TAKING CONTROL OF INDUSTRIAL DIGITAL TRANSFORMATION

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INTRODUCTION

The adoption of digital transformation (DX), or digitalization, is becoming critical for companies because they are looking to implement data-driven solutions and improve operational and business performance. While access to data has always been important, the scale and complexity of operations have increased and now include plants distributed across multiple geographies and industry domains.

In 2022, Omdia was commissioned by Schneider Electric to conduct an online survey with industrial companies to better understand views and ideas around the DX topic, and the readiness of distributed control systems (DCS) to support their initiatives.

In total, the survey targeted 250 respondents segmented as follows:

BY GEOGRAPHY

- NORTH AMERICA (32%)
- EUROPE & AFRICA (32%)
- ASIA & OCEANIA (26%)
- MIDDLE EAST (9%)

BY INDUSTRY SECTOR

- WATER (16%)
- CHEMICALS (17%)
- OIL & GAS (18%)
- REFINING (16%)
- PULP & PAPER (16%)
- POWER GENERATION (16%)

BY COMPANY SIZE

- LESS THAN 1,000 (11%)
- 1,000 TO 9,000 (65%)
- 10,000 TO 99,999 (22%)
- 100,000 OR MORE (2%)

BY JOB FUNCTION

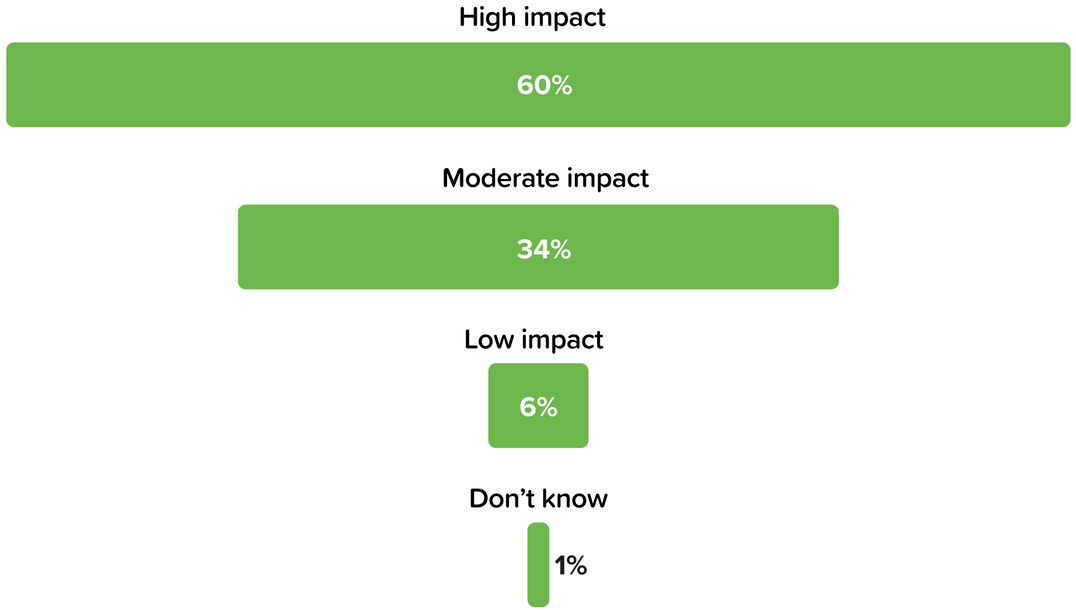
- IT MANAGEMENT (50%)
- OPERATIONS / PROJECT / PLANT MANAGEMENT (33%)
- CORPORATE MANAGEMENT (17%)

Survey results show that 94% of respondents perceive DX to have an impact on operations in the next two to three years. A majority (60%) expects the impact to be considerable.

The COVID-19 pandemic created a digital divide between the haves and have nots.

Companies that had already invested in DX were able to introduce much-needed applications, such as remote monitoring and operations, to ensure continued performance in an environment under stricter guidelines. Many companies that were unprepared have since accelerated their DX project investments.

WHAT LEVEL OF IMPACT DO YOU PERCEIVE DX WILL HAVE ON YOUR OPERATIONS IN THE NEXT TWO TO THREE YEARS?



