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A Frost & Sullivan White Paper

Accelerating Digital Transformation in the New Normal

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1.Overview

The COVID-19[1] crisis has fast-tracked business transformation on many levels, across industries and across regions. More than just a health crisis, the pandemic has affected societies and economies at their core, including employment, production, consumption and ways of working.

Frost & Sullivan research suggests that a high proportion of executives have revisited their technology road map during the pandemic. Of those who have redefined digital strategy, the majority adopted digital solutions for optimising process and to accelerate the digitisation of their customer- and supply-chain interactions by three to four years. The share of digital or digitally-enabled products in their portfolios has increased twofold. One visible manifestation of this pivot has been in creating collaborative environments for working.

To stay competitive in this new business and economic environment requires new strategies and practices. Most professionals recognise technology's strategic importance as a critical component of the business, not just as an avenue for cost reduction. Companies that have executed successful responses to the crisis report a range of technology capabilities that technology laggards do not possess; in addition, these companies possess speed in experimenting and innovating.

At the end of 2020, Frost and Sullivan polled 93 ***senior executives*** in ***Asia-Pacific*** (from organisations with global revenues ranging from US $10 million to over US $10 billion) across a range of sectors including oil & gas, architecture, engineering & construction, as well as energy & utilities to understand the impact of COVID-19 on their business and digital adoption in their respective industries during and post-pandemic.[2]

This paper outlines findings from that study.

1 Coronavirus disease 2019
2 Refer the Appendix for survey respondent profile

Accelerating Digital Transformation in the New Normal - Key Findings

17% of companies said that ***workforce*** would be affected as a result of deferred or cancelled investments due to the pandemic. 16% indicated that ***new facilities-related CAPEX investments*** were deferred or cancelled

29% of the respondents saw ***increased focus and effort put into digital transformation*** within their firm as a result of the pandemic

Uncertainty in market demand and a potential global recession - the main ***concerns post-COVID-19***

Over half of those surveyed are ***adjusting their technology roadmap*** to meet the challenges of slow economic growth

Data integration, analytics and unified communications - the main areas of focus for digital investments during most of 2020

Information and data management emerged as the single most mentioned reason why companies make technology investments

Acceptance of remote / distributed workforce (creating agile human capital) - the key strength that emerged as a result of responding to the pandemic that was likely to be leveraged in a post-pandemic world. ***Improving remote work experience*** - the most mentioned initiative planned post-pandemic

Changes to product or services, operations and pricing are a must for organisations to stay relevant to customers

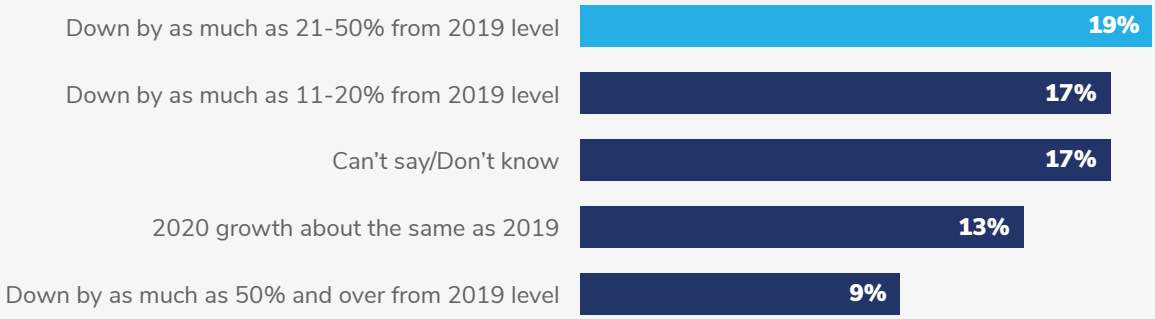
2. Key Business Challenges

In most economies, movement restrictions and poor consumer confidence as a result of COVID-19 led to lower overall consumption of goods and services, in turn, affecting the wider economy and businesses. In many countries, factories were closed, and the lockdown was prolonged (in turn, affecting project delivery, production throughput and supply chains). As a long-term effect of the pandemic, a common trend across industries is deferral of planned CAPEX investments as revenues dropped.

Impact of COVID-19 on annual revenue

Nineteen percent (19%) of the survey respondents expected that 2020 full-year revenue would be down by as much as 21-50% of revenue from the previous year. Seventeen percent (17%) saw an 11-20% drop. This subsequently impacts strategic decisions and transformational programs for businesses.

Figure 1: Impact of COVID-19 on annual revenue

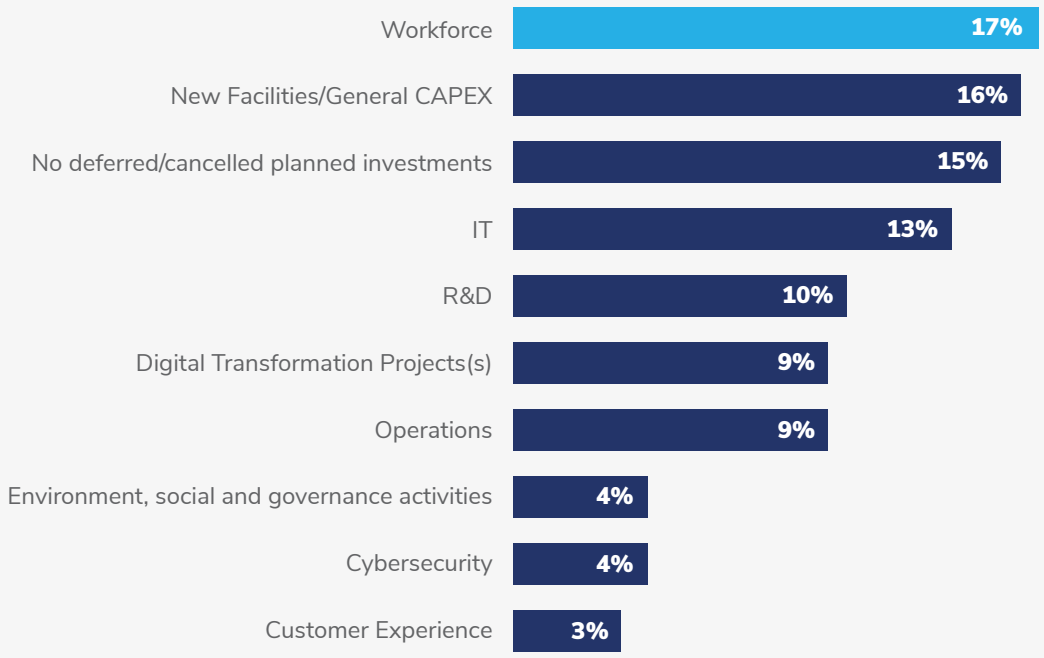


Source: Frost & Sullivan analysis; N=93

Areas where companies will defer/cancel planned investments

Freezing new hires and reducing headcount emerged as a common approach to reducing OPEX during the crisis. Seventeen percent (17%) of the respondents said that ***workforce*** would be affected as a result of deferred or cancelled investments, and 16% of respondents indicated that ***new facilities-related CAPEX investments*** were deferred or cancelled because of the pandemic.

Figure 2: Areas where companies will defer/cancel planned investments

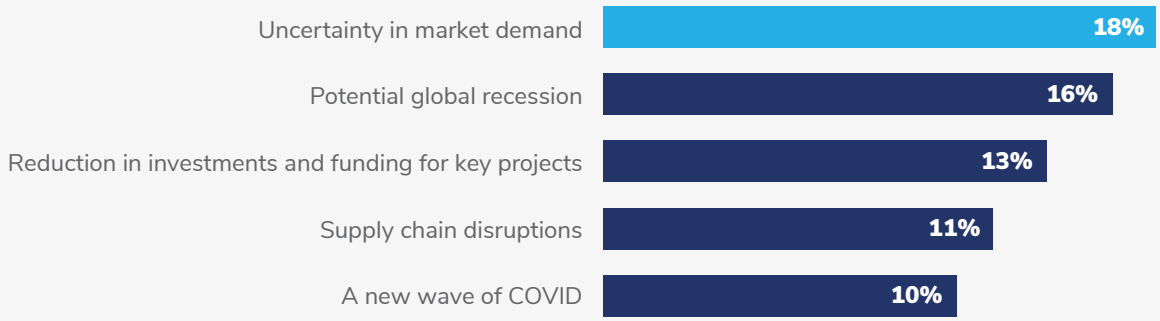


Source: Frost & Sullivan analysis; N=93

Top five concerns post-COVID-19 and operating in new business environment

Some of the common challenges that emerged during the expert interviews were ***uncertainty in market demand*** (in turn, resulting in poor demand forecasting and production scheduling); the potential ***economic fallout*** leading to a drop in consumption; ***pressures in investment and funding for key projects***; increased supply costs and uncertainty due to supply chain disruptions; and potential new waves of the pandemic.

