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FUTURE SKILLS AND COMPETENCIES FOR THE MANAGEMENT OF DIGITAL TRANSFORMATION

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EXECUTIVE SUMMARY

The world is digitally transforming at a rapid pace. Digital transformation is reshaping our lives, how we work, conduct our business, communicate and deliver value to our customers. These changes and their implications are broad and affect individuals, organizations, and societies at large. Digital transformation can be defined as, "socioeconomic change across individuals, organizations, ecosystems, and societies that is shaped by the adoption and utilization of digital technologies" (Dabrowska et al., 2022, p. 932). From an organizational digital capability-building perspective, **digital transformation requires leaders and managers to rethink, reshape, and renew their leadership, strategies, organizational structures, and processes**. This also leads to rethink roles and responsibilities and underlying skills and competencies of individuals dealing with digital transformation and workforce development. Within this framework, managers assume a central role in addressing these challenges and implementing changes; in these industrial scenarios, they are required to have not only technical and hard skills but also soft skills (Shet and Pereira, 2021).
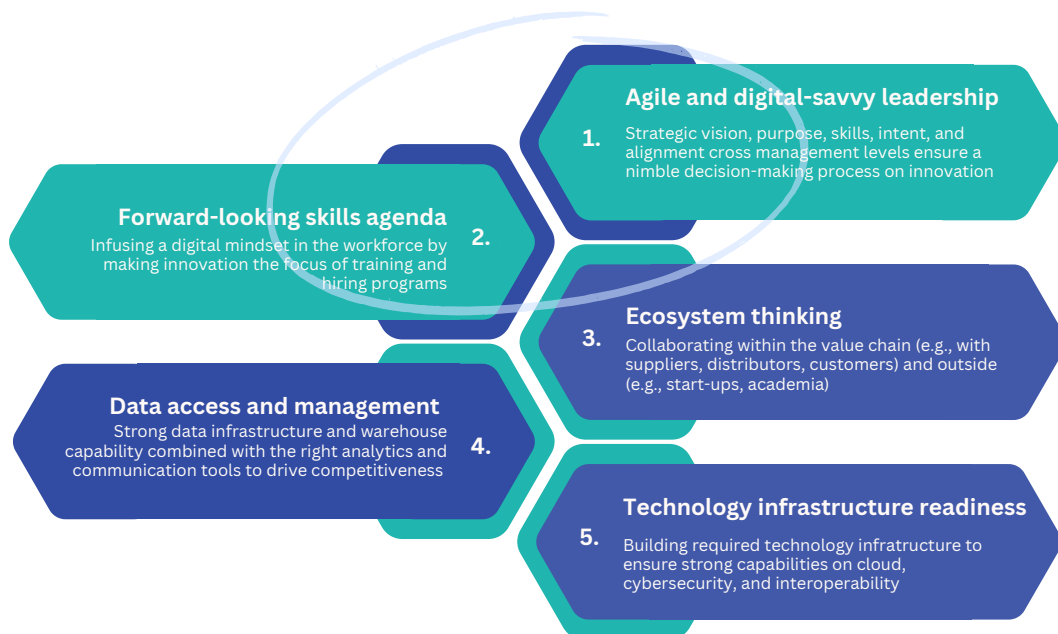

Figure 1 Key Enablers for Digital Transformation
(adapted from Digital Transformation Initiative, World Economic Forum & Accenture, 2018)

As Figure 1 illustrates, the top two key enablers for digital transformation and investments are 1) Agile and digital-savvy leadership and 2) Forward-looking skills agenda. This report focuses mainly on unpacking these two aspects. **Digital transformation comes with a high-level of uncertainty and often requires a cultural shift to embrace change.** This necessitates sustaining a strategic vision, clearly communicated purpose, and alignment across various organizational levels to facilitate a streamlined decision-making process. Often, companies define new and explicit roles to embark upon digital change and to foster a digital mindset (World Economic Forum, 2018).