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Source: Omdia

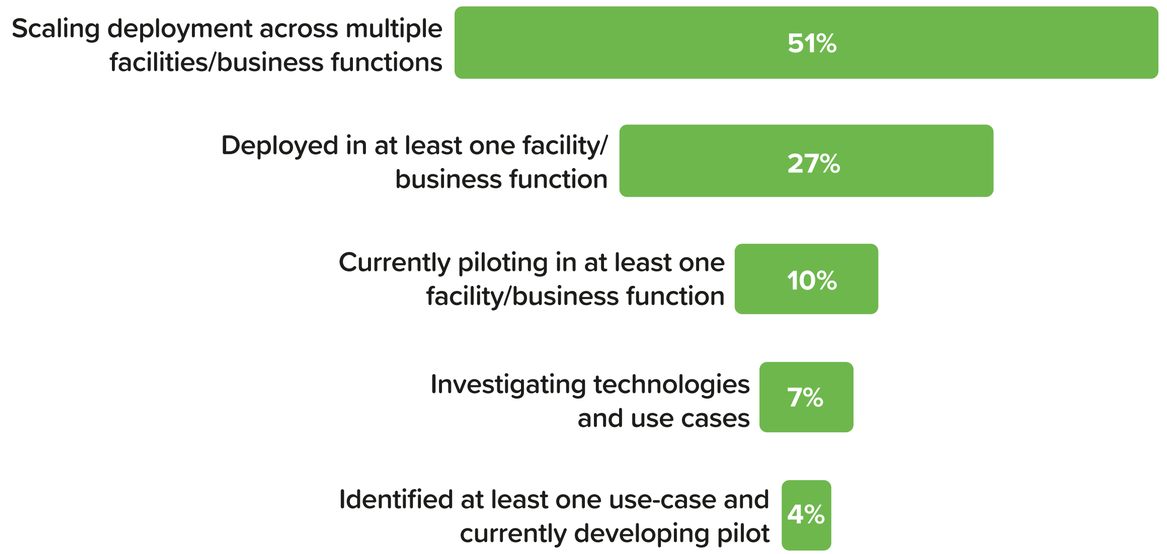
The additional flexibility offered through DX can enable end users to both directly impact their operations, as well as better manage unexpected events and market conditions.

Many companies are introducing pilot projects and small DX initiatives implementations are already under way - 78% of respondents have deployed digital technology in at least one facility or business function.

According to OECD[1], digital technology has the potential to boost more inclusive and sustainable growth by encouraging innovation, generating efficiencies and improving services. Moreover, DX has increasingly been put on top of end users' agenda to invest in as it constitutes a tool to respond and recover from the COVID-19 pandemic. Results from this study show that end users have accelerated the digitization across their supply chains in order to become more competitive and agile to deal with demand fluctuations and supply disruptions. Respondents view DX as not just a cost management driver, but as a critical component that offers strategic importance to their businesses and importantly encourages and supports innovation.

The deployment of DX projects is already common across a range of industries, however, the project size and length varies significantly. The challenge for industrial companies is to consider how to drive return on investment (ROI), scale and expand projects beyond the easy-win opportunities.

WHAT WOULD BEST DESCRIBE THE STATE OF DX IN YOUR COMPANY TODAY?



