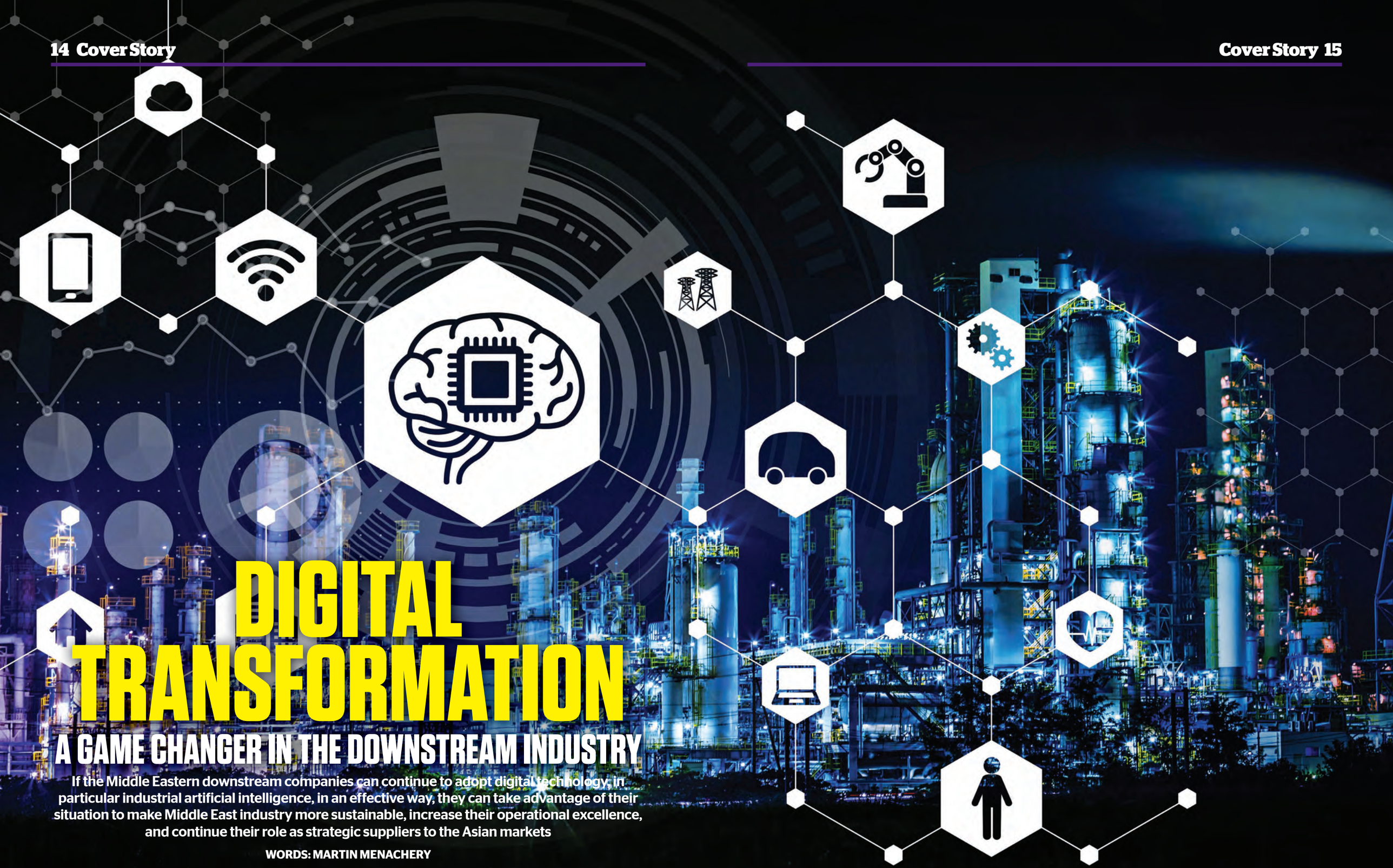

DIGITAL TRANSFORMATION

A GAME CHANGER IN THE DOWNSTREAM INDUSTRY

If the Middle Eastern downstream companies can continue to adopt digital technology, in particular industrial artificial intelligence, in an effective way, they can take advantage of their situation to make Middle East industry more sustainable, increase their operational excellence, and continue their role as strategic suppliers to the Asian markets

WORDS: MARTIN MENACHERY

Digital transformation is a $1tn opportunity, according to Boston Consulting Group. But, to fully capitalise on this opportunity, the Middle East energy businesses need to do more than simply digitising internal processes. It is important to apply digital thinking to every aspect of internal and external operations.

