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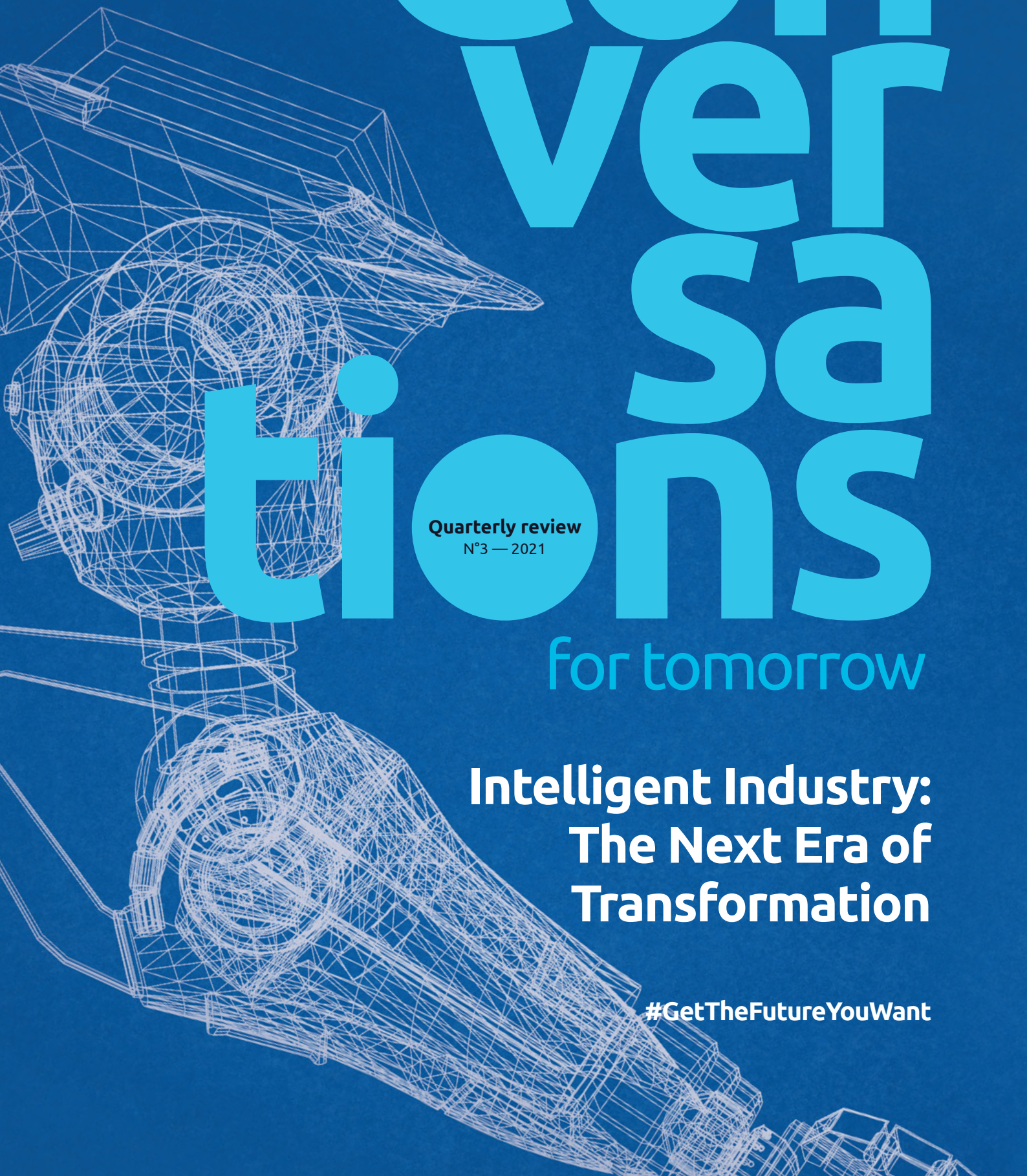
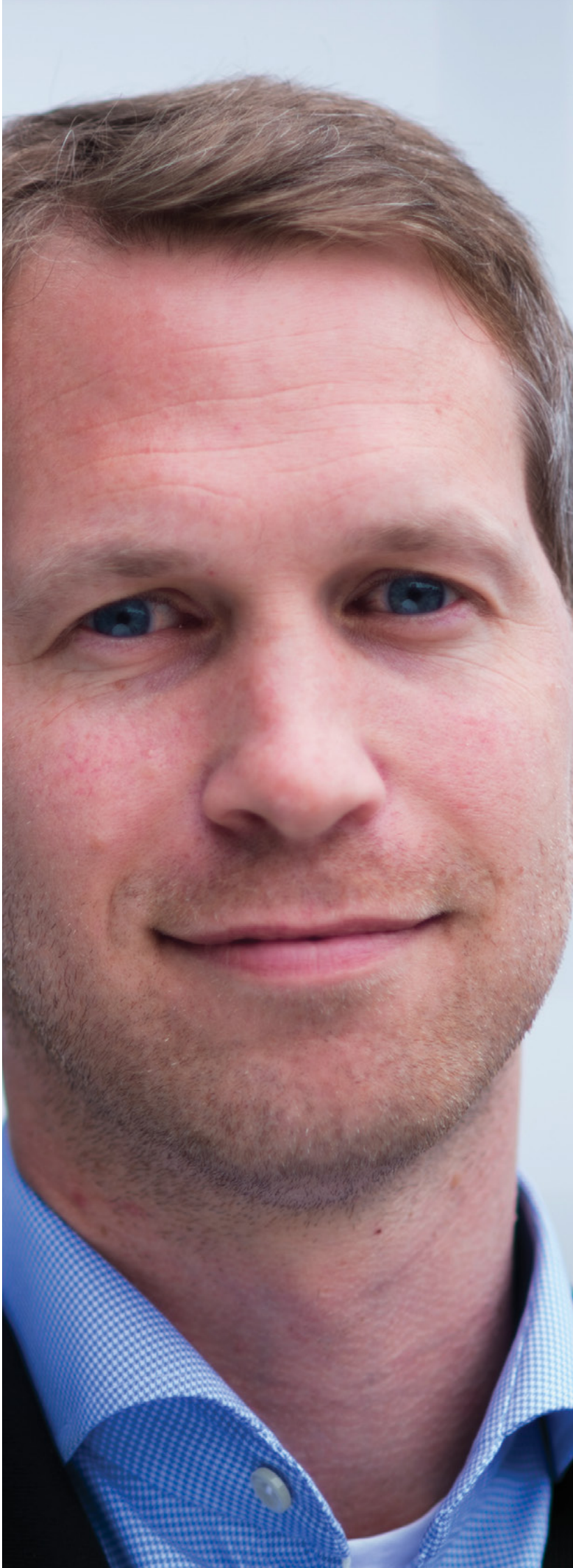


