Why successful digitalisation demands a strong C-suite to achieve total business transformation

Report

Digitalisation, cloud computing and ubiquitous connectivity are driving new waves of efficiency, security and maximised uptime for industrial organisations. While the technology is delivering results in these areas, further strategic business benefits are being achieved in sustainability, digital transformation, security, personnel, culture and change management. It turns out that Industry 4.0 isn't only a technology shift but a strategic business imperative and it is C-level management that are both driving changes and supporting holistic business transformation.

For organisations in the petrochemicals, oil and gas and chemical production industries, the C-suite has been targeting business benefits that go far beyond operational technology, cloud adoption, mobility and IT. By doing so, the environmental impacts of these industries can be minimised and organisations can enhance their reputation and attractiveness to workers, customers and partners. Harnessing of technologies such as artificial intelligence (AI), automation and advanced data analytics are streamlining processes and generating efficiencies but critically, they are also fundamentally changing how operations are conducted to deliver value to customers.

For C-level leaders, this transformation demands significant changes to people and culture. Stakeholders must be included in projects and brought along into the new business environment. This means leaders must create a culture in which change is welcomed, innovation is encouraged and openness to new ways of working is demonstrated. Only by taking this top-down and then horizontal approach to change, can the C-level foster an optimised business that can attract and retain talent, especially in new areas such as data science and AI.

This paper sets out priorities for the C-suite to engage in as their businesses transform, not only digitally, but culturally, operationally and technologically.

How to ensure transformation success

While digital transformation has been underway for up to a decade, projects often fail or lose momentum due to the complexity organisations encounter on their transformation journeys. Projects that look good at the planning and pilot stage can often be extremely difficult to scale up when expanded to networks of factories or campuses that combine multiple types of facilities. The investment is substantial so the pressure to deliver results is significant.

The prize for success is also glittering. Increased production capacity, reduced wastage, optimised efficiency and streamlined processes combine with accelerated lead times, greater employee and customer satisfaction, and reduced environmental impacts are at stake. In addition, when each of these, sometimes incremental, gains are scaled up over an entire organisation, the total advantage can be transformative to a company's performance and market position.

1 https://www.ey.com/en_gl/news/2022/08/82-of-chemicals-companies-expect-to-make-savings-using-digitization-in-sustainability-push-ey-digichem-survey
2 https://www.rcrwireless.com/20230118/5g/telefonica-nokia-fast-track-petrobras-private-lte-rollout-to-18-sites-in-brazil

Technology can be an enabler but technology alone is not sufficient so C-level priorities also include:

Build a sustainable future

Sustainability encapsulates all aspects of the environment, social and governance (ESG) framework that organisations are building upon to increase efficiency and reduce waste, while reducing their environmental footprint and offering attractive working practices. ESG has become a fundamental strategy for many organisations. A recent EY CEO Outlook Survey[1] has uncovered that more than 80% of chemical industry companies, for example, are placing as much importance on ESG and sustainability as they do on revenue growth.

This emphasis is partly because firms are under more intense scrutiny from regulators than ever before. They face tightening environmental laws, stringent health and safety regulations and higher customer expectations of their corporate behaviour. For petrochemical, oil and gas and chemical industry companies, the complex and volatile operating environments they work in place an extra layer of regulation, safety and responsibility on top of their operations that digital transformation needs to support.