The downstream industry is traditionally risk averse and slow to adopt new technologies, given the large capital requirements involved in developing, operating, and maintaining assets, not to mention the high focus on safety and reliability. Nevertheless, the industry is becoming more comfortable with digitalisation and the benefits that can be realised from leveraging the vast amount of data acquired from operations, in terms of efficiency, agility, safety, and reliability.

Digital transformation of downstream operations brings a plethora of advantages: operational excellence; improved plant availability and uptime; increased plant efficiency, from an energy, materials and emissions viewpoint; and workforce productivity. Utilising technology such as hybrid models, closed loop production optimisation, and predictive analytics are already helping downstream companies move toward their longer term business objectives, such as monitoring asset-wide emissions in a way that optimises profit while achieving carbon mitigation and reducing site-wide energy use in a programmatic way.

Digital transformation in the Middle East downstream industry

Energy companies in the Middle East and globally accelerated their digitalisation programmes in 2020 in response to economic and energy market shocks. The pace of investments will pick up in 2021.

"We have been having many conversations with our key Middle East customers over the past year. The region is investing in achieving leadership in digitalisation, so that the region's companies stay at the forefront of using technology for asset optimisation. There are a couple of key drivers across the Gulf region and Saudi Arabia. One is the integration of the value chain, driving efficiencies between upstream, downstream and chemicals. This is a key focus for digitalisation," says Antonio Pietri, CEO, Aspen Technology.

"We are working with a downstream company in the Middle East in applying hybrid models to one of their most advanced refining units. The Middle Eastern refiners have invested in some of the most advanced refining technologies in the world. The challenge is keeping these complex units at optimum performance and yield."

Antonio Pietri, CEO, Aspen Technology

"Another is application of industrial artificial intelligence (AI) to maintain a cost leadership and operational excellence global market position. A third is to use technology to drive sustainability objectives. The region desires to be leaders in delivering energy with reduced carbon intensity. This is accelerating initiatives in digitalisation," Pietri adds.

"We can measure progress in the Middle East downstream industry in two important ways. The first, and probably the most important, is through the maturity of our customers. We have seen national and international energy operators express their commitment to digital transformation with their projects that highlight digitalisation requirements. Some operators have begun developing their version of a digital twin, while others are exploring virtual reality and augmented reality. We will see progress as more traditional customers begin to shift towards digitalisation in capital projects," observes Samik Mukherjee, group senior vice president, projects, McDermott International.

"The second is through the benefits of digitalisation gained, no matter the scale, or scope of a project. With more of our people becoming trained and knowledgeable with digital tools and supporting processes, we will one day see an all-data capital project, where data is the commodity and paper is a thing of the past," Mukherjee adds.

The downstream industry in the Middle East has witnessed significant advancements in digital transformation. Digitalisation has become a game changer, disrupting traditional ways of doing business in an industry that remains conservative in many respects. The industry is now embracing new smart technologies that make a real difference to efficiency and productivity.

"It is further down the value chain that digital disruption poses a threat to traditional energy companies. Non-traditional players are entering the market that are not run by traditional engineers, but by technologists. Whereas traditional oil companies have historically looked at how much fuel they can sell, there is a shift towards understanding the demographics and motivations of each individual customer – where that person lives, their background, car ownership, age, income, etc. You can build a much broader picture of the type of services you can offer customers outside of the traditional confines of the industry," states Hesham Ali Mustafa, executive director, shared services, group HR and new business development, ENOC Group.

"To illustrate the point, the gradual growth in electric vehicles is changing the face of traditional fuel sales in a similar manner that e-commerce continues to impact the future of the physical retail environment. Much of the e-commerce model is based on the information e-retailers collect and utilise on customers and their purchasing habits," Mustafa adds.

"Industry digital transformation has naturally and rapidly progressed. The highlights have been the ability to process large amounts of information quickly through data management systems. This has enhanced the efficiency and accuracy of data, providing useful insights for more effective decision making. However, the industry still needs to do a lot more in order to achieve further transformational benefits in the way we conduct safe and productive operations," comments George Eapen, group chief information officer, Petrofac.

For most of the past decade, the industry as a whole has not taken full advantage of the opportunities from utilising data and technology. The volatility in commodity prices over the past few years, combined with rapidly increasing integration of digitalisation into daily life, has helped drive this acceptance.

"The impact from the pandemic – on travel and a more widespread reliance on digitalisation – is further accelerating the progress of digitalisation in the downstream industry, as well as industry in general. The Middle East has largely been an early adopter of disruptive technologies, recognising the value that can be gained from new and innovative technologies," Denis Voloder, head, Siemens Energy Industrial Applications, Onshore Solutions, opines.

