A

es the world turns toward a low carbon future, a panel of energy and automotive leaders agreed that natural gas will play a large role and demand for electric vehicles and batteries will rise with countries demanding cleaner fuel sources.

But they also acknowledged efforts toward keeping global temperatures below 2°C (3.6°F), as set during the 2015 Paris Agreement, which are falling short despite efforts by some companies taking part in climate change initiatives, investing in renewables and taking on carbon capture, utilization and sequestration (CCUS) projects. The world's energy transformation was discussed during an OTC session on Monday, April 30.

"The move to a low carbon future will reshape the energy space as we know it," Statoil CEO Eldar Sætre said. He added that the oil and gas industry could see the shift as a threat, but it should translate the so-called threat into an opportunity. "It is something that Statoil is essentially doing as a carbon-efficient producer of oil and gas, wind energy and carbon capture and storage (CCS).

Statoil aims to invest between 15% and 20% of its capex in new energy solutions by 2030. Reflecting its transition from an oil and gas company to a broad energy company, Statoil officially becomes Equinor on May 15.

Sætre called the Paris Agreement ambitious. In the end, "the industry has to do most of the job. Many people claim that producers of oil and gas can't be part of any kind of solution…We have to be part of the transition and part of the solution," he said.

To help reach the goal, the world must replace coal with natural gas and renewables—something that will not happen quickly, Sætre said. The industry also needs to explore a wider set of energy solutions such as further decarbonizing oil and gas via CCS and CCUS, which has become a priority for companies involved in climate change initiatives.

Similar thoughts were shared by Ernest Moniz, former U.S. energy secretary and panel moderator.

"In moving toward lower carbon energy demand side management, low to no carbon electricity followed by natural gas will play a large role and demand for electric vehicles and wind energy and carbon capture and storage (CCS)."

BY VELDA ADDISON

Digitalization Buzz Is Not Just Hype

Digital revolution and data technology will change the way the industry operates.

BY EMILY PATSY

Digitalization has become one of the industry's hottest buzzwords as oil and gas companies seek ways to boost efficiency, drive down costs and improve safety.

For Per Christian Johnsrud, product commercialization manager at Aker Solutions, it's safe to believe the hype. "If you go around OTC this year, it's all about digitalization and I agree: Digitalization is going to change the way we operate in our business," Johnsrud said while speaking on the "Digital Revolution and Data Technology Reshaping Offshore" technical panel on Monday, April 30.

During the panel, Johnsrud presented a paper on improvements of subsea boosting systems through advanced condition monitoring and data analytics, which Barbara Thompson, executive vice president of TeamBS LLC and session chairperson, said is "why a lot of us got into predictive analytics in the first place."

See CARBON continued on page 26

Digitalization Buzz Is Not Just Hype

Illuminating a New Way Forward

BY JENNIFER PRESLEY

The oil and gas industry continues to put the "dark time" of the recent market downturn behind it, the need for continued collaboration with operators and suppliers helped ensure project success.

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**Wednesday, May 2**

- 7:30 a.m. to 5 p.m. ......................... Registration
- 7:30 a.m. to 9 a.m. ......................... Topical/Industry/Ethics Breakfasts
- 8 a.m. to 11 a.m. ......................... OTC Energy Challenge High School Event
- 9 a.m. to 3:30 p.m. ......................... Poster Sessions
- 9 a.m. to 5 p.m. ......................... University R&D Showcase
- 9 a.m. to 5:30 p.m. ......................... Exhibition
- 9:30 a.m. to 12 p.m. ...................... Technical Sessions
- 12 p.m. to 6 p.m. ......................... The Next Wave Program
- 12:15 p.m. to 1:45 p.m. ................. Topical Luncheons
- 12:15 p.m. to 6 p.m. ..................... WISE Networking Event
- 2 p.m. to 4:30 p.m. ...................... Technical Sessions

**Thursday, May 3**

- 7:30 a.m. to 2 p.m. ......................... Registration
- 7:30 a.m. to 9 a.m. ......................... Topical/Industry Breakfasts
- 7:30 a.m. to 3 p.m. ......................... Energy Education Institute: Teacher Workshop
- 8:30 a.m. to 1:30 p.m. ................. Energy Education Institute: Student STEM Event
- 9 a.m. to 2 p.m. ......................... Exhibition
- 9 a.m. to 2 p.m. ......................... University R&D Showcase
- 9:30 a.m. to 12 p.m. .................... Technical Sessions
- 12:15 p.m. to 1:45 p.m. ................. Topical Luncheons
- 2 p.m. to 4:30 p.m. ...................... Technical Sessions

The 2018 Spotlight on New Technology awards ceremony took place on Monday afternoon at NRG Center. See the Monday and Tuesday editions of the OTC 2018 Show Dailies for details on the winning technologies at otcnet.org or EPMag.com. (Photos by CorporateEventImages.com)

Among the multitude of celebrations for OTC's 50th anniversary this year was the Party on the Parkway Monday evening, where Dysfunkshun Junkshun provided musical entertainment.
Marine Regulation

In these days of political partisanship, sorting science from speculation can be a challenge.

BY LEN VERMILLION

These days, it is sometimes difficult to know where science ends and speculation begins. When it comes to deepwater oil and gas exploration and the use of seismic technology, in particular, that line is blurred even further thanks to rampant political partisanship, a lack of scientific-based regulation and lackadaisical reporting, according to panelists on the Tuesday, May 1, OTC breakfast panel “Ocean Sound and Marine Animals: Advancing the Geophysical Industry in a Complex Regulatory Environment.”

While everyone acknowledges the need to protect marine life as best as possible, all three panelists said the lack of “good science” in favor of rhetoric not only contributes to difficulties for the industry but also puts marine wildlife further at risk rather than protecting it.

“The increasing [political] of this issue and the obscuring fog of propaganda, from both sides, makes it hard to find the scientific kernel,” said Dr. Robert Gisiner, vice president of marine environment and biology and the International Association of Geophysical Contractors (IAGC).

Dustin Van Liew, vice president of regulatory and government affairs at IAGC, opened the session by expressing dismay at “regulatory creep” continuing to seep into deepwater exploration, creating regulations that have no basis in common sense.

“Federal agencies or entities on behalf of governments around the world implement regulatory regimes that get more and more restrictive and are based on the ideas of outside interest groups or bureaucrats as opposed to the best available science,” he said.

He pointed to regulations such as a 100-km offshore corridor in Ireland put in place to allow marine mammals to have a channel to maneuver through surveys taking place. “So if you wrap your mind around that, common sense will tell you the animals aren't going to search for a specific corridor between current surveys,” Van Liew said.

He also cited a popular zooplankton study by the University of Tasmania and Curtin University that he said was limited in scope. He said the ideas or conclusions in that study led to nongovernment organizations opposition to oil and gas. In addition, he said government regulators, who without depth of knowledge on the specific subject of zooplankton, were led to believe the food supplies for zooplankton can be disrupted by seismic activity.

“First, have you shown through direct response and third-party analysis this is not the case and impacts are not widespread,” Van Liew said. “In fact, there should not be regulatory decisions made based on those surveys.”

That is why Gisiner said it is vital to be able to separate week science from good science, and more important, propaganda masquerading as science.

From exaggerated headlines claiming such preposterous notions as “Arctic Exploration So Loud It Can Deafen Whales” to “Ocean Noise Has Doubled Every Year Since the 1950’s,” Gisiner said it is important to take steps to ensure what you’re reading is actually true. “Taking science on faith is not a good place to be,” he said.

“The challenge is you have to go to the source and the source is not always readily available to you,” he continued. “Most of these advocacy websites do not reference their claims. Even when they do, you may find their interpretation of the reference is not the same as the author’s interpretation of the reference.”

He offered steps to checking references that most people do not bother to take. Among them: Google keywords for comparative articles and check related works.

He further lamented that, these days, results of studies often morph into speculation. “Scientists are people, too, and have research bias sometimes,” he said, noting that not everything in a peer-reviewed paper is based only on the data. How can the industry help the public fight through the rhetoric?

Dr. Gary Isaksen, executive committee chairman for the International Association of Oil and Gas Producers’ Sound of Marine Life Joint Industry Program, said the industry is conducting research designed to ensure proper environmental stewardship and to “try to get scientific answers to some of the claims coming up about what the industry is doing in the marine environment.”