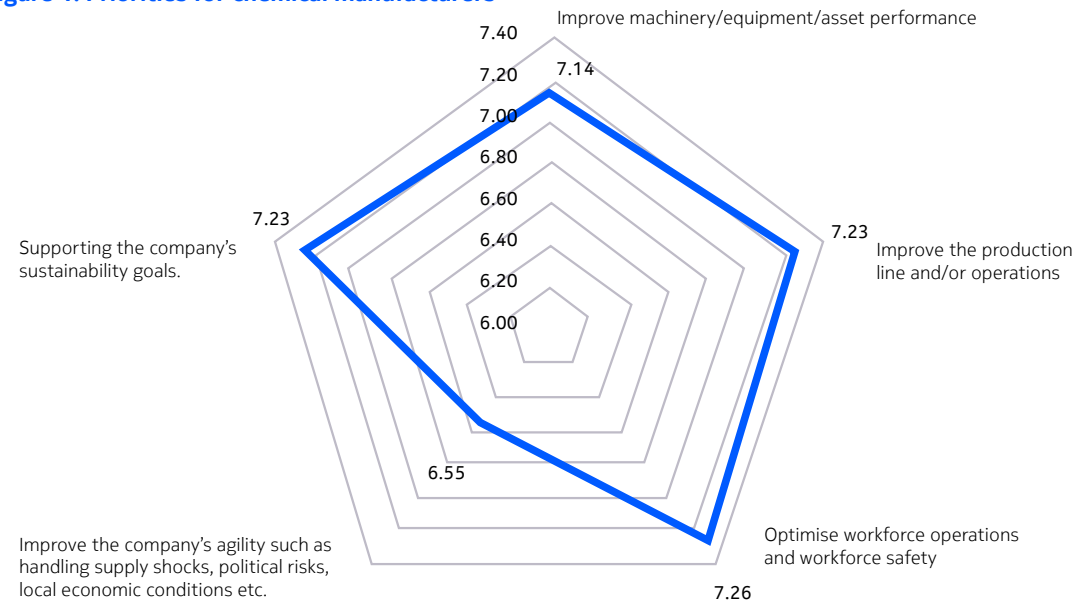
Real world example: Petrobras

Petrobras, the Brazilian oil and gas company, has increased its utilisation of private LTE networks on both on and offshore facilities, RCR Wireless has reported[2]. LTE networks have been deployed on 11 out of 29 offshore oil platforms and six of 17 onshore facilities. Telefónica is named as the lead supplier with Nokia identified as the supplier of most of the network equipment.

The 18 private network deployments are part of a wider project to connect all of the state-owned company's 46 sites to LTE and eventually 5G by the end of 2024. The offshore sites are in the Campos and Santos basins off the southeastern coast of Brazil while the land sites include refineries, gas processing plants, warehouses and ports. These sensitive sites have to comply with stringent safety and environmental regulations and the increased connectivity offered by the private LTE networks is set to aid Petrobras's operations.

Significantly, a recent study from ABI Research[3] found that digital transformation has now widened its scope and includes far more than simply the technology function of an organisation with some input from the CFO. Instead, industrial and manufacturing firms now have corporate strategies that involve senior management which is most concerned about their organisation achieving sustainability. For industrial and manufacturing companies in general, ABI Research scores sustainability as their highest priority with a score of 7.3. Figure 1 details the chemical industry specifically[4], finding that sustainability has a leading priority score of 7.23 alongside operational and production line improvements. EY has reported digitalisation is seen as an enabler of meeting sustainability targets. The firm says 40% of chemical industry CEOs are emphasising digitalisation to fulfil their companies' sustainability goals[5].

Figure 1. Priorities for chemical manufacturers



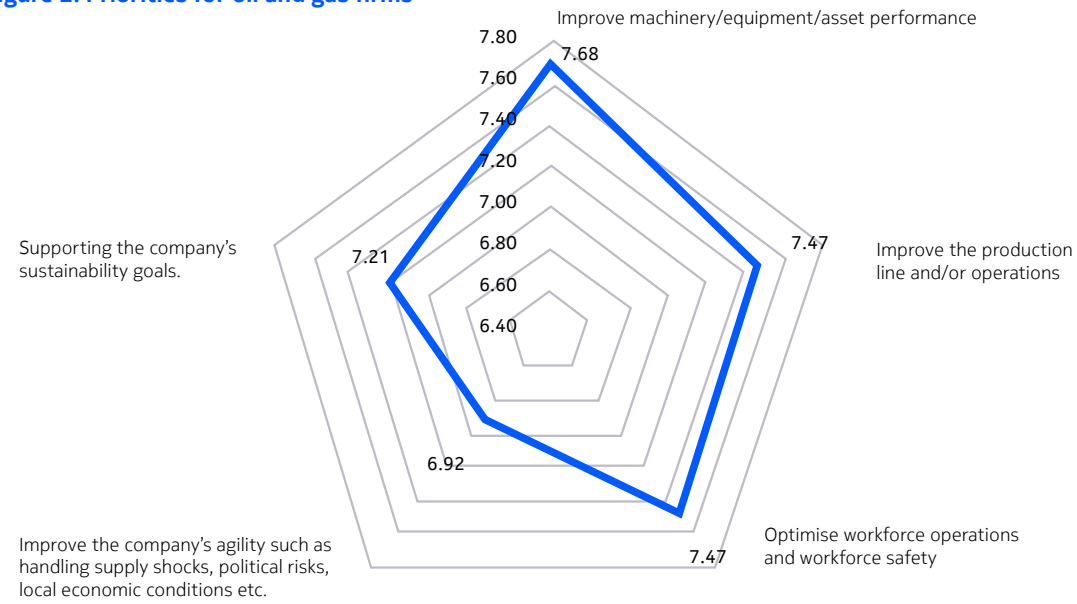
N = 100. On a scale of 1 to 10 (where 1 is not important at all and 10 is an urgent priority/critical to the company), please score the extent to which the following are desired outcomes from investments in industry 4.0 digital transformation.

