Microsoft

Microsoft Energy Core

Special Report

Industry Board Meeting - Q2, 2020

Key Takeaways: ***How can the energy industry use digitalization to spur its transformation?***

GI Consultancy
Gulf Intelligence

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Disclaimer: The quotes highlighted in this Special Report are not verbatim.

Executive Summary

What is Microsoft Energy Core?
A global initiative and center dedicated to digital transformation in the energy sector. Building on artificial intelligence (AI) and cloud-based technologies, Microsoft Energy Core supports organizations to develop AI solutions that improve operational efficiencies, enhance sustainability, increase energy innovation, and drive workforce transformation *(see page 3 for the Key Pillars and page 4 for the Engagement Protocol)*. Based in Dubai, Microsoft Energy Core has global scope.

Why now?
The energy industry faces its greatest overhaul in a century. But the rapid advances of digital tools under the umbrella of the 4th Industrial Revolution (4IR) can be major facilitators of innovative and sustainable change. The overhaul includes the global energy transition towards a greener world – the growth of both fossil fuels and renewables – in support of the Paris Agreement. Plus, global energy demand is rising to satisfy growing middle classes and a swelling global population, which the United Nations (UN) expects to be 9.7bn by 2050. Also, in this mix are extreme commodity price fluctuations. Most notably, the oil price fell into negative territory for the first time ever in April this year. The industry's chronic shortage of talent is also being exacerbated, in large part, by the need for more digitally aware human resources.

Harnessing digital allies
Against this backdrop, employing tools that better efficiency, bolster output, strengthen sustainability and enhance safety is a natural next step. Therein lies the value of AI, cloud-based technologies, and the wider digital toolbox of the 4IR. Momentum is already building. For example, the oil-focused digital services sector will rise from $5bn today to over $30bn annually by 2025, contributing $150bn in annual savings for oil companies, according to a 2020 report by Barclays. Plus, AI applications in four key sectors – energy, water, transport, and agriculture – could contribute up to $5.2trn to the global economy in 2030, a 4.4% climb relative to business as usual, according to PWC in 2019. The application of AI levers could also reduce worldwide greenhouse gas (GHG) emissions by 4% in 2030. The need for energy security, as well as a healthy planet, is rarely far from industry leaders' minds.

Microsoft Energy Core, and its AI Academy, can help turn the global narrative into one of innovation, long-term value, security and affordability. Participants will not only be at the forefront of digital innovations that will act as a relief valve for the pressures facing the industry worldwide. But they will also be instrumental in deepening the industry's collaborative spirit and reaffirming its relevance in a 21st century digital age.

47%
Nearly half of CEO respondents mentioned technology as one of their top two ways to improve productivity in the Gartner 2019 CEO and Senior Business Executive Survey.

$320bn
PwC estimates that the Middle East alone will accrue 2% of the total global benefits of AI in 2030 – equivalent to $320bn.

14%
In relative terms, of this growth, PwC expects the UAE to report the biggest impact with up to 14% of GDP in 2030.

Source of Whitepaper

This Special Report focuses on the exclusive insights harvested from Microsoft Energy Core's inaugural Industry Board Meeting on the 3rd June, 2020, with Gulf Intelligence as the project knowledge partner. Its pressing questions on what is next for global trends and challenges were harvested from the opinions and brainstorming of 28 high-level executives who dialed in from nine countries on three continents – the Middle East, Europe, and Asia. The Chatham House Rule applies to all, bar those featured.

Sources:
Barclays: https://novilabs.com/wp-content/uploads/2020/02/Barclays_Frac-to-the-Future-Oils-Digital-Rebirth_01152020.pdf
PwC: https://pwc.to/2YoxLPP - https://www.digitalpulse.pwc.com.au/report-ai-earth-sustainable-future/
Gartner 2019 CEO and Senior Business Executive Survey:
https://www.gartner.com/en/newsroom/press-releases/2019-05-08-gartner-survey-reveals-that-ceo-priorities-are-slowly
United Nations: https://www.un.org/development/desa/en/news/population/world-population-prospects-2019.html

Founding partners

Microsoft Energy Core's Key Pillars

Together with our valued partners, Microsoft Energy Core works across four key pillars:

1. Accelerate digital transformation
By applying advanced AI technologies, such as machine learning and cognitive services against the data coming in from processes, you now have a value-added layer of insight into your data. This allows you to improve operational efficiencies, speed production, optimize equipment performance, minimize waste and maintenance costs in order to transform the energy value chain from the digital oil field to the connected prosumer. It also enables you to create better customer and social outcomes as a sustainable energy operator and service provider.

2. Drive responsible innovation
AI is a driver of economic opportunity. Our goal is to make AI accessible and valuable to every business by infusing intelligence across all our products and services. AI creates new opportunities for every person and every organization, with the potential to advance nearly every field of human endeavor and address countless societal challenges. But AI also poses new challenges that require all stakeholders to develop and embrace different accountabilities and shared responsibility to ensure AI will be developed and deployed in a trusted and inclusive way. Microsoft Energy Core is working on building lasting, meaningful alliances with energy industry players, technology partners and academic institutions. Together, we will infuse the energy sector with the power of the intelligent cloud, enabling innovation to flourish.

3. Skilling and employability
AI is changing how business works across all industries. It will transform lives, transform communities, societies, and nations with people at the center – in ways unimaginable to us. We believe humans and machines will work together to not only boost productivity, but also to create new jobs that are enhanced by AI. At Microsoft, we understand the importance of constantly sharpening teams' technology skills and capabilities to keep pace with the rapid technological advances.

The Microsoft Energy Core's readiness on AI and cloud capabilities leverages Microsoft's investments in AI skilling complemented by contributions from leading universities, educational institutions, and industry partners to deliver AI readiness programs tailored for the energy sector. Through a robust and diligent curriculum, we aim to solve real world problems through industry specific workshops and hackathons. We seek to design technology that complements rather than substitutes human labor. Working with machines, humans can drive better business outcomes, discover new ways to protect and preserve the planet, cure the incurable, and transform industries.

4. Sustainability and societal impact
Microsoft's cloud and AI technologies are changing not just the world of business, but the world itself. Microsoft is tackling global environmental challenges and contributing to more sustainable business practices globally. Through AI for Good, we are democratizing access to AI for everyone who wants to contribute to protecting the planet's natural resources. And one of the great things about the cloud and Azure is that it makes that democratization so simple, because anybody, anywhere with an internet connection can now have access to some of the most powerful technologies since the industrial age.

Source: Microsoft Energy Core: https://www.microsoft.com/energycore/Default.aspx

Microsoft Energy Core's Protocol of Engagement

- Microsoft Energy Core's industry board agrees to collaborate and exchange knowledge to accelerate innovation and digital transformation in the energy sector.
- Microsoft Energy Core's industry board members will attend quarterly meetings to establish an industry challenge to solve for using AI (see page X). The identified challenge will move onto the ideation phase of the Centre's integrated strategy where solutions will be brought to life through hackathons.
- Microsoft Energy Core Industry Board Members will be elevated as 'Featured Speakers' on a rotating basis for each quarterly board meeting.
- Microsoft Energy Core's industry board members will deploy at least one representative from their respective institutions to each hackathon to bolster the Centre's posture and commitment to advancing digital transformation in the energy sector.
- Microsoft Energy Core's industry board will commit to qualify at least one minimum viable product that emerges from each hackathon and assess its viability to be deployed in a working environment. If the pilot phase of a minimum viable product proves to be successful, Microsoft Energy Core's industry board will strive to support further incubation and establish a strategy towards scaled roll out.
- Each quarter, Microsoft Energy Core's industry board members will deploy one representative from their respective institutions into the AI Academy to conduct a lecture on the practical applications of AI and the digital skills necessary for the future of work in the energy sector.

