for digitalization, industrialization, standardization and collaboration is a joint venture between AkerBP, Equinor, Aibel and Aker Solutions. The plan is for a common platform for digitalization that will facilitate a 'seamless exchange of information' between digital information models based on common, shared libraries of object models. DISC is to promote an open industrial vocabulary leveraging PCA's reference data libraries and IDO, its industrial data ontology. DISC is working to apply the IDO on various energy use cases including P&ID work, digital datasheets, maintenance and work planning and cyber security assessment. DISC is envisaged as a 'catalyst and test bed' to accelerate digital projects to at-scale industrialization.

The Show and Tell bravely announced its intention to 'step down from our "world champion" status in spreadsheet and PDF overload' with a 'data revolution!' The goal is for a 'seamless, secure, and verified data flow', that will lay the groundwork for digital twins in operations. A staging data minisite has been set up to provide reference data for the project. More on DISC in the next issue of Oil IT Journal.

Modeling the carbon capture value chain

ECA Engineering leverages MATLAB and CAPE-OPEN in full value chain CCUS studies.

Speaking at the 2023 CAPE-OPEN Conference in Nancy, France, Jens Peter Hansen (ECA Engineering) demonstrated the use of Matlab and Cape-Open to model the impact of impurities in CO2 streams in carbon capture and transportation. Process simulations are used to optimize CO2 transportation by ships and in pipelines to help emitters overcome the current 'chicken and egg' situation where plant sizing is hard across the as-yet unbuilt and expensive value chain.

ECA has tested a range of software and developed subroutines in Matlab. This work has been augmented with the addition of thermodynamics and chemical unit operations developed with the Matlab - Cape-Open thermo-sockets from AmsterChem. The solution goes beyond chemical process engineering to allow for 'guestimates' of capex/opex.

Today there is considerable public and political focus on CCS demonstration projects and calls for action. Investors are focused on feasibility studies. CEOs are more focused on commercial sales. Mechanical engineers are focused on testing. All of which is perturbed by 'buzzwords like IoT, AI and big data'. A healthy business model is required to ensure for success, one that can be easily explained and which rewards the developers for their 'huge effort' in the event of commercial success.

ECA has developed Matlab/Cape-Open models for process flue gas heat and mass balance, CO2 scrubbers, liquefaction and pipeline transport. Simulations can be run remotely from a web browser. ECA is a member of two ISO TC 265 workgroups, WG 1: 'performance of carbon capture plants and absorbents' and WG7: 'standards for CO2 transportation'.

Contents

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