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BP PIONEERS THE DATA MESH

Accenture podcast describes BP DataWorks' geocloud-based federated data platform. The interoperable mesh, the 'hottest topic in data', underpins BP's Aims Tracker emissions reporting tool. The mesh is also to provide data for the data science/analytics teams, an area where past data architectures fell short. But what exactly is the data mesh?

In a recent Accenture podcast, Accenture's Teresa Tung discussed BP's embryonic data mesh with Abeth Go and Liam Donohoe (both with BP). Tung kicked off the proceedings, describing the data mesh as the 'hottest topic in data'. BP was introduced as one of the few companies that has so far 'embarked on the data mesh journey'. Donohoe explained that BP was transitioning from data lakes to data fabrics and standardizing its data ecosystem to support data marketplaces with a transformed data organization, BP DataWorks. BP was inspired by data mesh guru Zhamak Dehghani who advocates a focus on data products and self-service data access.

Go added that the mesh paradigm aligns with BP's federated, global business, where there is a need to share across different units of the company. 'The old model did not scale'. Implementing the mesh means recognizing the concepts of data management, governance and data product at the asset-level.

Tung asked for more on the state of BP's data landscape and platforms. Donohoe explained that BP operates a global 'geocloud' strategy of a data platform distributed across dual cloud environments with multiple instances in each cloud. One challenge is to leverage key cloud technology alongside niche vendor solutions. The data mesh has to accommodate this landscape and BP is currently trying to identify which components can be realized as 'data products'. In this context, the mesh is 'essential' to allow interoperability across the different technologies and platforms.

Tung, 'So how did you make the business case for the mesh?' Go responded that, in fact, no business case was presented! The mesh was deemed necessary because of the requirement to 'increase velocity and reduce resource fragmentation', particularly in the context of the new BP as an integrated energy company. The mesh is allowing BP to move fast with an architecture that can support and sustain the anticipated growth. For the new businesses, modularity is key. The mesh operating model will abstract underlying complexities and enable security.

Donohue added that the mesh is already bearing fruit in applications such as BP's 'Aims Tracker' that captures diverse emissions data sources and helps with the trend towards net zero. Likewise the approach supports digital twins with commoditized data available to other business areas.

But it's not all plain sailing. Addressing all the governance and identity management issues in a greenfield line of business is hard. But applying the new world of data mesh to legacy is even more challenging. Go agreed, the new data governance processes represent a mindset shift, 'Now you are the data owner!' 'Change is happening, everyone is feeling it as we scaling ourselves to new ways of working'.

Tung asked for more examples. Go stated that while the primary actors are now data scientists, all data owners and managers benefit from spin-offs from the mesh. BP has 'data managers coming out of our ears, geos, seismic people, all are getting to be good data stewards'. 'Good librarians are part of our DNA, and the mesh is formalizing the whole approach to data management'.

Donohoe qualified the mesh as 'best practices as applied to the data problem'. But it's not all about technology. 'We prefer to view the mesh as a suite of data products'. Technology plays a key role but the 'harsh reality is that the technology is just not there in a number of areas'. The mesh is a journey and it will grow and evolve over time, starting locally with number of data products.

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BP has support from its senior leadership with top-down understanding and buy-in. Particularly in trying to understand why past data architectures fell short. Go added that while the initial emphasis is on providing data for the data science/analytics community, 'If we solve this the mesh could be how we provision data within and outside of BP, one place for all curated data. If it's done right, the prize is much bigger'. Tung wound up the podcast by congratulating BP's pioneering work on the mesh.

Like all good IT memes, the data mesh is loosely-defined. In her blog post Tung points to a piece by Zhamak Dehghani (cited by BP as canonical) who explains that 'Data platforms based on the data lake architecture have common failure modes that lead to unfulfilled promises at scale. To address these failure modes we need to shift from the centralized paradigm of a lake, or its predecessor data warehouse'. The next big thing therefore is 'a paradigm that draws from modern distributed architecture: considering domains as the first class concern, applying platform thinking to create self-serve data infrastructure, and treating data as a product'. So there you have it. After persuading us that all would be fine once 'disparate' data was grouped into a data lake, we now have to move it out again. From disparate to distributed. Also it appears that there a knowledge graph in the mix, tying the distributed data bits together.

FREE RESERVOIR SIMULATORS

EAGE presentation from Primera/Orkahub finds commercial simulators 'expensive alternative' to open source cousins.

Speaking at a recent EAGE 'after work' online event, Alejandro Primera (Primera Resources and Orkahub Energy) evaluated various open source reservoir modeling solutions. Primera is an open source advocate, OS code underpins much of the web. Facebook, Twitter and Google regularly release code as open source resulting in free, high quality code, particularly in the data science area.

Before embarking on a project, selecting the best open source license is key. The various 'copy left', and 'permissive' licenses (Primera counted nine different licenses) are evaluated in terms of code disclosure, permitted use and necessary disclaimers. License auditing can be complex.

Sintef's Matlab reservoir simulation toolbox is a great way to start although a commercial Matlab license is required*. There is an online gallery of examples and two textbooks. MRST includes synthetic test data and real data from Norway's Norne field. The project recently got funding for further development.

Another Norwegian initiative, the Open Porous Media project also includes many examples and a recently-added tutorial for simulating CO2 storage.

GEOSX from the Lawrence Livermore National Lab is a generic carbon storage application. Primera reports that GEOSX is hard to install and has configured a Docker GEOSX app which he can share.

The Waiwera geothermal simulator from the University of Auckland's Geothermal Institute proved another tough nut to crack. Primera could not get the parallel thermal simulator to work properly.

All in all, Primera considers commercial simulators as expensive alternatives to their open source cousins. There are some challenges. More benchmarking is needed and extra finance would help these projects. Primera concluded with a presentation of his work on Equinor's Volve field using Random Forest ML to perform a sensitivity analysis of MRST simulations. More on the many tests of the Volve data here.

Watch the EAGE event here and visit the Orkahub Energy YouTube channel.

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** Although as reported in Oil IT Journal, MRST supports the open source Matlab clone Octave, 'allowing most of the solvers to run without Matlab'.*

OIL IT JOURNAL REPORTING HITS THE FINANCIAL TIMES

The FT publishes Neil McNaughton's 'What blockchain owes to Kubrick's masterpiece' letter recapitulating his 2018 'Blockchain is bullshit' editorial. No rebuttals from the blockchain brigade as yet. But a great endorsement from a world-renowned BS 'slayer'.

Last December Oil IT Journal's reporting was picked up by the **Financial Times**. In the December 16 2021 issue, star reporter Gillian Tett, wrote an article titled 'Bankers quietly mold crypto innovations for their own use' describing how 'conservative corporate treasurers are being offered blockchain solutions to legacy problems'. Tett back-up her blockchain advocacy mentioning the BP podcast that we reported on in our 'Blockchain consortium model isn't working' lead last year. I felt that Tett had not quite got the story right. Our BP piece was essentially about the supremacy of legacy supply chain technology over the new blockchain solutions. Tett was implying that blockchain was the way forward. We were reported that it wasn't working!

So I wrote a letter to the FT which I am pleased to say they published (actually my 10th published letter to the FT in as many years). In fact I was so pleased with it that I ponied-up a small sum to have the right to re-distribute my own letter in a special FT-branded edition. You canread my contribution, which the FT letters editor elegantly titled, ' What blockchain owes to Kubrick's masterpiece'. You are welcome to share the PDF file and I would love to hear your comments.

Even though I am beyond skeptical about the merits of blockchain, it trundles-on as a popular theme for supply chain 'solutions' and conferences. We continue to dutifully report on these activities (see elsewhere in this issue) but add a few words of warning and a pointer back to my 2018 'blockchain is bullshit' editorial. We also shared this article with the blockchain protagonists asking for comments and perhaps a rebuttal. To date we have received none.

Revisiting my old blockchain is BS piece got me thinking. The thrust of my argument was that the blockchain, being merely a token on the computer, cannot be unambiguously tied to any real world object. What I did not realize at the time was that the world of blockchain was moving on along the same lines. If you can't relate a blockchain record to a real thing, just rebrand a token as 'nonfungible' and sell it as an NFT. This means that there are now different communities trading in blockchain tokens. First there are the folks who believe they are buying and selling stuff (art works, steel pipe) that gets 'certified' by a blockchain record. This is delusional. Next there are folks who are buying and selling NFTs representing works of 'art' like internet memes that they don't mind other folks copying. This is logical although fanciful. And then there is the rest of us who would not touch a blockchain token, an NFT or a bitcoin with a bargepole.

I think the whole blockchain thing represents the encroachment of fake news and junk science into the public consciousness. On this I am in good company. I had a quick email exchange with world-renowned 'slayer of bullshit' **Vaclav Smil*** to whom I sent my FT piece for appraisal. Smil came back with the following, '*I have always thought that all and any e-stuff (blockchain, cryptocurrencies, metaverse etc.) are nothing but a mass-scale fraud perpetrated on ignorant masses . . . with much worse yet to come.*' Brace yourselves!

** Smil is a Distinguished Professor Emeritus at the University of Manitoba, a Fellow of the Royal Society of Canada, and a Member of the Order of Canada. He has published over 40 books. We will be reviewing his*

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latest, 'How the world really works, A scientists guide to our past, present and future' in a future issue of Oil IT Journal.

SKUA-GOCAD AND THE GEYSERS

Calpine/Emerson presentation demonstrates Gocad's versatility in geothermal reservoir management.

In a recent webinar, Craig Hartline (**Calpine Corp**) and Adrien Caudron (**Emerson**) presented a case study of geothermal production and reservoir management at The Geysers field, Northern California. Calpine has been using Emerson's Skua-Gocad software to build and view 3D models and perform induced seismicity analysis and mitigation efforts at The Geysers since 2011. Calpine combines Gocad structural models with fluid flow simulations using Berkeley Labs' Tough/Tough2 suite of 'simulators for non-isothermal multiphase flow in fractured rocks'. The Geysers, the largest producing geothermal field in the world, produces 725 MW of electricity from over 300 wells. Wellhead steam temperature is around 180°C.

Hartline began with a plate-tectonic introduction to the highly active geological setting before presenting the comprehensive models and use cases that Gocad has supported. The models blend ArcGIS surface geological maps, well log-derived lithologies, steam production and public domain seismicity data. Induced seismicity is generated as cooled, re-injected produced water meets and reactivates existing faults and fractures. This is monitored in collaboration with LLNL and the USGS with an extensive permanent seismic monitoring network. Following some early hikes in seismicity as 'too many operators were fishing out of the same pond,' mitigation measures have been brought in and seismic activity is now essentially decoupled from steam production.