Inaugural Hackathon Challenge

Energy Core's first industry challenge to solve using AI

As per the second point on the Protocol of Engagement, board members will identify an industry challenge to be solved using AI once a quarter. Each challenge will be in line with one, or more, of the Energy Core's four key pillars: accelerate digital transformation, drive responsible innovation, skilling and employability, sustainability and societal impact. This first challenge for the Hackathon primarily falls under the latter: sustainability. In the inaugural Hackathon, technologies will be closely explored, with the goal of identifying a roadmap for adoption.

Challenge topic:
Methane leak detection and its environmental impact

Hackathon objectives:
- Identify sources of releases
- Release journey: GHG release from inception to diffusion
- Using AI and machine learning to enable operators to control and limit releases
- Establish recommendations and a roadmap for the future

Summary
The term sustainability is often used interchangeably in the oil and gas industry with sustainable development, where development meets the current generation's needs without compromising the ability of future generations to meet their own needs.

Meeting new targets
Fossil fuels will remain an essential part of the energy mix. It is on the industry to manage production safety to reduce emissions, discharges, and the ecological impact, while providing energy at a reasonable cost. In addition, companies face complex investment challenges due to the extreme price volatility and challenging operational environment of exploration and production (E&P). Proper detection, reporting and analysis mechanisms are considered key enablers of sustainable development at the oil and gas company level.

GHG emissions from oil and gas operations, especially methane, pose a critical challenge for the industry as it receives more and more scrutiny from investors, government, and the public, all of whom are demanding ambitious reductions. There are several key GHGs, such as CO_2, NO_2, SO_2, N_2O and CH_4 (methane) releases, emitted by the oil and gas industry, especially refineries and petrochemical operations. Methane is responsible for 25% of global warming, with over a third of such emissions from oil and gas. All these emissions are calculated as CO_2e (carbon dioxide equivalent). Detecting GHG emissions and leaks has been difficult due to technical, logistical, and cost limitations.

Gamechangers?
However, existing, and upcoming emissions tracking satellites (e.g. GOSAT-2, Tropomi, GHG Sat, Bluefield, EDF methane SAT) offer a breakthrough towards precise, timely, and affordable detection on a large scale. The data these satellites can capture is relatively new and could be enhanced by applying AI and machine learning models.

Precise and scalable methane monitoring via microsatellites is a promising new technology, which will make it possible to monitor methane and other GHG releases. As with any new technology, there are limitations in terms of coverage, visibility to satellites, and front-loaded cost. However, such limitations are likely offset by the potential benefits expected.

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An extract of the hackathon presentation:

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A planet-sized challenge

Sustainability – Environment: How can digitalization reduce emissions, improve adherence to environmental obligations, and contribute to global decarbonization?

"Sustainability" refers the process of maintaining a certain level of continuous productivity in a community, organization, etc. The term is often used interchangeably in the oil and gas industry with *sustainable development*, where development meets the current generation's needs without compromising the ability of future generations to meet their own needs.

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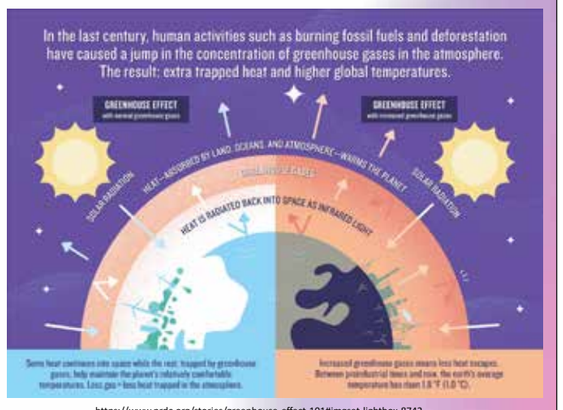
Earth's greenhouse gases trap heat in the atmosphere and warm the planet. The main gases responsible for the greenhouse effect include:

1. Carbon Dioxide
2. Methane
3. Nitrous oxide
4. Fluorinated gases (synthetic)

https://bcfarmsandfood.com/wp-content/uploads/methane-co2-balance-scale-new345.png



https://www.nrdc.org/stories/greenhouse-effect-101#imgset-lightbox-8742

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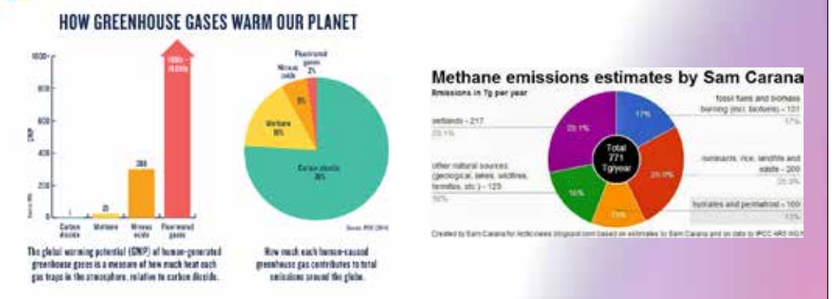

On an annual basis, these ultra-emitting oil and gas sources would result in just over 10 million tonnes (Mt) of methane. That is around 15% of our latest estimate of global methane emissions from oil and gas. A critical question for the industry and for policy makers across all countries is how to tackle these very large emissions sources.

FULL PRESENTATION ON REQUEST

OPINION

Responsible AI is non-negotiable

By Mark Chaban, Chief Technology Officer, Microsoft Middle East & Africa

The positive opportunities of AI are boundless. It promotes speed, precision, accuracy and is immune to the hostile environments found in energy operations. AI has the potential to overhaul the entire industry's balance sheets and human resources for the better – and safer. It can manage distributed power generation, streamline smart cities, create a bridge of efficiency between legacy infrastructure and 'new' energy, such as renewables, to name just a few.

Take energy efficiency as an example. Consider that the International Energy Agency's (IEA) latest data showed that primary energy intensity – how much energy is used by the global economy – in 2018 improved by just 1.2%. Now consider that this, the slowest rate of betterment since 2010, still amounted to a staggering $1.6trn more GDP for the amount of energy used compared to 2017. Now factor widespread AI into this equation and ask whether businesses can afford to ignore the added value of AI? No, especially not amid the challenges of the energy transition and in the current economic climate.

BE SMART

As with any new market, there are areas that must be carefully managed, notably ethics. Under this umbrella comes fairness, privacy, and truth.

Microsoft's approach to responsible AI is grounded in our ethical framework and deeply embedded with our timeless values. But the AI technology itself is not aiming to be ethical. We are trying to mitigate biases that are built into the system, but there is no way we can ensure biases will not be part of the broader ecosystem. We have all read the news headlines of how AI used in surveillance states for facial recognition are raising concerns. We are also seeing a steady rise of fake news, or deepfakes, which are being exacerbated by the 24/7 news cycle and social media. And then there are the biases being propagated through consumer services. For example, does an internet search reflect the results of the world you have asked to see, or one that a corporate has decided you should see?