The program’s members include E&P companies, academic institutions and other nongovernment organizations. It is the largest effort of its kind outside of the U.S. government, according to Isaksen.

The program studies things such as arctic seal hearing, dolphin hearing and Australian humpback whale behavioral response to seismic activity.

He said the program is in Phase 3, which will likely continue until 2020. The organization will have a review meeting with regulators this fall in The Netherlands.
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*Subject to a strict prequalification process undertaken by ADNOC.
In the Campos Basin, Petrobras Discovered a Lot to Learn

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Session Addresses Economic Field Development Strategies

Experts discuss solutions for economically viable project development.

As the oil and gas industry emerges from the depressed market, both operators and service companies continue to seek opportunities to develop resources economically. A series of presentations on Monday at OTC 2018 offered insight into several strategies designed to develop those offshore fields more economically in the current market.

Marcelo Becher Rosa shared lessons learned from the development of the Lula Field in the Santos Basin off the coast of Brazil, which was developed more than 10 years ago and is the world’s largest oil-producing field in ultra-deep water. Over the course of 11 years, the Lula Field has had seven FPSOs in operation with 91 wells producing more than 900,000 bbl/d.

Rosa explained that the field’s success has been a result of a development plan that featured a reservoir-oriented strategy designed to minimize risks and maximize value. He said the strategy for Lula Field included four basic steps: data acquisition during exploration and the early development phases, pilot projects, a definitive production system based on robust drainage strategies and production management.

With the field still in its relative infancy, Rosa said the strategy implemented by Petrobras should lead to Lula Field eventually developing at maximum level of 1 MMbbl/d.

Ted Mercer, of OneSubsea, a Schlumberger company, discussed a recent project in which an operator wanted to explore newly discovered assets by spudding a new well into existing field architecture with minimal equipment, time and cost.

Mercer said five options were considered, but ultimately OneSubsea decided on installing a step-over jumper (SOJ) supported by an existing wellhead. He explained the SOJ installation represented about a 60% savings in capex compared to the other four options.

Mercer said installing an SOJ into an existing shut-in wellhead allows operators to tie in new discoveries, reduces capex for brownfield applications and enables defining multiple stages of life for cluster fields.

Adam Adil of SBM Offshore discussed methods to improve the economic viability of deepwater projects. He explained that in recent years deepwater oil and gas projects have experienced a deterioration in capital efficiency through a combination of factors, including significant cost overruns, schedule delays and underperforming fields with oversized assets.

Adil identified a number of causes for such issues: over-specification of assets, increased ownership costs, delays in engineering and resulting “knock-ons,” and an overly optimistic view of the reservoir and the potential for subsea tiebacks, all of which, he said, play into the project’s economics.

Adil said operators should consider several factors that could result in improved project economics, including producing at a steady plateau rather than peak production during a project’s early years. In addition, he said other considerations for improved economics could include predictable economic value versus maximum economic value, operational excellence versus commercial excellence and a standard product as compared to a more expensive, bespoke project.

Adil said there are “three main pillars” that can drive improved cost and schedule performance during project deliver: standardization, supply chain-led solutions and the adoption of a culture of new performance.

Discounts for OTC Attendees

Exclusive savings and discounts are available for conference attendees with Visit Houston’s Show Your Badge program, enabling show attendees to maximize their H-Town experience during the first week of May. For details, visit experience.visithouston.com/check-out/3/visit-houston/B21/otc.
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The first rule of puzzle assembly is to start with the edges and work in, flipping pieces this way and that, until the snap of snug fit indicates correct piece placement. When looking at a world map, it is easy to see how South America and Africa were once part of a larger whole.

By working the edges of each, offshore E&P discovered vast reservoirs of oil and gas off the coasts of Angola and Brazil. Major oil discoveries in offshore Guyana in recent years have led to increased international investment in the Guyana-Suriname Basin. Attendees to Tuesday morning’s industry breakfast on Guyana and Suriname were transported to the lush forests of the region as they learned about how 16 years of patience and perseverance led to the eventual discovery at Liza-1 by Exxon Mobil and its partners Hess and Nexen in 2015.

“In May 2015 the Liza well came in. It was an incredible well and it has only gotten better,” said Erik Oswald, vice president of exploration, Americas, ExxonMobil Upstream Research Co. “Right now we’re working on the fifth appraisal well. It is a huge deal and a great thing for Guyana.” Four Liza wells later, along with discoveries at Payara, Snoek, Pacora, Turbot and Ranger in the Stabroek Block between 2015 and 2018, have resulted in an estimated potential resource reserves in excess of 3 Bbbl for the operator and its partners. Hess’ Timothy Chisholm, vice president of exploration, appraisal and developments, Guyana and Suriname, shared with attendees how the company sees Guyana as a major growth opportunity within its portfolio.

Chisholm added that the development and future exploration success in the Guyana-Suriname Basin depends on successful partnerships with commercial, government and resource owners. The potential for Suriname is significant according to Tom Ketele, nearshore drilling project manager for Staatsolie. The country, with more than 30 years of onshore production, has onshore crude reserves to sustain it for the next 15 years, he said. By developing its ultra-shallow nearshore resource potential, the country will be able to extend those reserves significantly. Staatsolie has identified and ranked 15 prospects, some stacked, in water depths of 5 m to 30 m offshore. The company has plans to drill a 10-well exploratory campaign from April 2019 to December 2019, he said.

The Liza story demonstrates the importance of not walking away after the first dry hole according to Bob Fryklund, chief upstream strategist, IHS Energy. “There are plenty of opportunities in South America,” he said. “Guyana and Suriname represent two different spots on the ‘proof of concept’ model for frontier development.” He noted that Guyana is an emerging producer while Suriname is just entering the offshore. Prospects abound in both locations but a big question that remains in the discussion is how far the Guyana-Suriname Basin extends across the border into Suriname.

The Liza Field, he added, contains 64% of the total recoverable resources for the area, he said. An extensive look at the field’s economics showed that it is competitive with the Permian Basin as its breakeven price of $24/bbl.

The promise of big discoveries offshore South America set to continue for years to come.

BY JENNIFER PRESLEY

SNC-Lavalin to Highlight Expanded Offshore Capabilities

SNC-Lavalin, a global, fully integrated professional services and project management company, has announced the integration of its offshore offerings following the acquisition of Atkins and its subsidiaries, Houston Offshore Engineering and Faithful + Gould. Together, the companies have scheduled a series of presentations and virtual reality demonstrations during OTC 2018. Each will highlight the innovation the company has delivered in offshore and digital solutions to drive productivity and efficiency at each phase of a project’s life cycle.

Presentations at booth 4414 will include the paired column semi-submersible; modular gas processing and compression; oil storage...
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Wednesday, May 2 Event Schedule

- **Merging the Physical with the Digital**
  Project Execution & Delivery at 1030 & 1430 daily
  Development & Visualization at 1130 & 1530 daily

- **Amazon Virtual Reality Experience**
  Every morning at 0900, 1000 & 1100
  Every afternoon at 1300, 1400, 1500 & 1600

- **Meeting New Challenges with Flexible & Spoolable Pipe**
  Wednesday, May 2 at 1120 · Room 604

- **QHSES Contest**
  Enter for a chance to win an iPad Mini

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#MDROTC
‘Soft Skills’ Play Vital Role in Career Success

No matter a person’s role or background, WISE event attendees will learn how they can add value to the industry through improved communication skills.

Christi Dowd

OTC may be known for its variety of technical sessions, but technical knowledge alone can only take a person so far when it comes to career success. That’s why Women in the Industry Sharing Experiences, or WISE, is hosting a session to help attendees add value to their careers and the industry through an often overlooked skill: communication.

“You can be super smart and very driven but if you can’t convey that message, how successful will you be?” said session chairperson Christi Dowd, director of finance at Pumpco Energy Services.

The “WISE Presents: Soft Skills, Hard Value” event will feature presentations to help attendees understand the value of communications skills in the industry and beyond, identify individual communication styles and employ learned strategies in table discussions with industry leaders. While WISE was founded as a networking event for women, both men and women are encouraged to participate in what organizers aim to make an inclusive space this year.