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Source: Omdia

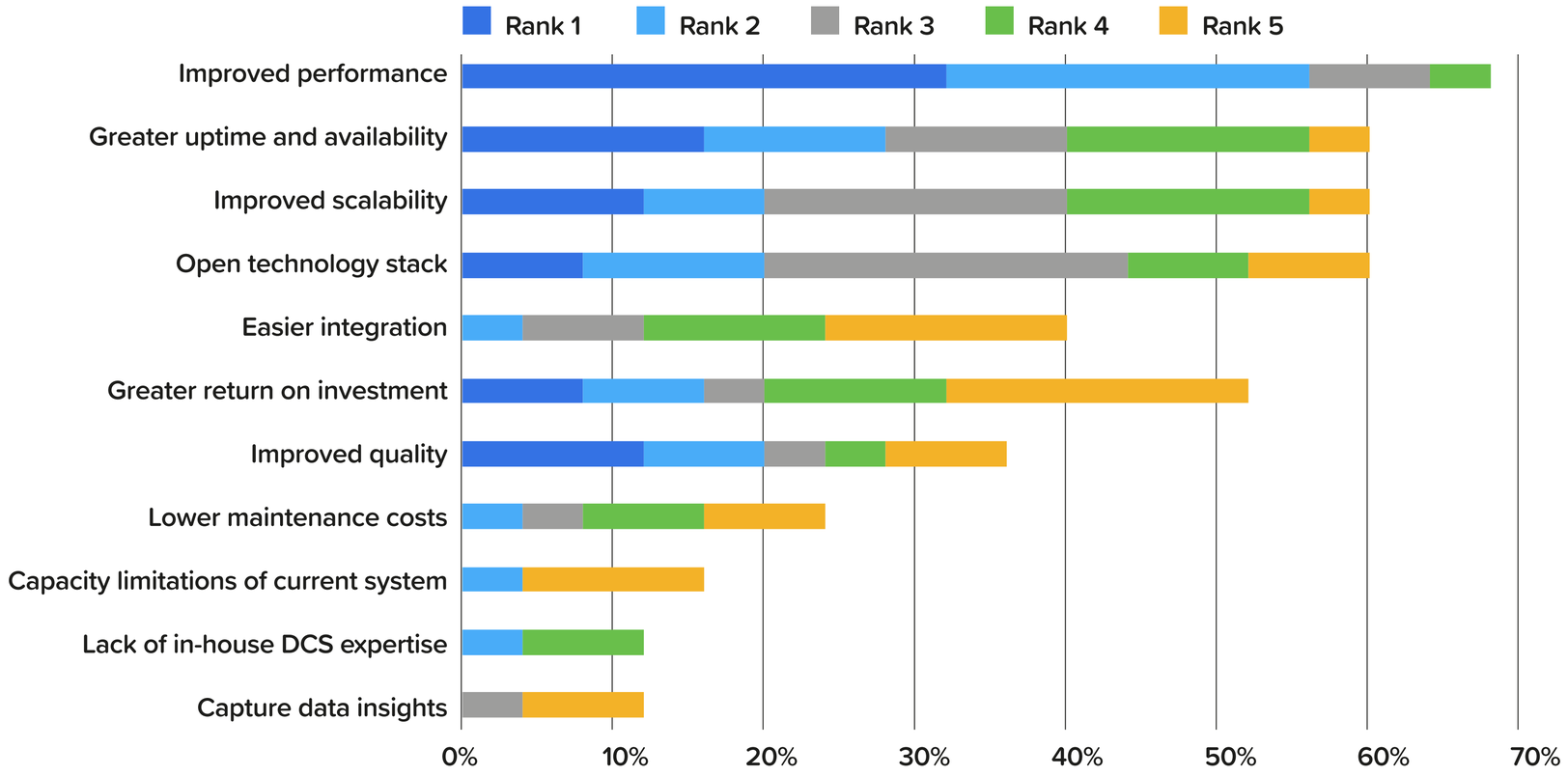
[1] https://www.oecd.org/g20/topics/digitalisation-and-innovation/

OPPORTUNITIES AND CHALLENGES

End users are faced with the continued challenge to do more with less, whether it be improving productivity and efficiency or reducing quality issues and operational downtime. End users should consider tools to identify inefficiencies in processes to drive profitability.

The results show the importance that end users place on measuring the success of DX on company performance. Initially, end users tend to focus on areas where DX could drive the most value and on achieving point-solution success, before launching DX plant-wide or expanding to include several application areas. Improved quality is also perceived as a key influencer and another parameter that is measurable through key performance indicators such as on-spec, process yield, product or batch returns, and more.

RANK THE MOST IMPORTANT INFLUENCERS TOWARDS IMPLEMENTING CONTROL SYSTEM DX TECHNOLOGIES?



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Source: Omdia

SEGMENT FOCUS: REFINERIES

Improved sensing can help monitor the quality of feedstock and adjust processes accordingly to ensure specifications are met. Product quality is referred to as an important driver, particularly in the refining industry. Low margin combined with tighter product quality specifications (e.g., reduced gasoline Sulphur levels) in the final product are causing refineries increased challenges in producing on specification gasoline, diesel and fuel oil at low-cost ethylene producers also face challenges around product quality due to different feedstock compositions.

Cost of implementation is considered the most important challenge in terms of integrating DX capabilities with the respondents' control system followed by the identification of the right partner. More than half of companies identified this as a top three challenge. Contrasting the viewpoints of different business lines, cost of implementation was the most common challenge amongst operational technology (OT) management whilst partner identification and technology resonated amongst IT management respondents.

There are also significant concerns around understanding what technologies to invest in, and by extension, the challenges in identifying the right partners. As part of developing a DX strategy, end users should first identify whether projects are application- or technology-led, and then look to partners that can support this development. They must have a clear roadmap to how they (or an ecosystem of partners) can support manufacturers' business needs to meet the technology solutions.

The benefits and values of integrating DX capabilities with control systems are clear as it ultimately aims to increase revenue and productivity whilst ensuring end users remain agile to respond to evolving demands on operations and customer requirements. Nevertheless, cost is the biggest challenge when driving DX, especially in uncertain times. Recently, this has been accentuated by the COVID-19 pandemic and need to manage and reduce capital expenditure investment initiatives. Therefore, securing the support of senior management is critical for companies to commit to and reach their DX related objectives. Selecting the right partner to support on integration is also of critical importance to develop proof of concepts and showcase quick wins that demonstrate real value before rolling out at larger scale.