AI BUSINESS SCHOOL

Part of our efforts to continually build a culture of AI that is responsible is the launch of the AI Business School, which enables you to get insights and practical guidance from industry leaders, executives, and AI experts. With their input, companies can judge how best to make AI part of their new and stronger operational norm. Several modules focus on responsible AI, as well as best practices. Microsoft has also established an Office of Responsible AI, which among other things, outlines the consistent approach that the company will have for the design, development and delivery of technologies internally and with our customers. Additionally, the office brings together teams from engineering, customer-facing, legal and small and medium-sized enterprises (SMEs) to review sensitive use cases. At Microsoft, we have also established an internal committee, which brings together engineering, research, and customer centric teams to ensure that we review sensitive cases. This level of collaboration is vital to ensuring our offering is in line with our six principles (please see below).

Looking ahead, businesses, governments and academic institutions must ask themselves, 'how can I quickly maximize the use of AI?' This is not an overnight exercise, but the sooner you start, the sooner you will benefit. •

TOP 3 CHALLENGES OF IMPLEMENTING AI?

- **Instilling a sense of urgency to implement AI.**
- **Ensuring biases are not accidentally built into the system.**
- **Identifying dedicated and skilled resources to help customers and partners build high quality AI systems.**

Microsoft's AI Principles

1. Fairness
2. Reliability & Safety
3. Privacy & Security
4. Inclusiveness
5. Accountability
6. Transparency

2016

Microsoft's work on responsible AI gained pace four years ago, with the view of aligning the six principles to meeting customers and partners' goals.

1st

Microsoft was the first company to get to human parity in machine reading in 2018.

1950

The Turing test illustrates the need to tread smartly with AI. The test was proposed in 1950 by the English mathematician Alan M. Turing to determine whether a computer can 'think'. It was passed for the first time in 2014 by a computer program called Eugene Goostman. Those talking to him online were convinced that his language was that of a 13-year-old Ukrainian boy.

Sources:
IEA: Energy Efficiency 2019: https://bit.ly/37nl7DF
Turing Test: https://www.britannica.com/technology/Turing-test

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Chapter 2: Partnerships 4.0

How to foster industry collaboration to spur digital transformations?

TOP 3 CHALLENGES

**Harvested from speakers' comments during the event.*

- **How best to use digitalization to create a collaborative yet competitive posture?**
- **How can digitalization help business partnerships without destabilizing agreements?**
- **How best to hasten industry-academia cooperation, especially in the realm of innovation?**

INSIGHTS

Don't underestimate the collective power of energy stakeholders.
In the energy industry, countries and companies working together have built many economies from the ground up, including in the Middle East. They have played a central role in the civilization that so many of us benefit from today. But the current transformation of the energy landscape – the greatest in a century – demands a new type of collaboration. One that is more transparent, more accessible, more accountable, and more productive. This cooperative narrative is especially necessary in a post Covid-19; partnerships and knowledge-sharing are more valued than ever.

"Partnerships hold great benefits for all involved. Sometimes it is about technology, sometimes it is about business, sometimes it is about both. And sometimes it is about working across industries and competitors. But ultimately, it is always about providing unique value. This is what we must collectively focus on by maximizing innovative platforms, like Energy Core, to achieve positive disruption in good time."

Ali Faramawy, Corporate Vice President, Digital Transformation & Partnerships, Microsoft

CATCHING UP

Momentum is rapidly building in the energy sector to take advantage of the digital transformation. All stakeholders now appreciate how digitalization can result in quicker, seamless, cheaper, and safer operations. But all must equally understand that this transformation is really a business transformation, rather than a technological one. The technologies and digital tools are facilitating the transformation, but it is business and politics driving it. And so, joint efforts between all stakeholders – industry, government, academia – are critical. This cultural change will flounder without unity.

COLLABORATION VS COMPETITION

"If you are not with me, you are against me." This is what one speaker shared their corporate stance used to be. Of course, this has evolved to be more open and more connected within the organization and with partners. Their effort paid dividends, the speaker added. Many companies worldwide have had their revenues cut in half overnight amid today's global pandemic. The subsequent strains can mean that reaching out to foster partnerships, especially in a new field like the 4IR, is not a priority.

But it must be the opposite. According to Henrich Greve, a professor at INSEAD Business School, in a Telstra report: "The traditional alliances are always about the complementarity of assets. Digital partnerships, however, are all about knowledge. This is because firms are so specialized, and knowledge is really difficult to get." Evidence of the rewards from digital partnerships include the development of new capabilities, access to new ideas, faster innovation, and faster time to market. All will help foster genuine collaboration. At the most basic level, companies must be clearer on where they do, and do not, compete so that they can have clear and productive conversations from the start.

ACADEMIA'S ROLE

Universities can breathe fresh air into energy alliances, especially when it comes to innovation. Academia can package up different component technologies to help solve problems for industries, which are more vertically oriented in their thinking, as well as bring those partners from industry together on 'common ground'. But this can only work with strong alignment between industry and academia in a broader research and development (R&D) ecosystem. A closer relationship between the two makes it easier to earmark precisely how academia can help industry, i.e. ensuring useful right skills, R&D and products are entering the market. The incubation of startups is also one of the major areas where industry-academia collaboration can both benefit.

The innovation and spirit of unity that founded the oil and gas industry in the early 1900s must be revived for collaborations to thrive. For example, the first standard data platform for the oil and gas industry, which aims to reduce silos and put data at the center of the subsurface community, has been created by The Open Group's Open Subsurface Data Universe Forum. It is available on Microsoft Azure's public cloud platform. Accelerating this positive trend means building trust; something that can be in short supply, as commodities, can be highly politicized. But navigating this by building more transparent relationships with partners and customers will help companies accelerate their digital transformation. •

"There is a huge new set of platform technologies, including AI, that are spurring companies' ability to innovate. From a university perspective, when we work with a company, we really see that we can have perfect alignment within that digital space. This is especially important because we all need a digital workforce that is prepared to commit to the energy sector."

Dr. Steve Griffiths, Senior Vice President, Research and Development, Khalifa University

Case studies

1. Microsoft, Baker Hughes and C3.ai formed an alliance in November 2019 to bring enterprising AI solutions to the energy industry on Microsoft Azure, an industry-leading cloud computing platform. This alliance will enable customers to streamline the adoption of scalable AI solutions for the energy industry that help promote safety, reliability, and sustainability. As any good partnership should, it employs strengths from each company. From the significant energy technology expertise of Baker Hughes, to C3.ai's proven AI platform and applications, and the Microsoft Azure cloud computing platform. Solutions will be tailored to address challenges across the entire value chain, from inventory optimization and energy management to predictive maintenance and process and equipment reliability.

2. Microsoft, Schlumberger, and Chevron announced the industry's first three-party collaboration to accelerate creation of innovative petrotechnical and digital technologies in September 2019. Data is fast emerging as one of the most valuable assets, yet its full value is often trapped in silos. The three companies will work together to build Azure-native applications in the DELFI* cognitive E&P environment initially for Chevron, which will enable companies to process, visualize, interpret and ultimately obtain meaningful insights from multiple data sources. DELFI* is a secure, scalable, and open cloud-based environment providing seamless E&P software technology across exploration, development, production and midstream. Chevron and Schlumberger will combine their expertise and resources to accelerate the deployment of DELFI solutions in Azure, with support and guidance from Microsoft.