Figure 3: Top five concerns post-COVID-19 and operating in a new business environment



Source: Frost & Sullivan analysis; N=93

Table 1: Top three concerns post-pandemic by key industries

INDUSTRY	KEY CONCERNS
Oil & Gas	• Uncertainty in market demand (21%) • Potential global recession (20%) • Reduction in investments and funding for key projects (11%)
Architecture, Engineering & Construction	• Possible global recession (19%) • Uncertainty in market demand (18%) • A new wave of COVID (20%)
Energy & Utilities	• Uncertainty in market demand (22%) • A new wave of COVID (14%) • Working capital management (14%)

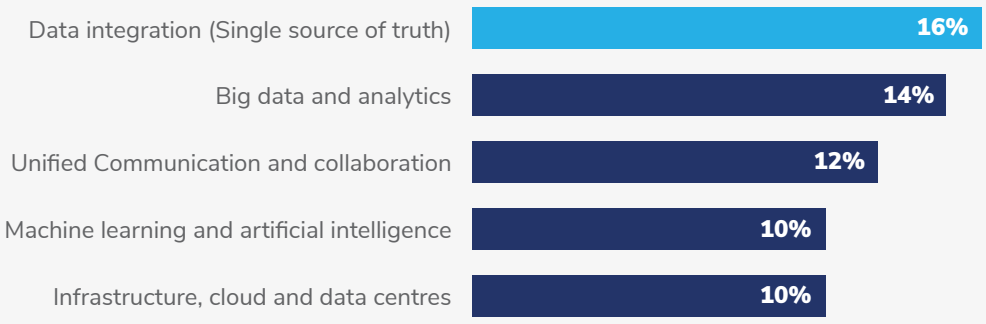
Source: Frost & Sullivan analysis; N=69

3.Leveraging Competency

Top five digital tools that organisations are leveraging to meet short-term challenges

Data integration emerged as the single largest area of focus for digital investments during most of 2020. Sixteen percent (16%) of the respondents confirmed that they had prioritised technology investment for data integration among teams, followed by investments in ***data analytics*** (14%). The pandemic has also dramatically increased demand for ***unified communications and collaboration*** (UCC) as the need for video conferencing calls and collaboration platforms has increased. Numerous companies have invested in UCC tools that enable remote working. A key insight that emerges from the survey is that ***most executives were keen to consider digital investments as part of their long-term strategic growth plans, rather than a mere short-term response to COVID-19.***

Figure 4: Top five digital tools that organisations are leveraging to meet short-term challenges

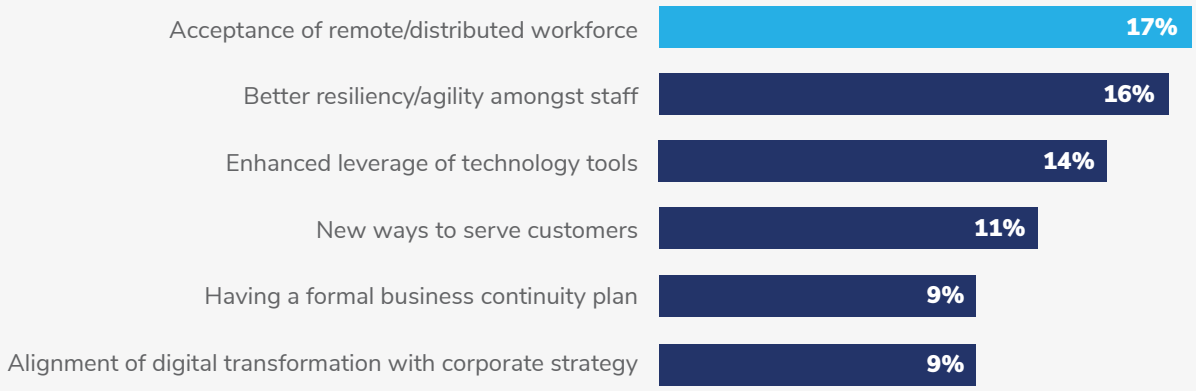


Source: Frost & Sullivan analysis; N=93

Short-term competency gained

In the wake of the pandemic, companies have adapted to new ways of working remotely and collaborating efficiently with employees through the leverage of cloud computing and productivity tools. The survey revealed that this would open up new ways of working over the long term and that companies are planning to leverage these current investments for the long term. Seventeen percent (17%) of the survey respondents feel ***acceptance of remote/distributed workforce*** (creating agile human capital) was a key strength that emerged as a result of responding to the pandemic that was likely to be leveraged in a post-pandemic world.

Figure 5: Short-term competency gained



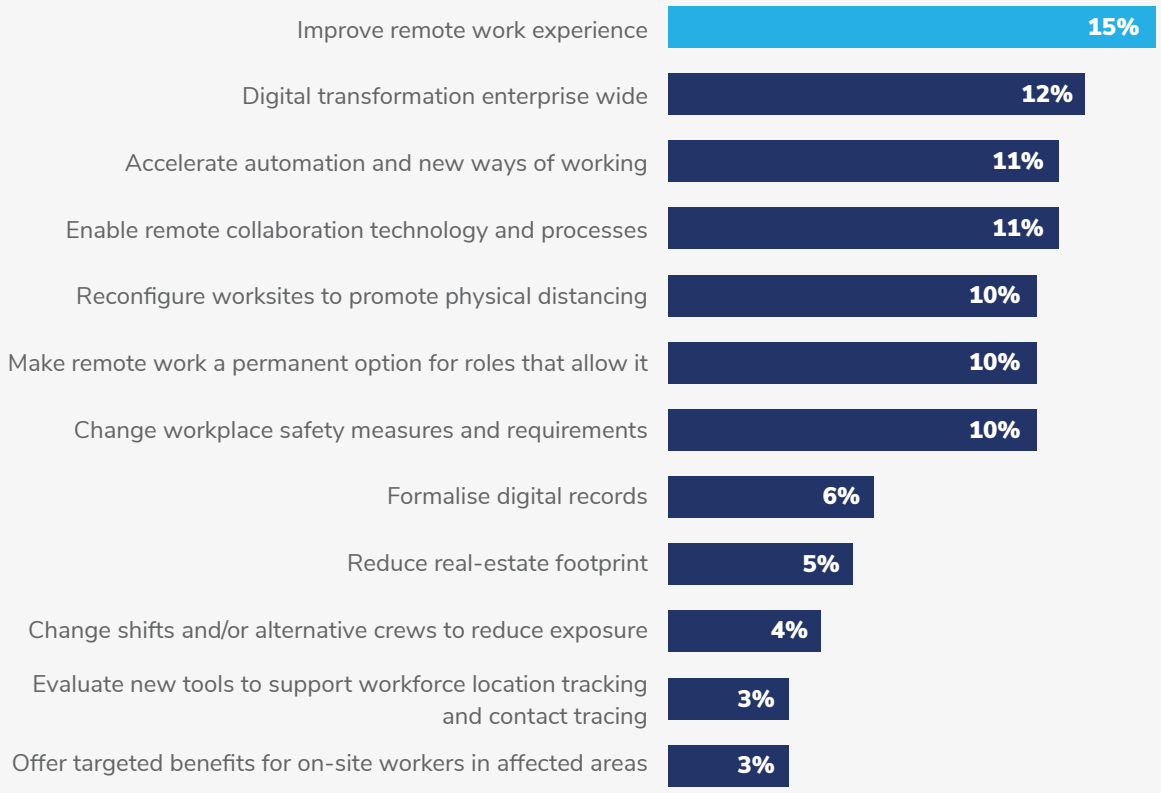
Source: Frost & Sullivan analysis; N=93

Initiatives companies are planning to implement post-COVID-19

Fifteen percent (15%) of the executives shared that remote working could continue post-pandemic as it has proved cost-efficient and productive for their organisations. As businesses look beyond the immediate impacts of COVID-19, towards recovery and a new reality, executives are looking to adopt a connected enterprise mindset and accelerate digital transformation.