Gocad is used to combine and animate production data and seismicity. This has led to a better understanding of the spatio-temporal relationships between water injection, induced seismicity and faults and fractures. Animations span some 36 years of product and seismometry. Gocad is also used to estimate microseismic-stimulated reservoir volumes. These studies have led to better water injection distribution and reduced seismicity, further optimized by careful placement of new wells. The Geysers' field-wide structural model is also used in public outreach exercises to assuage concerns over seismicity.

More on the Calpine/Emerson work from the Geothermal Library and the Emerson flyer. You may also like to visit The Geysers. Guided tours are available but the center is fully booked for 2022. The 2023 schedule opens on November 15, 2022.

GAZPROM, NVIDIA OPEN SOURCE SEISMIC PROCESSING

Machine learning code for noise reduction, horizon tracking and petrophysics released to Github. ML said to be the 'secret to major profits!'

A recent webinar from Gazprom and Nvidia introduced a suite of open source software tools for machine learning geophysical applications. Gazprom's Anna Dubovik presented the toolkit capable of 'labeling every voxel of a seismic field'. Gazprom's publicly-available tools include SeismicPro (noise reduction, automated first break picking), SeismicQB (horizon and fault tracking), PetroFlow (core-log matching, petrophysics) and PyDens (a differential equation solver).

Dubovik believes that upstream data is particularly amenable to machine learning. Inherent high uncertainty means that the extra knowledge is most useful, in contrast to the downstream where the value of extra information declines with more sales-oriented activity. PyTorch-based ML is now an integral part of Gazprom's business. Models have been extensively trained on large data volumes and the company now wants to 'broadcast these successful results to the world'.

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Sergey Tsimfer took over to present SeismicPro showing an AI-based cleanup process leveraging a local homogeneity cube prior to horizon tracking. 'Defects' are displayed on a quality map. First break picking for static correction is tricky. Autopickers are thrown by the slightest noise. Manual picking by experts is fastidious. ML is 'faster and more accurate'. In seismic interpretation, 'manual/autocorrelation software is a slow process'. Gazprom proposes a neural net-based approach trained on many fields and data. With no human interaction, a 3D volume can be picked in a few hours. Seismic stratigraphic interpretation also ran, using labelled models to identify stratigraphy such as marine fans. Fault interpretation? Again, 'manual picking is error-prone and fastidious'. 'Experts differ and interpretation is inconsistent'. Gazprom's neural net has been trained on its legacy field interpretations and now 'detects faults automatically'. The ML-derived velocity model building is the 'most sophisticated yet'.

ML is the secret to 'major profits' and the best returns from the upstream. But 'there is no easy way to get into AI'. 'Until now that is'. Gazprom has released the fruits of its AI/ML seismic efforts as an open source code base on GitHub under an Apache 2.0 license. Test data sets from Gazprom and Equinor are available with more from the community and Nvidia to come this year. Workshops are planned for the EAGE Learning Geoscience platform. Check out the blog on Medium and join the project on Git.

2021 INTERNATIONAL ROCK IMAGING SUMMIT

Craytive VR/AR and the BaselineZ virtual core store. Kazan University on USDZ AR models. University of Liege's RockePedia platform. Elemission's LIBS spectroscopy. CSIRO Rosetta Framework. The North Sea Core CIC. Badleys on BGS Role of Cores conference.

Speaking at the second virtual International Rock Imaging Summit (iRIS), Raymond Pols showed how Craytive Technologies is using augmented reality to make core images more accessible. Use cases in geothermal, CCS, and gas storage are driving demand for access to core data. Virtual reality for examining cores has been mooted for some time. But earlier efforts for 3D data rooms did not really work as they were too costly to set up and maintain. Today, accessible technology such as headsets and tablets is changing the equation. Craytive has worked with Core Technical Services to establish BaselineZ, an immersive remote collaboration platform. BaselineZ provides access to cloud-based holographic core data accessible from anywhere. Cores can be viewed with the Microsoft Hololens and there are plug-ins for Petrel, JewelSuite and more. Interested parties can set up their own Azure cloud-based core data rooms. VR functionality extend to a 'virtual core sheds' allowing a user to pick a core from the table and hand it to another remote colleague. BaselineZ also provides point and click access to CT scan data and other imagery.

Rail Kadyrov from **Kazan Federal University** has also been working on augmented reality, leveraging the 'universal scene description zipped' (USDZ) format from Apple and Pixar that is supported by many mobile devices. The resulting AR models can be shared as 3D visualization for integration into websites or use in scientific publications and conference presentations.

Eric Piard from the **University of Liege**, Belgium presented RockePedia, a.k.a a 'shared intelligence platform for computer-assisted rock identification.' Piard believes that scanning needs to move on from the acquisition of pixels to acquiring 'roxels'. Such 'rock elements' will be the building blocks of a future digital twin of the earth's crust. Piard envisages that in the future, researchers will be able to 'pool all the acquired images from geological surveys' into a large collective visual intelligence database 'tentatively named' RockePedia. RockePedia will be developed atop a sharing platform similar to the Cytomine database. Read Piard's RockePedia pitch.

Francois Ducet presented **Elemission**'s laser-induced breakdown spectroscopy. LIBS analyzers can identify and classify the chemical composition of any material, regardless of state. LIBS probes were deployed on the Curiosity and Perseverance Mars rovers. Elemission has leveraged machine learning to build a library of

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mineral fingerprints. Scanning is fast with up to 1,000 spectra per second. A new Ecore system is available for scanning drill cores.

While the **CSIRO** work on applying machine learning models to analyze hyperspectral data as presented by Fang Huang targeted the mining industry, results from the Rosetta Framework may be of interest to the oil and gas community. CSIRO's supervised machine learning models predict geochemistry and lithology labels using Corescan hyperspectral data. Preliminary results show that the models have a pretty good accuracy in predicting lithological labels and geochemical element concentrations, 'significantly improving the efficiency of utilizing raw hyperspectral images'.

Henk Kombrink introduced the North Sea Core CIC (a community interest company), a volunteer-run core store that started life in 2018 and is now supported by OGA and sponsored by Netherlands-based E&P One-Dyas. The idea is to give cores a second life by 'upcycling' information for distribution to amateur and professional geologists. The company has been granted a license to DUG Insight software. The shoestring operation is run from a garage by enthusiasts keen to preserve their 'geo-heritage' with training and energy transition research. One tangible deliverable is 'Geoart', a framed North Sea core slab for the office wall.

Adrian Neal (**Badley Ashton**) provided a summary of the British Geological Survey's 'Role of cores in 21st century reservoir characterization' conference. This kicked-off by questioning the argument whereby advances in seismic and borehole imaging mean that cores are now surplus to requirements. The core community had no trouble in destroying this strawman. A close examination of cores in Permian 'shale' shows that there is huge lithological variability. In fact much is not shale at all (*as Oil IT Journal surmised in 2017*). Elsewhere cores allow sedimentology to be tied to shale carbon content. New technologies such as QemScan and portable XRF are allowing researchers to re-assess cores to improve reservoir understanding. Shell's work with Imaged Reality got a shout-out. VR can 'bridge the scale gap' between core and outcrop interpretation. Others warned that while new uses, notably carbon storage site characterization, are on the horizon, core repositories need funding if they are to be around in 10 – 20 years' time. Proselytizing for the core store is important. 'Make sure folks know about them and appreciate their value, cite them in research and, if possible, quantify their value in monetary terms'.

More from iRIS.

SOFTWARE, HARDWARE SHORT TAKES

Beicip-Franlab InterWell 2021. New Safe Software FME Cloud. IBM's 13 petabyte tape library. Intelligent Wellhead Systems' iHub/inVision. Petrosys PRO. Interica OneView for OSDU. New E+H Houston flowmeter calibration rig. GE Digital's autonomous turbine tuning solution. Guardhat adds RKI gas monitoring to connected worker platform. nVent Raychem Pipeline Supervisor. New PVI CEMLab release. Quorum Val Nav 2021 V2. Siemens Comos Mobile Worker. ENS 2022 machine learning data challenges. Stratus' ruggedized ztC edge computing platform. TGS' single access point. New Höganäs superalloy for Velo3D printers. Zeno's new 'Pioneer' program for early adopters.

Beicip-Franlab has released InterWell 2021 with new functionalities for direct map extraction from seismic data and interactive filters on gathers to support pre-processing and angle-range decision while stacking. Tuning on prior probabilities and a nested approach for discriminant analysis address complex discrimination problems. New automatic trace classification extracts zonation maps from interpreted or raw 3D data. Also new is connected geobody extraction on any attribute. The software licensing system has been reviewed and now provides more options in the same base license bundle.

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Safe Software has updated its FME Cloud geospatial flagship. The new release includes a redesigned and rearchitected web interface, performance improvement, security enhancements and scalability.

A new Redbook from **IBM**, is a 500 plus page introduction to the IBM TS4500 tape library, a 'next-generation' tape solution that offers 'higher storage density and better integrated management than previous solutions'. The 10 sq. ft. unit holds up to 13 petabytes of uncompressed data.

Calgary-based **Intelligent Wellhead Systems**' 'iHub' edge computing module supports frac, wireline, and pressure control jobs with data acquisition, storage and bi-directional communications. IWS' inVision algorithms offer customized workflows, threshold alerts and analytical applications. Privately owned IWS is backed by Pason Systems. More from IWS.

The 2021.2 release of **Petrosys** PRO includes a complete rebuild of the 3D Viewer around a new graphics engine with multi-threading-based speed improvements. Petrosys has partnered with Amazon Web Services to integrate Interica OneView with the OSDU R3 Mercury platform. IOV can now discover and analyze data stored in OSDU along with in-house and cloud-based petrotechnical apps. More from Petrosys.

A new calibration rig at **Endress+Hauser**'s Houston campus services customers' flowmeters, including those from third-party vendors, with expanded line size and flowrate capabilities. The new rig extends testing capabilities to flowmeter sizes from ½" to 12". The ISO 17025-accredited facility has been providing flow, temperature and pressure calibration services since it opened in 2020. Watch the campus video.

GE Digital's Autonomous Tuning is to 'accelerates the energy transition with artificial intelligence and machine learning'. The new software is claimed to reduce gas turbine emissions and fuel consumption. An ML digital twin continuously determines the optimal flame temperature and fuel splits to minimize emissions and acoustics. The edge-deployed software senses changes in ambient temperature, gas fuel properties and performance, adjusting controls every two seconds.

Guardhat has added gas monitoring functionality from RKI Instruments to its connected worker platform. RKI's GX-3R Pro Bluetooth enabled gas detector senses LEL, O2, CO, and H2S. An optional fifth channel is available for other gasses.

nVent Electric has launched nVent Raychem Pipeline Supervisor, a 'temperature critical' pipeline monitoring solution. RPS delivers continuous performance trends and actionable insights for distributed temperature sensing traced in electrically heated pipelines. More from nVent.