When Investing in DX projects, focus should extend beyond proof of concept and be planned with end objectives and scale in mind. This should include an assessment of partner capabilities, a review of available technologies and capabilities, as well as cost. Projects should also involve relevant stakeholders from the start.

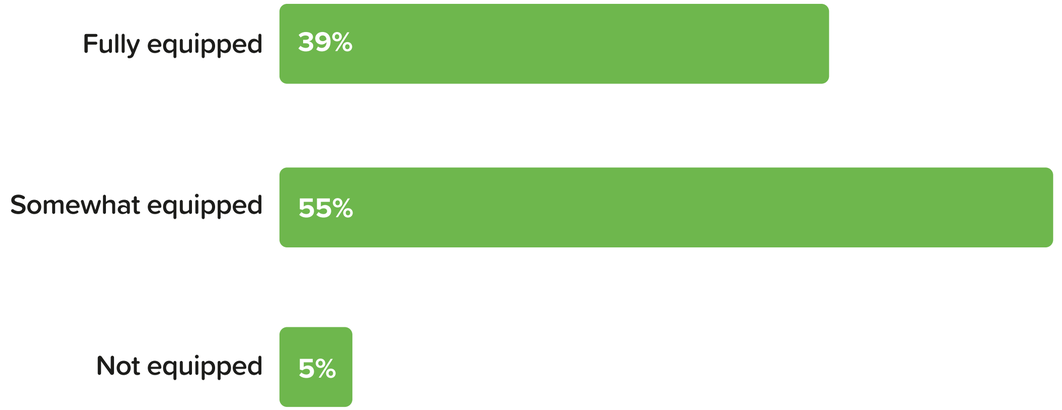
There is a common sentiment that legacy DCS systems are not equipped to support companies' DX initiatives. Consequently, identifying the key issues and challenges is a critical element of the problem-solving process. Key concerns relate to how capabilities of a new system may be best leveraged whilst making sure any disruption from potential information and intellectual property loss from the legacy system is minimized. Companies are also typically concerned about potential impact or disruption on operations through down-time as well as upfront investment cost and ROI needed to justify investment. As such, some companies choose to defer DX projects and DCS migration as a result of concerns on the impact on process uptime.

Introducing new capabilities to control systems is not limited to greenfield. Many DCS solutions were not sold or installed with DX in mind. However, with careful planning, end users can consider the introduction of upgrades to existing systems without downtime in production.

OT VS IT PERSPECTIVE

55% of respondents state that DCS solution is only somewhat equipped to support DX initiatives. Notably, the realization is much stronger among OT management (63%) compared to IT management respondents (49%).

HOW WELL EQUIPPED IS YOUR DISTRIBUTED CONTROL SYSTEM (DCS) TO SUPPORT DX INITIATIVES?



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Source: Omdia

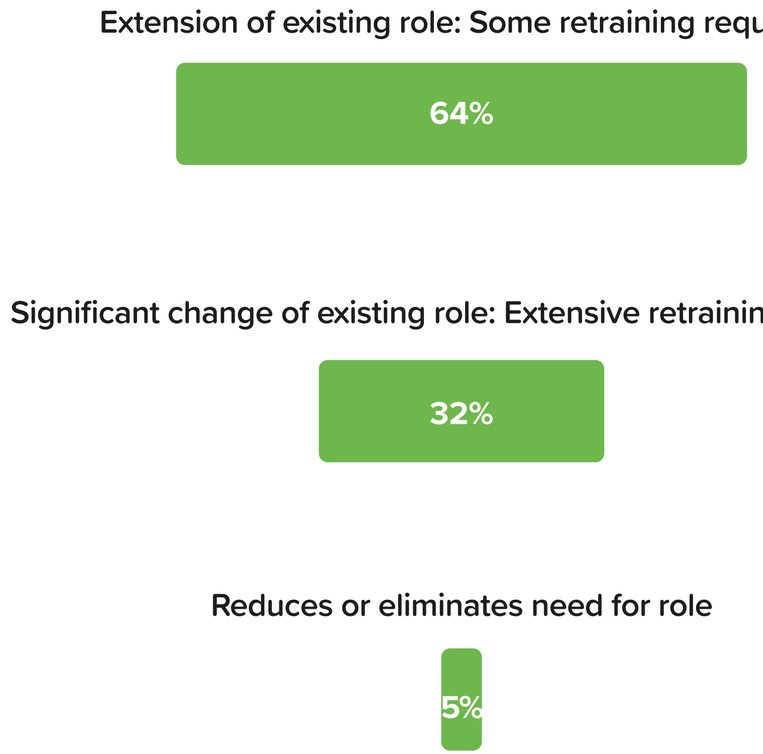
PEOPLE AND COLLABORATION

The deciding factor in successful DX deployments is as much a people issue as it is technology; whether this be insufficient training, or unwillingness to support what may be perceived as untrustworthy or job threatening technologies. However, rather than replacing the existing workforce, in many cases DX will augment the user experience and can support greater productivity and motivation. Clear communication of initiatives and upskilling of the workforce are foundations for success.