COVID-19 has been a catalyst for tactical digital transformation. Organisations had to react quickly to enable remote working, shift to digital channels and transform products and services to meet the changing demands of customers. The pandemic has forced organisations to urgently leverage new technologies and ways of working, implementing digital projects in mere weeks (that would previously have taken months, if not years). However, there are concerns that these rushed, reactive initiatives may have addressed a short-term need at the risk of long-term success. Twelve percent (12%) of the executives in the survey want to take a ***holistic approach to digital transformation*** and take this to ***enterprise-wide*** levels.

Figure 6: Initiatives companies are planning to implement post-COVID-19



Source: Frost & Sullivan analysis; N=93

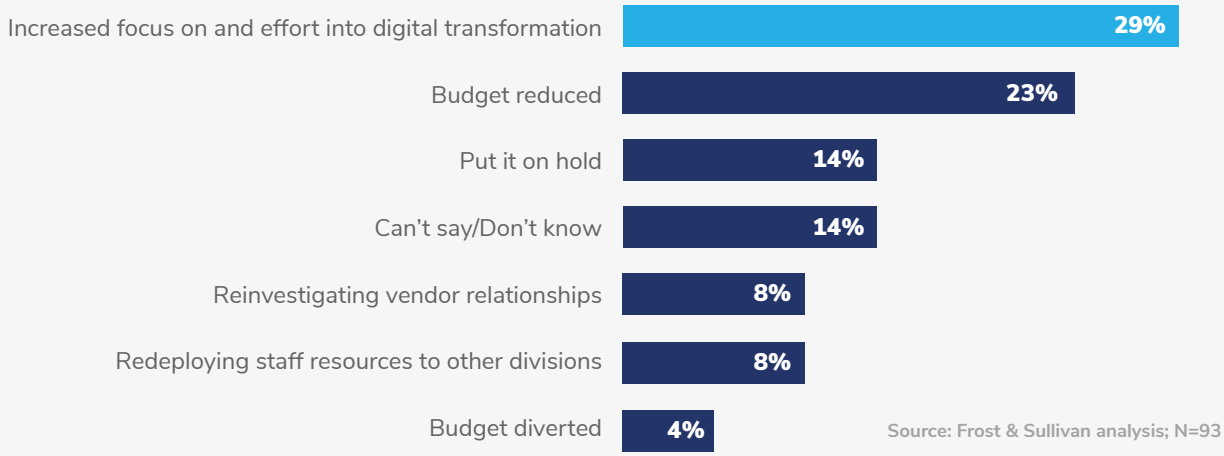
Impact of COVID-19 on digital transformation

It is very evident from the survey and interviews that despite poor market performance, companies have increased focus and effort toward digital transformation. Twenty-nine percent (29%) of the respondents saw ***increased focus and effort put into digital transformation*** within their firms. This has been more marked in the oil & gas industry than in other industries such as mining, chemicals, etc.

However, for those companies whose revenues were hit hard by the pandemic, the budget for digital transformation has been reduced as a consequence.

> **Fortunately, we invested in digital collaboration tools before COVID-19; the pandemic just made the transition look natural.**
>
> *– Key Opinion Leader*

Figure 7: Impact of COVID-19 on digital transformation



Source: Frost & Sullivan analysis; N=93

4. Objectives and Areas of Focus

Fifty-two percent (52%) of the survey respondents are ***adjusting their technology roadmap*** (digital processes and digital ecosystems) to meet the challenges of slow economic growth.

The immediate priority for executives clearly seems to be reducing operating expenses and optimising operations using digital tools. However, given the fact that digital transformation has both short- and long-term impacts, a 'here and now' focus on reducing operating expenses may hinder appreciation of the overall benefits of digital transformation (and as a consequence, may weaken the support for and effort invested in ensuring its successful implementation).

Given the complexity of the pandemic, there is reason to believe that the recovery phase for COVID-19 will require unprecedented levels of orchestration, communication and changing of existing configurations during what promises to be a challenging and potentially protracted period across the globe. For many technology leaders, the first steps they take during this phase will be informed by the necessary series of adjustments they enacted as the crisis erupted:

- Supporting and enhancing the workforce experience in collaboration and co-creation through relevant policies and protocols
- Securing technology to support the new work environment
- Improving governance

As organisations recover, it is essential that they cast an eye on the future competitive landscape. Three longer-term priority area shifts that will help their organisations thrive beyond the near and intermediate terms are:

- Reimagining customer experience through designing and delivering the products and services that meet customer needs
- Bridging the physical and digital worlds to deliver new value
- Establishing trust as key differentiation

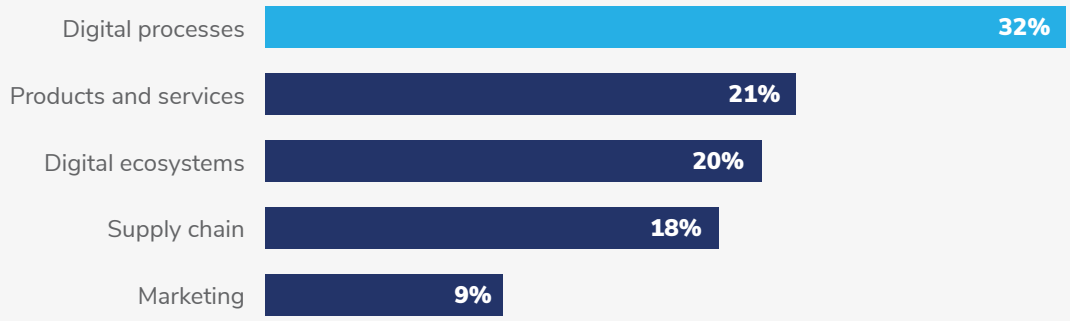
Most industries are making investments in these areas of value creation.

Primary focus of digital transformation during pandemic

32 % of the respondents focused on ***digital processes***

20 % of the respondents focused on ***digital ecosystems.***

Figure 8: Primary focus of digital transformation during pandemic



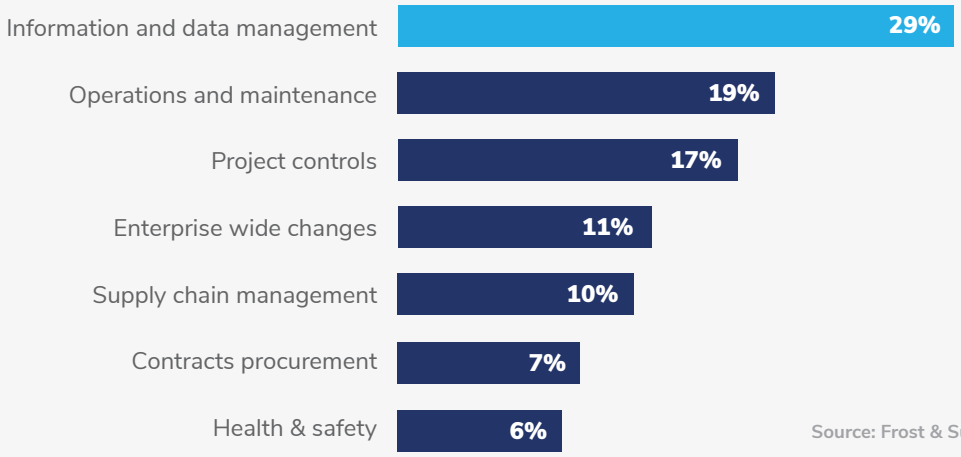
Source: Frost & Sullivan analysis; N=93

Functions that would benefit most from technology investment

Information and data management emerged as the single most mentioned reason why companies make technology investments, followed by ***operations and maintenance*** outcomes and ***project controls***.

> **Project control is one area where we are implementing seamless data integration.**
>
> – Key Opinion Leader

Figure 9: Functions that would benefit most from technology investment



Source: Frost & Sullivan analysis; N=93

5. Digital Transformation in Practice

While it is clear that digital adoption will transform most industries, there are challenges that need to be addressed, such as changing customer expectations, culture change, regulation and the need for skilled labour.