Intelligent Industry: The Next Era of Transformation

#GetTheFutureYouWant

TORBJØRN FOLGERØ

SVP, Enterprise Digital, Technology, Digital & Innovation, Equinor



GETTING THE FULL VALUE OF DATA

Torbjørn Folgerø is responsible for information technology and the overall digitalization agenda in the Norwegian energy company, Equinor. His remit covers cybersecurity, infrastructure, enterprise applications, software development, data science, and data-platform management.

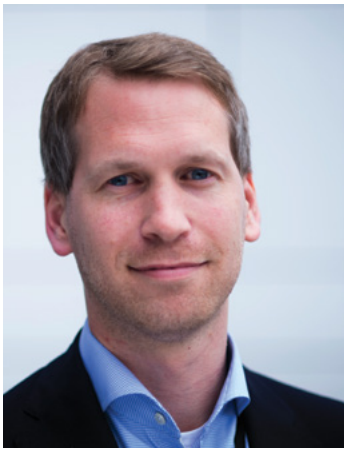
The Capgemini Research Institute spoke to Torbjørn about digital transformation in the energy sector; the benefits that Equinor has derived from data and digital technologies; and the challenges organizations can expect to face on their journeys to intelligent operations.

Digitalization is paramount to the success of energy transition, with data collection and analytics technologies enabling this shift. "

How are digital technologies enabling a successful energy transition for Equinor?

— Digitalization is paramount to the success of energy transition, with data collection and analytics technologies enabling this shift.

While a degree of global dependency on oil and gas is inevitable, it is nevertheless vital that we focus on carbon- and cost-efficiency on top of safe operations when using these resources. Data, analytics, and digital technologies are helping us achieve this efficiency. As an example, we are streaming operational data from all our 26 offshore fields in Norway and using it to develop and utilize machine learning (ML) models to improve our operations on a continuous basis. Since the launch of our digital roadmap in 2017, we have delivered around USD1 billion in value creation through efficiency gains from our oil and gas business. Our Johan Sverdrup field, a giant field on the Norwegian continental shelf, is an important contributor to the value creation.