V 4.1 of **Pegasus Vertex**' CEMLab cement lab data management system offers a 'crisp new look' along with a new data hierarchy, improved job tracking and enhanced equipment management.

Val Nav 2021 V2, the latest edition of **Quorum Software**'s decline curve analysis, petroleum economics, and reserves management software includes new data validation functionality, enhancements to the type well and new economic metrics such as netbacks, recycle ratios, capital efficiency and initial-production rates. More from Quorum.

Comos Mobile Worker from **Siemens** is a new application for mobile data management with integrated augmented reality functionalities. CMW combines engineering data to provide a holistic view of the plant that can be displayed on tablets, smartphones or data glasses. CMW is based on partner Augmensys UBIK software platform. More from Siemens.

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France's prestigious **Ecole Nationale Supérieur** has announced its 2022 machine learning data challenges. Of note are a semantic segmentation of industrial facility 3D point cloud data (challenge 79) and predicting SO2 concentrations from a sensor network (challenge 69).

The second generation of **Stratus**' ruggedized ztC edge computing platform supports up to 10 Xeon cores, ECC memory and up to 2 TB of NVMe storage. The 'zero-touch' ztC Edge 200i and 250i machines are destined for operational deployment in the oil and gas and other process industries.

TGS now offers a single access point to all of its interactive applications including the TGS data library, the R360 well log database and the new energy pathfinders.

3D printing specialist **Velo3D** has qualified a new superalloy for use in its Sapphire family of printers. The new powder, Haynes 282 from **Höganäs** targets high creep strength, thermal stability and weldability for applications in oil and gas, aviation and other domains. The material is said to be ideal for application in heat exchangers, combustors, turbine nozzles and more. Early adopter of the new powder is **Duncan Machine Products** of Duncan, Oklahoma.

Zeno Technologies of Austin, TX has announced a new 'Pioneer' customer program, offering a curated package of Pioneer benefits, including early access to new product features, enhanced customer support and C-level engagement. Zeno's Energy Operating System connects data, automates repetitive tasks, and delivers real-time insights for faster, smarter decision-making. Pioneers will be selected to represent a mix of regions, sizes and strategies, with the goal of 'empowering them to work in a more efficient, trusted and collaborative manner'.

2021 MATLAB ENERGY CONFERENCE

CO2Lab, Sintef's carbon sequestration reference application. Schlumberger IIC develops winch controller with Simulink/SimScape, tested on Microsoft Jenkins

Speaking at the 2021 Matlab Energy Conference Francesca Watson, (Sintef Digital) introduced the Matlab Carbon Sequestration Reference application, CO2Lab. CO2Lab is based on MRST, Sintef's open source/Matlab reservoir simulation toolbox. MRST embeds standard industry data formats and includes full simulators, state-of-the-art methods and C/C++ acceleration. The toolbox has seen some 25,000 downloads and has launched some 200 master/PhD theses.

CO2Lab extends MRST to support studies of the long-term behavior of stored CO2. The tool employs vertical equilibrium modelling of CO2 migration in dipping aquifers. CO2Lab is the fruit of decades of academic research and development in CO2 storage modelling. Users can interactively explore geological formations from the Norwegian continental shelf, visualize migration paths and compute capacities for structural, residual, and solubility trapping. Other functionality includes pressure build-up and plume migration, injector placement and detailed simulation of a particular injection site. The GUI allows for interactive variation of simulation parameters such as well locations, injection rates, and boundary conditions. More from Mathworks.

In a far more geeky presentation Fanping Bu presented **Schlumberger**'s nonlinear model-based adaptive hydraulic winch controller for wireline operations. Bu provides a detailed description of the development of a suite of embedded controllers for the winch controller leveraging model-based design and docker containers. The aim of the system is for autonomous wireline operation in the face of multiple inputs such as hydraulics, drum, cable, tool force and more. An 'adaptive robust controller' (ARC) was developed combining multiple container-based services developed with MathWorks Simulink/SimScape. Models were built and software-in-the-loop tested with Microsoft's Jenkins/Azure DevOps in the cloud. Other MathWorks tools (Stateflow, Control System Toolbox, Simulink Design Optimization) reduced manual

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coding and sped implementation of the resulting containerized simulator and controller. We asked Bu for clarification as to what services were running and where, 'The docker services are running locally on edge devices at the well site when they are deployed. When we are testing those docker services for development, they are running on the cloud through Azure DevOps or a Jenkins pipeline.' See also this IFAC World Congress presentation. Bu works at SLIIC, Schlumberger's Industrial Internet Center.

2021 ESRI EUROPEAN PETROLEUM USER GROUP

Esri and the OSDU Geospatial Consumption Zone. A platform approach to emissions. Shell's myMap in the cloud. New SiteScan (drones) and graph database from Esri. IOGP updates GIGS geospatial integrity toolset. Shell's Project Discovery, the maritime big picture. TotalEnergies GIS and oil spill planning. Kongsberg ML for sheen studies. ENI on loop current risk mapping. BP Project Zeus methane monitoring. BP CCS initiatives. OGA leverages Esri Experience Builder. UK Crown Estate, BP and GeoCap on wind farm planning.

Speaking at the 2021 Esri EU Petroleum User Group (PUG) Brian Boulmay (**Esri**) presented the OSDU Geospatial Consumption Zone. From the early days of what was originally the open subsurface data universe, now just 'OSDU', folks were asking for mapping functionality. This is now embedded as a core OSDU function with Esri contributing to what is termed the Geospatial Consumption Zone. The GCZ exposes a web mapping service using either Esri or the OGC's web services. The GCZ is, in OSDU terminology, a 'layered service' operating above the core services foundation. Currently the GCZ supports well and seismic data. This will be extended to allow for the extraction of shape files or GeoJson-formatted data to support arbitraty bounding-box selection of seismic data and other workfows. The final OSDU package will include a geospatial indexing utility that will build the geometries, a geospatial storage capability, most likely Apache Ignite, and an ability to produce open source map services, most likely based on Koop, a JavaScript toolkit for connecting spatial APIs. There is also the potential for OSDU to expand into other fields like new energy, ecological and emissions-related activity via the Open Footprint Forum, sharing the same geospatial underpinning. Boulmay summed up saying that 'Data integration and interoperability is hard. OSDU represents around 200 people working at this to provide an open source environment for upstream data access'. Usable products should be available real soon now. More on the GCZ in this short video and from OSDU.

Scott Noulis (**Esri**) presented Esri's platform approach to emissions monitoring. GIS brings multiple measurement technologies together. GHGSat provides weekly averages of methane in the Permian basin. Analysts can zoom int to an AOI, set alerts and focus inspection efforts. Satellites can be tasked to zoom-in on specific areas. On-the-ground IoT sensors, OGI gas cameras and thief hatch sensors can be rolled-up into the big picture. In-vehicle cameras and methane sniffers also ran. ArcGIS Workforce can be deployed to manage field personnel, issuing work orders and alarms. Tablet-based forms collect data in the field. Inspection data is collated back in the office, enhancing situational awareness through remote sensing, IoT and 'mobility'. This is a 'multi-scale problem that is very amenable to GIS'.

Mark Jones and Jorrit Jorritsma provided an update on **Shell**'s myMap, now deployed world-wide with a support staff of 200 geomaticians in 15 countries. In 2020 myMap was retooled to align with Shell IT's cloud strategy. The move to a secure SaaS platform was 'not just a simple lift and shift' operation and involved a change from file-based data to an API/web services paradigm, along with the move from the on-premise infrastructure. This made for a 'considerable migration effort'. Shell's myMap had some 10 years of community content to evaluate. And there were no off the shelf migration tools so Shell developed its own in Python, and now has several myMap apps and tools including 'deCarbon Works', 'Project Discovery' (see below) and other 'energy transition hubs'. The cloud-based system works with web services-style enterprise apps including FutureOn (digital twin), Autodesk Civil3D (engineering), I Hawk (drone software) and, of course, OSDU and ArcGIS Online. In the Q&A it emerged that some non-cloud subsurface

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applications were progressing more slowly to retool to the new paradigm and security model. Also, it emerged that there was a certain amount of 'forward-looking' material in the cloud advocacy, 'the depth of map services has been greatly exaggerated'. Some ArcGIS Online functionality is still the 'stuff of dreams'. Things will come good in a couple of years, 'we are on a journey'. Shell's is currently a blended cloud/on-prem approach.

Brian Boulmay elaborated on the merits of 'enterprise-pattern deployment'. GIS is now a comprehensive imaging and remote sensing application. A new SiteScan application extends the functionality of the Drone2Map desktop drone mapping app for multi drone planning and acquisition. A new product 'ArcGIS Velocity' offers cloud native IoT function in the GIS to track people and events in the field. Esri now also offers a graph database in the form of ArcGIS Knowledge. Matt Ballard (Esri) explained how a graph database stores the relationships between entities, as opposed to rows and columns. ArcGIS Knowledge allows graph algorithms and spatial analytics to be applied to the supply chain, showing a map of suppliers, raw materials and their interconnections.

Josh Townsend (**BP** and **IOGP**) presented on the recent update of GIGS, the IOGP's toolset that assures the 'Geospatial integrity of geoscience software'. Despite the best efforts of GIGS V1 (since 2011) poor quality spatial data still poses a 'significant and severe risk' with possible errors of tens of kilometers. The GIGS 2.0 toolkit including test data, checklists and guidelines. V2.0 was built by BP, Petrobras and EIVA A/S, and is managed by the IOGP's Geomatics unit*. The framework for testing and improving spatial integrity is available at the GIGS portal. Testers can find machine readable tests, a new help system and a package of synthetic geoscience test data with global coverage including wells and 3D seismic volumes. GIGS is currently working on a Python bridge. *More on GIGS in the Oil IT Journal contributed paper from Josh Townsend.*

** See also the great video explaining the new plate tectonics-compatible dynamic coordinate reference system.*

James Bowler and John Arundell presented **Shell**'s Project Discovery, a map-based business intelligence system for Shell's marine unit. Shell has up to 2,000 vessels at sea at any one time, across multiple lines of business. Discovery provides the big picture of this activity for, *inter alia*, insurance purposes. The system shows real time vessel locations and capabilities and seasonal weather data, allowing for rapid response to situations such as wars, and container ships grounded in the Suez Canal! Maritime data in the system includes vessel destination, pilot status, bunkering, cargo and more. Discovery is built on myMap, Shell's branded edition of ArcGIS Online (AGOL). The system was configured with standard Web App Builder functionality. This has proved to be a 'stable, repeatable way of exposing map services'. Discovery makes use of FME Server Workspaces for data ingestion into a pipeline that passes through SDE, ArcGIS Pro and AGOL. The system is accessed through a map interface configured for each use case. For insurance purposes, a widget can select and display downstream vessels in a geofenced high risk area for analysis.