50%

A 2019 study by the Multidisciplinary Digital Publishing Institute found that collaborative competition, when it lasted from three to five years, had more than a 50% chance of mutually reducing company costs throughout industry.

10

One of the many successful examples of collaboration so far is the Oil and Gas Climate Initiative (OGCI). The CEO-led consortium is composed of twelve global oil and gas companies from the region, including Shell, Total, Chevron, Exxon Mobil, BP, CNPC, Saudi Aramco, Repsol, Petrobras, Occidental, Equinor and Eni.

OPINION

Collaboration equals a collective win

By Abdul Nasser Al Mughairbi, SVP Digital, Abu Dhabi National Oil Company (ADNOC)

We must move beyond pilots and find tangible ways to work with industry partners. This is how we bring the energy ecosystem to the next level.

The oil and gas industry has a wealth of internal knowledge and data that must be better used. Bringing that intel together with external resources, like academia and those from outside the industry, will create a much more robust digital transformation journey. It will mean we can all hit our individual and united targets.

Data really matters
Data lies at the core of what we are doing. But it is not simple. Access to data and the ability to send it through the pipeline for AI to consume it and identify valuable insights remains a complex process. It is not yet as streamlined as it needs to be across the energy industry. Having integrated operations helps us make this a quicker process. For example, ADNOC is a fully integrated oil and gas company: all the way, from the well to retail. This means we can quickly leverage digital tools across the value chain to remove operational bottlenecks and bolster visibility. In this vein, improving data processes can be simpler. Companies with more scattered operations may need more support. As per the ecosystem, we should all be there to give it.

Environmental focus
In the 1990s, oil and gas industries formed a strong partnership on HSE, allowing everything to be shared openly. This paid dividends, as the industry is extremely safe. What lessons can we take from this success and apply to industry collaboration to adopt and embed the 4IR? The same applies to embracing cost efficiency, energy efficiency and sustainability. Accelerating the digital transformation must be a holistic effort that encompasses fossil fuels and renewables to ensure ultimate security of supply. Nobody can do everything, which is why Microsoft's Energy Core, among many other initiatives, is so valuable. We need a common platform to share and learn together. Remember, no man is an island.

"Digitalization is rapidly evolving in the industry. One of the things that is becoming normalized is obviously data, and the fact that the cloud is available to everyone. But protocols are very important – an area that we must all work on together to improve."

Ahmed Hashmi, Chief Digital Officer and Technology Officer, Upstream, BP

Sources:
Multidisciplinary Digital Publishing Institute: https://www.mdpi.com/2071-1050/10/8/2688
Telstra: http://connectedfuture.economist.com/wp-content/uploads/2016/10/Connecting-Companies-Whitepaper_final.pdf.pdf
Microsoft, Baker Hughes, C3.ai: https://c3.ai/c3-ai-microsoft-baker-hughes-announce-artificial-intelligence-partnership-for-oil-and-gas-industry/
Microsoft, Schlumberger and Chevron: https://news.microsoft.com/2019/09/17/schlumberger-chevron-and-microsoft-announce-collaboration-to-accelerate-digital-transformation/
OGCI: https://oilandgasclimateinitiative.com/wp-content/uploads/2018/09/OGCI_Report_2018.pdf
Open Subsurface Data Universe Forum: https://www.opengroup.org/osdu/forum-homepage

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Chapter 3:
Digital Workforce of The Future?

How to develop human capital as digitalization becomes mainstream?

TOP 3 CHALLENGES

**Harvested from speakers' comments during the event.*

- **How can industry and academia identify the digital skills that the workforce needs?**
- **How to most efficiently share best practices to upgrade staffs' digital awareness?**
- **How can employers boost their digital offering to attract and inspire new talent?**

INSIGHTS

Attracting the best minds has never been more important. But it has also never been so complicated. Therein lies the value of collaboration.

AI, the cloud, automation and many more tools of digitalization are transforming the way we work. Some jobs will disappear, others will grow in importance, and jobs that do not even exist today will become commonplace. Technology is not the only factor – it must be coupled with talent readiness. As the energy industry is quite dependent on the knowledge worker, and the energy landscape is rapidly transforming, it is time to reshape this core expertise. Collaborating in an open, transparent and progressive space, like the Microsoft Energy Core, will help curate the workforce of the future.

"Technology providers speak one language and business providers speak another. There must be unity."

Nabil Al Nuaim, Chief Digital Officer, Saudi Aramco

Employers' list of desirables from candidates is getting increasingly long. Candidates must be equipped with the right knowledge base, adaptable intelligence (AQ), critical thinking, communication, collaboration, and creativity. But relatively new to this list is the need for candidates to also be digitally aware. This is a tall order, but all are linked to an ability to think innovatively – one of the most coveted skills of all.

"We have created a complete pipeline to groom the future digitally enabled workforce for the industry. First, we are building talent's digital literacy and then, their business acumen. Then we provide them with a concentrated learning period, for example, studying AI. On graduation, they are ready for the digital workplace"

Dr. Adel Fadhl Noor Ahmed, Dean, College of Computer Science and Engineering, KFUPM

Main types of digital talent

Super users:
Can produce better and faster insights. They have elite digital skills and provide feedback to technology developers to continually advance digital products.

Process disruptors:
Can redefine end-to-end decision and operation processes. They can integrate digital tools, such as AI, across businesses. Industry collaboration is fundamental to finding such talent.

Digital enablers:
Can bring the specifications and the designs from the first and the second group to reality. Such talent is needed in bulk.

WHAT'S NEXT?

The job market is already changing. Examples of practices becoming mainstream in the oil and gas industry include cloud connectivity and mobile access to applications, and data and automation of repetitive tasks to free up more worker hours for value-added tasks. Data is being collected on a range of metrics to cultivate management decision-making, and automation has replaced the must-have human talent for welding. But this is just the beginning. The industry's push to "drill for data" is spurring employers' demand for staff with more advanced digital skills, including AI and predictive analytics.

On the other side of the job market is a shortage of digitally aware talent. Employers have found that as they start pilots and projects, they run into a roadblock as the talent gap becomes clear. Saying that, many in industry and academia are still not sure what the talent pool should look like; there is simply too much change now.

Chief Digital Officers are spending 40% of their time trying to pin down what skills they really need, one speaker pointed out. "We need to create the wave of talent if we do not have that wave yet," he said. Cross-skill programs are one route to developing more digitally savvy, novel-thinking industry experts. Another speaker said his company was trying to empower thousands of PhD holders with data science, i.e. make them data scientists. It goes both ways, of course. Employers must also work harder to incentivize talent. According to the last Microsoft Diversity and Inclusion Report, the diverse and inclusive companies are more innovative, profitable and better at retaining top talent.

SUCCESS STORY

Industry-academia alignment is crucial. Over the last four months, the King Fahd University of Petroleum and Minerals (KFUPM) said it has adapted its teachings to contribute to this digital transformation. Among other efforts, it has revised its undergraduate program to ensure students are both digitally and business enabled, meaning they can 'speak the same language' in the workplace. Every graduating student will have digital literacy in data science and AI, as well as business and entrepreneurship. This addresses the call by industry and government for businesspeople who are both digitally aware and entrepreneurial. It shows that, through collaboration, the tall order for talent is still a viable target. •

33%
A third of CEOs cite cyber threats as the biggest threat to their business in 2020, according to PwC's 23rd Annual Global CEO Survey. Companies must invest in digital talent for protection, as well as innovation.