Torbjørn Folgerø
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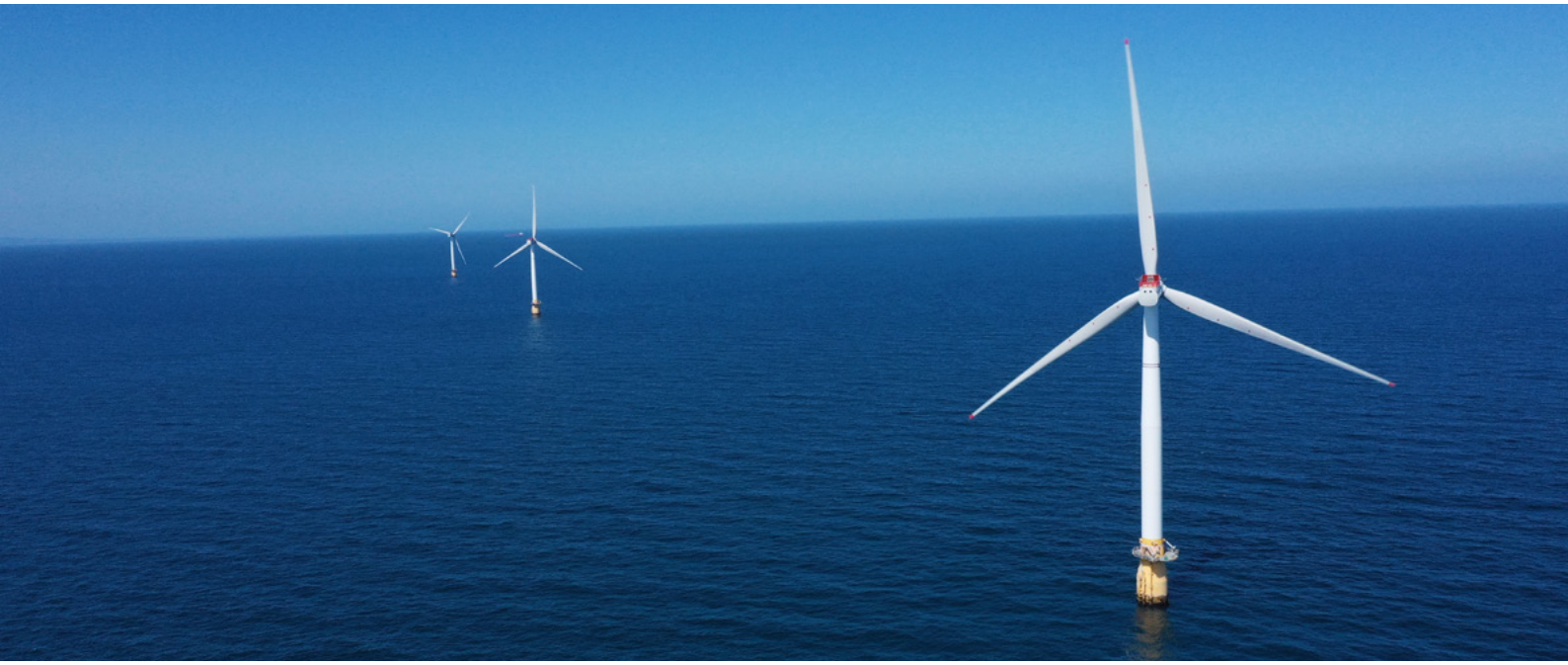
The field uses a range of new digital solutions to increase subsurface understanding, ensure more efficient start-up of wells, higher stable production and more efficient maintenance. This capital is re-invested in our renewables business, thereby helping to fuel the green transition.

"AI and advanced analytics can help to identify the best locations for offshore windmills and how to optimize their operations."

Secondly, at Equinor, we want to take a global position in offshore wind-power production. Digital technologies such as AI and advanced analytics can help to identify the best locations for offshore windmills and how to optimize their operations.

Lastly, a low-carbon agenda is key for us. We have initiated a project called Northern Lights as a part of the Norwegian full-scale carbon capture and storage (CCS) project. We're working on developing a full-scale CCS value chain, including capturing CO_2 from industrial plants; transporting compressed CO_2 by ship; and storing it below the sea bed under the North Sea. We are working with partners to digitize the CCS value chain, as well as using data and analytics to help other companies reduce their carbon footprints.



HARNESSING THE POTENTIAL OF DATA TO TRANFORM OPERATIONS

How is Equinor utilizing data and digital technologies (such as cloud, AI, and 5G) to reshape its operations?

At Equinor, we have huge amounts of operational and production data. We established Omnia, Equinor's cloud-based data platform, to ensure this data is available on a single platform across our value chain, including development and production, transportation, marketing, and trading.

Easy access to this data facilitates operations at our recently established operational support center The IOCT (Integrated Operation Centre & Technical Efficiency) uses a digitalized system to contribute to enhanced production efficiency, production potential, energy efficiency, safety, and reduced emissions from the fields Equinor operates on the Norwegian continental shelf.

The IOCT works with predictive maintenance by interpreting the data sent by sensors and scanning it for discrepancies. For example, if the exhaust temperature of a motor has been at around 700°F for the last three months and then it suddenly hits 800°F, this can be an indication of mechanical or electrical malfunction. It is the IOCT's job to detect "weak signals" using digital technologies such as AI/ML, before they develop into bigger problems, leading not only to unplanned downtime or financial loss, but also potentially posing a threat to worker safety.