This is achieved through the adoption of various upskilling and re-skilling initiatives, attracting 'digital-savvy' talent across organizational levels and into newly emerging roles (e.g., Chief Digital (Transformation) Officer, Digital Transformation Manager), units, and functions (e.g., Digital Transformation department).

This report explores the current literature on digital transformation in the digital era, paying particular attention to management, current trends, as well as workforce skills and competencies. It also reviews various frameworks, and offers insights based on an analysis of managerial positions (in the digital transformation space) job advertisements. This report also showcases short case studies developed in collaboration with partnering organizations within the EINST4INE consortium. Results show that leadership is necessary to support and boost the human side of digital transformation; secondly, business strategy thinking is a relevant competence for digital transformation. Moreover, finding and retaining diverse and skilled talent is a common challenge for companies, but a strong brand reputation, a clear recruitment process and collaboration with other companies may help to overcome such challenges. Finally, empathy and emotional intelligence have become crucial skillsets apart from technical and other soft skills when managing digital transformation initiatives. Empathetic team members can help colleagues internally and clients externally to gain confidence in the new digital era.

Knowledge intense business fields, such as IT & Communication, are among the most advanced digital sectors, while localized sectors, such as agriculture, lack digital development.

New work environments require new skillsets and competencies – reconsidering the education system and traditional leadership styles.

The mindset of the future workforce should entail willingness to learn and openness to change, while from the managerial perspective organizational agility, technical know-how and emotional intelligence is key.

Digital Transformation professionals are in demand, as shown by the increasing job titles related to Digital Transformation, including Consultants, Managers, and Advisory Directors.

Finding and retaining diverse and skilled talent is a common challenge, however, a strong brand reputation, a clear recruitment process, and collaboration with other companies may help to overcome such challenges.

1.DIGITAL TRANSFORMATION
STATE OF THE ART OF RESEARCH

1.1. Digitization, Digitalization and Digital Transformation

Today's economy is characterized by a growing relevance of digital technologies, innovation ecosystems and data. Companies are progressively adapting to new emerging technologies, often broadly defined as SMACIT (i.e., social, mobile, analytics, cloud, Internet of Things) (Sebastian et al., 2017) and, from 2017 to 2026 spendings on digital transformation are projected to increase from approximately 1 to 3.4 trillion U.S. dollars (Statista, 2022). Yet, many organizations fail in this transition, without successfully achieving return on digital investment (RODI) (Accenture, 2020). Digital transformation (DT) is changing the whole industrial world by blurring the lines between physical, digital, and virtual worlds (Dabrowska et al., 2022; Kraus et al., 2022; Hanelt et al., 2020).

> **"**
>
> **Digital transformation can be defined as**
> **"*socioeconomic change across individuals, organizations, ecosystems,*** **and societies that is shaped by the adoption and utilization of digital** **technologies".**
> Dabrowska et al., 2022, p. 932

Multiple definitions of digital transformation have been provided by academics and scholars. For example, Liu, Chen, and Chou (2011) described it as "an organizational transformation that integrates digital technologies and business processes in a digital economy" (Liu et al., 2011, p. 1730). Further, Parviainen et al. (2017) defined it as "changes in the way of working, roles, and business offering caused by the adoption of digital technologies in an organization, or in the operation environment of the organization" (Parvianen et al., 2017, p. 64). Another perspective of DT comes from Vial, who argued that "DT is **a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technology**" (Vial, 2019, p. 121).