Romain Collette and Lance Valeroso (**TotalEnergies**) presented on GIS use in oil spill contingency planning. Total's system addresses ESG impact and biodiversity data management. Oil spill contingency planning involves mapping for anti-pollution strategies, tracking spill location and projected path alongside locations of societal and environmental 'sensitivities' i.e. high consequence areas. During a crisis, daily ArcMap updates are pushed to a WebGIS Portal for action and mitigation measures. Total Energies 'Kompass' application combines ArcGIS crisis datasets and the open source GeoServer. Failure during a crisis is not an option so AGOL is used as a backup. A demo showed a Gulf of Mexico oil spill and various HCAs along the coast, along with the locations of available mitigation measures such as buoys and booms and local ground crews for clean-up. Crisis support is a collaborative exercise requiring many competencies. Reactivity is key and GIS is a crucial component of TE's crisis management process.

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Martine Espeseth (Kongsberg Satellite Services) presented an oil spill drift model that relates observed satellite color and sheen with spill thickness variations. A machine learning model using Spot satellite observation of a 2019 Java Sea oil spill has been calibrated with sheen style, from patchy 'rainbow' sheen to 'metallic' sheen indicating an actionable continuous oil spill. The system includes an oil drift model to forecast spill direction and a 'hindcast' to help identify the guilty party. KSAT is now working to verify its model with time series data from SAR and optical satellites and ascertaining the usefulness of including more data in initiating and updating the model.

Ridley Smith (**ENI Petroleum**) assisted by Matt Cadwallander (**40geo**) and Rafael Schille (**Fugro**) presented ENI's investigation into 'loop current' risk in the Gulf of Mexico. Loop currents are large-scale eddies that are shed by the Gulf Stream and whirl around the GoM. Strong loop currents are understood to have been a likely cause of the delayed commissioning of Chevron's Big Foot platform. ENI Now monitors loop currents to provide an online common operating picture including vessel and helicopter tracking. The system combines surface measurement from drifting buoys and platforms and monitoring from NOAA's Sea Surface Temperature satellite, all feeding into ArcMap. Fugro adds marine domain awareness from multiple data streams collected into 40G's Raptor GeoIoT running in the Amazon cloud. Smith acknowledged the following institutions, LumCon, the Louisiana Marine Consortium, the Grand Lagrangian Deployment and the Maritime Academy at Texas A&M.

Kevin Goldsmith presented Project Zeus, **BP**'s methane identification and quantification program. BP plans to install methane measurement on all major oil and gas processing sites by 2023, publish their data and then drive a 50% emissions reduction. BP is also pushing it to non-operated joint venture partners to set a 0.2% methane target. VIIRS (visible infrared imaging radiometer) data from the Suomi NPP Satellite and NOAA 20 are downloaded daily. Data is filtered on source temperature, area and quality and clustered with the Python DbScan algorithm. The EU Tropomi nadir-viewing imaging spectrometer and Sentinel Hub API is exceptionally sensitive although spatial resolution low. The Maxar WorldView 3 pinpoints non-flaring events. In 2020 BP also invested in Satelytics. The Zeus Application is a BP-developed JavaScript front end for all of the above. Zeus leverages the Uber H3 hexagonal indexing system to select, name and save an AOI, and then generate a time series. BP is now working on automated alerts and the integration of 'bottom up' production data.

Chris Richardson **BP** presented BP's UK carbon capture and storage initiatives (Net Zero Teesside, the Humber Hub and Northern Endurance Partnership) all now visible in One Map. This provides point and click to access bathymetry, site survey data and vessel tracking. The system leverages the EsriAzure Event Hub and Safe Software's FME. The swipe widget has proved useful to compare past and current site states. Lidar/drone data is also viewable in the 3D App along with CAD site data.

Bee Smith and Jenny Gray (**UK OGA**) presented their work with the Esri Experience Builder a 'no-code' front end development tool. This has enabled the development of ad-hoc apps for, e.g., displaying the UKCS stock of suspended wells, the Energy Pathfinder app and more.

While windfarms are a little out of scope for Oil IT Journal it has to be said that this, and other energy transition activities, fits GIS like a glove. In fact the renewables sector is arguably even more amenable to GIS than oil and gas with its activity concentrated on the earth's surface (where GIS shines) rather than in the subsurface (where GIS is not such a great fit).

The **UK Crown Estate** presented on the use of GIS to evaluate multiple criteria for wind farm site selection using 'analytical hierarchical processing' to combine weighted constraints of wind strength, exclusion zones and more. Renewable energy consultants Everoze got a shout-out. More on the methodology and the results.

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Simon Kettle (**BP Global Offshore**) presented similar work on global wind opportunities. 'Not all wind energy resources are born equal'. BP's One Map has allowed for combined risk segment mapping across wind speed, water depth, distance to grid and more. The North Sea looks promising.

Erlend (**Geocap**) presented a joint venture with Atkins and others into seabed investigations for offshore wind. The 'Ground Model JIP' integrate a wide range of data and formats into ArcGIS environment along with visualization with ArcGIS Pro 3D/2D viewers. More here. See also here for Geocap's seismic viewer. **Latest**: *from Kvinnesland (February 2022) 'We are currently finalizing the JIP and plan to release the product within the next month or so. Once it's available on the market the JIP will be over. However, we will of course continue to develop the product with new functionality going forward'.*

The 2021 Esri EU PUG videos can be viewed on the Esri Events YouTube channel.

FOLKS, FACTS, ORGS

Altair, Codesys Group, Datagration, Esri, EPAM, Forum Energy Technologies, Fugro, GE Digital, Houlihan Lokey, Imubit, Intelligent Wellhead Systems, KP Engineering, Lapis Energy, Maurel & Prom, mCloud, Research Council of Norway, Opportune, Ovation Data, Petrosys, Railroad Commission of Texas, Ryder Scott, Society of Exploration Geophysicists, TotalEnergies, DataCo.

Sandy Carter has joined the **Altair** board of directors. Carter was previously with Amazon Web Services and is also SVP and 'channel chief' of Unstoppable Domains, a software company 'building domains on blockchains'.

Patrik Hug is now head of sales at **Codesys Group**. He was previously with Schneider Electric.

Texas A&M petroleum engineering chair, Jeff Spath, has joined **Datagration** as Executive Advisor. Spath previously served as president of Schlumberger's reservoir management group and later as CEO of the Texas Oil & Gas Institute.

Brian Boulmay has moved from Director, DataWorx Integration at BP to director, Petroleum Community & Solutions at **Esri**.

James Brady has been appointed CTO Energy at consultants **EPAM**. He hails from Schlumberger.

Neal Lux is now president and CEO at **Forum Energy Technologies**. Current chairman and CEO Christopher Gaut moves over to executive chairman.

Céline Gerson is now group director Americas with **Fugro** succeeding retiree Edward Saade. Gerson hails from Schlumberger.

Scott Reese is now CEO of **GE Digital**. He joins from Autodesk.

Rouzbeh Fazlinejad has joined **Houlihan Lokey** as MD of the new Middle East industry group in Dubai.

AI process specialist **Imubit** has appointed Robin McCaffrey as head of people, Ran Rosin as head of product, and Shlomi Zohar as head of infrastructure. Zohar was previously with Sisense.

CEO William Standifird is base manager at **Intelligent Wellhead Systems**' new 15,000-sq-ft Houston facility that will support onshore USA unconventional operations.

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Bill Preston is the new president and CEO at **KP Engineering**. He has been president and COO since 2015.

Hamish Wilson heads-up the team at environmental start-up **Lapis Energy**. The team includes Glen Cayley, former VP of Shell UK and Brian Mitchener, former exploration head of BG.

French E&P **Maurel & Prom** has named Jean-Philippe Hagry as COO and technical director following Philippe Corlay's retirement.

Vincent Higgins, formerly with Honeywell has joined **mCloud** as president, oil and gas digitization at its new Houston hub. MENA president Ibrahim Al-Hindawi heads-up the mCloud-Aramco hub in Saudi Arabia. Dave Weinerth has been promoted to EVP AssetCare Solutions.

The **Research Council of Norway** has announced that two new national petroleum centers will receive state funding. The National center for sustainable use of energy resources on the Norwegian continental shelf (University of Stavanger) and the Center for sustainable subsurface resources (NORCE, Bergen) will each receive some NOK 80 million over eight years.

Opportune LLP named Ken Bourgeois, Byrony Coan and Glenn Hartfiel to new 'principal' leadership roles. Bourgeois is an IT solutions specialist, Coan has over 20 years experience in software implementation and process streamlining. Hartfiel works in IT strategy, architecture, project management, and assessment.

Ovation Data has appointed Mark Bashforth as CEO. Bashforth hails from Ikon Science. Sam Loree has been appointed chief revenue officer.

Founder Volker Hirsinger is retiring after nearly 40 years with **Petrosys**.

The **Railroad Commission of Texas** has hired its first chief data officer, Alkesh Amodwala. Amodwala, who hails from General Motors, leads a new, 10 member team in the RRC's IT services division focusing on data projects.

Manish Singh has joined **Ryder Scott** as a senior environmental engineer. Singh was previously a corporate consultant at Hess Corp.

Ted Bakamjian has retired from his position as Associate Executive Director, Publications and Communities at the **Society of Exploration Geophysicists**. He will continue in an as-needed consulting role. Jeno Mavzer has been promoted to Director, Journals.

Namita Shah heads-up **TotalEnergies** 'OneTech' organization that federates the company's technical and scientific expertise. OneTech comprises 3,300 engineers, technicians and researchers, working on the new challenges faced by TotalEnergies.

Deaths

Henri Tykoezinski, formerly with DataCo and co-founder of Geognostics died after a short illness. Read Jon Teasdale's account of his fascinating life on LinkedIn.

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DONE DEALS

Validere acquires Phoenix Energy. NextMart, Emco. Viking, Gate Energy. Wilks Bros., Dawson Geophysical. Cresta backs Lapis. Eliis on BFM TV. Kappa bags Reveal. FourQuest acquires Boyle ES&T. SpotOn Energy and AGR. GEM backs Interfield float. Kimray acquires CEI. Seequent bags Advanced Resources and Risk. EnCap Flatrock funds Elysian Carbon. Opus DigiTech JV incorporates. Ametek acquires Alphasense. HKW bags Technical Toolboxes. CGG sells data storage unit.

Validere has completed its acquisition of Phoenix Energy Consultants, a provider of oil and gas transportation and marketing optimization services in Western Canada.

NextMart has acquired a controlling interest in Emco Oilfield Services. NextMart describes itself as a 'public quoted shell company'. In a sign of the times, its home page currently welcomes visitors to the NextMart Crypto Universe.