Respondents believe innovative technology adoption can be supported by retraining existing staff (53%).

Adoption of technology must not be considered in isolation, it will also involve process and people transformation. With people at the centre of any technology transformation, new skills and in some cases new ways of working will be needed – with many companies seeing significant changes to the future of work. This is especially the case as industry battles with the "silver tsunami" of a retiring workforce (accelerated by COVID-19 pandemic), and the challenge of recruitment. These new skills won't primarily come from external sources, but through the retraining of existing workforces.

HOW WILL INNOVATIVE TECHNOLOGY ADOPTION IMPACT OPERATIONS IN YOUR COMPANY?



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Source: Omdia

With the accelerated pace of DX implementation, there is a risk that businesses fail to grasp the necessity of creating a digital culture and understanding inside their organizations, before the programs are being rolled out. Communication of key objectives and responsibilities across the organisation is fundamental for the successful implementation, nevertheless, only 58% of OT managers in the survey stated that this was the case. The response to this question is critical as many stakeholders in the company may not be prepared for a change. This is often accentuated at the middle management layer where the responsibility for implementation and operation of new strategies often falls. As a result, a potential drop in performance and employee efficiency can be expected at least during the transition phase and where key stakeholders may not be fully updated or considered on the transformation path.

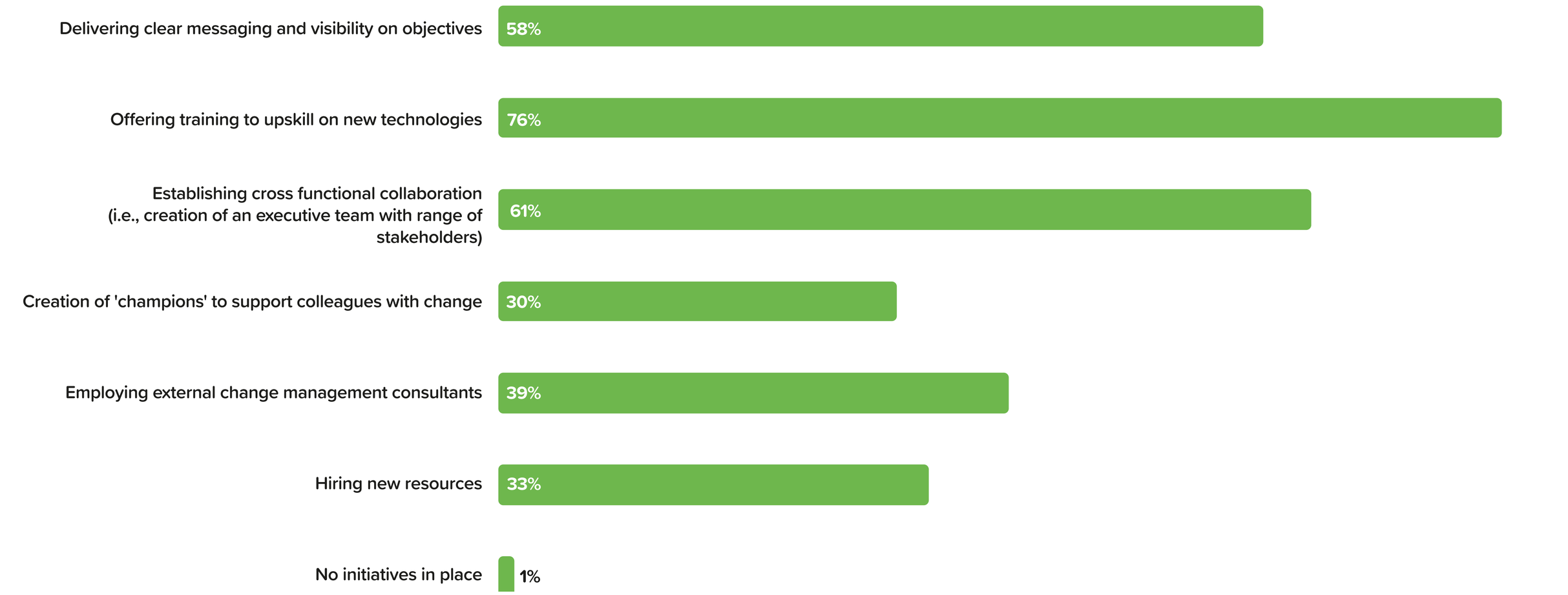
Initiatives that are being considered and implemented by organizations is training to upskill on new technologies (72%) and establishing cross functional collaboration (67%). It is evident that the success of DX does not just rely on technology or tools available, but on the people knowledge and expertise in executing the plan. Identifying skill gaps is therefore a first and important step on the company's DX journey. Understanding which digital skills are already existing in-house already, as well as what skills will be needed in the future to remain competitive are important questions to consider and address before implementing training programs.