The most significant barriers or challenges to digital adoption according to the survey are:

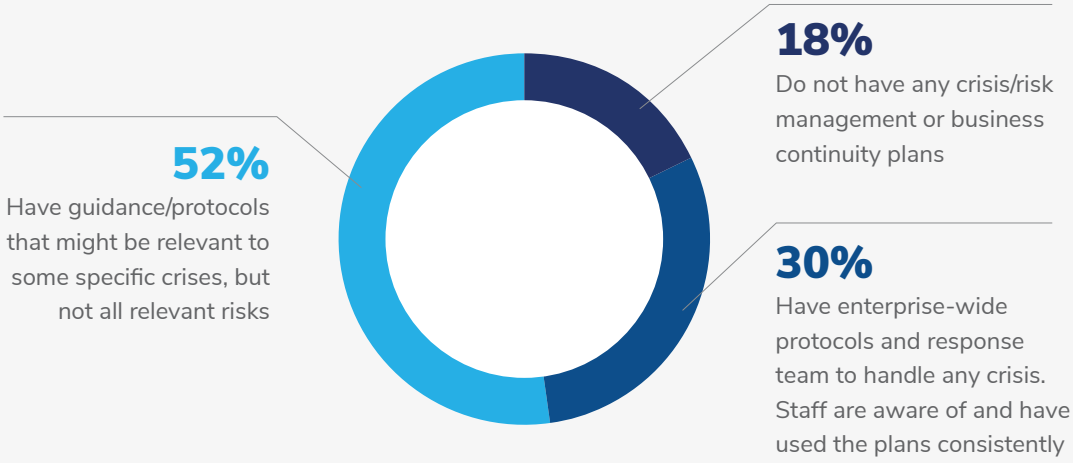
1. **Ability to re-skill talent:** This reflects the culture of the organisation and its capability to bring in everyone along the change process.
2. **Ageing workforce:** As employees age, it is difficult for many of them to adopt new technologies and practices or make rapid changes.
3. **Regulatory uncertainty:** In many countries, the pandemic led to uncertainty in policy and decision making, which challenges organisations as they seek to make investment decisions.
4. **Resistance to change:** Due to the siloed nature of operations, individual teams do not always have full visibility of organisation-wide digital transformation initiatives. This weakens the level of support they provide to such initiatives.
5. **Economic conditions affecting cash flow:** Industries such as construction are directly tied to the economy of the country; the impact of COVID-19 on the economy has directly affected such industries and their pace of transformation.

Crisis management, business continuity or other risk management plans

It is very evident from the survey that the preparedness for crises such as COVID-19 has been found wanting, and from interviews, it has emerged that ***a pandemic was never an identified and acknowledged risk in enterprise-wide risk management planning.*** Fifty-two percent (52%) of the respondents said that they might have some protocols or guidance for risk, but not for all the relevant risks.

> **We were able to manage the financial crisis, but not the operational issues that occurred due to the pandemic.**
>
> – Key Opinion Leader

Figure 10: Approach to crisis management



Source: Frost & Sullivan analysis; N=93

Important factors to eliminate cost and/or enhance revenue streams after facing a disruption

Respondents feel that ***changes to product or services, operations and pricing*** are a must for organisations to stay relevant to customers. Optimising operation and decreasing OPEX has always been a priority of digital transformation. However, the pandemic has, in many instances, radically changed customer preferences and has forced organisations to pivot from their existing product and services to ***more relevant offerings***.

According to interviews with key opinion leaders, with the current state of economy and higher than normal unemployment levels, ***affordability for customers should be given primary focus when pricing***.

The pandemic has also exposed the risk of over-dependence on China for intermediate goods. Supply chain disruptions and supply price increases during the pandemic have prompted companies to adopt multiple strategies such as dual sourcing, multi-sourcing and relocating production out of China. Many companies have already shifted manufacturing facilities from China to other growing economies such as India, Vietnam and Mexico.

Figure 11: Important Factors to eliminate cost and/or enhance revenue streams after facing a disruption

Source: Frost & Sullivan analysis; N=93

6. Insights across Key Industries

Oil & Gas

Oil, gas and chemical companies are in the midst of two prolonged crisis, an oil price war and the ongoing pandemic. ***Oil prices dropped dramatically*** when OPEC and Russia failed to agree on production cuts early in 2020. The prolonged lockdowns, movement control, travel restrictions and closure of businesses resulted in falls in oil demand. This supply/demand imbalance occurred in tandem with the ***weaker demand for chemicals and refined products***. The short- to mid-term outlook for high-cost producers, small operators and those companies with high levels of debt appears to be challenging, and globally, many highly-levered companies exited the market during the pandemic.

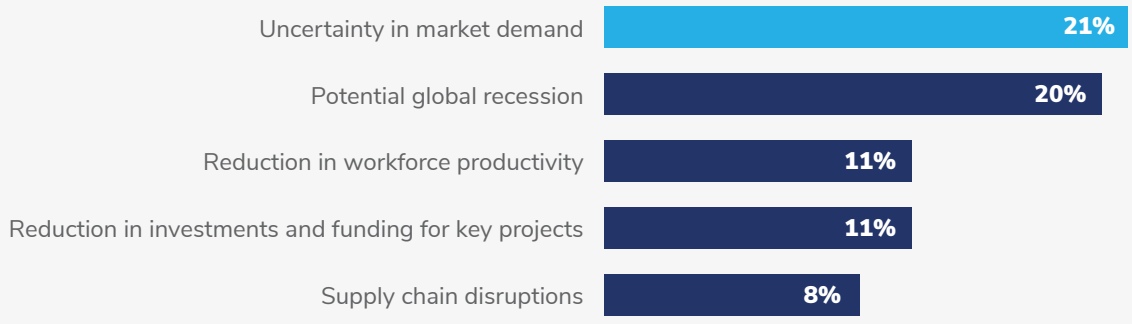
The potential long-term impact appears to be:

1. Many companies are responding to the loss by ***cutting capital and operational expenditure***.
2. Likely shortage of skilled labour when the market rebounds.
3. Companies may alter or accelerate their plans to ***diversify into other energy segments*** or change the way they have been operating their businesses.

Top concerns of O&G industry post-COVID-19

Uncertainty in market demand and another ***potential global recession*** emerged as top concerns of oil & gas companies post-COVID-19.

Figure 12: Top concerns of O&G industry post-COVID-19



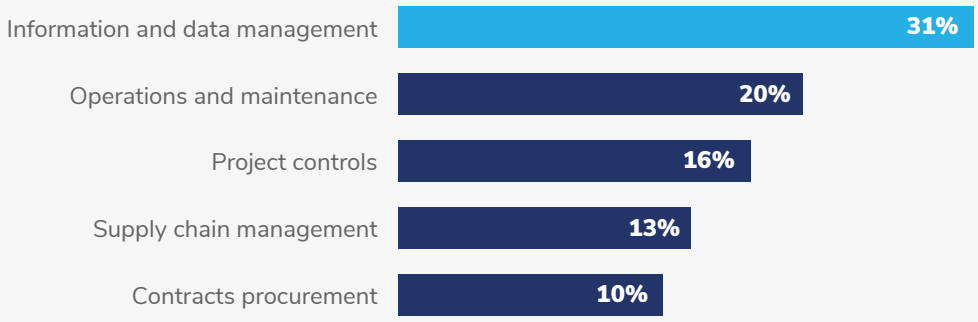
Source: Frost & Sullivan analysis; N=31

Digital technology or innovation is not new to the oil & gas industry. The sector commenced adopting digital solutions as early as the 1980s to focus on resource utilisation, the productivity of rigs and improved health and safety of employees. With the evolution of digital instruments and control systems, the industry's capability to automate plant operations and data collection improved. However, the industry is yet to reap the full benefits or opportunities from using data and digital technology to support decision making. In a day, oil and gas plants generate and collect terabytes of data, of which only a small fraction is used to derive actionable insights.

Areas that would benefit most from technology investment

Information and data management was the most mentioned area that was likely to benefit from technology investment.