“This theme is universal,” Dowd said. “Anybody who walks into this event open to hearing the messages will take away the concept of how important communication is.”

Susan Morrice, founder and chairperson of Belize Natural Energy, will present the keynote discussing the importance of fundamental emotional quotient and how she has used her communications skills to move forward in her career.

“There’s a significant amount of value in the soft skills. Communication is a skill that’s overlooked and undervalued,” Dowd said. “Susan Morrice didn’t get where she is just because she’s a fantastic geologist. She got where she is because she could also influence people; she could convince people they could do things that they hadn’t done before and didn’t know they were capable of. Those skills are necessary for all leaders.”

Erin Collins, operations improvement manager for Forum Energy Technologies, will lead attendees through questions to determine their individual personality types and resulting communication styles. Attendees will walk away understanding which of the four communication styles they exhibit and how they can more effectively communicate with other personality types.

Participants will wear badges indicating their personality type to facilitate discussions while attendees practice what they have learned through three 30-minute table discussions led by C-level executives. Topics will include active listening, conflict resolution, successful persuasion, personal branding and more.

“I expect they will get a personal benefit from it. I think they’ll see it right then and there,” Dowd said. “But I also hope they’ll take that back with them to their companies or their families. It’s so universal. Understanding how you communicate, how you listen and how you need to interact with other people is just a basic part of life.”

No matter a person’s role in the industry, adapting to colleagues’ personality types will benefit the team. The same way someone would tailor a presentation to a board of directors in a different way than they would present to an accounting team, adapting communications to individual co-workers and teams will only improve the work.

“The potential for teamwork is limitless,” Dowd said. “How can a team not be successful if people are effectively communicating with each other? It’s core to everything that we do. It makes people more effective, being able to convey ideas in such a way that people understand where you’re coming from.”

And while the message is equally important for men and women to take back to work with them, the speakers are staying true to the WISE event’s original premise—women in oil and gas sharing their experiences and path to success.

“It’s important in an industry that for a long time was predominantly male to see these successful women and how they’ve attained this success. How they hold themselves and how they convey this message is very relevant,” Dowd said.

“That’s important for everybody: men, women, people from different cultures. Anybody is welcome, and coming in with an open mind you can walk out with a whole lot more.”

The WISE event is scheduled for 12:15 p.m. to 6 p.m. on Wednesday, May 2.
Intellectual property (IP) is the lifeblood of service companies and oil and gas producers. James Trussell, associate general counsel and chief IP counsel for BP Americas, addressed the need for a fluid IP strategy at Tuesday morning’s OTC panel “Active Arena: Global Intellectual Property Strategy.”

“If you’re going to invest heavily in technology and you don’t protect it with IP, you’re doing R&D for your competitors,” Trussell said. “They’ll be fast followers.” Still, software can be stolen without the creators ever knowing—so why share it? Countries cheat patent holders or, in the case of China, require foreign entrants to share their technology. How much you share depends on your need for the business.

Even trademarks that aren’t sufficiently unique or capricious are at risk. Sand tolerant pump may accurately describe a product, but it should be called “something fanciful and arbitrary,” said Bill Imwalle, associate general counsel for technology at Weatherford International. “The competition to sell goods and services in the oil and gas business is very stiff,” he added. “Smart scientist engineers at different service companies can come up with similar ideas. It’s a race,” he said. “The best practice is to first file [a patent] before disclosing your new idea to the customer.”

However, the protection of ideas—particularly those created in the digital realm—suffers from a framework of patent laws that is 50 years old, Trussell said. IP continues to move toward more digital solutions with the result that leading-edge technologies brush up against patent laws that are far behind. Rulings from the U.S. Supreme Court also have dealt setbacks to IP. “We all benefit from predictability,” he said. Trussell serves as a board member of the Intellectual Property Owners Association, which advocates for stronger patent laws.

Even technological advances protected by patents can be difficult to police, Imwalle said. “You might decide, ‘let’s keep that as a trade secret’ because we won’t know whose infringing out there if we go out and teach the world how to practice this technology,” he said.

Trade secrets—such as the formula for Coca-Cola—don’t expire so long as the owner takes reasonable steps to protect them and they afford the owner a commercial advantage. “A trade secret can last forever provided you keep it secret,” he said.

BP doesn’t always use its patents and secrets to bring lawsuits or earn royalty agreements. In one case study he presented, Trussell illustrated how BP created new seismic technology that required building new hardware. Teaming up with a services company could allow BP to negotiate early access, a royalty or discounted access to services later.

BP used the same technology to negotiate with a national oil company, turning its research into a three-way partnership. “Protecting IP early allows you to come to the table with more leverage,” he said. Still, in some cases OTC panelists acknowledged that sharing technology in particular countries means forfeiting control of it.

Trussell said he was pleasantly surprised by his time in China a decade ago. “It wasn’t as bad as I thought it would be. That’s not a high hurdle,” he said. However, he was able to win patent suits and actually put counterfeiters in jail.

China may also become more rigorous in patent protection now that its companies have progressed in their technology. Nevertheless, “what you find in China is it’s the more systemic issues you’re reading in the headlines today,” he said.

To do business in the country requires entering a joint venture (JV), which in turn requires teaching the domestic company the technology. “Over time,” he said, “you have to assume any technology you brought into the JV is going to become public.”

Jose Gutierrez, director of technology and innovation at Transocean Inc., said the company no longer tries to protect itself in some countries. “Certainly there are some countries where we have decided, recently, that we don’t bother any more. We don’t pay maintenance fees anymore.”

He said infringement cases are difficult to prosecute and defend, and registration fees cost the company money. The company instead files patents and other legal protections where it does business and where original equipment manufacturers relevant to its strategy are based.

“We rationalize it, like a portfolio,” he said.
If we are to understand the delicate balance between oil and gas production and environmental preservation in the U.S., we need not look any further than the green state of Maine.

There are more than 13 million acres of forest in the state, but energy is scarce and commodity prices are high—a tomato can cost as much $3 and Maine has lost its place as the No. 1 producer of paper during the last 20 years. It’s all a result of high costs Maine has incurred because it doesn’t have access to a natural gas pipeline or the ability to tap into offshore resources.

“We really need natural gas,” said Maine Governor Paul LePage, who sat on OTC’s “Policy Panel, Offshore Energy—Safety, Technology, Production—Governmental Perspective,” on Monday, April 30. “Maine is an industrial state. It’s the only industrial state in the Northeast.”

Yet increasingly, Maine is finding it hard to be competitive on the open market when it comes to farming and selling paper products because of the higher fuel costs. But even more alarming for LePage is how the lack of energy is affecting the residents in his state.

This past winter when there was a stretch of 22 days of 10-below-zero weather, Maine was forced to ration heating oil because residents were running out of oil and the state could not deliver more oil.

“It’s no longer about prosperity but it’s about heating the homes of our people,” LePage said.

Meanwhile, in states like Louisiana, Texas and Alabama, where fuel costs are reasonable and energy is plentiful, the main questions revolve around safety and the environment, particularly in the Gulf of Mexico. But politicians and governmental leaders say the gains far outweigh the risks. Joining LePage on the panel were BSEE director Scott Angelle, U.S. Rep. Paul Gosar (R-Ariz.), U.S. Rep. Garret Graves (R-La.) and Senator Gerald Allen (R-Ala.).

Graves said the oil and gas industry and the environment co-exist well in his state.

“We are also the top producers of fisheries,” Graves said. “Believe it or not we have more crawfish than anywhere else in the nation. We have more oysters, more shrimp and more blue crab all in the same estuary where people are producing oil and gas.

“So we actually can co-manage these two in an environmentally safe manner contrary to what people who are promoting these narratives say.”

But Graves does not downplay the seriousness of the Deepwater Horizon oil spill.

“You are right it was a disaster,” Graves said. “But we have produced billions of barrels of oil in the Gulf of Mexico, we have produced trillions of cubic feet of natural gas and we have done it safely.

“Yes there was an accident and a whole bunch of mistakes were made and they have been held accountable. As a result of what we saw happen in 2010 some of the technology related to safety is just extraordinary. We were safe before based on the statistics I threw out, but the number of incidents we have had have gone down significantly since then and the volumes of spills have continued to just plummet compared to what it was like before. Things are getting safer.”