We have also built a digital twin solution, Echo, which is a tool used to access and visualize data stored in Omnia. It allows for a virtual, real-time representation of our physical installations, and aims to improve safety and efficiency in project development and operations across our business areas.

Could you highlight some of the beneficial results obtained from the Integrated Operation Centre?

From a sustainability perspective, the Integrated Operation Centre plays a key role in reducing CO2 emissions from the Norwegian continental shelf. With more than 300 energy improvement measures implemented since 2008, it has resulted in annual emission reductions of 1.6m tons of CO2.

From a financial perspective, as well, the Integrated Operation Centre has already been quite successful. In 2018, we announced our target to raise cash flow by USD2bn by 2025. By June this year, we had already managed to make USD1bn, and the centre has been the main contributor. Subsequently, we heightened our aspirations and increased our target to USD4bn by 2025.

An increasing part of that USD4bn will come from using unmanned robots and machinery on our fields, which will reduce our capital and operational expenditures while improving safety and security by reducing human involvement in physically intensive activities. At Johan Sverdrup, a number of other digital initiatives are also being tested out, such as robots over and under water, machine learning, and the use of 3D printing technology.

1.6M TONS OF CO_2

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Staying with the safety aspect, could you describe some of the technologies available to your field workers to make their jobs easier and safer?

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We have developed an operational planning tool to extract insights from our safety records. It uses natural language processing to provide a single interface, displaying data from all of its sources, highlighting technical issues and safety incidents that have the potential to reoccur, raising risk levels. The operational planning tool gathers all the incident reports in one system, and the system can say, "you really should read this report, because the last time someone did something similar, something went wrong."

We have also equipped all our field workers and operators with tablets. We have set up an industrial app store that has apps related to different work areas including safety, job analysis, maintenance, etc., which workers can access through their tablets. Operators in the field still make decisions and create goals but now they can have the data they need to hand, rather than having to return to the office to use a PC.

We are also using HoloLens (Microsoft's holographic remoting device intended to improve clarity and accuracy of remote working) and our digital twin solution, Echo. We have made all our 3D models available in Echo, so that they can be accessed in the field via tablet or laptop. We have enriched these models with required data, so workers can navigate on Echo to access information on any part of the plant. The HoloLens helps workers visualize the work to be done and execute them more quickly as it takes Echo's 3D drawings and elegantly superimposes themselves over reality in the field.

Another area in which these technologies are being used is gamification of safety training. Traditionally, workers had to undergo safety training on an e-learning platform, but now, we are able to use VR. Workers can get a feel of being in the field while sitting in the office. They can compete with colleagues in league tables and make training much more fun.

OVERCOMING TRANSITIONAL CHANGES

What challenges do organizations face on their digital transformation journey and how can these be overcome?

Digital transformation generates opportunities to create new revenue streams and drive new business models as an organization, working together towards it. However, it can be challenging to get business units onboard, change their ways of working, upskill employees, and build competencies. A key principle is that business units (as opposed to the technology centers) own the digital initiatives, because it is the business unit that, ultimately, is going to realize the benefits.

From a technology perspective, data management is a huge challenge for large organizations such as Equinor. We process a lot of data, and the first step is to get it out of the on-premises siloed solution into a single data platform. While we have made good progress in doing that for raw data, we now have to focus on making that data ready for analytics.

It is vital to be able to focus. If we try to do everything at once, we are unlikely to succeed.

How do you see the energy industry evolving: with increased adoption of future technologies or more use cases of current technologies?

First, in terms of use cases of cloud, AI, and ML, I believe we are just starting to explore these technologies and there is much more we can do with them in areas of safety, sustainability, and new revenue opportunities. Data can be made much more accessible through cloud solutions, allowing organizations to share data more efficiently internally and externally with partners and suppliers and thereby enabling new services and business-model opportunities for a company like ours.

> **"Last year, we conducted the world's first offshore drone transportation of a spare part that had been 3D printed."**

We are testing a lot in terms of the physical side of digitalization, as well – drones, 3D printing, robots that can navigate their way around the plants – but we are still in the pilot phase. Last year, we conducted the world's first offshore drone transportation of a spare part that had been 3D printed. A lot will happen in this area in the next year and the whole supply chain is going to be much more efficient through these technologies.

We are also looking into some use cases of blockchain. Notably the implementation of blockchain in the US for streamlining of contract execution drives increased safety, quality, and cost saving. Further down the road, we believe quantum computing could be interesting for us, for example to design more profitable drilling paths that also take into consideration the limitations imposed by required drilling angles and geophysical features. I think the organization needs to engage with multiple technologies but, in the end, it is all about managing the business by data. Data is the key.

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