Figure 13: Areas that would benefit most from technology investment, O&G industry

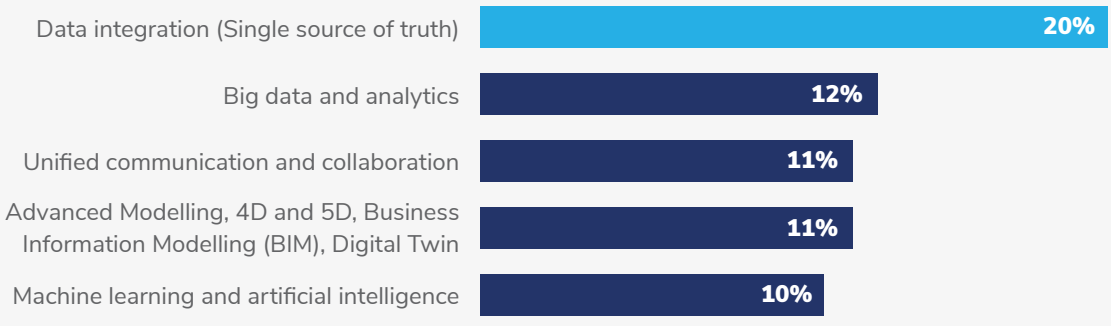


Source: Frost & Sullivan analysis; N=31

Top five digital tools that O&G firms are utilising to meet short-term challenges

Leveraging ***data integration*** to achieve a single source of truth appeared to be the most mentioned digital tool that oil and gas firms are using in the short term.

Figure 14: Top five digital tools that O&G firms are utilising to meet short-term challenges



Source: Frost & Sullivan analysis; N=31

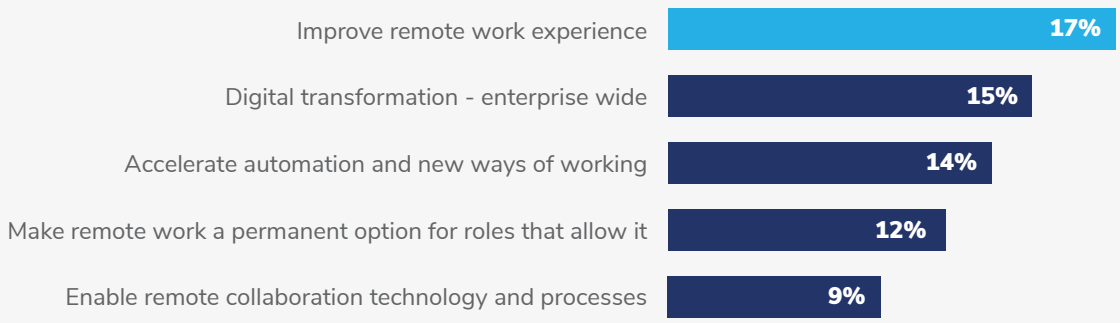
Other use cases of digital transformation specific to the oil and gas sector include:

- Demand and production forecasting
- Digitally enhanced oil recovery
- Analytics across unconventional assets
- Predictive maintenance
- Automation of work
- Transferring work onshore from offshore facilities
- Asset monitoring and increased asset security

Initiatives that O&G companies are planning to implement post-COVID-19

Integration of Wi-Fi, LPWAN[3] and location-based technologies to allow for remote monitoring of potential incidents, plus tracking and tracing not only of people in potentially dangerous situations, but also contractors and equipment utilisation appeared to be the most mentioned initiatives in the pipeline post-COVID-19.

Figure 15: Initiatives that O&G companies are planning to implement post-COVID-19



Source: Frost & Sullivan analysis; N=31

3 Low-power wide-area network

Hexagon Case Study

Petroleum Development Oman (PDO), the largest oil and gas exploration and production company in the Sultanate of Oman, completed phase three of its Information Management digital transformation journey with Hexagon in November 2020. This stage of the project included implementing Hexagon's Digital Twin technology and SmartPlant® Enterprise for Owner Operators (SPO) platform to enable PDO's maintenance and operations teams direct access to the digital twin across the complete business lifecycle.

Using Hexagon solutions enables PDO to digitally transform its information management and project collaboration by providing a single source of truth platform where all the lifecycle information is available in a centralized manner to more than 4,100 employees and contractors.

PDO chose Hexagon as the preferred solution provider because of the unique capabilities of the SmartPlant Enterprise platform: the platform is based on zero-footprint technology with full mobility features. This enables the project and operations teams, as well as contractors and vendors inside and outside the company network, to collaborate on projects in real-time. This on-premise, cloud-based concept provides secure access while improving efficiency and productivity as errors, clashes and the need for rework is reduced.

Mohamed Mujaini, Engineering and Operation Information Management Functional Manager at PDO, said, "SPO is one of the strategic solutions for Petroleum Development Oman (PDO) to drive the digital transformation of projects and operations. Having Hexagon's SPO platform has enabled us to transform our project collaboration and improve efficiency digitally. For example, the time needed to allocate tags has been reduced by 90%, from days to a few minutes. Also, the time needed for handovers between contractors and project teams has decreased by 50%."

Architecture, Engineering & Construction

The global architecture, engineering & construction industry, which was already reeling under the impact of multiple challenges such as lack of capital, economic weakness, low consumption and regulatory burdens, is now more acutely affected by the pandemic.

To contain the pandemic, many nations restricted the movement of people, goods and gatherings. Due to the restrictions put in place, much of construction activity came to a standstill. As industries continue to curb CAPEX investments, construction activities remain subdued. However, despite the negative impact of the COVID-19 pandemic, global construction activity is projected to grow by around 35% over the coming decade to reach US $5.8 trillion by 2030. [4]

4 Global construction sector to grow 35% in 2030 on urbanisation, softer pandemic impact, Oxford Economics quoted by ICIS, 2020, https://www.icis.com/explore/resources/news/2020/09/11/10551509/global-construction-sector-to-grow-35-to-2030-on-urbanisation-softer-pandemic-impact, accessed 06 Jan 2021

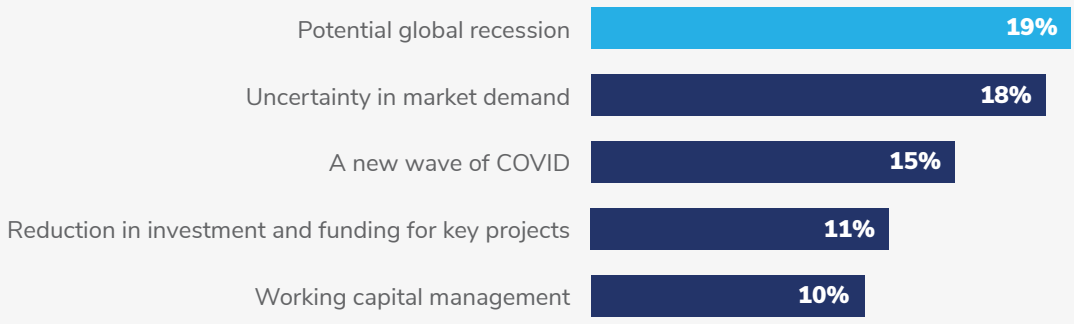
Key shifts that are likely to impact the sector over the long term include:

- **Disruption of the traditional value chain** (through exploration of new business models such as off-site construction, circular construction, etc.)
- **Increased project complexity (**spurred by increased government investment in a range of mega infrastructure projects to stimulate economies post-COVID-19, as well as additional compliance obligations[5] and safety requirements onsite and also by the growing traction for green buildings, which stimulate use of sustainable materials, building integrated photovoltaic (BIPV), smart lighting, building energy management systems, smart HVAC, etc.)
- **Construction cost pressures** resulting in cost overruns (with repercussions for contractors including hefty penalties, loss of reputation and compromised profitability of operations.)

Top concerns with respect to operating post-COVID-19

Growth in the construction sector is directly tied to the health of the global economy. A recession triggers fall in property values, which has a major negative impact on the industry. The respondents felt that a ***potential global recession*** could be a major challenge to the industry post-pandemic. This and ***uncertainty in market demand*** emerged as top concerns for executives post-pandemic.

Figure 16: Top concerns with respect to operating post-COVID-19, Architecture, Engineering & Construction industry



Source: Frost & Sullivan analysis; N=21

5 For example, various high-profile cases that revealed serious building defects (for example, the combustible cladding class action equating to several billion dollars in relation to over 1,000 buildings in Australia) have resulted in greater scrutiny and additional verification and certification of building projects.