Angelle said it’s important that the U.S. continues to make gains in offshore drilling in order to reduce its reliance on foreign oil and to continue to grow its position as one of the top offshore producers in the world. Currently, the U.S. is third behind Saudi Arabia and Brazil and has a realistic chance of catching Brazil.

With a stronger positioning comes reasonable fuel costs and jobs for Americans.

“More than just the energy, offshore is important to America because of the jobs it creates,” Angelle said. “There are some 300,000 jobs and the royalties it produces, some $2 billion a year to the federal treasury making offshore royalties the highest to the federal treasury only behind income taxes.

“You better believe we can have both. We are not an either/or nation,” he said. “We can have robust offshore production and at the same time do it in a safe and environmentally sustainable way.”

LePage, meanwhile, just wants the playing field leveled and for politics in Massachusetts and New York to stop preventing his state from having the energy and fuel it needs to help Maine be competitive.

“If we are united we ought to work together, ” he said. “There is no reason the state of Massachusetts prevents us from having a pipeline or the state New York prevents us from having a pipeline.”
Oil and Gas Operation Transformed

Presentation will demonstrate digital transformation’s capabilities.

T
his year at OTC people will be talking a lot about digital transformation in oil and gas. Many companies are trying to figure out what digital transformation means for them. While many are planning to invest in the Industrial Internet of Things (IIoT) applications, building the business case for it requires having a grasp of both the technology and the operational implications.

How could digital transformation help, say, an unconventional oil and gas company in West Texas? What solutions are available and how could they benefit a typical operation in terms of maximizing efficiency, improving safety and cutting costs?

During OTC 2018 Emerson will be presenting its Digital Transformation Experience, a unique immersive demonstration offering an up-close look at what digital automation solutions can do for an unconventional oil and gas business. During the live 10-minute presentations, personnel carry out real-world tasks both pre- and post-digital transformation to show what IIoT applications are capable of.

Imagine a production engineer sitting in an office debating with an asset manager on how to make sure they hit their monthly production targets. The engineer says the company needs to somehow pull together a forecast accurate enough to help them avoid drilling any more underproducing wells. The problem is that they don’t have access to the latest reservoir model data, and even if they did, it would be days or weeks behind what is going on in the field. If they cannot apply learning from previous wells, they could punch six or seven bad wells in a row, which would mean missing their production targets.

Fast-forward to the same office after digital transformation. To create the forecast, the production engineer studies the dashboard on a desktop and sees that the cloud-based reservoir model software has flagged a handful of wells as producing below level. They are able to compare flow predictions for each well against real-time performance data, which helps them to decide where to drill next and choose the right wells to prioritize for optimization.

Digital transformation can enhance operations in the field just as dramatically. Before, it would be up to the field operators to drive around from pad to pad and manually check each well site, looking for problems with mechanical equipment. If anything is missed, it might not show up as a discrepancy between allocation and sales totals until the end of the month when it’s too late. Safety risks, like vehicle accidents, would be a constant concern.

See TRANSFORMED continued on page 27
**Improved Elastomers Reduce Downtime for Floating Drill Rigs**

Deepwater rig contractors can experience improved uptime and reduced maintenance by using packers manufactured from new nitriles.

**CONTRIBUTED BY LORD CORP.**

The dynamic elastomeric seals, or packers, that contain drilling mud within the risers of floating rigs experience a great deal of friction and abrasion during their service life. Packers interface between the inner and outer barrels of the telescopic joints (TJ) that accommodate tactual motion from vessel heave. The packers are subjected to constant pneumatic or hydraulic pressure to maintain their seal. When using packers made of standard nitriles, which wear very quickly, rigs can experience frequent downtime for replacement of leaking seals. Urethane packers are an alternative that provide improved wear resistance, but they are less resistant to hydrolysis when exposed to water, which results in a loss of mechanical properties.

Polymer scientists have developed nitriles that exhibit much less wear than other nitriles in abrasive environments. The new wear-resistant nitrile is no stiffer than traditional nitriles, and packers constructed with it require lower actuation pressure to seal than those made with urethane. A new soft wear-resistant nitrile is a lower durometer version of the wear-resistant nitrile, it is designed for use in applications with a lower targeted stiffness.

**Nitrile testing**

During the elastomer formulation process, samples were tested using a rotary platform abrasion tester, which measures how much mass a test sample loses as it wears against abrader wheels. Wear-resistant nitrile samples lost 23 to 31 times less material than a standard nitrile. Swell tests, using water as a test fluid, were conducted on both the wear-resistant nitrile and the soft wear-resistant nitrile. Results were then compared to those of polyurethane. Polyurethane retained only about 10% to 15% of its original tensile strength while the wear-resistant nitrile and soft wear-resistant nitrile retained about 90% of their tensile strength.

An American Petroleum Institute (API) 16F Telescopic Joint Packer Test Machine was designed and built to act as a full-scale simulator of a TJ assembly. It was used to conduct comparative wear testing between packers molded from wear-resistant nitrile and standard nitrile. During abbreviated wear testing to 6,300 of the 50,000 cycles required in API Standard 16F, the wear-resistant nitrile did not lose any mass or thickness, while the standard nitrile packer lost 0.46 lbs and had a maximum decrease in thickness of 7%.

Finally, field testing of the wear-resistant elastomer was performed on two packer seals for six months at separate locations. One was installed in the North Sea in March 2016 and the other was installed in Brazil in April 2016. When the packer seals were returned to the lab, 3-D imaging was conducted in addition to visual inspection. The 3-D scan provides dimensional details, thereby quantifying the extent of wear on a fielded packer and allowing for more accurate comparisons between one packer and another. It was determined that the wear-resistant nitrile packer lasted 20 times longer than a standard nitrile packer.

The new elastomer performed so well that in one field test special accommodations were made to have it re-installed on a rig in which a standard nitrile packer had begun to leak after only four days. The wear-resistant packer, which had already seen 21 days of service before its TJ assembly was sent to shore for unrelated maintenance, was flown back to the rig. It then provided an additional 62 days of service and based on its condition at that time—it had lost only 25% of its thickness—the wear-resistant packer could have been returned to service again.

Because the wear-resistant nitrile and soft wear-resistant nitrile exhibit much less wear than other nitriles in abrasive environments, and because their material properties are better suited to application on TJ packers, deepwater rig contractors can experience improved up-time and reduced maintenance by using packers manufactured from the new nitriles.

Visit LORD at booth 2070.

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**Digital Equipment Monitoring**

Predictive maintenance improves reliability and service quality.

**CONTRIBUTED BY SCHLUMBERGER**

A digital technology transforms oil and gas production with industrywide efficiencies, equipment utilization is on the rise, which also increases the stress on the equipment and the frequency of maintenance.

To ensure that stimulation, completion and perforating equipment is prepared to perform reliably for every operation, Schlumberger’s new OneStim business, which is dedicated to North America operations, manages stimulation and completion equipment from an all-digital, centralized facility in Denton, Texas. There, service teams use real-time data analytics to predict—and prevent—the onset of major component failures.

Reducing costs and minimizing disruptions

The status of the equipment can now be monitored in real time. This means that for any frac pump anywhere in North America, OneStim can determine where the equipment is located and how it is performing. For instance, when monitoring the acoustic response of the pump, it can be determined when a pump is approaching a failure phase and proactively service the equipment and perform preventative maintenance. Real-time data from the equipment is collected 24/7 at the remote monitoring center where experts alert field personnel to remove equipment from operations. Maintenance can then be done before failures occur.

Preventing damage reduces service company costs, which in turn reduces costs for operators. For example, a fluid end or power end failure during an operation can result in hundreds of thousands of dollars in damage, plus operational delays. Proactive, preventive maintenance cuts the cost by orders of magnitude and enables scheduling, rather than having an incident at a critical point in an operation. This proactive approach ultimately reduces the time equipment remains offline, keeping OneStim more agile and ready for the next job.

**Centralizing project, equipment and logistics planning**

OneStim also manages the operational details of each completion program at one central location, with real-time data guiding logistical decisions to streamline operations.

At the central operations planning control center in Sugar Land, Texas, each completion program is managed with state-of-the-art digital solutions, including mobile app logistics tracking. Real-time data are used to coordinate people, products, equipment—all in one view.