Advantages of adopting digital transformation

Hybrid models make it far easier to get the full benefit from refinery-wide planning, scheduling and optimisation. In turn, these more accurate asset-wide models are key in defining the integrated oil-to-chemicals processes that can then further improve operational excellence across the value chain.

"Where does the value of industrial AI and analytics come into play? Predictive analytics can forecast equipment and asset health. When you can predict equipment degradation, or failure 30 days in advance, this then can inform refining and petrochemical planning and schedule that takes into account plant availability. Most importantly, when you can present it in the context of industry workers (planners, schedulers, operators, managers, and plant technicians), it immediately makes the planners and schedulers smarter, without needing translation from people like data scientists, and company agility provides competitive advantage," notes Pietri.

This is just one example. Other examples include the interplay between the value chain, and demand planning, which can inform the plant manager how it should optimise production to make the company perform better.

"Transparency – project data can be exchanged in real-time, which allows our customers and our project teams to collaborate with current, accurate information. Optimisation – digital transformation supports facility optimisation as customers are able to develop digital replicas and run simulations to maximise throughput in a facility, or assess the impact of energy fluctuations. Value – we are able to generate value for our customers by reducing risk and uncertainty on projects," Mukherjee points out the advantages gained by the adoption of digital transformation.

"In addition, digitalisation allows McDermott to enhance our design, or respond quicker to customer requests and collaborate more effectively with our customers as well," adds Mukherjee.

Adoption of new smart technologies make a real difference to efficiency and productivity and the industry is already embracing these technologies to digitise their operations. In upstream extraction, for example, 4D seismic technology is being used to identify reservoirs remotely without having to drill a single well. This is making exploration far more efficient and less risky.

"Moving downstream into processing, predictive analytics (putting sensors into rotating and other equipment to predict potential breakdowns ahead of their occurrence), are making a huge difference in improving equipment uptime. This not only benefits the processing facility, but also original equipment manufacturers (OEMs), which generate a significant amount of revenue from after-sales maintenance contracts," Mustafa mentions.

"New digital technologies combined with data-driven insights can transform operations, boosting agility and strategic decision-making. Digital systems allow companies to reap the benefits of improved workforce productivity, higher efficiencies in business processes, and increased cost savings in project deliveries. In addition, technology can boost HSSE performance and lower risks," cites Eapen.

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The integration of the downstream operations into existing production and refining operations, and into further downstream industry, requires the application of digitalisation technologies to maximise value. The application of digitalisation can maximise efficiency, better manage emissions, enhance reliability and safety, future-proof the industry, and build in an inherent competitive advantage.

"Digitalisation can enable true operational integration, end-to-end real-time analysis and management of operations, to ensure maximum efficiency, whilst minimising risk. Thousands of manual operations can be distilled and refined into a small number of automated processes. Digitalisation can enable the huge quantities of data to be more quickly analysed, and operations altered automatically, to enhance efficiency, stability, security, and safety," Voloder declares.

Technology allows experts to remotely operate production as well as inspect and

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maintain facilities from control rooms a half a world away. This is proving crucial in the current environment of severe travel restrictions and social distancing.

Key initiatives/projects in digital transformation

Digital technology will be increasingly AI-based in the coming years and will facilitate lower carbon emissions more easily than any human control interaction. This is one of the biggest drivers of digitalisation for the next five years.

The shift from time-based maintenance to data-driven, condition-based maintenance enables for longer operation of assets, early failure indication and optimised maintenance planning. Done right, digitalisation enables more uptime, less maintenance cost and finally more efficient operation.

"We have seen a number of trends emerging in the downstream industry in the Middle East related to digital transformation over the last few years. These include initiatives to reduce the carbon footprint, optimise maintenance of critical equipment and also to increase the efficiency of operations," affirms Voloder.

Siemens Energy is providing the Duqm Integrated Power and Water project (DIPWP), in Oman, with gas and steam turbines, long-term power generation services and digital solutions, to ensure stable energy supply and asset security. The Siemens Energy scope of supply includes a combined cycle power plant consisting of five SGT-800 industrial gas turbines, five SST-300 industrial steam turbines, and the corresponding control system. Additionally, the project scope includes the cybersecurity solutions of Siemens Energy to improve asset visibility, reliability and security, while decreasing operation and maintenance costs.