32%
The availability of important skills, including digital, is next on CEOs' lists as a top threat to the business environment in 2020.

34%
Just over one third of CEOs in the Middle East specifically said the speed of technological change and the cyber threats are the biggest risks in 2020.

Sources
Microsoft: https://cloudblogs.microsoft.com/industry-blog/en-gb/cross-industry/2020/01/20/investing-in-your-talent-the-journey-to-a-diverse-and-inclusive-workforce/
PwC: https://www.pwc.com/gx/en/ceo-survey/2020/reports/pwc-23rd-global-ceo-survey.pdf

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OPINION
Do you have holistic digital talent?
By Nabil Al Nuaim, Chief Digital Officer, Saudi Aramco

Does your company have a digitally enabled workforce or a digital workforce?
The difference is that a digitally enabled workforce refers to the whole company's digital awareness, not just a team of data scientists in the IT department. For example, introducing AI to a select number of workers who can understand and adopt it is not the same as embedding a culture of digitalization and relevant skills across all levels of an organization. Adopting a more holistic view of digitalization, to create a digitally enabled workforce, will help both current staff and attract new employees.

Speak digital
The energy industry needs a common digital language for the tools of the 4IR to become mainstream, both for current and prospective staff. When we talk to technology providers, they speak one language and business providers speak another. There must be unity. This means identifying and then working on a common framework, such as a technical foundation language. This means everyone understands the conversation, be it about AI, the cloud, the Industrial Internet of Things (IIoT), and so on. This saves time and confusion, which ultimately saves money, strengthens output, and improves safety.

Leverage academia
Industry must maximize the vast intellectual and practical value offered by academia. This is a vital springboard to enhance human capital in the digital space. This could include developing virtual development hubs, where a small group of data scientists can work on a specific industry challenge. Feeding this appetite for novel thinking is vital to pushing new boundaries; something the energy industry must do to thrive in this time of major change. This co-development arrangement marries the business expertise of industry and the digital expertise in academia. Ultimately, it means both parties keep pace with the rapidly developing 4IR.

"No one can do it alone. We all need to have an open dialogue about where we compete and where we collaborate when it comes to digital talent of the future. Generally, we must be more creative and look at talent as a spectrum of possibilities. It needs to be an ecosystem of talent, as opposed to having them all under one roof."

Xiaojun Huang, Senior Advisor Upstream Digital Transformation, ExxonMobil

"Industry-academia alignment is a vital springboard to enhance human capital in the digital space."

Microsoft

Chapter 4:
Sustainabillity – Environment

How can digitalization contribute to global decarbonization?

TOP 3 CHALLENGES

**Harvested from speakers' comments during the event.*

- **How can digitalization accurately and quickly identify and plug methane leakages?**
- **How to use digital tools to identify CO_2 storage opportunities more efficiently?**
- **How to accelerate digitalization within CCS projects and harvest best practices?**

INSIGHTS

Digitalization must be leveraged as the gamechanger it is for the industry's – and indeed the world's – environmental targets.

In the past five years especially, there have been significant advancements worldwide. For one, industry, both state-owned and private, has taken meaningful steps forward. For example, the OGCI each pledged $100mn to OGCI Climate Investments (OGCI CI) to develop and fast-track the commercial utilization of innovative, low-emission technologies.

Refining and petrochemicals have been in the vanguard of process automation for many years. And national oil companies (NOCs) are leveraging their global R&D network, including exploring how to use digitalization to rethink the combustion engine, speakers shared. But the Global CCS Institute said there are only 59 CCS facilities in various stages of development worldwide. It is not a new idea; implementation should be much higher.

Most recently, digitalization has shown its value as lockdowns worldwide mean remote working has become the norm. The use of cloud computing, among many other digital tools, means that the monitoring and processing large amounts of data captured from energy operations can be 'digested' in real-time in multiple homes. For one, this saves on vehicle pollutants from staff visiting sites or working in offices. This is having an unexpected, but welcomed, impact. For example, the Indian capital New Delhi frequently tops the world's most polluted city lists. Yet it saw a 60% reduction in PM2.5 levels from March 23 to April 13 from the same period in 2019, according to IQAir, a global air quality information and tech company.

"We would like to see the energy industry be able to pin down the carbon footprint for a barrel of oil. And more specifically, the carbon footprint of a specific barrel of oil."

Vanessa Miler, Director, Energy Innovation & Impact, Microsoft

"Amid the Covid-19 pandemic, we are all learning a lot about how to better use digital tools to improve environmental awareness. Now we must try to make sure we adopt these sustainable changes for the long-term."

Torbjørn Folgerø, SVP & Chief Digital Officer, Equinor

Untapped potential

Digital tools could help the world to reduce its energy use by 1.3bn megawatts (MW) and 15% respectively by 2030, according to the UN. The World Economic Forum and Accenture echo this potentially positive impact. They said digital transformation in the energy industry could create benefits worth approximately $640bn for wider society, which includes $430bn from lowering emissions. It also includes reducing CO_2 equivalent emissions by 1,300mn tons, avoiding oil spills equivalent to 230,000 barrels, and saving 800mn gallons of water. The latter is especially relevant. The Middle East and North Africa (MENA) has one of the world's worst rates of water scarcity, a fact that poses a threat to habitation in the second half of this century. Unfortunately, this is just one of the environmental pressure points.

1.5°C

The Paris Agreement sets out a global framework to avoid dangerous climate change by limiting global warming to well below 2°C and pursuing efforts to limit it to 1.5°C. It is the world's most comprehensive climate-mitigation agreement to date.

$1bn

Microsoft launched an initiative to use its technology to help its suppliers and customers worldwide reduce their own carbon footprints, with a $1bn Climate Innovation Fund to accelerate progress.

3

The fund will have three focus areas: to accelerate the global development of carbon reduction, carbon capture, and removal technologies.

2021

Carbon reduction will become an explicit aspect of Microsoft's procurement processes for its supply chain.

GI Consultancy
Gulf Intelligence

OPINION

Use digitalization to rethink environmental goals

By Vanessa Miler, Director, Energy Innovation & Impact, Microsoft

A pivotal step to hitting the goals of the Paris Agreement is using the digital tools we have available.
When considering the scope, variety, and rapid change across the global energy industry, having real-time insights to make the best decisions quickly is essential. This is where digitalization comes in. Only then can management or mitigation solutions be identified and rolled out. But digital tools are an aid, not a silver bullet. Their value can only be maximized in an innovative, collaborative environment.

For example, our new biodiversity initiative aims to put data and digital technology to work, including through an ambitious program to aggregate environmental data from around the world and put it to work in a new "planetary computer". We plan to combine this and our expanded AI for Earth program with new work enabling partners and customers to use the resulting output to enhance environmental decision-making in their organizational activities. Also, we will speak out on ecosystem-related public policy issues, take responsibility for Microsoft's own land footprint, and share our plans on water. And we will share our plans on waste this summer.

Rallying action
Microsoft is not just talking the talk; it is walking the walk. The company is going to be carbon negative by 2030. This means going beyond carbon neutral and beyond net zero, to also be carbon negative. But that is not all. By 2050, Microsoft will remove from the environment all the carbon the company has emitted, either directly or by electrical consumption, since it was founded in 1975. Hitting these ambitious, but very necessary, goals means using technologies that remove CO_2 emissions from the atmosphere, such as CCUS. While such projects are emerging worldwide, industry is still far behind where it should be. We must all catch up, for our collective sakes.