> "*Every industry has its nuances and contextual differences, but they all share certain inhibitors to change. These include the innovator's dilemma (the fear of cannibalizing existing revenue models), low technology adoption rates across organizations, conservative organizational cultures, and regulatory issues.*"
> World Economic Forum, 2018

Different authors have explored digital transformation, embracing different angles of analysis of this process. Dabrowska et al. (2022) point to the socioeconomic character of digital transformation, stating that DT relates to broader socioeconomic change rather than organizational change only. This change spans "across individuals, organizations, ecosystems, and societies that are shaped by the adoption and utilization of digital technologies" (Dabrowska et al. 2022, p. 932). Thus, the authors propose four lenses to interpret the DT phenomenon, i.e., individuals, organizations, ecosystems and geopolitical. Nadkarni (2021) and Appio et al. (2021) further recognize that it is possible to identify a micro, a meso and a macro level of analysis:
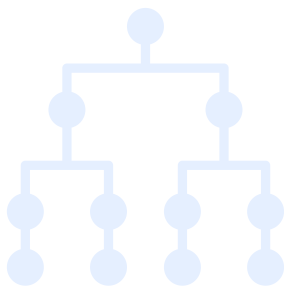
At the **macro-level**, "digital transformation influences the ways industries are organized and companies interconnected and offers opportunities and threats that depend on contextual conditions" (Appio et al., 2021, p. 10). The macro-level deals with the bigger picture of digital transformation, where companies find themselves operating; it includes the competitive dynamics and innovation ecosystems triggered by this process—collaboration within and across organisational boundaries is one of five key enablers for digital transformation (World Economic Forum and Accenture, 2018).
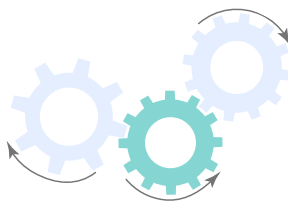
The **meso-level** reflects new capabilities, processes, and routines in response to digital transformation (Appio et al., 2021). According to Vial (2019), companies need to adopt strategic responses to digital transformation, that lead to major changes in business models and in the overall structure of the company. Leadership, as the number one key enabler for digital transformation, will lay the foundation for bringing the overall vision with those required structural changes into alignment (World Economic Forum and Accenture, 2018). Although the introduction of digital technologies concerns many, if not all, areas of our lives, we most commonly discuss the concept as it occurs within organisations, as often DT is associated with a company's ability to react and utilize new technologies.

At the **micro-level** of analysis, "the need of companies to reframe their value creation mechanisms involves changes in their micro-foundations that can condition the transformational mechanisms toward new business and operating models" (Appio et al., 2021, p. 11). This includes changes in routines or work practices of employees and, as another key enabler for digital transformation, requires planning ahead of upcoming skills needs (World Economic Forum and Accenture, 2018) since digital technologies demand increasingly high competencies and skills of the workforce (Sony and Naik, 2020; Marsh et al., 2022) and an increased dependence on analytical skills to solve more complex business problems (Vial, 2019). Lack of knowledge or unfamiliarity with new technologies, their features and potential benefits could lead to acceptance problems (Florek-Paszkowska et al., 2021) and impact the overall success of the digital transformation undertaking.

Defining **digital transformation**, and how it differs from **digitization** and **digitalization** (see Table 1) has been a concern for academics and practitioners in recent years. Digital transformation scholars argue that the application of digital technologies to business operations, products and services ultimately should lead to the development of new digital business models (Kraus et al. 2022; Hanelt et al., 2021; Vial, 2019), entailing business model innovation, adaptation, regeneration and/or transformation in firms (Barlatier et al., 2023).

In this quest, however, we must first build the digital competencies to be able to develop, implement and maintain digital-based products and services. Thus, digital transformation can be also presented as a phased endeavour, having digitization and digitalization as required foundations (Verhoef et al., 2021). Although a firm in the process of transforming might have all three happening concomitantly, one or the other might prevail depending on how far along the process in the organisation might be.

Further, while firms might pursue digital transformation, they might not reach the later stage of digital transformation – that which focusses on new digital business models. It has been argued that most companies are at the digitization and digitalization stages and might remain at these levels as they struggle to develop the capabilities and foundations to move further.