'Critical well engineering' specialist Viking Engineering has acquired Gate Energy's engineering division, adding systems engineering, operations readiness, risk assessments and more to its portfolio.

Dawson Geophysical is in the process of being acquired by Wilks Brothers unit WB Acquisitions.

Cresta Fund Management is backing the carbon capture and storage and clean hydrogen startup Lapis Energy. Dallas-based Lapis is a combination of CCS consultants BluEnergy and Viridis Resources.

Interviewed on France's BFM TV, **Eliis** founder and CEO Sebastien Lacaze described the company's 15 years of activity developing and marketing interpretation software. Initially targeting oil and gas seismic stratigraphic applications Eliis is now expanding into CO2 storage and natural hydrogen exploration. Today Eliis has 55 employees working out of four worldwide locations for around €7.4 million/year in sales.

Kappa Engineering has acquired Reveal Energy Services. The deal sees the integration of Reveal's Orchid package into the Kappa software portfolio. Kappa MD Olivier Houzé observed that the deal adds completion information and diagnostics to Kappa's production data offering and 'will be particularly useful in the context of unconventional plays'.

FourQuest Energy Services has acquired privately-held **Boyle Energy Services & Technology**, a provider of engineering expertise, equipment and field services to large-scale energy construction projects. BEST operates as a separate company headed-up by CEO Michael Boyle.

SpotOn Energy has acquired **Akastor**'s AGR Well Management in exchange for a 20% stake in SpotOn. More from AGR and SpotOn.

Dubai, UAE-based Interfield Solutions has received a 'share subscription facility' of up to CAD 30 million from GEM Global Yield, a Luxembourg-based private equity company. The facility will allow Interfield to draw down funds by issuing shares to GEM. Interfield's 'ToolSsuite' hosted data management solution is used in a variety of industrial contexts including oil and gas.

Oil and gas control equipment manufacturer Kimray has purchased Texas-based Control Equipment Inc. CEI is Kimray's largest distributor.

Bentley Systems' Seequent unit has acquired geostatistics specialist Advanced Resources and Risk Technology.

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Elysian Carbon Management has secured an initial $350 million in financing from EnCap Flatrock Midstream. Elysian provides carbon capture and storage solutions to owners of industrial and power facilities. San Antonio-headquartered EnCap Flatrock is currently making commitments to management teams from its $3.25 billion EFM Fund IV.

AFKAR Group and **Bahwan CyberTek** recently announce the incorporation of Opus DigiTech, a joint venture that is set to 'accelerate digital disruption' across the energy sector. Opus provides solutions and services addressing the digital supply chain, predictive analytics and 'digital experience'. More from Opus DigiTech.

Ametek has acquired **Alphasense**, a UK based provider of advanced gas detection sensors used in fixed and portable detection systems. Alphasense, with annual sales of approximately £25 million, is to join Ametek's Electronic Instruments Group (EIG).

Pipeline engineering software boutique Technical Toolboxes has been acquired by HKW, a 'middle-market' private equity firm.

CGG has sold the physical storage assets and associated services of its Smart Data Solutions business to Oasis and Access Information Management. The sale includes seven storage facilities holding collections of client records and subsurface rock and fluid samples. Access acquired the three North American sites and OASIS the four EU sites.

TOWARDS GEOSCIENCES 4.0

IFP Energies Nouvelles launches Tellus Share Community

Originally announced in 2020, in full covid-19 crisis, IFPen*'s Tellus Share Community has been relaunched. Tellus Share Community (TSC) a.k.a. 'towards geosciences 4.0' sets out to 'accompany the digital transformation of industries associated with the underground environment'. Current partners include Andra (France's nuclear waste management company), Petrobras, Perenco and TotalEnergies.

Tellus is led by IFPen Ressources Energétiques, a member of the Carnot Network, a collection of French public-private R&D partnerships. TSC conducts research into emerging digital solutions (data science, artificial intelligence, virtual reality, etc.) that will facilitate the work of geoscientists in industriessuch as underground storage, geothermal energy, mines, oil and civil engineering.

Membership costs €25,000/year and allows participants to consult with each other on their operational needs, sharing challenges and usage scenarios and monitor the development of IFPen prototypes and new digital geoscience tools. One early Tellus project is a 'digital companion for subsurface professionals' that reduces the burden of time-consuming and repetitive activities, such as data mining.' Another solution, developed in partnership with TotalEnergies helps geologists explore the large volumes of heterogeneous data accumulated across sedimentary basins. Along with the Community offering, members can opt for one-to-one technology watch partnerships covering a particular area of interest.

We were curious about the origin of the 'Tellus' name. Had this been recycled from earlier CGG/Fugro data products? Not at all. Tellus poetically refers to the Roman equivalent of the Greek Gaia, goddess of the earth and more prosaically to the English 'tell us' as suggesting an intelligent digital companion.

**IFP Energies Nouvelles, the French Petroleum/New Energies Institute.*

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GOING, GOING, … GREEN

Carbon footprint: McDermott launches ArborXD, Civitas to plug Colorado wells, Orcadian, OGA, Ørsted, Neptune electrify UK offshore, OGA benchmark, BPEP backs Onboard Dynamics, ESG in the oilfield. Methane emissions: LongPath expands Basin-SCAN, Kuva Systems methane detection, PTAC's methane mitigation, EPA disburses SBIR cash, ExxonMobil deploys Scepter satellite, STDC backs Validere/Clearstone, Sustainable LNG shipping, IEA reports on methane. Neptune, EDF trial drone-based monitoring. CCS: NPD's 25 years of CCS. DNV/Equinor CFD for CCS, SADAR CCS seismics trials, Eosys and Geological Net Zero

First a note on our 'Going green' reporting. This rubric has now grown to become unmanageable. In preparing this issue we have accumulated over 60 news items of potential relevance. From now on we will try to focus on new, tangible activity and solutions in the ESG, CO2 and other emissions reduction space. We will no longer be covering forward-looking statements and claims for 'net zero' goals, however laudable these may be.

CARBON FOOTPRINT

McDermott International's ArborXD is a web-based tool for data collection, estimation and reporting on the potential carbon impact of energy prior to construction and reduce the operating footprint of a facility. More from McDermott.

Civitas Resources, a 'carbon-neutral oil and natural gas producer' has volunteered to plug wells orphaned by their previous operators throughout the Front Range of Northern Colorado. The work will be monitored by Project Canary, a Denver-based climate technology company which will provide before and after monitoring and TrustWell certification of all 42 wells. Once P&A is completed, devices will remain on-site to monitor any residual fugitive emissions.

A group led by Orcadian Energy has been awarded £466,667 by the UK Oil & Gas Authority to fund development of its concept for the electrification of offshore installations in the central North Sea, part of a £1 million decarbonization competition that was run jointly by OGA and BEIS as part of the March 2021 North Sea Transition Deal (NSTD). More from OGA.

The UK **Oil & Gas Authority**'s inaugural emissions monitoring report finds that a 'laser focus' will be required to achieve key targets. The new annual report is part of the OGA's efforts to monitor, benchmark and hold industry to account, in support of the UK's target of reaching net zero by 2050. The report is to help to chart progress in delivering commitments made in NSTD. Initial findings are that the UK upstream oil and gas industry 'must go much further and faster in its drive to cut emissions'. 'Falling short isn't an option if the sector wants to retain its social license to operate.' More from OGA.

OGA is also advocating the electrification of offshore oil and gas installations as a component of the NSTD. Power generation accounts for around two thirds of oil and gas production emissions. Using electricity from the shore or a nearby windfarm could lead to a 2-3Mtpa CO2 emissions reduction. The project is a collaboration between Ørsted and Neptune Energy which are working to electrify offshore productions and support an integrated energy system that includes offshore low-carbon hydrogen production. The UN Goal7 organization is backing the project.

Onboard Dynamics has signed an 'investment agreement' with **BP Energy Partners**, a Dallas-based private equity firm. The equity investment is to allow Onboard Dynamics to scale its products and service offerings. Onboard Dynamics' products allow customers to conduct best practices during natural gas pipeline operations, recovery of stranded natural gas from various sources, and natural gas vehicle fleet

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refueling. OD's flagship is the GoVAC Flex pipeline evacuation system that mitigates methane emissions during pipeline maintenance, repair and replacement. More from Onboard Dynamics and BPEP.

The US Alliance for Innovation and Infrastructure has released a report, ESG in the Oilfield, showing how the environmental, social, and governance (ESG) approach in the oil and gas industry can give companies a framework for improving data collection and material investment. The report addresses the 'often-overlooked impact' of produced water spills. Produced water incident rates and spill volumes 'regularly surpass the volumes of marketable oil and gas'. AfII found that 'equipment or material factors are the cause of nearly 80% of spills'. The study sets out to provide 'transparent and accessible data to help identify and address such risks'.

METHANE EMISSIONS

LongPath Technologies is expanding its Basin-SCAN methane monitoring service across the Permian Basin. As of January 2022, ten centralized laser nodes were operating within the Permian, each monitoring dozens of well sites, tank batteries, and compressor stations by interacting with non-intrusive retroreflective mirrors installed within production infrastructure. LongPath received a $5 million Department of Energy award in 2021 under the ARPA-E 'Seeding critical advances for leading energy technologies with untapped potential' (SCALEUP) program. More from LongPath.

Kuva Systems reports key performance milestones achieved in blind tests of its continuous optical gas imaging camera. Kuva cameras demonstrated reliable methane detection of emissions from oilfield equipment at all heights with no false detections in blind testing at Colorado State University's Methane Emissions Technology Evaluation Center. METEC was developed in 2016, again with funding from ARPA-E. The tests were conducted under METEC's Advancing Development of Emissions Detection continuous monitoring protocol, also funded by the DoE.

A new, 36 page report, 'PTAC Methane Detection and Mitigation Initiatives' from **Petroleum Technology Alliance Canada** covers a decade of Canadian methane emissions reduction efforts and technology tests. PTAC consortia pay up to 75% of the cost of equipment and installation of cost-effective methane mitigation technologies with over 100 deployments to date. The report includes an appendix of 'technology descriptions' covering some 20 commercial offerings in the environmental technology space.

Beneficiaries of the US EPA's $3 million Small Business Innovation Research (SBIR) Program that funds small businesses developing novel technologies to address environmental and public health problems include Physical Sciences (laser technology for continuous quantitative methane emission monitoring of oil and gas storage tanks), Spectral Sensor Solutions (spatial monitoring of methane emissions over large areas) and InferLink (software system for automated, systematic reviews of the scientific literature on chemical risks). More on SBIR from the EPA.