This offers many operational advantages, including:

• Centralized decision-making
• End-to-end supply chain integration
• Process consistency and standardization
• Collaborative environments; and
• Optimized resource utilization and scalability.

These benefits help to expedite service delivery, reduce risks and increase overall well productivity. Streamlining the entire completion-to-production cycle generates program savings and enables consistent delivery of every well according to plan.

Digital automation and monitoring

With digitally enabled technologies such as the automated stimulation delivery platform (ASDP), OneStim also brings more efficiency onto the wellsite. The ASDP’s automated process system controls all equipment with a one-touch approach. This system employs monitoring and predictive health processes to run each job as designed and minimize downtime.

By integrating innovative technology with streamlined processes and automation, this platform improves reliability, enhances efficiency, minimizes dust and autoamates wellsite processes to ensure that each operation is successfully run as designed. For example, automated features of the massive manifold of the ASDP trim up to 15 minutes from of each fracturing stage, which could add up to two days operational time saved per month.

Consistently placing more stages per day

For an operator in West Texas, OneStim was able to use digital technology to organize the most efficient operations and break the previous record of eight stages placed per day. The team pumped 12 stages in 24 hours, a 50% improvement on the established record. The team would then go on to place the equivalent of 23 stages in a 48-hour period by coordinating people, equipment and logistics at the job site.

This is one of many examples of how centralized equipment monitoring and operational coordination is used to deliver wells consistently and efficiently. With real-time data analytics to enable proactivity across many facets of unconventional operations, OneStim helps operators make informed decisions during well completions and reduce overall downtime for more productive operations.

Visit Schlumberger at booth 2415.
Data are one of the most untapped assets in offshore E&P operations. Despite platforms generating floods of data about the conditions of topside equipment condition, down-hole drilling gear, electrical submersible pumps or other mechanisms, only a small fraction are used. And much less is analyzed in real time to flag anomalous system behaviors for action and to improve decision-making processes.

Decision-making with AI
In recent years, artificial intelligence (AI) has been enabled by several converging technology trends: cost reductions in computer processing power; parallel processing computer architectures; sophisticated statistical techniques supporting advanced analytics; scalable, cost-effective all-flash storage for massive amounts of data; super-fast networking interconnections between compute and storage resources; and cloud computing models, such as the Siemens MindSphere IoT platform, that have made all these other resources much more accessible, affordable and quickly scalable.

Complementing these at the field level are increasingly “smart,” self-calibrating sensors that provide offshore equipment and components with their “voice” — the ability to communicate status to higher-level systems. In addition, well-established global standards, such as OPC UA, are facilitating machine-to-machine communication, a core enabler of the Internet of Things (IoT) that commands so many headlines today. Importantly, cybersecurity standards and defense-in-depth models have grown in response to the increasing frequency and sophistication of cyberthreats that continue threatening critical infrastructure, especially energy.

Fueling AI
Data fuel most AI applications, including machine learning. Programs and machines run data through various statistical models to find patterns and to “learn” from the data. They can then adapt their functions without specific programming. The more data that is processed, the smarter the program or machine becomes.

With machine learning and AI, users can find out what they don’t know—and better quantify what they think they know. That’s because these applications are constantly looking for patterns that humans cannot detect in a stream of a billion datapoints every second.

AI in offshore
In an offshore platform, those patterns might signal an impending bearing failure, a sticking valve, or an odd vibration, all worth investigating. Depending on pre-set rules, a maintenance technician can also be alerted and dispatched with the diagnosis, remediation instructions and spare parts identified and even pulled. The workflow could look like this, with the system:

- Recognizing an impending failure via anomaly detection,
- Knowing what went wrong via root cause analysis and deep learning pattern recognition,
- Generating a work order for technician and or-

See AI continued on page 27

Transforming Offshore E&P via AI

BY ALEC GRUSS, DRESSER-RAND BUSINESS, PART OF SIEMENS POWER & GAS

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BY ALEC GRUSS, DRESSER-RAND BUSINESS, PART OF SIEMENS POWER & GAS
One Gulf: 50 Billion BOE and Growing

BY JULIE WILSON, WOOD MACKENZIE

The historic opening of Mexico’s oil and gas sector to international investment means that companies can approach offshore Gulf of Mexico (GoM) as one holistic region—One Gulf. It provides unique growth opportunities to a wide range of oil and gas companies. Players with experience in the U.S. side of the GoM are advantaged, but how much synergy will there really be across the maritime border to create One Gulf?

Both the U.S. and Mexico have decades-long histories of offshore exploration and production. Over 70 Bboe have been produced from shallow waters across the U.S. and Mexican GoM, with a further 11 Bboe produced from U.S. deep water. Considering discovered resources that have not yet been produced and potential resources, Wood Mackenzie estimates a combined GoM approaching 50 Bboe and growing.

While the U.S. is peppered with wells and some plays are now mature, most of Mexico’s offshore is as yet untouched. Over 50,000 wells have been drilled in the U.S. GoM waters, of which over 3,500 are in deep waters greater than 400 m (1,312 ft). At least five different geologic plays have been developed, with a new one emerging every decade or so. In contrast, only 55 wells have been drilled in Mexico’s deep waters. Most offshore activity has been centered on the Campeche sub-basin—one of the most prolific offshore areas in the world. The abundance of giant, highly productive fields meant that, until recently, Pemex did not need to explore in riskier, higher-cost areas like deep water or subsalt.

Mexico’s opening began with the December 2013 Reforma. The goal—to spur activity and investment as quickly as possible—led the authorities to move at an extraordinary speed in holding licensing rounds. During 2015 and 2016, seismic contractors shot huge amounts of new seismic data, adding to the existing Pemex library, which was made available to bidders. Synergies between the two sides of the GoM extend beyond geology. Deepwater drilling, completion, development and production technologies have made great advances since the 1990s, and the U.S. GoM has been the proving ground for many of those technologies. Mexico will benefit from 20 years of experience, compressing the learning curve and enabling exploration and development of multiple play types simultaneously.

While there are undoubtedly synergies between the two countries across the GoM, there are key elements that make doing business very different. The commercial and regulatory environment in the U.S. is long-established and well-understood. In Mexico the authorities had to build their organizations, processes and frameworks very quickly, and they are now in test mode. Infrastructure has been a key enabler for the industry in the U.S., with the development of a network of third-party pipelines feeding into multiple Gulf Coast terminals. Offshore operations are supported by well-developed shore bases, which also could service Mexico’s northerly sectors. The liberalization of Mexico’s midstream is an opportunity for pipeline and midstream companies to compete with Pemex.

Across the region there are challenges to overcome—technological, commercial and regulatory—if the 50 Bboe potential of One Gulf is to be realized. The GoM on both sides of the border will need to compete with global opportunities, including shale, in many operators’ portfolios. It will benefit from learnings and practical synergies that can be applied. Continued collaboration with and support from authorities, particularly in Mexico where norms are still being established, are vital to achieving growth ambitions.

Hear industry leaders debate these issues during the Thursday morning panel session “One Gulf Reaching 50 Billion BOE and Growing” in Room 306. To learn more visit Wood Mackenzie at booth 4079.
Finding Value in Upstream Data

Oil and gas businesses are submerged in what data scientists would call a ‘data lake.’

**CONTRIBUTED BY BAKER HUGHES, A GE COMPANY**

Generally, the value of the Industrial Internet of Things (IIoT) is delivered through two processes: collecting data from industrial assets, processes and workers; and then applying analytics to that data and finding new information for improved outcomes. The problem that offshore businesses are facing is that the amount of data is too vast for traditional data science and modeling techniques to deliver value, and getting the asset intelligence is often based solely on operator knowledge and experiences.

Terabytes of data are collected and stored every year—that's hundreds of millions of datapoints for individual offshore platforms per day. Moreover, collected data exists in silos. There's little to no consistency in data tagging and mapping: operations data, service data and asset data are viewed, catalogued and named separately. Without bringing together these datapoints, visibility into the production impact of an offshore platform can't be measured or improved.

Finding value in the offshore “data lake” requires a new approach to digital focused on delivering automation through artificial intelligence (AI) and machine learning technologies. It requires taking the work out of the data wrangling and putting it toward building better, outcome-driven models that are easy to build and deploy.