Counting carbon
Environmental data clarity must be compulsory. For example, identifying the carbon footprint on a single barrel of oil is something the industry must aim for. Think of it like the 'farm to table' concept. We must know what the carbon footprint of that single barrel of oil is along its entire journey, from the well to retail. This requires working together – industry, technology providers, academia, and governments – to maximize AI and broader digitalization to generate and transmit real-time data. This data then needs to be fed to operation centers that can then employ AI and other tools to harvest knowledge. This is the most efficient way to help those along the value chain upgrade their best practices. Industry-wide collaboration is a must.
There is no time for bureaucratic back-and-forth. Time is not on the industry's side; most countries are already missing their climate goals.

"Industry must collaborate like never before. The Energy Core is an excellent platform to identify common goals – and reducing CO_2 emissions is certainly a shared interest for every single one of us."

Daniel Jeavons, General Manager, Data Science, Shell

BOLSTER EFFICIENCY

Energy efficiency, a cornerstone of the Paris Agreement, is also instrumental to accelerating decarbonization. For example, more and more residential and commercial buildings are equipped with smart appliances and intelligent energy management systems, the IEA detailed. In the industry sector alone, advanced robotics and 3D printing are becoming standard practice, and the interaction between automated, connected, electric and shared (ACES) mobility is reshaping energy consumption. And US -based energy company Hess Corporation expects to optimize costs and strengthen efficiency by roughly 40% by transferring workloads to a Platform-as-a-Service (PaaS) solution through cloud adoption. This includes 10%-20% saving in labor costs overall. But again, much more must be done. •

"An area that remains largely underutilized is CO2 storage; digital technologies have a lot of untapped potential in this field. Many companies' climate targets are very, very ambitions, especially those aiming for net zero by 2050. To make this happen, we must collectively leverage digitalization, including AI, on common platforms, like Energy Core."

Trygve Randen, President of Software Integrated Solutions, Schlumberger

"We are very excited by how the Open Group Open Subsurface Data Universe (OSDU) is shaping up, including its phenomenal number of members. The standards that have been created now go way beyond the original scope, and are moving into renewables and asset performance monitoring. Looking ahead, shared data standards are going to be fundamental to move the needle in this space. We have started to work with a select number of the OSDU members around what we are calling open footprint, i.e. to develop standardized ways with the industry and non-governmental organizations (NGOs) to calculate our environmental footprints. If we try to do it in a way that it is Shell proprietary, we will inevitably face scrutiny, as will the industry. But if we are able to in an open way and get the buy-in of the NGOs and academia, then there is a real opportunity for us as industry to make this change."

Daniel Jeavons, General Manager, Data Science, Shell

WHAT'S NEXT?

For one, the industry must focus on cutting methane leaks. In the oil industry, 60% of the CO_2 emissions come from methane, speakers explained. There are already many digital options to both measure and mitigate these preventable leaks, including satellite imaging, predictive analytics, and smart sensors.

Another area of vast potential is CO_2 storage; an option that has largely been unexplored for fifteen years, speakers highlighted. Industry already has the fundamental tools to do this. The area where the CO_2 is injected must be geologically proven, which is similar to the subsurface processes used to store oil and gas. Pinning down geological storage capacity means using smart sensors, satellite imaging, AI, and digital twins, for example. All these tools are currently in play in parts of the energy industry; it is now a case of fully utilizing them. But the economics must be robust to attract investors into this relatively new territory. Building confidence that this can be a mainstream option – rather than the idea of a select few – is paramount to attracting investors.

Data transparency is also vital. Initiatives, such as the Open Subsurface Data Universe (OSDU), play an instrumental role in lifting the veil on data processes, harvesting and application. It also ensures that general data practices are held accountable, so that what is 'harvested' should be increasingly good quality. After all, weak data processes lead to weak data intel. The standards that have been created in this space are gradually moving across to the renewable markets, notably wind and solar, and mostly being used for asset performance monitoring.

Increasing the level of shared data standards is fundamental to 'moving the needle' of climate change. Energy companies – be they fossil fuel or renewable entities – cannot afford the time or finances to continually reinvent data handling internally, or in partnerships. Innovative initiatives, like Microsoft Energy Core, are pivotal to facilitating this common space and innovative space.

Overall, a holistic progress across all value chains is central to accelerating decarbonization, so both private and public entities must up their efforts. This will also help strengthen the industry's ability to attract high-quality and ambitious talent. Currently, its 'dirty' reputation does not fit the global narrative for a greener, cleaner future. ●

Environmental pressure points

The outlook for the planet's health should concern us all. For one, water shortages could affect 5bn people worldwide by 2050, said the United Nations (UN). There is also the grim news from the UN's Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). Its first Global Assessment Report on Biodiversity and Ecosystem Services showed that a quarter of the planet's species are threatened with extinction. Wetlands that purify and store water and provide habitats for thousands of species have been reduced by 87%. Coral reefs that provide aquatic habitats, food, natural flood barriers, medicine and millions of tourism jobs have declined by 50% in the modern era. Mammals, birds, and other wildlife populations are down almost 60% in the last 40 years, and the number of species threatened with extinction continues to rise rapidly. When an animal dies off, the ecosystem it called home begins to unravel and the implications can be catastrophic. There is no such thing as an overreaction to climate mitigation.

Sources:
Global CCS Institute: https://www.globalccsinstitute.com/news-media/press-room/media-releases/
IQAir: https://www.iqair.com/blog/air-quality/citizen-science-air-quality-monitoring
Accenture: https://www.accenture.com/_acnmedia/pdf-69/accenture-cloud-vision-pov-oilgas-112117final.pdf
Microsoft: https://blogs.microsoft.com/blog/2020/04/15/a-healthy-society-requires-a-healthy-planet/
Cyprus Institute: https://www.cyi.ac.cy/index.php/in-focus/climate-exodus-expected-in-the-middle-east-and-north-africa.html
United Nations: https://www.unwater.org/water-facts/scarcity/
OGCI: https://oilandgasclimateinitiative.com/wp-content/uploads/2018/09/OGCI_Report_2018.pdf

Chapter 5: Health And Safety (HSE)

How can AI enhance the HSE of operations in the energy industry?

TOP 3 CHALLENGES

**Harvested from speakers' comments during the event.*

- **How can AI create a more proactive posture to risk mitigation?**
- **How to standardize data along companies' value chain and in partnerships?**
- **How to streamline the quality of raw data inputs to maximize the value of AI?**

INSIGHTS

Zero fatalities, zero incidents, zero harm to the environment. This is the goal. AI, and broader digitalization, can make it a reality. But there's some way to go yet.

Up to 40% of accidents in the energy industry are due to human error, approximately 40% arise from equipment faults, and 20% are from issues with process. All are preventable.

Up to $2bn was spent in the oil and gas industry on AI and machine learning to help solve such problems in 2019, according to one speaker. Combine this with a history of strong collaboration in the HSE community – ultimately creating one of the safest industry's worldwide – and creating a zero-harm environment seems within reach.

Leveraging AI is especially pertinent now. For example, rising energy demand means offshore activity has increased and more rigs are being built. The operational life of older assets is also being extended, said the Worldwide Offshore Accident Databank (WOAD). Plus, new geographies are being explored and operations are moving into deeper and colder water, increasing risk.