ExxonMobil is to deploy **Scepter Inc**'s advanced satellite technology and proprietary data processing platforms to detect methane emissions at a global scale. Initial focus is ExxonMobil operations in the Permian Basin. Scepter is to launch its first satellites in 2023, with a constellation of 24 satellites planned for 2026. ExxonMobil and Scepter are working on a proprietary data fusion system to reconcile information collected from multiple detection methods, including ground-based stationary and mobile monitoring devices. More from Scepter.

Validere and partners Xpansiv and Clearstone Engineering have received $1.2 million from Sustainable Development Technology Canada to accelerate the development of technology that supports the low emissions gas market in Canada and globally. Validere captures emissions data that is processed by

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Clearstone. Xpansiv maintains a registry of emissions datasets to 'remove the risk of double counting and ensure transparency for buyers'

Chevron, **Qatar Gas** and **Pavilion Energy** have just released a 112 page study, 'The SGE Methodology' to calculate the GHG impact of delivered LNG Cargoes. The methodology promises a 'a consistent approach to GHG emissions calculations throughout the LNG value chain, allowing for independent verification and reporting transparency'. The approach is said to align with the GHG Protocol Product Life Cycle Accounting and Reporting Standard and ISO14064:2018. Environmental Resources Management helped author the report.

A new report from the **International Energy Agency** finds that methane is responsible for around 30% of the global rise in temperatures to date. Rapid steps to tackle methane emissions from oil, gas and coal operations would have immediate impacts because of the potent effect of methane on global warming and the large scope for cost-effective actions, according to the report, 'Curtailing methane emissions from fossil fuel operations': Pathways to a 75% cut by 2030.

Neptune Energy and the **Environmental Defense Fund** have complete a trial of drone-based measurement of methane emissions on a working UK offshore platform. Fixed wing and rotary drones equipped with methane-sensing equipment were deployed on the Neptune-operated Cygnus gas production platform. UK-based drone platform provider, Texo DSI, operated a rotary drone provided by Scientific Aviation. In parallel, an unmanned fixed-wing drone operated by Flylogix carrying methane measurement technology provided by SeekOps was flown from Weybourne Airfield in Norfolk to the Cygnus platform. The results are to be published in a 'scientific peer-reviewed paper' in 2022. More from Neptune Energy, Flylogix and SeekOps.

CCS

Speaking at an EU-Norway Energy Conference in Brussels recently, Ingrid Sølvberg DG of the **Norwegian Petroleum Directorate** reported on Norway's 25 years' experience with 'safe and secure CO2 storage'. 50 years of oil and gas activity on the Norwegian shelf has yielded 'exceptional insight' into the subsurface that informs CCS activity. CO2 has been injected on the Norwegian shelf for 25 years, and this is subject to strict monitoring. On Snøhvit in the Barents Sea, this means continuous in-well monitoring. On Sleipner in the North Sea, 4D seismic mapping shows that there is capacity to store as much as 80 billion tonnes of CO2 on the shelf, the equivalent of 1,000 years of Norwegian emissions! More from NPD.

DNV and **Equinor** have partnered on the development of KFX CO2 computational fluid dynamics simulation software to increase safety in carbon capture and storage. KFX promises 'reliable consequence models for safety assessments, design of barriers and documentation of safe CCS design'. The tool can simulate what actually happens if accidents occur and is used for mitigation in the event of a release. Equinor has partnered with DNV for the next three years for the further development of KFX CO2. The KFX CFD toolset was originally co-developed by Equinor and Norway's ComputIT. DNV acquired the company in 2017.

Geospace Technologies and subsidiaries **Quantum Technology Sciences** and **Geospace Technologies Canada** have kicked-off a joint industry partnership with **Carbon Management Canada** to develop carbon storage monitoring technologies. The solution will build on Sadar, a seismic acoustic detection and ranging technology originally developed by Quantum for security and surveillance applications. The solution will be tested at CMC's 200-hectare field research station. More from Geospace and CMC.

Concomitant with last year's COP 26, Patrick Portolano (**Eosys**) has proposed a 'Geological Net Zero' solution for global warming and greenhouse gas mitigation. This involves a 'simple and globally effective

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international agreement on fossil carbon' whereby for each quantity of fossil carbon extracted, the same quantity of carbon must be geologically sequestered in the same year. GNZ needs to be activated 'as soon as possible' and supervised by a 'supranational entity'. *That shouldn't be too hard!*

SALES, PARTNERSHIPS, DEPLOYMENTS

Upstream: CGG to Equinor, Interface Fluidics to Equinor/ExxonMobil, Ikon to Wintershall, OmniSci to IHS Markit, Schlumberger Delfi for Northern Lights. Construction: FutureOn and Wood, Proserv and Trendsetter. Operations: American Robotics for Chevron, Engage Mobilize, Eagle Field Tech, TAQ Energy, Equinor and Cognite, Eserv for Neptune Energy, Kinder Morgan and Palantir, Redline, TEC and ONGC, Aramco and Seeq, Siemens and AWS, AssetWorksfor Torq. Retail: ACI Worldwide and Dover Fueling.

UPSTREAM

Equinor has extended its contract with **CGG** for the operation of a dedicated permanent reservoir monitoring imaging center in Stavanger. The facility helps Equinor analyze 4D seismic imagery from the Johan Sverdrup, Snorre and Grane fields in the Norwegian North Sea.

Interface Fluidics has kicked-off a joint industry project with partners **Equinor** and **ExxonMobil** to demonstrate the viability of its rapid fluid screening equipment for oil and gas. The portable laboratory is set to 'revolutionize' pressure-volume-temperature analysis in the field. Interface's miniature slim tube system was developed in partnership with Equinor and is now claimed to provide faster and cheaper minimum miscibility pressure measurements than conventional approaches. More from Interface.

Wintershall Dea has selected **Ikon Science**'s Curate knowledge management application to optimize its core data. The global, multi-year deal includes Ikon's expert data services to migrate, optimize and quality assure data. Curate will subsequently be used to manage and visualize core data, providing geological insights and decision support in the field.

OmniSci's Immerse data visualization technology is now used in **IHS Markit**'s Energy Studio to provide geospatially-enabled analysis of production, reserves, economics and more. Immerse is a browser-based accelerated analytics environment that visualizes results from OmniSciDB, 'the world's fastest open source SQL engine'. More from OmniSci.

The **Northern Lights** CCS project, a joint venture between Equinor, Shell, and TotalEnergies is to leverage Schlumberger's Delfi 'cognitive' E&P platform in its subsurface workflows and longer-term modeling and surveillance. More from Schlumberger.

CONSTRUCTION

FutureOn is to partner with engineer **Wood** on an 'integrated technical and digital service to operators'. Wood is to offer clients use of FutureOn's FieldTwin Design software and API which Wood has been trialing since 2019. More from FutureOn.

Proserv Controls and Trendsetter Engineering have signed a memorandum of understanding relating to the joint marketing and supply of integrated subsea hardware and controls.

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OPERATIONS

Chevron has ordered an unspecified number of drones from Ondas Holdings' **American Robotics** unit. Chevron is the second American Robotics oil and gas Fortune 100 customer. The 'fully-automated' drone systems can conduct up to 20 missions per day without a ground based observer, allowing for automated inspections, site monitoring and enhanced safety. More from Ondas and AR.

Engage Mobilize has partnered with **Eagle Field Tech** to offer liquid haulers accurate, automatic volume measurements at the source and a comprehensive ticketing and payment solution. The deal adds Eagle's patented IoT data collection solution to the Engage transaction platform. More from Eagle Field.

Engage has also partnered with P&A specialist TAQ Energy, to develop a cloud based operational and financial platform for TAQ's well servicing business, adding an automated financial workflow to TAQ's field data acquisition. More from Engage Mobilize.

Equinor is to deploy **Cognite Data Fusion**, as a module in its Omnia Azure cloud based data architecture. A joint Equinor and Cognite team is to develop solutions to accelerate Equinor's data-driven insights in marketing and supply and other business areas. The partnership will focus on building a future-proof data architecture, new ways of working, and accelerating data extraction and contextualization. More from Cognite.

UK-based 3D technology specialist, Eserv, is creating a digital twin of **Neptune Energy**'s Dutch North Sea L10-A drilling and production platforms in preparation of a large-scale offshore CCS project.

Kinder Morgan has signed a multi-year agreement with Palantir Technologies for the deployment of the Foundry data integration software platform across its US gas storage operations.

Redline Communications has been contracted by **Telephone Electronic** to provide its Virtual Fiber solution to **Oil and Natural Gas Corporation** (ONGC). Redline's RDL-3000 wireless backhaul will be deployed at ONGC's Neelam Heera asset delivering long-range connectivity to 29 remote fields, onshore and offshore.

Saudi Aramco has extended its agreement with Seeq Corp for the provision of its analytics, predictive modeling data analytics, and visualization tools as part of Aramco's ongoing digital transformation program. The deal was facilitated by local partner Crucial Solutions & Services.

A collaboration between **Siemens** and **Amazon Web Services** sees the former's Xcelerator deliverable as software as a service. Xcelerator acts as a catalyst for 'fast and predictable digital transformation' Siemens and AWS will accelerate adoption and democratize new digital twin solutions using AWS IoT TwinMaker, an AWS service for creating digital twins that incorporate multiple data sources.

Calgary-headquartered **Torq Energy Logistics** has deployed **AssetWorks**' Field Service Solution for its field ticketing and electronic logging requirements. Torq operates an extensive multi-product terminal network with associated rail transload services, marketing, storage and trucking and a 'first and last mile' one-stop transportation solution, both from and to the well, for multiple energy related products.

RETAIL

ACI Worldwide and **Dover Fueling Solutions** have teamed on a point-to-point encryption offering to secure customer credit and debit card data at the pump. The solution leverages Wayne RSA encryption

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solution for the forecourt. Cardholder data is encrypted at point of sale, protecting it from skimmers, network sniffers, malware and other threats. More from Dover FS.

STANDARDS STUFF

OPC takes over MDIS sub-sea comms standard. OPC and CESMII announce UA Cloud Library. Digital Twin Consortium proposes interoperability framework. Energistics now The Open Group affiliate. OGC approves OGC web API, publishes guide for earth observation apps. PPDM strategy review. PPDM/Dancy Energy launched DANR Hub. XBRL for greenhouse gas reporting. More GAFA appointees at W3C.

OPCF, the **Open Process Control Foundation** has taken over the ownership of the MDIS sub-sea data process control communications standard. MDIS is designed to connect a subsea master control systems with the topside DCS. Back in 2017, MDIS selected OPC UA as its protocol standard. The network is managed by OTM Consulting, now a Sagentia Innovation unit. The MDIS spec is freely available for market adoption and the MDIS working group is open to all interested OPC Foundation members. More from MDIS.