Baker Hughes, a GE company (BHGE) delivers digital technologies to enable the IIoT and cloud-based software solutions and services aimed at increasing the value oil and gas businesses get from their data across the fullstream.

**Reservoir planning**

From the start, better modeling of the subsurface means improved recovery. Time to value in these cases can be difficult, with reservoir planning taking months. BHGE’s JewelSuite applications provide better, more accurate views of the subsurface allowing for faster time to oil.

The JewelSuite Subsurface Modeling application, for instance, delivers unique gridding technology and advanced structural modeling capabilities for precise geological models in half the time as other tools. Offshore businesses deploying the full suite of JewelEarth applications can increase knowledge sharing across company boundaries and enable smarter, more informed decisions and greatly improved hydrocarbon recovery.

**Better asset and process reliability**

Once a station is in operation, a single asset can result in hundreds of millions of datapoints. When considered across the thousands of mission-critical assets, the scope and scale of the data issue that offshore businesses are challenged with becomes clear.

The value at stake is big. Better asset and process management on offshore platforms can drive percentage points in improvement worth billions in productivity gains each year.

BHGE delivers a unique set of capabilities addressing better asset and process management, from the asset reliability-focused Asset Performance Management application to BHGE's IntelliStream application, which delivers better upstream productivity across reservoir, wells, network, facilities and people. Deploying these software applications for offshore use cases can better provide remote operations managers historical and real-time view of performance, operating conditions, as well as predictive maintenance, to avoid downtime while meeting production goals.

Anomaly detection serves as a good example. Identifying anomalies—or unusual patterns in asset and process data that indicate future problems or unplanned downtime—typically requires a data team to create a model that can find these patterns. Creating those models takes time and resources, meaning data coming in can’t be used right away.

BHGE's software uses AI and machine learning so that systems consistently learn from data patterns and quickly identify patterns. That means problems are detected earlier, maintenance is conducted based on actual performance and with asset health in mind, unnecessary human intervention can be eliminated and high-risk operations can be de-manned.

To learn more visit booth 2827.

**Finding Value in Upstream Data**

**Digital solutions from Baker Hughes, a GE company deliver actionable insights for oil and gas businesses seeking to improve productivity, minimize risk and drive radical organizational change across the fullstream. (Image courtesy of Baker Hughes, a GE company)**

**Reservoir planning**

**Better asset and process reliability**

**Digital solutions from Baker Hughes, a GE company deliver actionable insights for oil and gas businesses seeking to improve productivity, minimize risk and drive radical organizational change across the fullstream. (Image courtesy of Baker Hughes, a GE company)**

**Smart Drive Solutions**

Our company has been a long standing supplier of drive solutions for the growing oil and gas industry. Extreme operating conditions demand for high-quality, reliable products and services, in which we can provide due to our profound know-how. With production facilities in Germany, Canada, China and Brazil DESCH is able to offer you discerning worldwide service. Many customers in the oil and gas industry put their trust in drive train components made by DESCH. We offer a variety of products and solutions for your offshore and onshore needs with guaranteed customer satisfaction. To ensure DESCH’s highest quality of standards, we continue to work together with various organizations to guarantee and safeguard quality, such as ABS, DNV, Bureau Veritas, German Lloyd, Lloyd's Register, etc...

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OTC SHOW DAILY | MAY 2, 2018 | WEDNESDAY 19
Since the announcement of President Donald Trump’s America First Offshore Energy Strategy about a year ago, the Bureau of Ocean Energy Management (BOEM) has been making some headway on the executive order.

“Abundant, affordable energy is a mainstay of economic growth and this administration’s energy policy is focused on creating opportunities for greater growth, more jobs and energy security,” Walter Cruickshank, acting director of BOEM, said during a luncheon at OTC on Monday, April 30.

The executive order directed BOEM to develop a new five-year, offshore oil and gas exploration program as well as reevaluate a number of regulations overseeing the plan. “A year ago we were handed a very ambitious agenda of work to do,” said Cruickshank. “We are implementing that agenda given …[and] we have made great progress in all of these issues.” Part of the agenda includes these required actions:

• Review of notice to lessees;
• Review of BOEM’s air quality rule;
• Review of the Arctic rule; and
• The review process of expediting seismic survey permit applications

“You can’t actually see progress on most of them quite yet, but rest assured we are very close to rolling things out on each of them, and stay tuned over the coming weeks and months,” he said, also mentioning that there would be no breaking news coming from the podium that day.

However, BOEM’s biggest order of business is the National Outer Continental Shelf Oil and Gas Leasing Program (National OCS Program) for 2019-2024, Cruickshank noted. “The next five-year program for 2019 to 2024 has been made clear to me a top priority at the moment and moving forward to get that new program in place as quickly as we can. We initiated the process last summer with the request for information,” he said.

The draft proposed program includes 47 potential lease sales—the most in the history of the program, he said. This includes 25 of the 26 OCS planning areas: 19 sales off the coast of Alaska, seven in the Pacific region, 12 in the Gulf of Mexico (GoM) and nine in the Atlantic region.

Oil and gas is BOEM’s biggest program, which accounts for about 19% of U.S. oil production. In 2017, 629 MMBbl of oil were produced—an all-time record for the OCS, according to Cruickshank.

“It’s for these reasons the administration has really looked at the offshore program, to provide continued support for energy in this country,” he said.

In March, under the executive order, the Interior Department held the largest oil and gas lease sale in U.S. history, generating $124,763,581 in high bids for 148 tracts covering 815,403 acres in federal waters of the GoM. A total of 33 companies participated in the lease sale, submitting $139,122,383 in bids.

INDUSTRY NEWS (continued from page 10)

for stranded assets, floating wind platforms; modular NUI (normally unmanned installation platforms); integrity, maintenance and operations; and a virtual reality demo to experience multiplayer/multilocation engagement with engineering models.

Diamond Offshore Drilling Signs License Extension with Trelleborg

Following the successful manufacture of four strings of helically grooved buoyancy for Diamond Offshore’s Blackship vessels, Diamond Offshore Drilling has extended the exclusive license for Trelleborg’s offshore operation to this patented technology until 2029.

Helically grooved buoyancy is the result of a joint development between Trelleborg’s offshore operation and Diamond Offshore Drilling that integrates vortex-induced vibration suppression and drag reduction with drill riser buoyancy, increasing rig efficiency without compromising on safety or structural integrity. The design dimensions are optimized to ensure uncompromised uplift while effectively eliminating riser motions and higher levels of drag in onerous offshore current environments when compared to traditional riser buoyancy.

The multifunctional solution integrates the technology to suppress vortex-induced vibration and reduce drag into drill riser buoyancy module equipment during manufacturing, essentially eliminating the requirement of ancillary suppression systems.
Intelligent Slickline Conveyance for Well Intervention

In an industry where time is money, the ability to optimize well interventions with actionable decisions is invaluable. Traditionally, slickline has long been considered the most cost-effective service option for offshore operations, with its small footprint and simplified pressure control equipment. However, the inability to offer a real-time downhole depth-control solution has limited its work scope, and operators are still required to rig up electric line for depth-critical applications. This is no longer the case with innovative new slickline technologies being developed for the harshest deepwater conditions.

One example of this advanced technology is the Halliburton RELAY Digital Slickline (DSL) system, which combines the versatility and efficiency of traditional slickline with the real-time data streaming capability of electric line. It is ideal for any intervention where there are multiple slickline and electric line rigups, where space is limited like on offshore platforms, and in riserless interventions where braided line usage may be limited. The slickline system has averaged as much as two to five days of rig-time savings compared to traditional slickline and electric line interventions.

Case study

On a recent project in Alaska, the DSL system was successfully deployed to set a tubing patch in a field with known downhole scale that presents some operational challenges. Notably, the bidirectional metal slips on the wireline-retrievable (WR) packers will fail to bite into the tubular wall and has proven to be challenging in the past for supporting a stable bidirectional telemetry signal for usable real-time depth correlation.