Figure 2 Levels of Digital Transformation
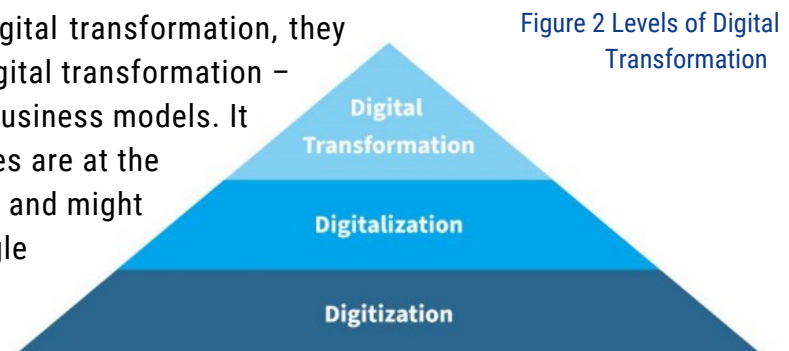
Digitization, Digitalization and Digital Transformation	
Digitization	Digitization is the encoding of analogue information into a digital format (i.e., into zeros and ones) such that computers can store process and transmit such information.
Digitalization	Digitalization describes how IT, or digital technologies, can be used to alter existing business processes.
Digital Transformation	Digital transformation (DT) is the most pervasive phase and describes a company-wide change that leads to the development of new business models.

Table 1 Digitization, Digitalization and Digital Transformation
(from Verhoef et al., 2021)

Academic and industry research has largely also explored the various **industry-specific trends and industry-related nuances** in digital transformation. Further, research has called attention to the different level of digital maturity across industries (Teichert, 2019) – with a large gap between sectors, and between companies within those sectors (Gandhi et al., 2016; Manyika et al., 2015).

For instance, while the leisure, publishing, and media industries have already been largely digitally transformed, the construction and agriculture industries remain traditionally non-digital. In the years to come, some industries are expected to be more affected by digital technologies than others, e.g., financial services, manufacturing, etc. (The New Digital Economy, 2011).

In addition, the recent COVID-19 pandemic had an accelerating effect on the digital transformation (Mention, Pinto Ferreira, et al., 2020; Mention, Torkkeli, et al., 2020) of some industries, e.g., healthcare and retail. According to a survey from McKinsey, **67% of different industries have accelerated the process of adopting digital products as a response to COVID-19** (McKinsey & Company, 2020).