"We have two flagship initiatives. The first, GeminiXD, allows our customers and operators to digitally collaborate with our project teams. GeminiXD is McDermott's digital collaboration platform built to coordinate information, automate processes, and enable workforce collaboration across the entire lifecycle of a project. The platform, which is accessible to our customers and JV partners, integrates data elements from multiple systems like EDMS, AVEVA, Hexagon, and Primavera and provides inputs to Power-BI dashboards," Mukherjee claims.

"We also have SubseaXD, which is a collaborative, cloud-based platform that surfaces complex subsea knowledge visually for faster early concept development. McDermott uses the platform to develop and install subsea fields significantly faster while lowering overall risk," adds Mukherjee.

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optimum performance and yield. We are very excited on the early results from this project," Pietri asserts.

It will increase unit availability and increase the sale value of the products being produced. And, it will be a blueprint for doing the same thing with other key units in refineries and chemical facilities across the region.

"We are supplying our most advanced technology to another major customer in the region who is modelling their refinery units at the highest fidelity level, to understand how to produce end-fuels with the greenest possible carbon profile. And, we are working with another major petrochemical producer in the region to apply advanced planning technology in a way that will help transform how the chemical facilities are operated, going towards a strategy that provides better agility in producing to demand, and to changing demand, making the entire

operation more agile in responding to the dynamics of the needs of individual customers and the marketplace who they are supplying to," adds Pietri.

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As a national champion, ENOC Group's growth strategy places strong emphasis on enhancing its business and operations through digitalisation. This will play a key component in optimising operations and identifying synergies within ENOC Group businesses, while continuing to serve the company's goal of meeting the growing energy demand in Dubai and the UAE.

"At Petrofac, we have developed a number of digital initiatives that are improving our business operations. These include a computer vision and knowledge mining system. This platform provides design engineers with smart capability to process non-intelligent information and translate it into information that can then be further processed through machine learning techniques, like natural language processing and neural networks, to build models that power AI-based applications," remarks Eapen.

Petrofac also has a material life cycle management and supply chain control tower system. This is a fully integrated system that tracks the life cycle of material from the engineering design stage, to supply chain, construction, until the handover of the completed facility. The platform supports the application of fundamental processes, which align with global codification. This then facilitates the application of advanced analytics, which is particularly useful in supply chain management.

Future of adopting digital transformation in the Middle East

The downstream industry across the Middle East is growing rapidly, as a key part of regional efforts to diversify the economies of traditionally oil-export driven economies. Given a large upstream sector with relatively low production costs, well established infrastructure, and developed markets, the downstream sector in the Middle East has most of the key ingredients required to excel.

"Because the upstream and downstream operations generally have a large state-owned operator component, this helps to facilitate integration between assets. This means that upstream production and downstream processes can be united with relative ease. But operators need to act fast as the momentum to integrate digitalisation in operations will only grow in the coming decade, as competition, as well as requirements to maximise efficiency, returns and emissions controls, will also grow," Voloder observes.

Driving forward digitalisation requires a very different set of capabilities. The talent requirements to drive an organisation in the oil and gas sector in its traditional sense, may not be what is really needed to drive an organisation into the next 15, or 20 years.

"We see the Middle Eastern downstream industry as leaders in digital transformation adoption. As I mentioned earlier, we have seen some of our primary customers share their digital transformation aspirations. Many of our most important customers have a strong footprint in the Middle East. They are leaders in energy and are now leaders in digital transformation. We are excited to partner with them and transform delivery of capital projects," observes Mukherjee.

While initiatives such as Dubai 10X may accelerate the ideas that will take the UAE forward as a knowledge economy, it also requires a more digitally literate age of engineers that can direct automated rig equipment, oversee the design, and build of solar, or wind installations, manage large amounts of analytical data and map out paths for autonomous vehicles.

"As digital transformation takes momentum, the aspect of process efficiency for energy companies will remain a critical aspect. But the differentiators will be not only in business reinvention, but also in the people factor. Defining elements will be in developing a profound understanding on who your customers are and the internal capabilities you need to engage them," Mustafa states.

"Total integration of technology will not only transform business operations in the region, but it will also enhance transparency and flexibility, giving way to newer business models," asserts Eapen.

The Middle East downstream companies are in a unique position with respect to global

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economies. The growing economies and middle-class consumers in China, India and Southeast Asia are, according to most projections, going to continue to need a growing share of the world's energy and chemical production. The Middle East is ideally placed geographically and is, from a cost point of view, advantaged.

"We are committed to working closely with the Middle East industry to enable them to fully adopt digital technology and to sustain the value of technology. We are driving technology to enable the self-optimising plant, and we see the opportunity for key Middle East companies to become early adopters," Pietri concludes. RPME