This DSL system provided a clean casing collar locator (CCL) for depth correlation over the entire well and successfully set the bottom WR packer with the downhole power unit setting tool. Unfortunately, the packer fell to bottom as it was set in scale. After successfully fishing the packer, an explosive string shot was run to clear the scale. The WR packer was rerun with an explosive setting tool and positively passed the mechanical integrity test (MIT). A second setting run with the base pipe and upper WR packer was deployed, spanged onto the bottom packer, and explosively set as planned. This was followed by another MIT to confirm pressure integrity.

After the patch was successfully placed on depth as planned, the operator requested the bottom gas-lift valve (GLV) be removed and replaced. All services, including the fishing of the packer, setting the patch, and replacing the GLV, were completed with one rigup. Additionally, no real-time loss of telemetry or cable damage was experienced. This particular job saved approximately five days of rig time compared to the traditional slickline/electric line approach that requires multiple rigups and equipment scheduling to complete.

On another Alaskan project, an operator requested a modification to the explosive electronic trigger from a timer based to a surface-controlled on-command device to improve wellsite efficiency. The RELAY DSL system was recommended to provide real-time depth correlation with a CCL and optional gamma ray. The new surface-controlled trigger works in conjunction with the DSL system to leverage bidirectional communications. The customer’s current slickline trigger was replaced with an electronic firing system and successfully completed 65 real-time on-command explosive runs.

The DSL system has been successfully deployed not only in Alaska, but also in the Gulf of Mexico, offshore Australia, North Sea and in the Middle East. The ability to minimize rigups has allowed the operators to complete more runs per workday to reduce costs.
The oil and gas industry continues to develop more advanced technology to help optimize the drilling process and make it more efficient. In doing so, drilling a well has become a complex job that has an overwhelming amount of data and tasks that are in need of constant attention. A platform to address the challenge of repetitive complexities of machine and process control needed to be developed.

A recipient of a 2018 Spotlight on New Technology Award, NOVOS is a reflexive drilling system that was developed to combat these complex challenges. The system provides a common platform for the control, monitoring, scheduling and optimization of drilling operations. It is the industry’s only reflexive drilling system that automates repetitive drilling activities, which benefits operators by optimizing drilling programs. It also benefits service companies by allowing drillers to focus on consistent process execution and safety. The system is designed to perform a series of actions when prompted, just as human reflexes respond when acted upon by a specific stimulus.

The NOVOS system provides the ultimate control and consistency for any operation by allowing drillers to automate repetitive drilling activities, such as coming off and on bottom, friction tests, downlinking, taking surveys and making fully hands-free offshore connections. The result is greater consistency with every driller—regardless of individual experience level—allowing each to achieve the same improved performance time and time again. The software development kit is available and allows developers to create and deploy their own optimization applications so they can develop applications that address specific challenges.

There are four different application types with NOVOS:

- Core applications are predownloaded onto the system and are ready to use following installation;
- Enhanced applications provide even more value to the operator than the standard core applications;
- Commissioned applications are applications that National Oilwell Varco (NOV) helps develop. It’s the user’s idea, IP and application; NOV just helps write the code; and
- Third-party applications are value adding and developed by other companies, private organizations and universities that can confidently use a software development kit to write their own applications.

There is a group of operators, contractors, service companies, universities and independent third-parties that are already creating value-added applications. The applications developed have helped 25 operators align operations with their drilling objectives.

NOVOS can help concepts come to life by taking great ideas and plugging that intelligence into a rig. Whether it is something specifically with a tool or an automated action that needs to be created, NOVOS helps with its open platform.

NOVOS has already been installed and commissioned on dozens of land rigs in West Texas, Oklahoma, Pennsylvania, Alaska and Canada.

To learn more visit NOV booth 2839.
Enabling Technologies for LNG

Innovation arises from lessons learned and a new perspective.

BY JUDY MURRAY

More countries are turning to LNG, driven in part by increasing gas consumption resulting from economic growth and the desire to replace dirtier fuels. The demand for LNG is expected to grow by 4% per year until 2035, and the market is becoming more diverse, according to Vincent Lagarrigue, Trelleborg.

The bonded high-pressure hose has an inner stainless steel layer covered by a liner overlaid by reinforcement cables with embedded rubber protection between the layers so the cables do not cut one another. This is covered by a fire-resistant layer, with an outer UV-resistant cover. The result, Szekely said, is a robust and long-lasting product that is designed for the offshore environment.

Szekely enumerated the advantages flexible hoses offer over marine loading arms, including less complexity, no moving parts and considerably shorter construction times (only four to six months for transfer hoses). Two main factors driving the transition to this type of solution are finance and lead time, he said: “Marine loading arms need hydraulic power for operation,” Szekely explained, and “require intensive maintenance.” While transfer hoses require a crane to connect, they only need to undergo visual inspection after each use and a pressure test after five years of service.

“Both options are permanent,” he said, “but transfer hoses last 20-25 years, which delivers considerable savings.”

This technology has undergone a system integration study using a 30-m (100-ft) length of 12-in. line under 100 bar (1,450 psi) working pressure with the FSRU vessel empty and full in a range of environmental conditions.

“It is an enabling technology for short-term projects,” Szekely said.
A Better Way to Design and Manage Offshore Projects

Advanced platform improves efficiency and productivity throughout project life cycle.

BY YANN NICOLAS, TechnipFMC

The complex structure of flexible pipes combined with their installed configuration makes inspection challenging. One of the most difficult aspects of flexible pipe inspection lies in the multilayer structure design. Various materials, profiles and thicknesses in a single pipe result in different assets throughout the process. The key advantages are ease of transparency and collaboration on a project.

Creating a digital twin

Gemini XD, which is Latin for “twin,” provides an integrated project delivery approach from project inception to decommissioning. Following up the design twin created during the EPCI phase, Gemini XD will enable creation of the operational twin, marrying the physical state with a living, up-to-date 3-D model combined with data and analysis for the facility or subsea field. The operational twin is a “digital twin” at a facility scale, compared to the conventional approach centered on a piece of equipment. The key advantages are ease of transparency and collaboration on a project.

TechnipFMC’s In-Service Riser Inspection System (IRIS) is a versatile subsea inspection system that deploys and operates nondestructive testing (NDT) techniques simultaneously to detect damages in risers. IRIS is a new generation of inspection systems that works in parallel with electromagnetic testing, ultrasonic testing and x-ray computed tomography. IRIS is remotely controlled and operated in real time via a umbilical from the control room of a support vessel. All inspected results are displayed and analyzed in real time using dedicated software.

The objective of inspections is to gather information to establish the current condition of a component and analyze its degradation rate. The IRIS solution allows autonomous inspection of multiple riser sizes with different NDT technologies, like electromagnetic testing, resulting in a riser inspection report and integrity diagnostic report. IRIS enables the detection of flooding and defects like corrosion, breaks and cracks in multilayer products such as flexible pipes. Given its architecture, this subsea nondestructive testing laboratory also allows operators to inspect risers without halting production under water, in the splash zone or in the air.

While the historical reliability of flexible risers has been relatively high, operators remain concerned about a lack of asset integrity information available regarding changes in operating conditions, general maintenance, life extension and replacement. The introduction of IRIS and the resulting increased confidence in flexible risers could open the market to greater acceptance of flexible pipes and additional floating systems developments. IRIS has been developed primarily for complex flexible pipe structures but will be suitable soon for other kinds of pipes such as rigid pipe, pipe-in-pipe and umbilical.

McDermott’s Gemini XD provides a digital twin of the as-built facility as shown here of the Pemex Abkatun A-2 platform in the Gulf of Mexico. (Image courtesy of McDermott)

Meet with Lloyd’s Register during OTC at booth 3005.
UNLOCKING $1.6 TRILLION OF VALUE FOR THE OIL AND GAS INDUSTRY

WHY EXHIBIT?
ADIPEC 2018 attracts senior decision makers from 20 National Oil Companies (NOCs) and 18 International Oil Companies (IOCs). Host to 30 exhibiting country pavilions, and more than 2,200 exhibiting companies from across the globe, ADIPEC provides participants with a direct route to 110,000+ oil and gas professionals from 135 countries. By booking a stand you gain unsurpassed access to the people who matter in the global oil and gas industry. This year ADIPEC will help the oil and gas community to understand how digitalisation can transform the performance of their assets.