How digitally advanced is your sector?
An analysis of digital assets, usage, and labor
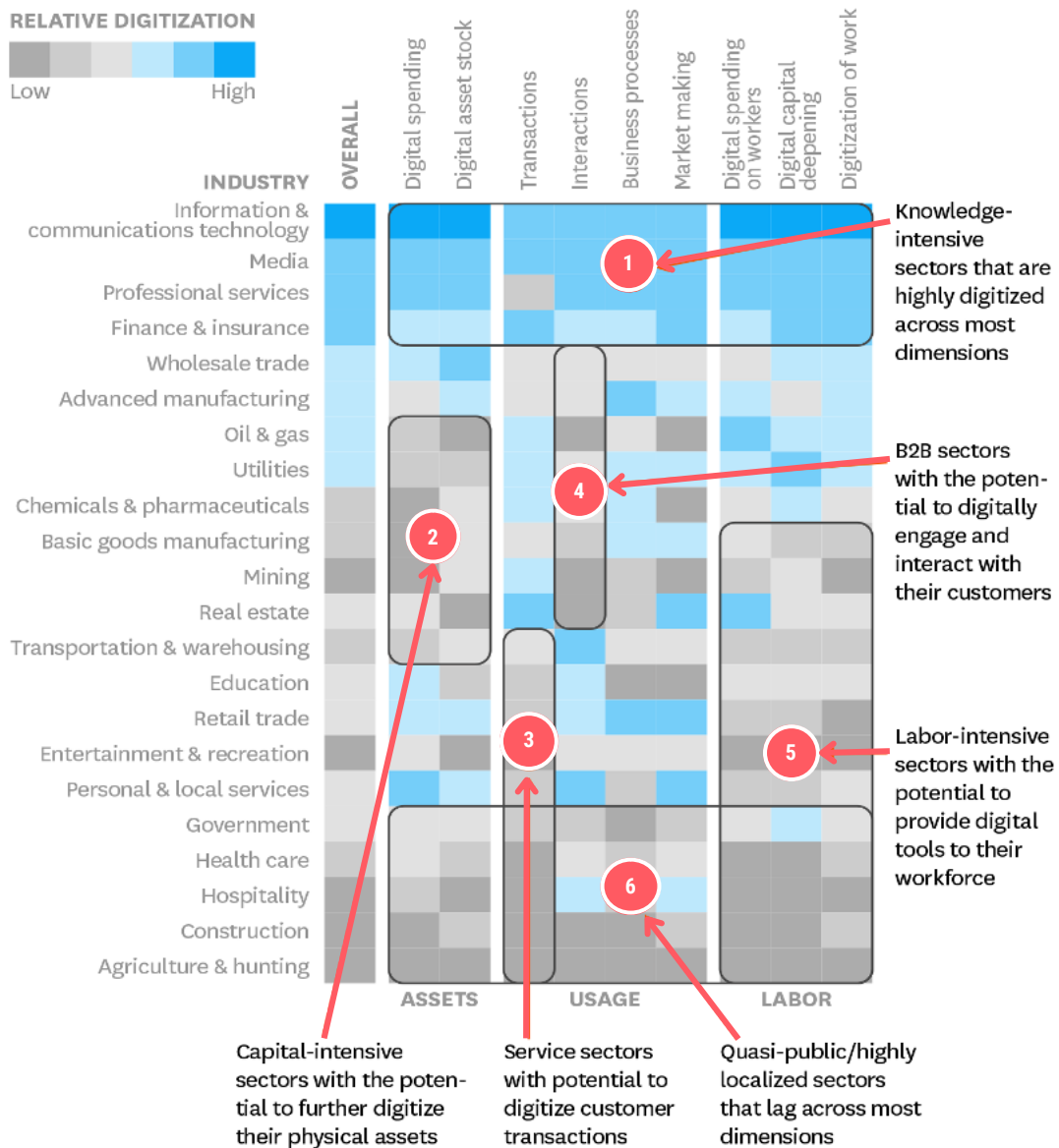
Figure 3 Digitization per Sector (adapted from McKinsey Global Institute)

With the introduction of technologies into the workplace, organizational dynamics have shifted. As argued by Teece (1997, p. 515), "how competitive advantage is achieved" has changed. From the organizational capabilities' lens, internal and external **competences can be integrated, build, and reconfigured** in order to adjust to changing environments – such as in the case of digital transformation and innovation. For many years now, "everything a firm does involves technology of some sort" (Porter, 1985, p. 62). However, facilitating the technological infrastructure already presents one key challenge but is foundational for digital transformation efforts (World Economic Forum and Accenture, 2018).

While technologies have already become a core resource of many firms, the struggle to keep up with and adapt to the consequential changes remains. Though the potential of increased efficiency, safety, and convenience is there, we also have to consider technology as a significant challenge to organisations, in particular jobs, skills, wages, and the overall nature of work (Manyika et al., 2017). In order to leverage digital transformation, it all starts with the people (Nadkarni and Prügl, 2020).