Initiatives that companies are planning to implement post-COVID-19

Remote ***collaboration technology tools and processes*** were the most mentioned initiatives that architecture, construction and engineering companies were planning to implement post-COVID-19. According to the 2020 Global Construction Disputes Report[6], in 2019, the global average value of construction disputes was US $30.7 million, and the global average length of disputes was 15 months. More regular communication between project staff and third parties as well as transparency are cited as key factors in mitigating or resolving disputes. This is where collaboration solutions can play a significant role.

Figure 17: Initiatives that companies are planning to implement post-COVID-19, Architecture, Engineering & Construction industry

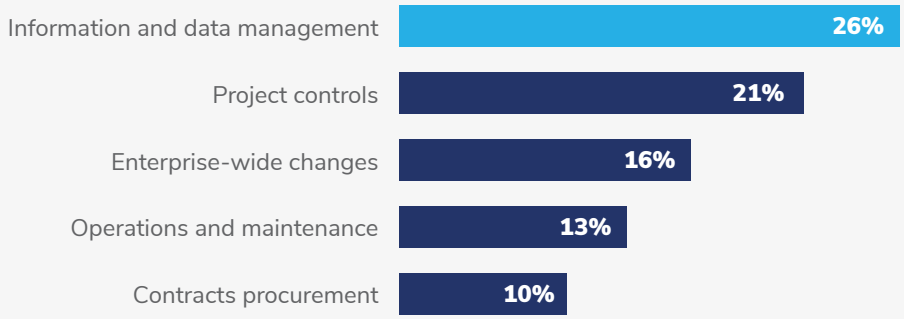
Source: Frost & Sullivan analysis; N=21

Areas that would benefit most from technology investment

Information and data management emerged as the area that would benefit most from digitalisation. Project management that is combined with next-gen technologies can significantly improve communication amongst the stakeholders. For example, 5D-BIM is transforming the construction industry by integrating spatial 3D design with project cost and schedule data. It also allows owners and contractors to identify and analyse the changes in project cost and schedule alongside a proposed change in design on a single platform.

6 2020 Arcadis Global Construction Disputes Report, Arcadis

Figure 18: Areas that would benefit most from technology investment, Architecture, Engineering & Construction industry

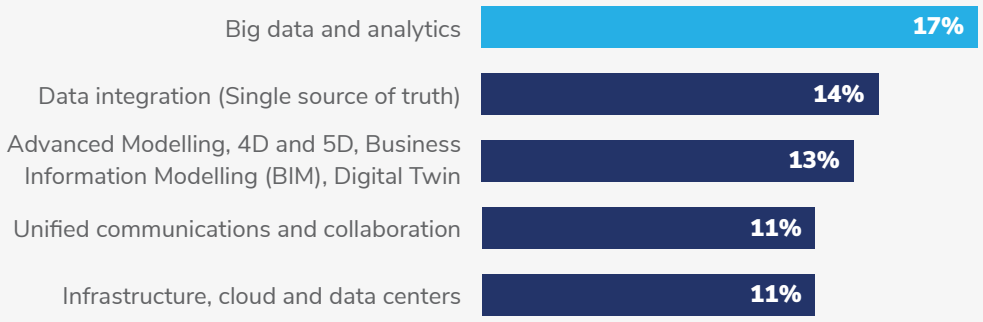


Source: Frost & Sullivan analysis; N=21

Top digital tools to meet short-term challenges of COVID-19

Data analytics appeared to be the most mentioned digital tool that architecture, construction and engineering firms were using to address the short-term challenges of COVID-19.

Figure 19: Top digital tools to meet short-term challenges of COVID-19, Architecture, Engineering & Construction industry



Source: Frost & Sullivan analysis; N=21

Hexagon Case Study

After two decades of extreme traffic congestion in their city, LA County residents voted to approve tax initiative Measure R, which would commit $40 billion for traffic relief and transportation upgrades over the next 30 years.

LA Metro was scaled for delivery of only one to two major projects at a time. However, the delivery strategy for Measure R assumed that four to five major projects would be executed concurrently. Add to this the increased expectation for quicker project deliverability and it was clear the agency needed a system that would help successfully manage a program of this size. LA Metro decided to implement an enterprise-wide, web-based program management information system, inclusive of capital planning and staffing analysis. It used Hexagon's EcoSys™ Enterprise Project Performance software as the program's central hub and created an integration, reporting, and analysis platform to address the demand for greater cost accountability and reporting.

Through its use of EcoSys, LA Metro has realized a major increase in its capabilities for project and program management and is better able to deliver on the Measure R timelines. Use of EcoSys will now be extended to other capital programs beyond railway projects, and LA Metro and EcoSys are working together to systematically develop in-house application expertise at the agency.

Energy & Utilities

The battle to become the next energy super-power has affected economies, and geopolitical conflict is leading to unrest, energy commodity price volatility and trade bans.

Over 2020, lockdown measures have significantly ***reduced electricity demand*** in the commercial and industrial sectors. The International Energy Agency (IEA) estimates that global electricity demand decreased by 2.5% in Q1 2020 and estimates a 5% contraction by the end of 2020.[7]

Slower demand growth–resulting from falling economic activity–prompted by COVID-19 is expected to keep oil prices down. Low oil prices will help oil-importing countries, including those where the price of natural gas is indexed to oil. Natural gas prices were already at record lows before COVID-19 due to the economic slowdown in China and record shale gas production in the United States.

Increasing unemployment due to the pandemic may prevent many people from paying electricity bills. Payment delays and delinquency of utility bills by end-customers (residential, commercial and industrial) are beginning to have a detrimental impact along the energy supply chain. In many countries, governments have intervened by maintaining electricity services to the population during the lockdown, whilst also reducing the negative financial impact on the sector. Lower power demand and end-consumer payment stresses are constraining the ability of distribution companies to pay power producers under long-term, take-or-pay power purchase agreements (PPAs).

7 World Energy Outlook 2020, IEA, October 2020

Many power distribution companies are in need of significant and immediate liquidity support. This is a major concern for investors who rely on PPAs to recover their investments and make a return. In more liberalised markets, the drop in demand has resulted in the collapse of electricity market prices, hurting power generation companies.

Many companies across different sectors globally have ceased or decreased capital expenditure, where possible, and the power sector is no exception. Non-critical investments have been suspended throughout the sector from generation to transmission to distribution. Supply chains for the power sector are also impacted. Manufacturing of most power sector equipment is going into a sharp slowdown. On the positive side, the COVID-19 situation in China, where the majority of solar supply comes from, is normalising, and factories are starting to re-open. Supply disruptions from other countries are affecting the wind industry (which relies on international supply linkages) more heavily than solar. Moreover, local and international travel restrictions, quarantine requirements and lockdowns have resulted in project delays and have added to project construction costs.

Global power generation from renewables increased by 3%, largely driven by new solar and wind projects coming online during the past year. The resiliency of renewable power under current circumstances provides strong optimism for increased demand and investments in renewables going forward.

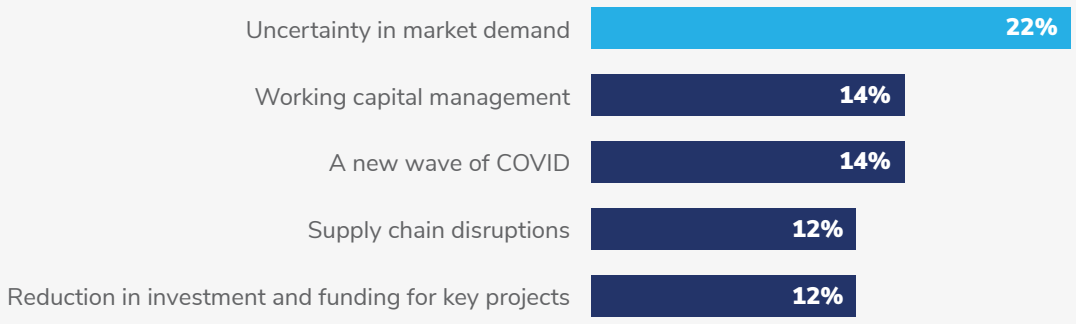
The energy and utilities industries are facing massive digital disruption, radically redefining the way they conduct their business and spurring business model innovation. Digital technology has helped to create Wholesale Electricity Spot Markets (WESM) to trade electricity as a commodity, fixing spot prices based on the demand. This increases the visibility on when electricity prices are high, enabling customers to exercise control over their usage. Increasing integration of renewable energy sources, a move to decentralised energy systems, smaller-scale distribution/transmission, bi-direction electricity flows and proactive consumers are key markers of the shared economy in power generation across developed and developing countries.