The **OPC Foundation** and CESMII, the Clean Energy and Smart Manufacturing Innovation Institute have announced the UA Cloud Library providing access to OPC UA information models DEXPI and MDIS. IoT vendors said to have adopted the OPC UA cloud technology include Amazon Web Services, Google Cloud, IBM, Microsoft, SAP and Siemens.

The **Digital Twin Consortium**, a unit of the Object Management Group, recently published a white paper describing a 'simple, scalable interoperability framework' for the digital twin. The 28 page publication lays down 'seven key concepts to create complex systems that interoperate at scale' and includes many short and wooly definitions of the nebulous concepts that constitute the digital twin meme.

Energistics is now an affiliate of **The Open Group**. Energistics continues as a separate entity, with TOG assuming the control of operations. The special interest groups continue with notably the recent release of the Energistics Transfer Protocol V1.2 and a consolidated release candidate. *Oil IT Journal tested the new organization's reactivity with a cheeky ping to standards@energistics.org. So far nothing.*

OGC Membership has approved the OGC API Processes Part 1: Core specification as official OGC Standard. OGC API Processes is a means to 'build simple-to-understand Web APIs through which complex computational tasks can be executed'. The API is a successor to the OGC web processing service and supports geoprocessing by 'wrapping complex data processing tasks into a list of processes available for execution by a client'. Areas of application include raster algebra, geometry buffering, constructive area geometry, routing, imagery analysis, ETL and more. Visit the API minisite.

OGC has also just published a best practice guide for earth observation application packages, covering the implementation, packaging, and deployment of cross-cloud EO applications. Download this and other guides from the OGC best practices home page.

The PPDM Association's board of directors has conducted a comprehensive strategy review with the intent of developing a new five-year plan, deemed critical to maintain the relevance and long-term sustainability of the association. The new work program is to expand coverage into the field of renewables, emissions monitoring and alternative energies, while continuing to support and enhance its petroleum-related resources.

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The **PPDM Association**, supported by **Dancy Energy**, has launched a new Data as a National Resource (DANR) Hub. The hub is designed to support national data repositories, regulators and national oil companies looking to leverage, maintain and improve their data. The new global community includes a virtual hub, resources and information, virtual and potentially in-person events, professional development, a showcase, and more. More from the DANR Hub.

The **XBRL** Standards Board has approved updates to the data type and unit type registries to support greenhouse gas emissions reporting. .More on the XBRL specification sites for data types and units.

Recent additions to the **World Wide Web Consortium**'s technical architecture group illustrate the regulatory capture that big tech has exercised over web standards. The new appointees hail from Microsoft, Alibaba and Google. There is little chance of these folks working on any technologies that might limit their stranglehold on the web! A 2019 investigation by the House Judiciary Committee found that 'Google has an outsized role in the formal stakeholder standards-making processes' citing one market participant as saying 'Though standards bodies like the W3C give the impression of being a place where vendors collaborate to improve the web platform; in reality Google's monopoly position and aggressive rate of shipping non-standard features frequently reduce standards bodies to codifying web features and decisions Google has already made'.

OSDU UPDATE

Emerson connects Geolog to OSDU for TotalEnergies, contributes RESQML/Open ETP code and plugs EPOS in to OpenVDS. Ikon Science and AWS team on Curate-based OSDU front end, targeting SMEs. Multi-level certification from OSDU Forum. Accenture weighs the cost/benefits of deployment.

Emerson's Paradigm E&P Software unit has been working with the OSDU* data platform to support multi-disciplinary integrated reservoir workflows, from interpretation and geomodeling to flow simulation. Emerson joined OSDU in 2018 and is a 'major contributor' of code and subject matter expertise to the reservoir data management forum. Emerson's existing and future software portfolios will be connected to OSDU, both desktop and cloud-native. Already Geolog, Emerson's flagship well log data management solution is registered in the OSDU catalog and can consume and ingest well data from OSDU. Geolog 21 now supports read-write connectivity to OSDU R3 with searchable access to data for display, editing and processing. Output such as a petrophysical analysis can be written back into OSDU making the results available to other applications. More on Emerson's work on the OSDU Geolog connector for flagship client TotalEnergies here. For the geophysicist, Emerson's seismic interpretation suite can read and write OSDU post-stack seismic volumes in the OpenVDS format. Seismic volumes can be directly streamed from the OSDU platform, avoiding duplication. New volumes created in Epos native format are fed back into OSDU in OpenVDS.

Emerson is also working on OSDU metadata definition, contributing code to the reservoir domain data management service. Reservoir DDMS supports input of reservoir data generated in the Energistics RESQML earth modeling standard with data stored in a relational database. The code contribution includes an Open ETP Server in C++ to communicate with the relational backend. Emerson's code contribution can be accessed on Gitlab. Watch the video here.

An Amazon/Ikon Science blog explains how Ikon's upstream knowledge management solution Curate now integrates the OSDU platform. For mid to small size operators, implementing the complex OSDU data platform is likely a 'daunting task'. In partnership with AWS, Ikon has connected Curate to OSDU in a 'ready-to-deploy solution' that 'delivers data and insights to end users in an easily consumed manner'. Curate on OSDU promises 'scalable access to data, performant workflow iterations and confidence that

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industry standards and security protocols are adhered to'. Curate, along with iPoint and RokDoc are now all available as hosted software in the Amazon cloud. The desktop editions of RokDoc and iPoint integrate with Curate through Amazon AppStream 2.0 and are 'compliant with OSDU'.

Last year Oil IT Journal reported that there were no 'OSDU-certified' apps, and that 'solutions that claim to be OSDU-compliant or OSDU-certified have not been verified or endorsed by The Open Group'. It appears that the situation has evolved with the announcement of the OSDU Forum's certification program that is to ensure 'consistent, conformant implementation of the OSDU platform'. Certification will be at three levels, platform provider (for cloud providers), external data provider (data service companies) and application provider. The latter will ensure that all OSDU-certified application software can be used across platform provider implementations. OSDU has also published guidelines to help software vendors interact with native OSDU platform services. More from OSDU.

A new position paper from Accenture extolls the merits of the OSDU platform as helping oil and gas companies 'overcome their legacy data challenges' and 'dramatically improve application interoperability, accelerate workflows and drive operational efficiencies'. Accenture warns however that 'the decision to adopt the OSDU platform cannot be made lightly'. Accenture shares five prerequisite actions prior to OSDU deployment that will 'ensure a smooth transition'. Overall Accenture claims that operators can achieve a '5 to 15% increase' in return on capital employed.

** OSDU, previously the open subsurface data universe, is an Open Group-backed initiative to provide universal access to upstream data. More from the OSDU Forum.*

LBCG ONSHORE WELLSITE FACILITIES CONFERENCE

Guidon Oil and Gas cuts flexible deals with multiple gas gatherers. LIDAR surveys turn flaring and fugitive emissions into revenue.

Speaking at the 2021 LBC Onshore Wellsite Facilities conference, Jake Balderama explained how **Guidon Oil and Gas** managed to reduce flaring at its onshore US production assets. The first and biggest step was finding outlets for intermittent gas production. This involved cutting deals with multiple gas gatherers, sometimes with no minimum daily or monthly flow requirement.

Next a LIDAR camera was deployed at Guidon's larger facilities to detect and track flaring and send alerts. These allowed operators to 'stay in front of any occurrences'. When flaring was detected, Guidon could immediately contact the gas gatherer to see what the issues were. Alternatively, gas could be redirected to a different gatherer until the issues were resolved. Guidon now performs LIDAR fly-overs quarterly on all wells and batteries and is trying to encourage other operators in the area to follow suit and help absorb survey costs.

One serendipitous result occurred when a long-term shut well was spotted with a roughly 20 mcf/d leak rate at the wellhead. 'A great catch!' The well was rigged up and brought back into production. Overall, of a total 747 mcf/d gas detected, Guidon manages to capture and sell 619 mcf/d. All this was achieved with minimal long-term operational expenditure. Most legacy vertical wells were outfitted at minimal cost. Smart accounting optimizes equipment rental and maintenance costs. Guidon now designs its facilities to allow kit to be added, resized or removed, shifting oversized equipment from older sites to its newest facilities. The system now in place allows Guidon to control its carbon footprint and avoid fines. 'Well worth the money we put into our strategy'.

*More from the **London Business Conferences** Onshore Wellsite Facilities home page.*

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ALTAIR 2021 'DON'T BE LATE TO SIMULATE' CONFERENCE

Chiastek presents Cosimate, a 'complete co-simulation platform' for simulation across multiple applications and function blocks running on different machines.

A presentation by Matthieu Jude (Chiastek) at the 2021 Altair 'Don't be Late to Simulate!' online event introduced 'CosiMate, a complete co-simulation platform'. Cosimate is Chiastek's solution for multi-functional mock-up unit (FMU) simulation. FMUs are programming blocks that perform a specific simulation function. FMI, the companion functional mock-up interface is an API that connects the blocks together. The CosiMate software is a platform that allows co-simulation of both FMUs and native (commercial) models. CosiMate is currently used mostly in aero and automotive industries but the solution may have application in other digital twin developments.

The solution offers time-stepped live co-simulation across different machines, leveraging inter process communication. In the Altair presentation, Jude demonstrates co-simulation using PowerSim's PSIM and Matlab SimuLink. Oil country use of CosiMate has been reported from China's Lanzhou Lanshi Heavy Industries to design its oilfield equipment. Lanshi used the toolset to perform co-simulation across Siemen's Amesim platform, MSC Software'e ADAMS multibody dynamics simulator and Matlab.

In a short email exchange, Jude told Oil IT Journal, 'CosiMate is the perfect tool to improve development teams coordination and validation of complex systems using integration of models created and hosted from different simulators, languages, domains and networks'. More from Chiastek and CosiMate.

SAFETY FIRST

Blackline Safety and Vlahi Systems on gas plume dispersion. Shell awards Blackline frame agreement. CSB video and analysis of fatal Aghorn H2S release. IDEC's Safety Commander tablet holder. Five new safety reports from IOGP. MSA Safety monitors mobile workers. Viking's new flame detectors. GTI/Semtech LoRaWAN gas shutoff switch. RFSI backs SlateSafety's biometric armband monitor.

Blackline Safety has partnered with Vlahi Systems, a provider of cloud-hosted, sensor-driven gas plume dispersion modelling software. The partnership sees data from Blackline's G7 EXO portable area gas monitors integrated with Vlahi's real-time, location-enabled web and smartphone-based Ceres plume modelling software.

In a separate announcement, Blackline Safety was named 'preferred portable gas detection supplier' for **Shell** in a three-year framework agreement covering Shell's global offshore and onshore facilities.