With a dedicated innovation theatre anchoring the digitalisation zone, startup businesses and SMEs will feature at the heart of the eco-system and will be able to immerse an all-inclusive 50m exhibition “pod” that is incorporated into a 200m purpose built stand.

Representing your business with the opportunity to liaise with the industry’s most influential stakeholders.

DIGITALISATION IN ENERGY CONFERENCE SESSIONS
Digitalisation is the number one IT trend that will fundamentally change the face of the oil and gas industry. How is your business preparing for the transformation? Are you at the forefront with your digital journey mapped out and already deployed? Or are you still evaluating your digital investment and its potential benefits to your business?

ADIPEC provides key insights into the world of digitalisation and how innovative disruptive technologies are transforming business models.

KEY TOPICS IN FOCUS
• Increasing returns and enhancing competitiveness through digital strategies
• The role of AI, robotics, blockchain, IoT and advanced analytics for oil and gas optimisation
• Reshaping workforce culture alignment and mind-set shifts to embrace and drive digitalisation adoption
• Trusting data driven decisions

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CARBON
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substantially greater electrification throughout the econ-
yomy is certainly necessary but it is not sufficient to reach
the goals," Moniz said, adding that energy efficiency offers
opportunities on the demand side. "For electricity, there are
many options: renewables, nuclear, carbon capture and
sequestration.

Total CEO Patrick Pouyanné pointed out some reali-
ties. Referring to the future energy mix scenarios, he said
all three scenarios through 2040 include oil and gas, but
less oil will be needed than today. "The opposite is true for
natural gas consumption, which will grow.

He pointed out that electric vehicles will make up half
of all light-duty vehicles in 2040. "Total strives to be integrated along the entire value
chain—not only as an energy producer but also a sup-
plier and downstream, even distributing gas," Pouyanné
said. Total announced on April 18 a proposal to buy
French utility Direct Energie in pursuit of its develop-
ment in electricity and gas generation and distribution in
France and Belgium. "Demand for electricity will grow quicker in the 21st
century than the demand for energy," Pouyanné said, not-
ing gas and renewables are ways to produce electricity.
In addition, "demand for batteries is booming like we've
never seen. We don't have enough production capacity
today to follow the trend." Meanwhile, the number of electric cars sold continues
to grow, especially in China where government-led action
to lower emissions is driving change.

Carlos Ghosn, chairman and CEO of Renault-
Nissan-Mitsubishi, said the number of electric cars it
sold globally has grown from practically none in 2006 to 1.3
million in 2017, though that's only about 1% of the 94 million
or so cars sold annually.

Electric cars will make up 35% of major markets (Japan, Europe, China and the U.S.) and 25% of the global market by 2030, Ghosn said.

He added that many government officials already have set dates to
discontinue diesel and combustion engine use in their regions.

"Without any doubt, electric cars are going to become one of the
most important segments of transportation," with the cost of
ownership falling below that of an internal combustion engine by
2022-2023 without government incentives as technologies improve driving distances,
metal costs and infrastructure costs, Ghosn said.

Change is also on the horizon offshore, where DNV GL
CEO Remi Eriksen said more energy will come from off-
shore wind than from offshore oil by 2050. By the same
year, DNV GL forecasts renewables will make up about
50% of the world's primary energy demand.

"The onward march of renewables seems unstoppable,"
even with the cost of storage, Eriksen said. Electricity also
is going to be the dominant energy carrier by 2050, dou-
bling to 40% of energy demand from today, he added.

Gas becomes the single biggest energy source by about
2034, overtaking oil before falling back to levels seen

Today, Ghosn said. Natural gas should be seen as a long-
term energy source amid the renewables excitement given
its role in the greening of the energy mix, role of hydrogen and
its symbiotic relationship with renewables, he added.

However, "even with the massive and rapid uptake of renewables in our forecast it is falling short of the
Paris Agreement," Ghosn said. "We need a silver bullet here,"
Eriksen said, suggesting it will take a combination of actions to reach the goal such as CCS, carbon price,
breakthrough energy efficiency and more renewables.

"The combined power of the oil and gas industry and
the automotive industry will certainly help drive the
energy transition forward."
that were very difficult to navigate for suppliers. Our work has been to ratio-
nalize and get down to the really neces-
sary and critical standards, as opposed to the ones that are nice to have.” He stressed the importance of having a real dialogue with the suppliers, add-
ing that these discussions by asking crit-
ical questions and examining the results of those decisions helps ensure successful project execu-
tions. “I think we’ve learned an enormous amount in the pro-
cess and that’s allowed us gradually and increasingly, as we move through the project execution, to change the game,” he said. “It’s quite interesting because I would imagine that most of us say don’t change anything once you’ve sanctioned the project. Once again, that’s a dialogue that I think we’ve been able to successfully uphold and that’s really helped us to realize a 50% cost improvement, which is tremendous.”

“If you look at the year of 2013, 2014, it always used to be that oil is at a price of $110 or $120 and it’ll remain there, and it seemed there was an entitlement that oil would be high,” off-
tired Lorenzo Simonelli, president and CEO of Baker Hughes, a GE company. “We should look at it a different way. If oil is going to be $20, how do we make a project go forward?” He added that by challenging itself, the industry can move forward consistently by applying new approaches to stan-
dardization and digitalization. “I think Ammonett is the first of several project where this new behavior in the supplier and operator relationship was formed,” he said. “As we move forward, it is important to remember the challenges our industry faces have not changed. We have to ensure the collaborative nature is con-
sistent as we move forward into these projects.”

This new collaborative relationship is also a new culture for the industry, one that falls onto the shoulders of leadership to nurture, according to Steve Demetriou, chairman, CEO and president of Jacobs Engineering Group. “It’s about culture and the behavior of leadership,” he said. “We’re evolving the partnership, the relationship that leadership exchanging, behaving differently by not only bringing innovation and new tools and techniques but by enhancing the culture and communication and the way we work together.”

In a post-transformation world, things are very different. At the beginning of every shift, the field operators and the entire team automatically receive alerts with a list of ex-
ceptions based on real-time well performance and equipment health data. The production engineer can send alerts directly to an oper-
ator’s smart phone telling them which wells need attention and which equipment needs attention. Instead of driving around all day, crew can target their routes, covering far more wells, mitigating the risk of accidents and reducing costs significantly.

Visit the Digital Transformation Expe-
rience at the Emerson booth 2661 during exhibit hours.

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during spare parts via a system’s ap-
plication product or other enterprise resource planning; and

• Closing the loop by logging the com-
pleted maintenance and updating the analytical models with any new
information, either from the techni-
cian or the sensor data.

Alternatively, engineers can acknowledge the alert and decide whether to run a part to failure, then replace it, or address the issue at the next planned shutdown. Fundamen-
tally, machine learning is about decision
support, especially in industrial applica-
tions. It can help make engineers and techni-
cians better at their jobs because they can make much more informed decisions faster.

Proven deployments

Although applications of AI in offshore E&P operations are still in their early stages, Siemens has successfully deployed remote condition monitoring on one North Sea platform more than 161 km (100 miles) off Norway’s coast. From there, the solution is securely transmitting real-time equipment data more than 965 km (600 miles) to an onshore control room.

The data allow the company to monitor equipment conditions the same as if staff were aboard the platform. But instead of scheduling maintenance, it conducts remote condition-based maintenance, a more pre-
cise, safer and lower-cost approach.

Early AI adopters, who focus on the ben-
efits of enhanced decision support to drive
better business outcomes, can enjoy a wide
competitive lead over later adopters, who
may need years to catch up.

INDUSTRY NEWS
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equipment, alleviating complicated and time-intensive riser running and retrieval procedures.

Gulf Publishing Rebrands to
Gulf Energy Information

Gulf Publishing Co. has announced the business’ transi-
tion to Gulf Energy Information (Gulf). The new corpo-
rate identity better reflects the scope of Gulf’s offerings
across the upstream, midstream and downstream sec-
 tors of the international energy industry.

The corporate rebrand took effect on May 1, and
Gulf’s updated identity includes a new corporate
logo, website and mission statement. Gulf’s brands—
World Oil, Hydrocarbon Processing, Petroleum Econo-
mist, Pipeline & Gas Journal, Gas Processing & LNG,
Pipeline News and Underground Construction—serve
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