Covid-19 is also brightening the spotlight on HSE. Undoubtedly, the pandemic will accelerate digital efforts in the HSE arena. Most obviously, professional spaces – notably staff's proximity to others – must completely change in the near-term.

"In 2019, approximately $2bn was sold into the oil and gas industry in the vein of using AI and machine learning to help solve problems. So, if we take this knowledge of the past and combine it with the automated sensors we have today, that represents a big opportunity for positive change."

Norm Gilsdorf, President, Honeywell, High Growth Regions, Middle East, Russia

For example, plans to utilize drones for inspections and using algorithms to pin down hotspots of risk have a greater urgency. Plans that may have taken years to implement must now be done in weeks, in order to sustain operations.

MOMENTUM IS BUILDING

Energy companies generate a huge amount of data – both current and historical – and digitalization means that this data can be used to accelerate innovation so that computing systems can see, hear, learn, and reason. All lie at the core of improving HSE.

For example, AI and advanced wireless networks can help compute and analyze data locally in real-time, which supports crews using smart sensors to detect poisonous fumes. AI from wearable sensors can provide real-time monitoring to detect workers at risk, sounding the alarm for the rest of the crew. The same goes for smart safety jackets and helmets that are connected to the Internet of Things (IoT).

"If we utilize AI by using poor data, our forecasts and predictions will suffer. For me, AI is a connection between all disciplines. So, if we want to implement a really valuable AI approach, it must encompass multiple KPIs, not just those of one or two individuals."

Hamad Ahmad Al-Zaabi, Manager Innovation & Technology Group, KOC, Kuwait Petroleum

1970

The cumulative number of accidents appears to be increasing at an apparent linear rate over the last 50 years, according to the WOAD.

31

An annual safety performance indicators report recorded an 8% year-on-year drop in the Fatal Accident Rate, to 31 deaths in 2018, according to 46 members of the International Association of Oil and Gas Producers (IOGP). The trajectory is going in the right direction, but there is still a l ong way to go to hit zero fatalities.

37%

Hydrocarbon releases (HCRs) were the single largest category of reportable incidents, accounting for 37% of all events, according to Oil & Gas UK's Health and Safety Report 2019. This damages the reservoir, the infrastructure, and investors' confidences. In worst case scenarios, it can lead to loss of life.

Microsoft

OPINION
Digitalization is our best chance of zero-harm
By Darryl Willis, Vice President of Energy, Microsoft

Sheer will. That is what has dramatically improved HSE in the oil and gas industry over the last three decades.

The industry was determined to have stronger safety performance, especially in the context of significant events, such as the Deepwater Horizon incident. But this has not happened automatically. It required a vast amount of coordination and sharing of best practice across supply chains. The hard work paid off: corrections have been made both in-house and within joint ventures and partnerships.

A new ally

But now there are new challenges, notably safely meeting the rising demand for energy while curating a diversified energy mix. The good news is that there is also a new ally: AI and the broader scope of digitalization. For example, data modelling is a must for HSE stakeholders. In part, this uses AI and neural networking to interpret vast quantities of sensor data, which can then show the exact impact of explosions and leakages. Using digital tools is the only chance we have of achieving zero fatalities, zero incidents, and zero harm to the environment. But it means working differently and ramping up the historical level of collaboration through united, transparent, and accessible platforms.

Remote working trials

While deeply unfortunate, Covid-19 has prompted operators to explore remote working. This applies not only to staff (many energy companies have staff from multiple nationalities), but also physical operations. This encompasses refineries, drilling rigs, seismic vessels, and so on. Effectively utilizing digital tools in this space can radically reduce risk to staff, while safeguarding energy production and security. Going forward, the challenge is to ensure the best lessons learned during the pandemic are a springboard for even more robust HSE standards. We cannot afford to have a short memory.

"A collaborative, digital approach across the whole value chain is the only way to create a zero-harm environment. This HSE roadmap must include digital processes that enable seamless and real-time cooperation between the operational engineer, the safety engineer, the HSE manager, the reservoir, the process, and so on. Everyone must move in the same direction."

Some of these tools are already in use. For example, Microsoft's Azure helps oil and gas companies' engineering and maintenance teams use predictive analytics to minimize their oil field visits. The general rule is that safety rises as trips to the rigs decrease. Plus, a speaker from a major Middle Eastern NOC shared how his company uses AI and machine learning on a massive bundle of data, captured since 1952, to enhance HSE. Another speaker shared how his company addresses HSE.

"We start by building a foundation on the existing digitalization, whether it be gas systems, safety systems, alarms, events, smart sensors, drones, control loops, and so on. We also look at connected personal protection equipment where the worker can be monitored and tracked. Then we bring that together with the history of best operational insights, to drive faster and better decisions," he explained. This includes using digital twins, which allow his company to run simulations and scenarios.

MAKE DATA WORK FOR YOU

A multi-stage digital approach that has clear and realistic plans for harmonizing operations is needed for a zero-harm HSE. How to achieve this?

Proactivity is pivotal, which means data must be better structured. Speakers warned that energy operators often track data based upon incidents or near misses. Structured data can turn this reactive response into a proactive approach, by gathering more relevant real-time data from IoT technologies, drones, and sensors. Disseminating this data with AI, predictive analytics, and other tools in the digitalization toolbox, will eliminate the risks before they happen.

Data standardization is also fundamental to maximizing the value of AI and the potential for innovation. On average, an energy company may have several ways to collect, store and analyze data. This is especially true for larger organizations, speakers pointed out. In-house standardization is the first step to creating efficient, seamless data processes. But this effort must extend from companies' 'front door' and into their partnerships and broader supply chains to mitigate all hazards.

This does not need to be a costly exercise – a concern in today's financial climate – as progress can be as simple as standardized labelling. Of course, the quality of data being 'fed' into the digital architecture must be high. Weak data inputs result in weak, erroneous forecasts. This is where guidance from industry and technology experts is key, i.e. as facilitated by Microsoft Energy Core and the AI Business School. •

Sources:
IOGP: https://www.iogp.org/blog/oil-and-gas-safety/latest-safety-report-shows-reduction-in-fatal-accidents/
WOAD: http://production.presstogo.com/fileroot7/gallery/DNVGL/files/original/79060cc678d242999f1cf41551f8ee5a.pdf

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Chapter 6: Integration

How to integrate new digital technologies into legacy infrastructure systems?

TOP 3 CHALLENGES

**Harvested from speakers' comments during the event.*

- **How to find a 'common data language' to standardize all companies' legacy infrastructure?**
- **How to illustrate the advantages of digital data integration to spur positive cultural change?**
- **How to ensure your company's technical and digital capabilities are aligned?**

INSIGHTS

Legacy infrastructure systems remain highly valuable, both to energy security and economic growth. But they need an upgrade.

Largely, this is to cope with the new and growing pressures on the industry, notably the need to meet rising energy demand and strict environmental targets. The energy industry is becoming increasingly digitized. Valves, pumps, and compressors, not to mention entire separation and reaction trains, are monitored and controlled by sensors, algorithms, and set points, with human operators inputting parameters and supervising operations. Such progress is laudable, but it must be carried out in harmony with legacy infrastructure. This is especially relevant as the interconnectivity and the blurring lines between Information Technology and Operational Technology is making processes more complex. This calls for multiple layers of control and monitoring to safeguard operations. There can be no gaps in operations between existing and new – all must be seamlessly aligned.