(Source: ABI Research)

3 https://onestore.nokia.com/asset/213235
4 https://onestore.nokia.com/asset/213398
5 Ibid. https://www.ey.com/en_gl/news/2022/08/82-of-chemicals-companies-expect-to-make-savings-using-digitization-in-sustainability-push-ey-digichem-survey

Figure 2 shows that oil and gas firms place sustainability as a high, although not their highest, priority with a score of 7.21. These organisations place improvements in asset performance, the production line and employee safety above sustainability but the topic is clearly on the industry's radar and generating substantial management attention.

Figure 2. Priorities for oil and gas firms



N = 53. On a scale of 1 to 10 (where 1 is not important at all and 10 is an urgent priority/critical to the company), please score the extent to which the following are desired outcomes from investments in industry 4.0 digital transformation.

(Source: ABI Research)

3 https://onestore.nokia.com/asset/213361

Digitalise to drive change

C-level executives continue to focus on integrating digital technology into all areas of their business as a catalyst to enable changes in how they operate and conduct their business and serve and delight customers. Digitalisation is a loose term that encompasses a raft of technologies from the implementation of AI and data science in decision making to enabling mobility, cloud and ubiquitous connectivity. There is still a long path of deployment and adoption ahead for petrochemicals, oil and gas and chemical companies.

Companies are hampered by incompatibilities between different systems with skills gaps, certifications and protocols unable to be integrated smoothly across operational technologies and information technologies (OT and IT). This presents significant challenges to the wider adoption of concepts addressed under the Industry 4.0 umbrella and lengthens the time organisations need to transfrom, delaying productivity, sustainability, safety and security benefits.

Digital transformation demands the capability to capture, analyse and act upon information in close-to real-time. That involves adoption of new technology and new infrastructure that can accommodate industry's new need for speed. Vast processing power is now available with increased automation fuelled by AI and machine learning, all connected by the latest high-speed, low latency networks and it is this infrastructure that takes industry into the new generation.

7 https://onestore.nokia.com/asset/212818

Real world example: BASF

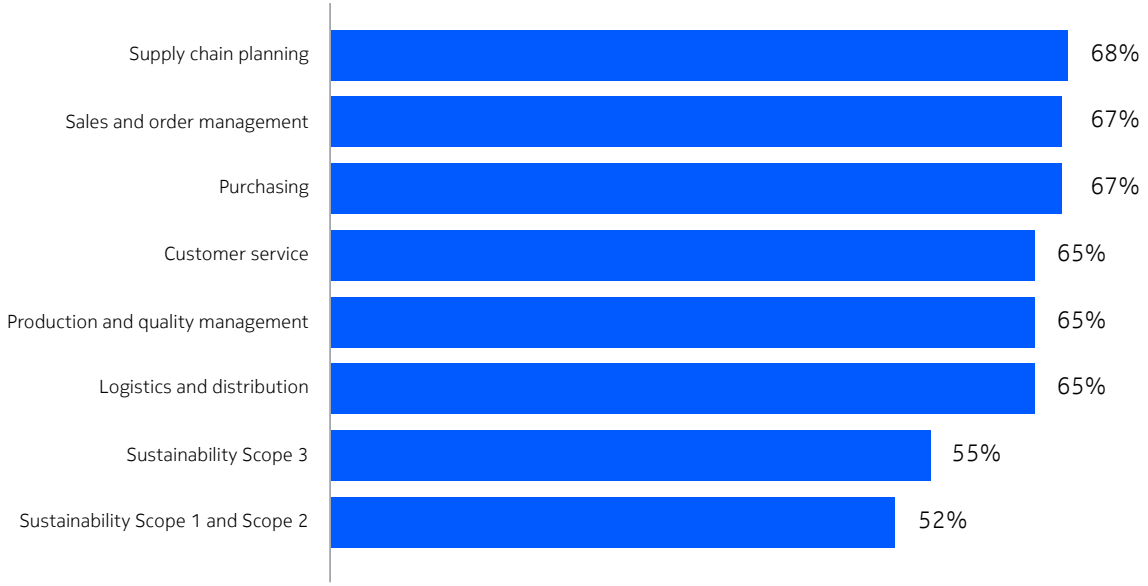
Global chemicals giant BASF has been the first chemical industry company to install a private network based on Nokia's 5G technology[7]. Deployed by Cellnex Telecom and Nokia, the new network will pave the way for IoT, big data, virtual and augmented reality and artificial intelligence at the company's production facility in Tarragona, Spain.