CSB, the US **Chemical Safety Board** has issued a new safety video, 'Silent killer: hydrogen sulfide release' covering its investigation into the Aghorn Operating waterflood station in Odessa, Texas. The release fatally injured an Aghorn employee who was working at the facility as well as his spouse who attempted to locate him at the facility after he did not return home. The investigation uncovered six serious safety issues and the CSB made seven recommendations for improvements at waterflood stations where there is potential exposure to toxic hydrogen sulfide gas. Download the summary of the final investigation report here.

IDEC's HT3P Safety Commander is a tablet holder and hardwired emergency stop function for users of machinery, robotics, automatic guided vehicles and production lines. Traditionally, industrial operations personnel stand in front of fixed control panels, or use dedicated handheld touch panels or teaching pendants. For applications that require more detailed human-machine interface capabilities, IIoT developers

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are increasingly targeting tablet-based HMI. Safety Commander adds industrial-grade safety to consumer or commercial grade tablets. More from Safety Commander.

The International Oil and Gas Producers association **IOGP** has issued a number of safety related reports and recommendations. These include:

IOGP Report 459-1 Life-Saving Rules: Start Work Checks, covering controls and safeguards to carried out just prior to starting work.

IOGP Report 2020p Safety performance indicators: process safety events covering offshore and onshore drilling and production incidents and reporting. The report is part of IOGP's data series.

IOGP Report 643 Guidelines for health, safety, security, environment and social responsibility governance in joint ventures. The document covers governance, policy development, implementation and management of HSSE&SR in oil and gas joint ventures.

IOGP Report 456 v2 Process safety: Recommended practice on key performance indicators aimed at preventing major incidents.

IOGP Info Sheet, 'Review of Well Control Incidents' summarizes the results of a review of 172 well control incident reports submitted to IOGP by members through 2019. The full IOGP Report 637R is members-only.

MSA Safety has announced a subscription-based service that combines its connected services platform for actionable, real-time data with the Altair IO 4 gas detector. The hardware and software combination features a 'cloud-ready' wearable gas detector linked to the MSA+ subscription service, a 'direct-to-cloud' gas detection system with global cellular connectivity and GPS location tracking. More from MSA Safety.

Viking Integrated Safety's new VSF300 and VSF301 video flame detectors are designed for hazardous environments. The detectors process live video images to characterize flame properties by means of FM and SIL 2-certified flame detection algorithms and an onboard digital signal processor. VIS has also introduced the VSF303, an infrared flame detector that detects hydrocarbon fires over a long range. More from Viking.

GTI and **Semtech** have announced a new natural gas smart safety shutoff system that leverages LoRaWAN wireless connectivity. The solution comprises a remote methane detector, smart valve and smart meter. When methane is detected, the valve and meter are shut off, preventing a possible gas-related incident. More from Semtech.

SlateSafety has raised $1.7 million in a seed round led by Sherron Lewis' **RFSI** fund to develop its next-generation wearable armband, SlateSafety Band V2. SlateSafety (formerly FireHUD) has received over $2 million in funding from both the National Science Foundation and the United States Air Force to develop and deploy an easy-to-use wearable that enables real-time group physiological monitoring for first responders, the military, and industrial workers. The wearable monitors biometric markers such as heart rate and core body temperature, creating personalized profiles that predict exertion levels workers and provide real-time alerts to prevent injuries and deaths.

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IOGP/IPIECA STUDY BLOWOUT MODELING AND MITIGATION

Wells Expert Committee provides guidance for computational fluid dynamics in well control, addressing capping stack landing intervention, plume and gas dispersion analysis.

A new report from IOGP/IPIECA*, Guidance for computational fluid dynamics in well control (IOGP Report 596) offers advice on computer modeling of blowout modeling and mitigation. The Report discusses modeling of capping stack landing intervention, plume and gas dispersion analysis. Computational fluid dynamics is 'a branch of fluid mechanics that uses numerical analysis and data structures to analyze and solve problems that involve fluid flows'. CFD is used in subsea well response pre-planning. The Report covers CFD workflows, models and factors that influence model reliability, quality checks and reporting requirements.

The report was prepared by the IOGP wells expert committee, set up in 2011 following the Deepwater Horizon disaster. Today the WEC is a 'global voice of operators' and an authority on the prevention and mitigation of high consequence well control events (*blowouts to you and me*). Oil country CFD practitioners from Boots & Coots, Siemens, Trendsetter Engineering and others provided input to the study.

The report advocates using a combination of models, sized to fit the engineering complexity of the problem and the acceptable level of risk. Four types of analysis are covered. Understanding the impact of a capping stack landing on a flowing well requires a model that predict how the stack behaves as it is progressively lowered until land-out. CFD is also used to model the behavior of the oil and gas plume in the water column as it interacts with ocean currents. Likewise analysis of the surface plume or 'boil' may be necessary as a blowout in shallow water may inhibit a vessel's ability to work vertically above the source. CFD modeling has been successfully applied to non vertical slant-stack deployment.

The authors recommend the use of transient as opposed to steady state solvers. 'Most capping stack landing simulations will use transient solvers [which] may be the only way to perform the simulation'. There are also situations where the blowout flow becomes a compressible flow problem particularly when flow exceeds Mach 0.7, another important consideration for the modeler.

In some extreme scenarios the flow in the well may be under-expanded when it reaches sea surface at which point it becomes increasingly complex, with shock and expansion wave structures. Such considerations need to be weighed against the 'considerable effort' required for compressible flow CFD.

Various CFD approaches are discussed, Volume of Fluid, Reynolds Average Navier Stokes, the role of spatial and temporal sampling and meshing paradigms. The 30 page report discusses in detail these and many other considerations as to what should be modeled and how. The report is, as it indicates, 'guidance'. Unlike other work, notably from the IOGP's geomatics committee, the report does not delve into the details of CFD modeling tools and code or their suitability for a particular task. No credits are given to the developers and vendors of the various illustrations of CFD tools in action.

** IOGP, the International Oil & Gas Producers Association. IPIECA, the International Petroleum Industry Environmental Conservation Association.*

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BLOCKCHAIN FOR ANYONE?

A caveat! BITMO blockchain platform at COP26. Data Gumbo's blockchain audited. BRI gives GuildOne 'pioneer' status. Industrial Internet Consortium on distributed ledgers. ANSI on blockchain for access control. ECCMA on the shortcomings of blockchain in track and trace.

A caveat! Readers should by now be aware of our skepticism with regard to blockchain. However, as there is activity in this space we are somewhat obliged to report on it. We have shared Neil McNaughton's critiques of blockchain with all of the companies mentioned in this section. Only a couple responded as we report. None came back with any counter-arguments for his 2018 blockchain is bullshit editorial.

The 'Blockchain for climate' organization presented its BITMO Platform at the 2021 COP26 in Glasgow. BITMO enables the issuance and exchange of 'blockchain internationally transferred mitigation outcomes' a.k.a. ERC-1155 Non-Fungible Tokens (NFTs) on the Ethereum blockchain. One token is equivalent to one tonne of CO2 equivalent and has 'all pertinent carbon credit data embedded right into the NFT'. Donate (*if you are nuts*) to the BfC here.

The BfC's response to the Oil IT Journal challenge? NONE.

Data Gumbo reports completion of a 'SOC 1 Type 2 Data Security Standards Compliance Audit' by independent auditor **Grant Thornton**. The audit focuses on Data Gumbo's controls that are 'likely to be relevant to an audit of a customer's financial statements'. The controls tested Data Gumbo's assertion of process compliance for its blockchain-backed smart contract network over a six-month period and covered GumboNet's risk assessment process, monitoring activities, information and communications, and control activities.

Data Gumbo's response to the Oil IT Journal challenge? NONE.

Grant Thornton's response? 'Grant Thornton will not be able to provide a rebuttal to your argument'.

GuildOne has been 'accepted' as a Blockchain Pioneer by the 'prestigious' **Blockchain Research Institute**. Pioneer status means that GuildOne's ESG1 sustainability division will benefit from BRI's ecosystem and database of 100+ blockchain research projects. A whitepaper due for release in Q2 2022 will explain how ESG1 is using public and private blockchain networks to build an 'automated low-carbon economy, mapping the project's verified carbon credit tokens from their genesis at an industrial carbon sequestration facility into two market pathways: private transactions as offsets, and as a publicly-traded green investment product'. GuildOne also recently signed a partnership agreement with data and analytics SaaS provider Validere to create 'new digital assets for balancing energy needs with emission reductions'.

GuildOne's response to the Oil IT Journal challenge? NONE.

BRI's response to the Oil IT Journal challenge? NONE.

Validere's response to the Oil IT Journal challenge? NONE.

The **Industrial Internet Consortium** has just published a white paper on the 'Impact of distributed ledger technologies on provider networks'. DLTs are used for applications such as shipping-container tracking, vehicle identity and history, energy trading, and farm-to-store tracking. According to the IIC they are on the one hand 'ideal' as they 'facilitate information sharing among trustworthy partners'. On the other hand, 'the peer-to-peer distributed ledgers can overload a service provider network due to wasted and inefficient communication'.

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IIC's response to the Oil IT Journal challenge? NONE.

A new Draft publication from the US National Institute of Standards, 'Blockchain for Access Control Systems' by Vincent Hu. The 31 page document presents general information for blockchain access control system and implementation. The NIST report concludes with some rather serious unresolved issues, notably, vulnerability to hacking* or misuse, performance (the Ethereum blockchain can verify 14 transactions per second, Visa, 24,000) and scalability. Such gotchas are rather downplayed in the conclusions which have blockchain as offering decentralization, high confidence, and tamper-resistance all issues which are 'challenges for network access control by traditional mechanisms'.

NIST's response to the Oil IT Journal challenge? Hu replied, 'Thanks for the query. My research focus on access control: NISTIR 8403 Draft discusses computer user authorization (access control) mechanism implemented by blockchains. I am not an expert on NFT nor does my research relate to the connection between blockchain tokens and physical objects. So, I am not a right person to comment on your articles. (which are well-written and I enjoyed reading them).'

Oil ITJ: In fact we are in agreement on this in so far as the control exercised by the blockchain is restricted to tokens on the network. Whether the blockchain may be any better (or as good as) 'legacy solutions' may be moot.

Oil IT Journal also exchanged with **ECCMA** Executive Director Peter Benson, sharing the FT Letter. Benson offered the following. 'I have been watching blockchain for some years now and I am still not impressed. We quickly recognized the shortcomings of the use of blockchain in track and trace resulting in ISO 8000-117 quality blockchains, where the issuer of the identifier is known and the data referenced by the identifier on the immutable blockchain must also be immutable.

** A Study by Atlas VPN blockchain hackers stole over $1 billion worth of cryptocurrencies in the third quarter of 2021 with the Ethereum ecosystem being the target of most hack events.*

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