Establishing cross functional teams is considered a key aspect when implementing a DX strategy. This can include the convergence of data, networks and people from multiple business functions including IT, OT, maintenance and even human resources. Many of these teams have traditionally worked in siloes with sometimes opposed objectives and ways of working.

This often necessitates unlearning practices and processes that were fundamental to the success of the past, and where people and teams working together can better equip organizations to innovate and being more agile. Cross functional collaboration must be a strategic focus support DX implementation. When executed effectively, greater collaboration across functional boundaries can not only reduce waste and costs, but also generate measurable financial returns and colleague engagement.

Besides DCS upgrade or modernisation constituting an important part to support DX transformation initiatives, a major challenge is that many DCS in process plants are approaching the end of their life cycles and where many plants have been controlled by the same automation system for more than 30 years. Nevertheless, although migration projects require significant upfront investment, funds spent are recovered through savings from improved operations, less downtime, and decreased support costs.

WHAT INITIATIVES HAS YOUR COMPANY UNDERTAKEN OR PLAN TO IMPLEMENT FOR SUPPORTING YOUR EMPLOYEES THROUGH YOUR DX JOURNEY? (SELECT TOP THREE IN TERMS OF IMPORTANCE)



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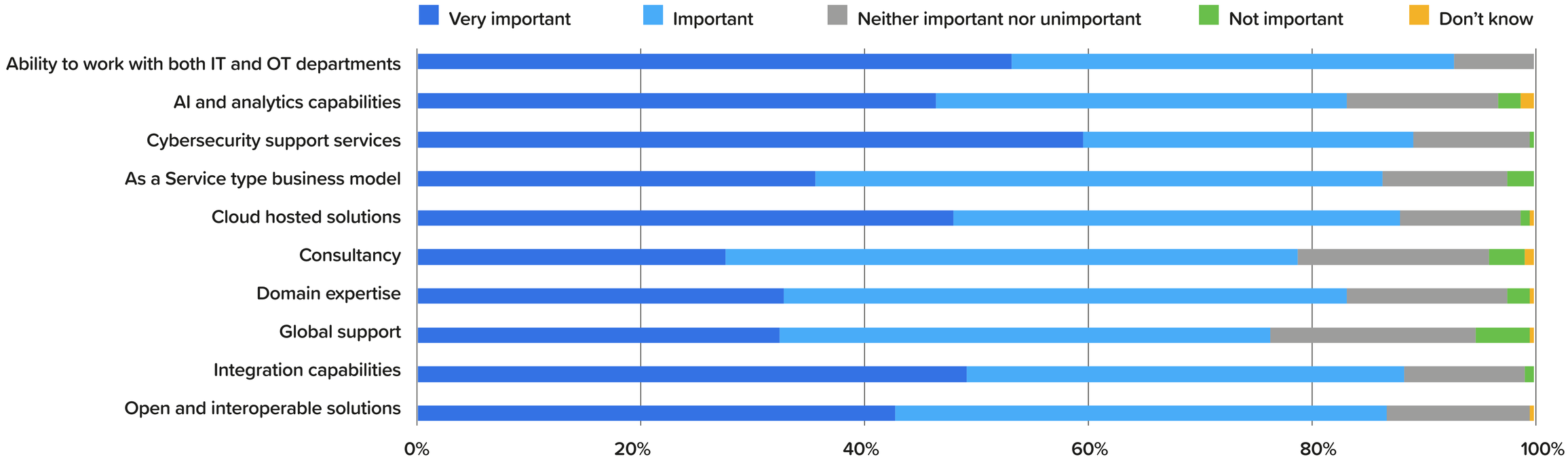
Source: Omdia

PARTNER SELECTION

The ability of vendors to provide support and expertise on DX technologies whether cybersecurity, AI or the use of the cloud is perceived as of high importance by end users and is an important consideration in vendor selection criteria.
In addition, the ability to “speak” with various internal stakeholders across different business functions (e.g., IT and OT) can enable a greater buy-in from internal teams.

Around two-thirds of respondents perceive a gap in current vendors' expertise or ability to support DX. Notably, small and medium size enterprises are more likely to indicate gaps, compared with larger organizations. Finding the right partner is important for companies to support DCS upgrades or modernisation efforts. The factor stated as most important to respondents is technical competency, which must include domain knowledge of the plant in question and its processes. Other important factors to consider include – but are not limited to – platform knowledge, service expertise addressing front end loading (FEL), front end engineering design (FEED), engineering and installation, and long-term support. Finally, the partner should offer support across each step of a DCS upgrade or modernisation project, as well as on cost justification.