"This project represents a turning point for the Tarragona production centre," confirms Benjamin Hepfer, the director of the BASF production centre in Tarragona. "With 5G technology, we will make a leap forward that will allow us to advance exponentially towards a new way of operating. This is a pioneering project in the entire chemicals industry."

ABI Research has predicted that by 2030, firms in the manufacturing and industrial sector will have deployed more than 49 million 5G-connected IoT devices inside their facilities[8]. In the chemical industries, 5G connections are forecast to reach 4.8 million in 2030 and chemical firms' spending on digital transformation will have a compound annual growth rate (CAGR) of 6% from 2022 to 2031[9]. The firm says companies in this industry will focus on technologies such as predictive maintenance, digital twins, augmented reality (AR) and Industrial Internet of Things (IIoT), all of which can be underpinned by wide-area wireless technologies, such as 4.9G and 5G cellular networks.

Figure 3 outlines the areas in which respondents to EY's 2022 DigiChem Survey 2022[10] see being affected by digitalisation in the coming years. Sustainability is less significant here with business fundamentals such as supply chain, sales, purchasing, customer service, production and logistics all seen as substantially affected by digitalisation.

Figure 3. To what extent will operational competitiveness be effected by digitalisation in the next three years (2022)?



(Source: EY DigiChem SurvEY 2022)

8 https://www.abiresearch.com/press/in-2030-manufacturing-and-industrial-facilities-will-have-over-49-million-5g-connections-generating-us24-billion-in-connections-revenue-for-suppliers/
9 https://www.abiresearch.com/blogs/2022/07/14/putting-six-chemical-manufacturing-challenges-to-rest-with-technology/
10 https://assets.ey.com/content/dam/ey-sites/ey-com/en_fi/noindex/ey-digichem-survey-2022.pdf

Strengthen security to mitigate new threats

The security challenges facing businesses are magnified by the continuing growth in malicious activity from malware to state-sponsored bad actors. This is particularly a concern for organisations in sensitive industries such as chemicals, oil and gas and petrochemicals which, in addition to securing their operations, also need to ensure the safety of their workers. Significant information security enhancements can be achieved with adoption of digitally transformed infrastructure with a range of different approaches offering higher levels of data security than ever before.

Different types of organisations will have different demands and preferences. For some, an optimal response to cybersecurity concerns is to have an on-premise service utilising edge computing, such as Nokia's MX Industrial Edge (MXIE) offering. MXIE is an on-premises edge solution that combines a simple as-a-service model with a high-performance, resilient and secure edge architecture. Designed to accelerate OT transformation, MXIE comes with a portfolio of ready-to-use industrial applications and connectors and supports an extensive range of industrial devices.

Real-world example: Butachimie

Butachimie Chalampé in eastern France is the world's largest production site for Adiponitrile, with the company supplying 35% of the world market for the organic compound that is a precursor to polymer nylon. Butachimie has achieved a 20% reduction in energy use and greenhouse gas emissions over the last five years and increased its workforce by 33% in the last three years. The company has selected Orange and Nokia's Private Mobile Network to help modernise its facilities and optimise product at the Chalampé plant[11].

Nokia's core network and RAN solutions are supporting Butachimie's teams with greater control over IT applications and allowing use of new services through wirelessly connected equipment in real-time. Security is an essential element of the new network, as Stéphane Cazabonne, the project director at Butachimie, explains: "Our digital transformation and modernisation plan must meet very strict challenges in terms of security and availability. It is therefore essential for us to be able to rely on trusted partners capable of offering us technological robustness, tailor-made support and a strong knowledge of our businesses and associated uses. Thanks to Orange Business Services and Nokia, we are opening a new stage towards the development of our Factory of the Future by offering our employees a better on-site experience and by securing our performance and competitiveness in our sector."