OPPORTUNITIES ABOUND

For example, integrating new IoT technologies is core to revamping and maximizing growth in legacy infrastructure systems across the energy sector. IoT technologies alone will witness $933.6bn of investments by 2025, according to Grand View Research.

"If you can get the right data, you can get the strongest outputs, produce the right workflows and then achieve the highest integrity in your operations. Then you can really start to maximize the value of your data, including tapping to legacy systems. There are still a lot of old systems out there with slow communications."

Simon McEntee, Regional Sales Director-EMEA, Rockwell Automation

For example, a shipment of millions of barrels of oil for delivery is organized by vessel type, capacity, and route plans, according to best known practices. But if AI is added to the logistical equation, it may quickly reveal that the way it utilizes its vessels is sub optimal, speakers said. Spotting inefficiencies on such large shipments can translate into huge economic and environmental savings.

Of course, there is still plenty to work on. Developments in technologies, such as cloud computing, are only just beginning to positively impact business agility by breaking down silos of corporate business functions. Big data and analytics are helping with innovation by supporting companies in analyzing large quantities of structured and unstructured data from disparate sources and generating real-time insights. Plus, the falling cost of sensors and the emergence of the IIoT will vastly broaden the volumes of data that companies can access. But again, the effectiveness of these tools relies on internal alignment with legacy infrastructure.

"How to find seamless alignment when you combine three large technology companies and 181 oil companies to establish a single data standard?"

Dave Wisenteiner, Managing Director of Energy, Microsoft Azure

1.3

The oil and gas industry scored a mere average of 1.3 in digital integration and maturity, placing itself lowest on the spectrum compared to all other sectors, according to Deloitte's Digital Maturity Index.

62%

The percentage of CEOs who said that they have a management initiative or transformation program to make their business more digital, according to Gartner's 2018 CEO and Senior Business Executive Survey.

#8

Cost management has risen in CEO priorities, from number 10 in 2018 to number 8 today. When asked about their cost-control methods, 27% of respondents cited technology enablement, which secured the third spot after measures around people and organization, revealed Gartner's 2019 CEO and Senior Business Executive Survey.

OPINION

Visibility pivotal to merging old and new

By Dave Wisenteiner, Managing Director of Energy, Microsoft Azure

Some of the more robust thinking that we see is from legacy companies, including some of the world's oldest petroleum companies.
This is particularly true when it comes to sustainability. Some are, to some degree, starting their businesses afresh. And that means thinking about data in a whole new light. If you were going to start an oil company from scratch today, would it look like the oil company you already have? Almost always, the answer is no. This reflects how the industry knows it needs to change. Digital data integration – a merging of existing and new – is inevitable.
But this brings a new problem. As one speaker put it: how to find seamless alignment when you combine three large technology companies and 181 oil companies to establish a single data standard? Potentially a lot of confusion. Data must make sense for everyone across multiple applications. That is the challenge we must all collectively resolve.

Bolster visibility
Greater accessibility and transparency are imperative. Imagine that I want to see every well with certain pressure parameters that is deeper than 10,000 feet. I can already do that with one tool. But I cannot do that across all my subsurface tools, or with multiple partners simultaneously. Industry is not speaking with one voice when it comes to data management, let alone integration. Now, we are beginning to see the same limitations with some of the more established renewable projects.

Finding answers
Leveraging today's real-time data, as well as historical data, is the only way to pin down clear answers to fundamental questions. For example, how do I integrate all the data that is available on where I should build a wind farm for the maximum operational and commercial effectiveness? What weather patterns can I expect? What partners and investors have expressed an interest in this sort of project before? How successful was this project in the first year versus the fifth year? And so on.

Improve buy-in
People lie at the heart of integrating new digital technologies into legacy infrastructure systems throughout the energy sector. The buy-in and integration of people in any organization is crucial, which begins with management driving a new culture in-house. Staff do not always march in the same direction, especially in large organizations. In this case, how can we expect digital data integration to be unified? The tremendous success we have seen predominately comes from those who have fully embraced a cultural change.

Avoid data exhaustion
Huge volumes of data that companies seek can be unusable. It does not give us the intelligent answers that we need. These include, what product do I want to make tomorrow in my refineries? How much of that product do I want to make? How am I going to transport that differently? How am I going to manage human resources accordingly? In these scenarios, when lost for answers, always ask if your data could work harder for you.
The cleaner the data, the more effective the rest of the digital toolbox can be, i.e. AI and predictive analytics. Also, think about not just what you want now, but what outcomes you need in five, ten, 50 years from now. There is more than a century of data in the energy markets. Much of it is on paper in legacy infrastructure. We must unlock all that value with digital data integration – and quickly.

SPEAK WITH ONE VOICE
Producing the right workflows means unifying data into a common format, ensuring even higher integrity. From there, it is a quicker and easier process to optimize routines in real-time along the value chain, erasing silos as you go. Take the North Sea as an example. Vast legacy infrastructure has evolved from where seven operators were dominant. Today, there are hundreds of small operators. Unsurprisingly, de-manning is getting more common as demand for automated services climbs. This is a positive move to reduce well-documented situational risks, but it must be done coherently.

So many departments within one organization speak different languages, have different views, and do not communicate easily. Correctly applying digitalization in legacy infrastructure will create a streamlined language of reporting, accounting, KPIs, forecasting and more. It is about finding a common ground to optimize operations. •

Cultural transformation

There are a lot of deep-seated culture behavioral practices that must be addressed in this transition to a digitalized world. How do you get staff to interact in a different way to what has been the industry's norm for a century? It will likely have its challenges, speakers warned.
Weak company strategies and the challenge of transforming the operational culture coupled with high investment costs – especially in today's financial climate – are some potential hurdles in adopting digitalization. The fossil fuel industry is very experience-driven, so an effective transformation requires example-led change from the top. Therefore, management must have fluency in the technologies that they are implementing, especially when it is being woven into legacy infrastructure. Again, this is where companies, academia and government can work together using new knowledge-based initiatives, such as the AI Business School and Microsoft Energy Core.
This can help CEOs better understand the value and return on their investments, meaning they can make informed and accurate decisions to keep their company current. Most executives still tend to neglect a holistic digital transformation approach and leave digital initiatives exclusively to an IT group, which can isolate it from other business units.

Sources:
Deloitte Digital Maturity Index 2019: https://www2.deloitte.com/content/dam/Deloitte/xe/Documents/About-Deloitte/mepovdocuments/mepov30/standing-still-is-not-an-option_mepov30.pdf
Gartner 2018 CEO and Senior Business Executive Survey: https://www.gartner.com/en/newsroom/press-releases/2018-05-01-gartner-survey-reveals-that-ceo-priorities-are-shifting-to-embrace-digital-business
Gartner 2019 CEO and Senior Business Executive Survey:
https://www.gartner.com/en/newsroom/press-releases/2019-05-08-gartner-survey-reveals-that-ceo-priorities-are-slowly

Energy Core Board Meeting (Q2, 2020) – Participants

*(*Alphabetical order)*

Energy operators
Abdul Nasser Al Mughairbi, SVP Digital, Abu Dhabi National Oil Company (ADNOC)
Ahmed Hashmi, Chief Digital Officer and Technology Officer- Upstream, BP
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Consultancy
Intelligence
Publishing