RANK THE MOST IMPORTANT CAPABILITIES CONSIDERED WHEN SELECTING A VENDOR FOR YOUR CONTROL SYSTEMS



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Source: Omdia

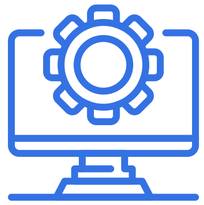
The survey shows that cybersecurity is an important criteria when selecting a control system vendor. Cybersecurity breaches that go undetected can lead to significant financial losses and mitigation costs. For the full benefits of DX to be achieved, not only do connections need to be safe, but also the value of data. This challenge continues to grow as more devices are connected and the surface area of attack increases.

Almost half of respondents viewed cloud hosted control (48%) as a very important technology capability influencing vendor selection. Industrial companies are increasingly considering how changes to DCS through upgrade or modernisation and enabling some engineering and software applications to the cloud can support greater flexibility, management and data sharing. Indeed, cloud enablement would facilitate the convergence of data across multiple sources and importantly improve data availability to support decision-making and application interoperability. This doesn't necessarily mean that the industry is moving to a cloud native DCS now but highlights that industrial companies prioritize working with vendors that can support technologies that are part of their longer-term strategic roadmap. Interoperability and the supporting new business models are also important customer considerations (95%).

OT VS IT PERSPECTIVE

More than 70% of respondents viewed cybersecurity as very important.