There has been a fundamental shift from the use of conventional sources of energy for power generation. A case in point is the rapid adoption of ***electric vehicles*** (EVs) that is challenging traditional ways of doing business in the utility industry. Tesla's Powerwall, an innovation in power storage, made it possible to deliver 7+ days of continuous power during a power outage. Thanks to smart meters and smart grids, customers now have increased visibility and control over their energy consumption. Blockchain[8] is enabling peer-to-peer energy trading amongst prosumers and larger commercial and industrial customers.

Top concerns with respect to operating in new business environment

Nearly 22% of the survey respondents considered ***uncertainty in market demand*** as a key challenge in the post-COVID-19 era, followed by managing ***working capital***.

Figure 20: Top concerns with respect to operating in new business environment, Energy & Utilities



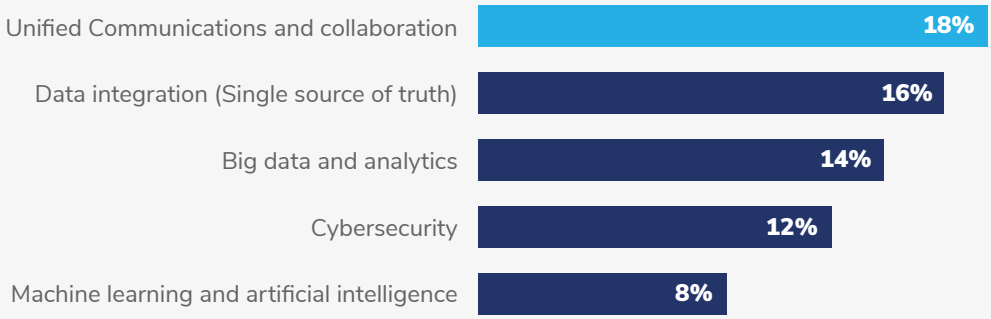
Source: Frost & Sullivan analysis; N=17

8 Blockchain is a decentralised digital database that stores and transfers incorruptible blocks of information across a peer-to-peer (P2P) cnetwork. It allows data to be recorded and transferred in a transparent, secure and efficient way.

Top digital tools that organisations are leveraging to meet short-term challenges of COVID-19

Collaborative tools and ***unified communications*** emerge as the most widely adopted digital tools in the industry, followed by ***data integration*** and ***data analysis.***

Figure 21: Top digital tools that organisations are leveraging to meet short-term challenges of COVID-19, Energy & Utilities



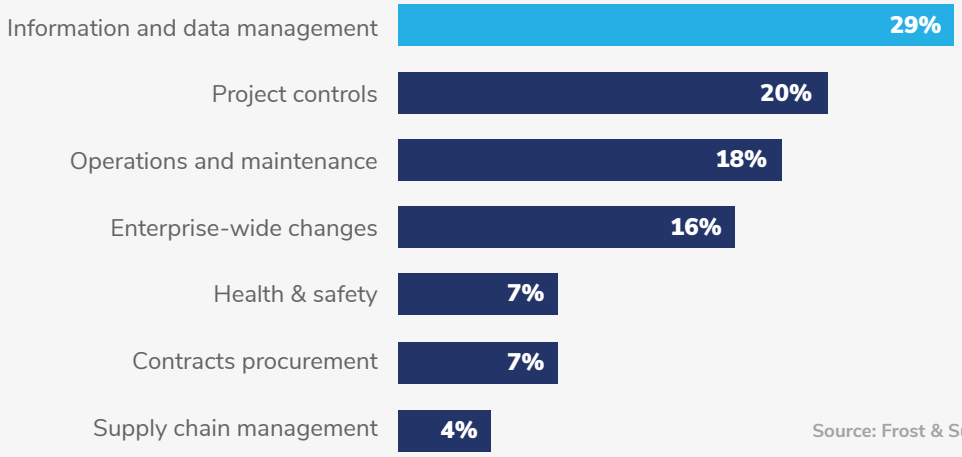
Source: Frost & Sullivan analysis; N=17

Areas that would benefit most from technology investment

According to the survey and interviews with key opinion leaders, the top three areas that would benefit the most from the digital adoption is

- Information and data management
- Project controls and
- Operation and maintenance

Figure 22: Areas that would benefit most from technology investment, Energy & Utilities



Source: Frost & Sullivan analysis; N=17

Hexagon Case Study

AGL Energy was aiming to streamline the provision of daily requirements and combine that data with actual achievements to evaluate the shift production levels at the Loy Yang open cut brown coal mine in Victoria.

During each shift, the daily directions and targets had to be conveyed to the operations staff, indicating the requirements in terms of quantity and quality of the coal. Detailed information about the status and availability of the major equipment was also needed.

To achieve this, AGL Energy Loy Yang Mine implemented Hexagon PPM's j5 Operations Management Solutions. The utilized solutions are the j5 Operations Logbook, j5 Shift Handover, j5 Work Instructions, j5 Event Manager, the j5 Connector for the OSIsoft™ PI System™ and j5 Event Frames (connected to PI Event Frames), along with j5 Dashboards, Reports and Views and j5 IndustraForm® Templates. The PI System interface enables current and future planning data to be provided to j5 Operations Management Solutions.

This helps build the requirement details and shift production levels, enabling improved operations workflow. j5 Operations Management Solutions save time by producing concise requirements and directions at the start of each shift. All relevant information is available to the entire AGL Energy Loy Yang Mine operations crew allowing for greater communication and planning. The provision of this data at the start and end of each shift enables a group approach to Shift Handover and Daily Production Meetings.

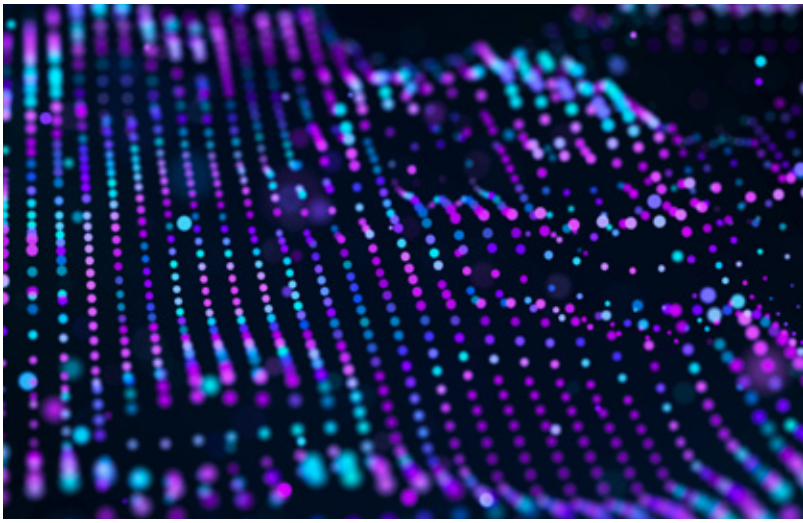
7. Conclusion

Having operated for a good part of 2020 when the world contended with a global pandemic that created unprecedented disruption, companies have now developed a better understanding of strategies that are likely to work and those that may need change. Most companies relied on existing contingency plans during the early days of restrictions, making changes on-the-go, as new regulations and stipulations to deal with COVID-19 were announced. Preparedness was tested, and business continuity and resource optimisation became primary challenges. Managing internal challenges has been a strategic imperative, and some of the internal organisational behavioural changes have included: ***decision making that was adequately decentralised and localised***; ability to ***analyse data*** and information ***for smarter decisions***; ***rapid go-to market*** strategies driven by technology; and continuous ***focus on innovation***. As crisis management efforts were initiated, ***technology adoption curves became steeper***, companies ***scaled up faster, decision-making cycles were compressed*** and many reluctant adopters finally turned the corner. While adjusting to new stakeholder expectations, the ***prioritising of digital transformation took on more urgency***.