11 https://onestore.nokia.com/asset/212818

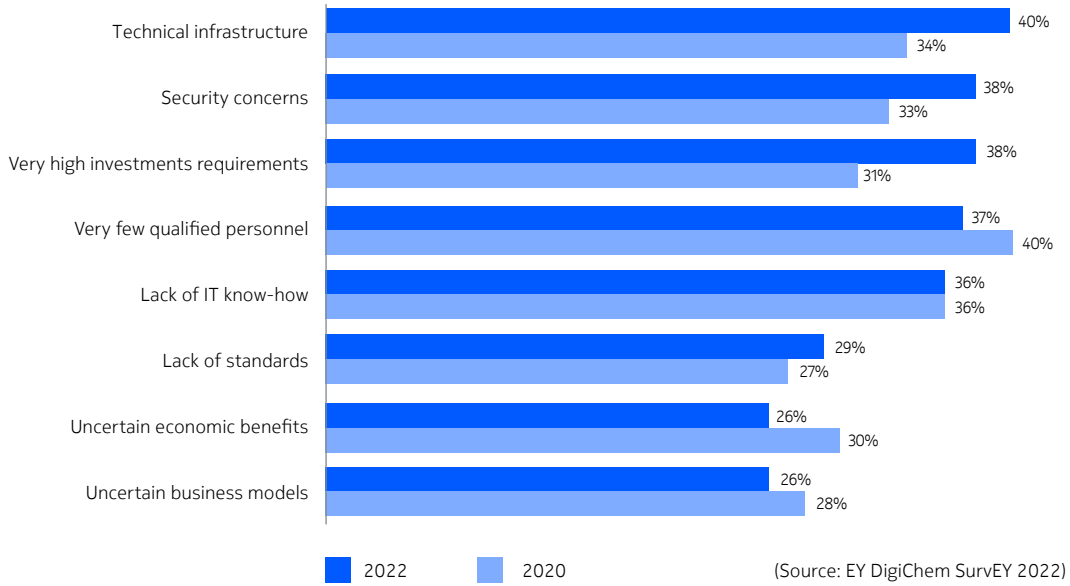
Focus on personnel development

New processes and automation accelerate the need for different skillsets and approaches to work for companies. As industrial transformation continues there are shortages of available people with data science, AI and cybersecurity skills and a C-level priority has become attracting and then retaining talent in these – and other more traditional – areas. EY has identified personnel as a significant barrier to digitalisation, especially for those in industries that have highly-specific requirements.

For chemical businesses, for example, lack of qualified personnel was identified as a key challenge in the firm's 2020 DigiChem survey for 47% of respondents; however, in the current survey, concerns have waned with a little more than one-third now citing this as an issue. Currently, as illustrated in Figure 4, companies face challenges in developing a robust technical infrastructure which was cited by 40% of respondents, meeting the investment requirements of digitalisation (38%) and developing secure systems (38%).

Consulting firm McKinsey in its State of Organizations 2023 Survey[12] has uncovered that in Europe 35% of people leaving jobs cite unsustainable performance expectations as a reason for their departure. Organisations can either respond by tailoring employee value propositions to individualised preferences in ways that can help close the gap between what workers want and what companies need or continue to shed employees.