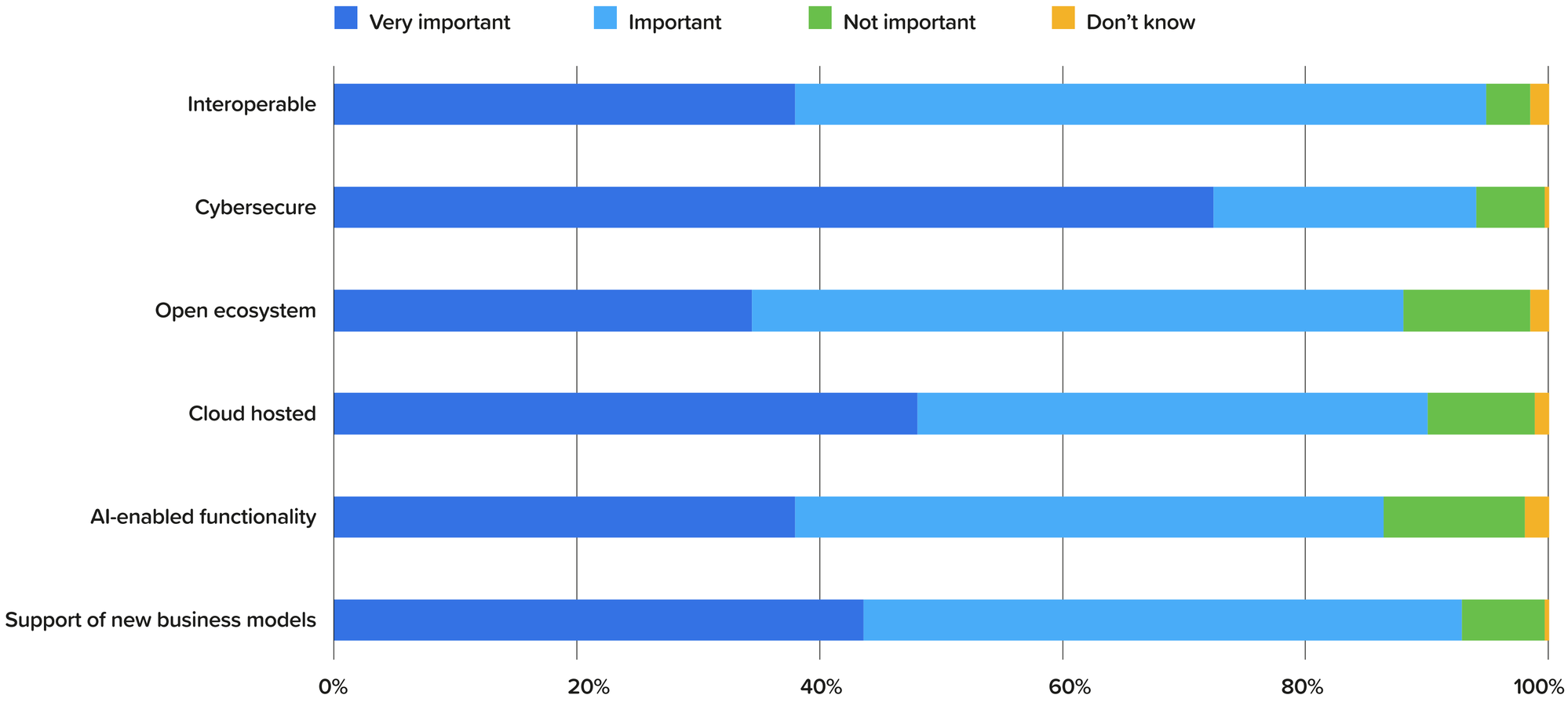
IT - 74%



OT - 78%

C-level - 57%

HOW IMPORTANT WHEN SELECTING YOUR CONTROL SYSTEM VENDOR ARE THE FOLLOWING TECHNOLOGY CAPABILITIES?



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Source: Omdia

CLOUD

The inexorable convergence of OT and IT approaches will see the continued transition to cloud-native software. This transition will be deliberate based on the significant brownfield installed base and ongoing technology and culture concerns. Companies should review internal and partner skillsets and consider their cloud strategy including how and where data will be hosted (e.g., use of single of multi-cloud).

Overall, 46% of respondents state that a cloud-based solution is ideal for their operations. Whilst a further half of respondents believed it was a feasible solution hindered by current technical limitations or cultural challenges.

At the enterprise level the transition is already accepted with software solutions such as ERP and CRM transitioning from on-premise to cloud native solutions, and subsequently from perpetual to subscription-based licenses. However, on the field these transitions have been slow, and whilst there are numerous solutions recently released for cloud native Manufacturing Execution Systems (MES),, Asset Performance Management (APM) and more. The current market is a small fraction compared to on-premise solutions.

The strategy of if, and/or how much cloud to use, was a topic of much discussion by CIOs prior to 2020, with many companies considering the adoption of cloud computing as a platform to support greater agility and flexibility. However, the impact of the COVID-19 pandemic forced many companies (that were structurally ready to do so), to accelerate their plans to adopt cloud to enable capabilities such as remote working. However, one size don't fit all for cloud, with different industries having different requirements and nuances that can make working with a "generic" cloud solution cumbersome, this places the burden of applying the technology to their companies' business on the customer. In combatting this challenge vendors have begun to explore the packaging of services and solutions into more industry specific offerings.

BENEFITS

Reduced IT cost is the strongest argument among respondents for implementing a cloud-based DCS solution. Here is a list of the top ranked benefits:

- Reduced IT cost (53%)
- Improved scaleability (53%)
- Enhanced data processing and management process (46%)
- Greater business continuity (44%)

CHALLENGES

Data security is by far considered the most important challenge. Here is a list of the top ranked challenges:

- Data security (70%)
- Cost management (46%)
- Multi-cloud environments (42%)
- Performance challenges (39%)

IT VS OT TAKEAWAY

With many enterprise level software solutions already cloud native, from this survey, IT management were far more likely to see the cloud as an ideal solution for control systems (52%). In comparison, OT management (34%) were more hesitant to see cloud-based control. Collaboration between the two groups is crucial to provide IT with greater understanding of the requirements of control systems, whilst OT teams can leverage the technology expertise from IT colleagues.

RECOMMENDATIONS

As process end users continue to develop and incorporate DX solutions, they can consider the following:

- **Lead with applications not technology – identify business pain points to be resolved THEN consider the applicable technologies.**
- **Work with partners to ensure a resilient and secure system that considers cybersecurity as part of technology implementation, work processes and training.**
- **Develop DX projects with scale in mind. Projects can thrive at the proof of concept stage, but then fail when scaled due to a lack of forward planning.**
- **People supercede technology – provide clear messaging, training and support so that people are equipped to use the technology, and trust it won't have a negative impact on their role. Culture beats strategy.**
- **DX is a cross-business function project. Support cross group collaboration and involvement (including between IT, OT, Engineering Technology (ET), Finance, C-Suite, and HR etc.).**
- **Identify partners and vendors that can provide a clear technology roadmap for DCS (both directly and through their ecosystem) that aligns with your goals and objectives (e.g., a transition to cloud native software) and support the different business functions.**

OMDIA CONSULTING

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We create business advantage for our customers by providing actionable insight to support business planning, product development, and go-to-market initiatives.

Our unique combination of authoritative data, market analysis, and vertical industry expertise is designed to empower decision-making, helping our clients profit from new technologies and capitalize on evolving business models.

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We hope that this analysis will help you make informed and imaginative business decisions. If you have further requirements, Omdia's consulting team may be able to help your company identify future trends and opportunities.

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