Moving forward, remaining idle is not an option as economies open and businesses must ideate next steps and execution plans. As expectations from all sides—customers to stakeholders—develop a trajectory of their own, companies must reset their digital transformation scope and pace.

When a leading North American oil & gas company found its project execution disrupted by the COVID-19-driven lockdown, it leveraged its ***cloud-first policy*** and Hexagon's cloud-based ***asset lifecycle information management***, HxGN SDx, to ensure ***project productivity and efficiency*** were maintained across multiple project teams located on two continents.

Moving forward, this leverage of the distributed collaboration platform is expected to support remote access to the right project information at any time, from any location.



A leading Malaysian energy major is accelerating its business transformation post-COVID-19 towards ***the goal of greater autonomy***. To facilitate remote operations where possible, it seeks to leverage the HxGN SDx platform, ***sensor*** and ***drone*** technologies, as well as GIS solutions to create a dynamic ***digital twin*** of remote operations.

Critical to the success of this move towards autonomy is the use of operational technology (OT) ***cybersecurity*** solution, PAS to prevent, detect, and remediate cyber threats and protect the company's critical infrastructure.

As companies now front load ***digital-first strategies***, the significant change is likely to be in the ***quantum of resources*** being deployed and the ***pace of deployment***.

The use of ***data analytics*** and d***ata-driven insights*** to improve ***processes***, increase ***efficiency*** and enhance ***productivity*** is set to become the norm.

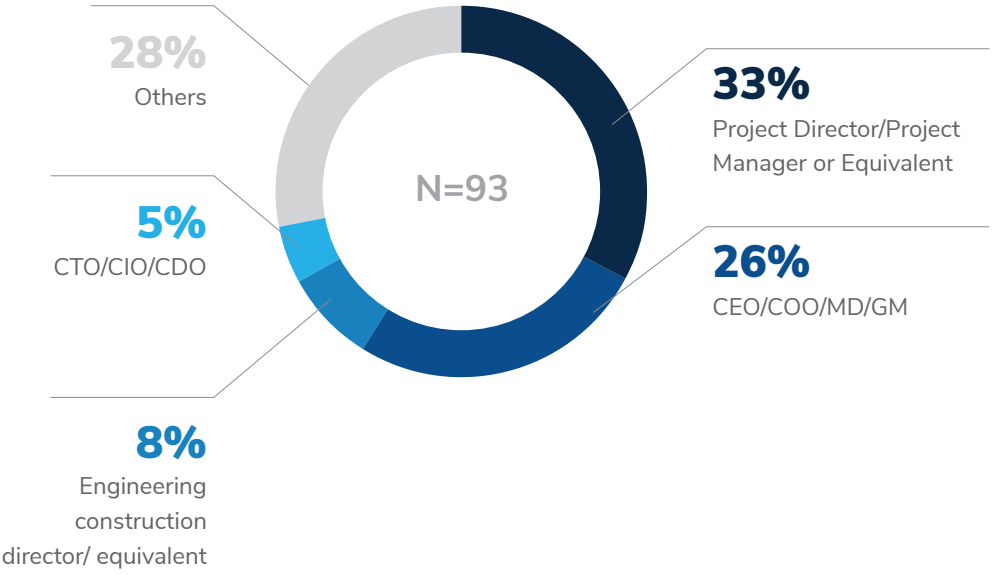
As the study has shown, the process of reinvention in the new normal will require ***improving the remote work experience and taking digital transformation enterprise-wide***. Post-pandemic, over the medium- to long-term, companies must ***align more closely with their extended ecosystem*** of clients, expert vendors, partners, peers and consultants to devise plans and strategies to ***future-proof*** their organisations and make ***them more resilient.***

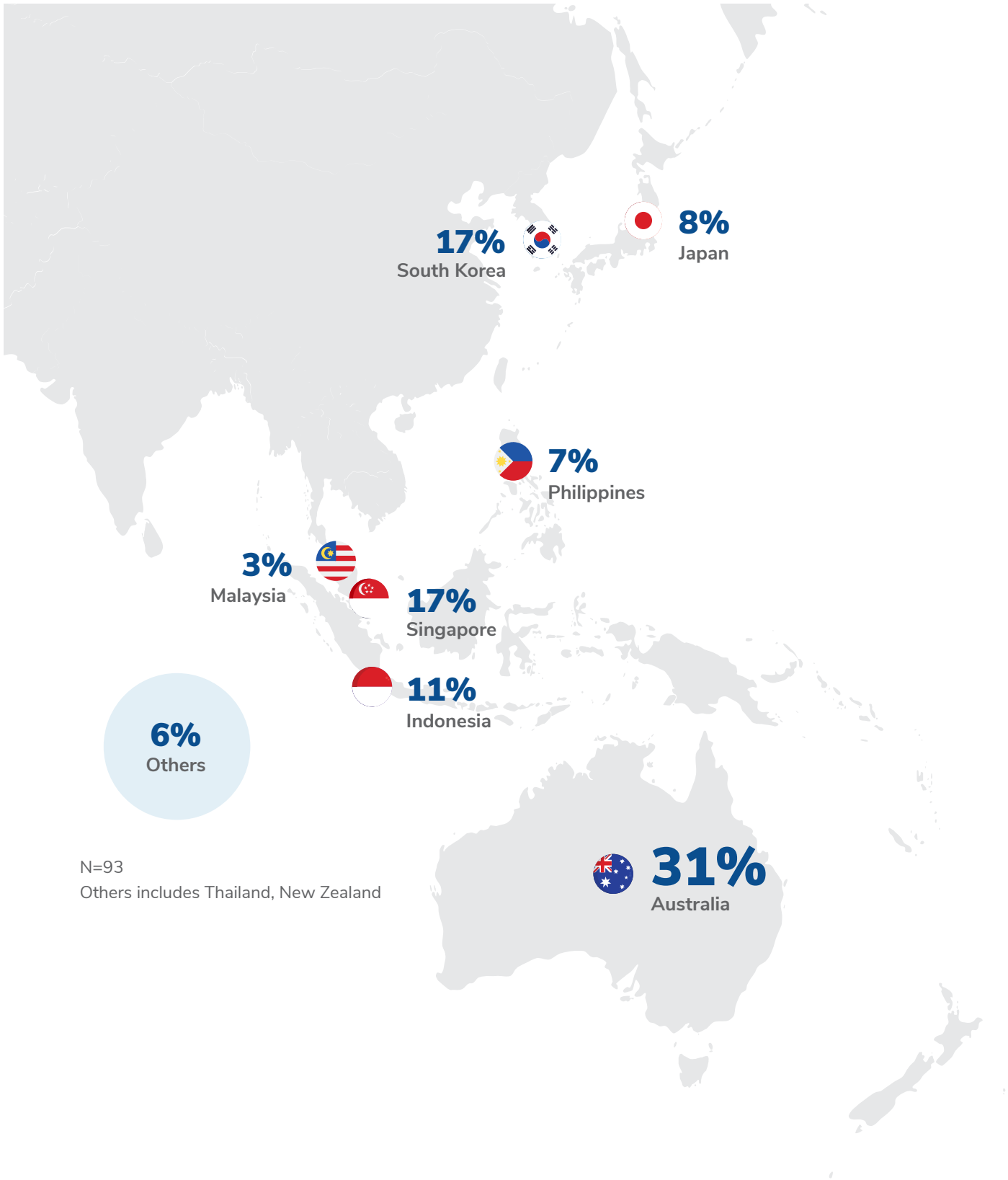
This means greater convergence of information technology (IT) with operational technology (OT) which in turn increases the need for cybersecurity solutions. Hexagon's understanding of this was a main factor in its acquisition of PAS Global. Embedding the appropriate controls in the design, rather than after implementation of the software, allows businesses to take a more proactive posture to mitigate cybersecurity risks in the next normal.

To succeed in implementing the ***changes to products, services, operations and pricing*** (which the study shows is essential to eliminating cost and/or enhancing revenue streams), a dynamic, agile and flexible framework to achieve digital transformation is going to be critical.

Appendix

Survey Respondent Profile





N=93
Others includes Thailand, New Zealand

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Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications.

Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's PPM division empowers its clients to transform unstructured information into a smart digital asset to visualize, build, and manage structures and facilities of all complexities, ensuring safe and efficient operation throughout the entire lifecycle.

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