Figure 4. Three biggest barriers to digitalisation observed by chemical players



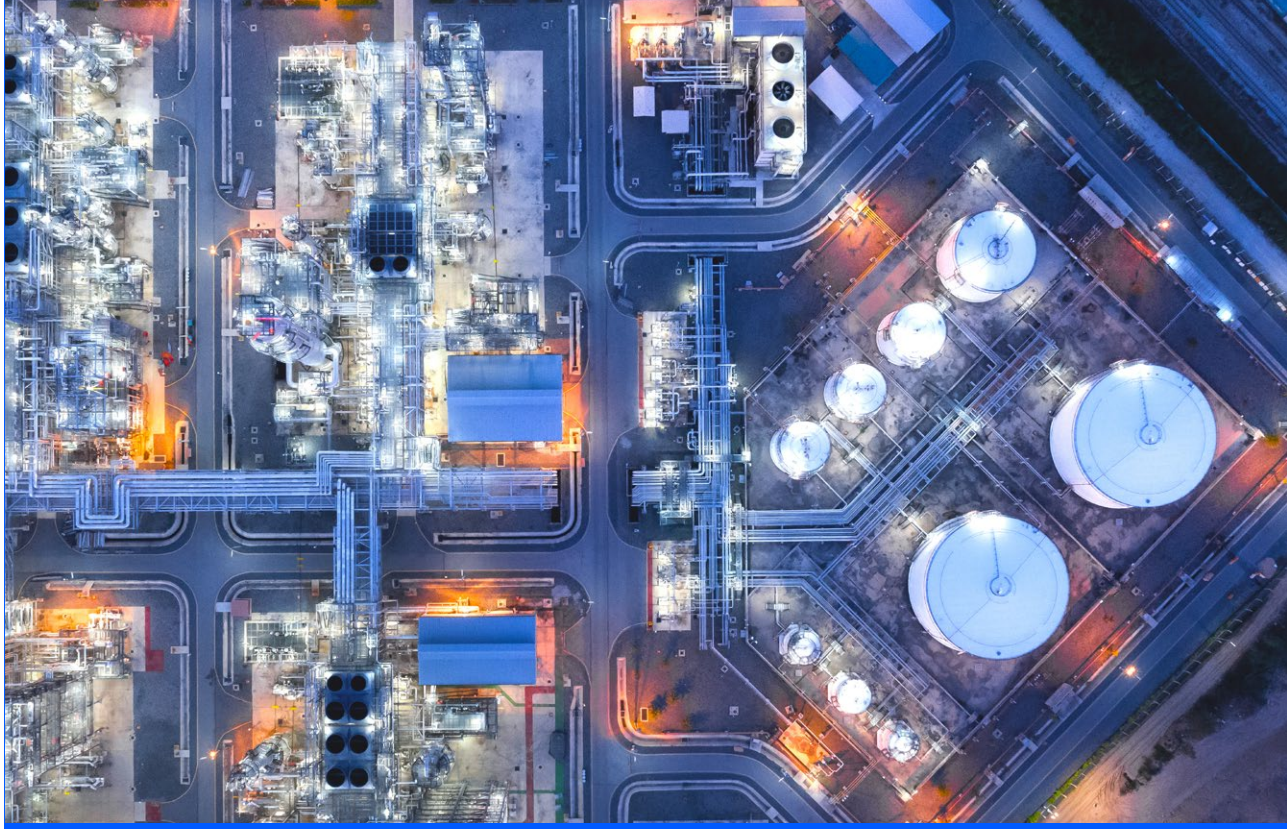
Retention is a significant issue with 39% of respondents in a seven-country survey saying they are planning to leave their jobs in the next 3-6 months. Traditional requirements of compensation, job title and job security are no longer sufficient to retain workers and companies must instead focus on tailoring their work tasks to workers' individual needs. This shift is underway with McKinsey reporting that 40% of respondents in its State of Organizations Survey stating their companies are attempting to improve employees' experiences by meeting their individualised needs.

12 https://www.mckinsey.com/~/media/mckinsey/business%20functions/people%20and%20organizational%20performance/our%20insights/the%20state%20of%20organizations%202023/the-state-of-organizations-2023.pdf

Manage change and culture

Digitalisation of the petrochemical, oil and gas and chemicals industries and their moves to Industry 4.0 is not a technological transformation that is happening in isolation from every other aspect of the business. Digital transformation is pervasive and holistic and needs to bring people and culture along with the technology on the transformation journey. It is the C-suite's role to ensure all the moving parts interlink and the direction of travel is both understood and accepted. Only then can employees become transformation advocates and support the organisation's ongoing change.

It's clear that this challenge faces large numbers of companies. Analyst firm Gartner's 2023 CEO Survey uncovered that 45% of CEOs plan a culture change in the next three years[13]. The firm reports that this culture change will focus mainly on people, social responsibilities, accountability and adaptability. In addition, another 48% of CEOs intend to fine-tune their culture and 93% of CEOs expect culture change in their businesses in the period.



Real world example: Dow

Kyndryl and Nokia have successfully implemented a private wireless network with edge computing for Dow, at its petrochemical processing plant in Freeport, Texas, USA[14]. The modernisation of the Dow plant with advanced connectivity has increased worker safety, and enabled remote audio and video collaboration, and real-time smart procedures. Previous reliance on paper documents, which posed safety risks for workers as they inspected the site, also allowed greater potential for human error.

"One of the primary problems we were trying to solve was getting information into the field to change the way we do operations and maintenance tasks," says Clark Dressen, the Global IT Innovation Center director at Dow. "We wanted to make that information available at the fingertips of the front-line professionals, impacting how they work, how they interact, how they collaborate, how they solve problems."

13 https://www.gartner.com/en/documents/4432499
14 https://www.rcrwireless.com/20221102/5g/from-a-standing-start-in-texas-the-story-of-dow-chemicals-multi-site-private-lte-push

Actionable strategies and best practices for transformation success

To succeed in their digital transformations, chemical production and oil and gas companies need the ability to capture and act on data, often in near-real time. Data from IIoT sensors must be processed by industrial edge computing systems that can use artificial intelligence and machine learning to model and analyse operations. The Nokia One Platform provides actionable intelligence, empowering businesses to optimise processes, enhance product quality, and improve overall operational performance.

A range of exciting new use cases for chemical manufacturing companies are emerging thanks to the arrival of new technologies and connectivity. These extend from digital twins and autonomous mobile robots (AMRs) to remote maintenance and rich group communications. These use cases promise to help accelerate and simplify site and plant automation, improve asset tracking and quality assurance, increase the data transparency, and augment workforce safety and productivity.

To turn these aspirations into operational realities, a comprehensive networking platform is needed that can:

- Connect end-to-end production processes to gather data, and provide monitoring and optimisation for greater efficiency, reliability and security. Connectivity can be provided by industrial grade private 4G and 5G wireless networks and Wi-Fi connectivity.
- Empower users with certified and ruggedised industrial devices. Paper documents, clipboards and biros are obsolete, insecure and can lead to errors. Digital devices enable rich new experiences that promise improved safety alongside greater efficiency.
- Support edge computing applications while protecting industrial data. This encompasses on-premise edge computing capabilities that can support mission-critical communications.
- Transform data into operational insight and support autonomous actions. Big data only delivers value when actionable insights can be derived from it.
- Ease digital transformation and avoid disrupting operations. By communicating effectively with staff and offering additional training, employees can participate and commit to the transformation journey, rather than feeling that change is disruptive.

Such a platform needs to be easy to set up and integrate with legacy networks and operational technology (OT). It must also work seamlessly with the Wi-Fi networks for basic IT connectivity, typically in indoor areas and offices. The network becomes the nervous system of the facility connecting edge computing assets with machines, robots, automated vehicles and emerging tools such as drones. The data these collect in addition to the process efficiencies they support with AI, machine learning and augmented and virtual reality, streamlines, simplifies and secures operations.

The strategic imperative is therefore to put in place the network capacity needed to underpin the use cases enabled by digital transformation. That network then provides the foundation upon which industrial devices can connect, communicate and collaborate and edge computing can enable real-time decisions to be made using low-latency data streams and analytics, augmented by AI and machine learning.

Conclusion

The disruptions associated with digitalisation should not be seen as a threat but a series of opportunities for organisations in the petrochemicals, oil and gas and chemical industries. Although EY reports that 40% of survey respondents say their organisational structures are too complex and that affects their businesses significantly[15], change is coming and structures will be simplified. The opportunities to create a highly flexible, more responsive, more productive, less wasteful and more environmentally friendly business far outweigh the teething troubles, technical challenges and costs of digital transformation.

In addition, the opportunity to redefine company culture and ways of working for future generations has the potential to address the skills shortage and transform a business's capability to attract and retain workers. For the C-level leadership, this also involves transformation and senior management moves away from focusing on incremental improvements to maximise productivity and towards becoming visionaries that can imagine and enable the future.

This demands strategic thinking, wide exploration and greater social connection as the siloed hierarchical structure of the past is replaced with flatter more consensual management of autonomous teams that McKinsey describes as being coordinated by management rather than controlled by it[16]. For petrochemical, oil and gas and chemical industry C-level leaders this could be the major change of their careers rather than the implementation of the technologies that make Industry 4.0 a reality.

To learn more about how digitalisation is reshaping your industry, visit **www.nokia.com**.

15 https://assets.ey.com/content/dam/ey-sites/ey-com/en_fi/noindex/ey-digichem-survey-2022.pdf
16 https://www.mckinsey.com/~/media/mckinsey/business%20functions/people%20and%20organizational%20performance/our%20insights/the%20state%20of%20organizations%202023/the-state-of-organizations-2023.pdf

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