1.2. From Industry 4.0 to Industry 5.0: A new Human-Centric Perspective of the Industrial Revolution

The fourth industrial revolution has been associated with several benefits for enterprises operating in the market, including increased production efficiencies, cost savings, streamlined labour requirements, and business model adaptations ("Workforce Skills for Industry 5.0 (RIA)", European Commission, OECD, 2022). Nonetheless, at the same time, it is accompanied by economic, social, ethical, and organizational challenges, that include the development of new competencies and skills (Sony and Naik, 2019; Marsh, 2022), the replacement of workers by technologies (Rojko et al., 2020) and increased inequalities (Raut et al., 2021; Santhi and Muthuswamy, 2023). The latter from one side refers to wage disparity between different labour categories (Santhi and Muthuswamy, 2023) and discrepancies between countries: developing and underdeveloped economies are challenged by the requirements of new infrastructures and skills, related to Industry 4.0 (Raut et al., 2021).

In view of these issues, some authors have called for a new paradigm shift towards Industry 5.0 (Grybauskas et al., 2022; Rojko et al., 2020). This new industrial framework can be understood as an attempt to restore the human-centric approach to the industrial framework (Shahbakhsh et al., 2022; Müller, 2020) and fix the ethical issues around Industry 4.0 paradigm (Müller, 2020). Moreover, it also aims at coupling digital transformation with sustainability, by targeting sustainable manufacturing (Santhi and Muthuswamy, 2023) and sustainable development (Müller, 2020).

> **Industry 5.0 should not be intended "*as a replacement, nor an alternative to, but an evolution and logical continuation of the existing Industry 4.0 paradigm*."**
> Müller, 2020, p. 7

This industrial framework is now part of the European Commission's digital strategy agenda, that provides a vision of industry that aims beyond efficiency and productivity as the sole goals. It also reinforces the role and the contribution of industry to society, placing the wellbeing of the worker at the centre of the production process and uses new technologies to provide prosperity beyond jobs. As a result, **Industry 5.0 should prioritize the involvement of humans** and robots, as well as the **incorporation of human knowledge, creativity, intuition, skills, experience, and so on, into robotized production**. Furthermore, Industry 5.0 must provide a foundation for human presence in industrial processes aligning with modern workforce requirements, including the ability to collaborate with robots (Rojko et al., 2020), that helps to improve the efficiency of the industrial production (Adel, 2022; Maddikurna et al., 2022).

There is a wide variety of technologies supporting and enabling Industry 5.0.

1 **Human-centric solutions and human-machine-interaction technologies** that interconnect and couple the strengths of humans and machines (Müller, 2020); an example is represented by collaborative robots or cobots (Adel, 2022; Maddikurna et al., 2022), that are robots designed to work in cooperation with humans, and thus provide an uncontested potential by combining machine strength and inimitable human skills.

2 **Artificial Intelligence (AI)** represents another key pillar of this industrial paradigm (Müller, 2020; Maddikurna et al., 2022). AI allows quick decision making and improved quality control, as well as higher predictive power, higher efficiency, and better results (Goralski et al., 2020). It can also contribute to improve health and safety of workers, offering opportunities for operating in high-risk areas and environments, and for advanced extraction techniques (e.g., space-based mineral extraction), and for managing highly volatile materials (e.g., nuclear waste) without risking human health (Nishant et al., 2020).

3 Real time-based **digital twins and simulation** (Müller, 2020), that lead to reduced cost, more accurate prediction of future errors, design customization and predictive maintenance (Maddikurna et al., 2022).

4 Safe **data transmission, storage, and analysis technologies**, which handle data and system interoperability (Müller, 2020). Examples of such technologies are Edge Computing, 6G and beyond, blockchain, Internet of Everything and Big Data Analytics; they generate higher predictability, faster and better decision making, and cost reduction (Maddikurna et al., 2022).

5 Others, like **bio-inspired technologies and technologies for energy efficiency** and trustworthy autonomy among the key technologies within this industrial framework.

Figure 4 presents another classification with anticipated benefits of key enabling technologies for Industry 5.0 (i.e. AI, Cobots, 6G, Digital Twins, Blockchain, Internet of Everything, Big Data Analytics and Edge Computing).
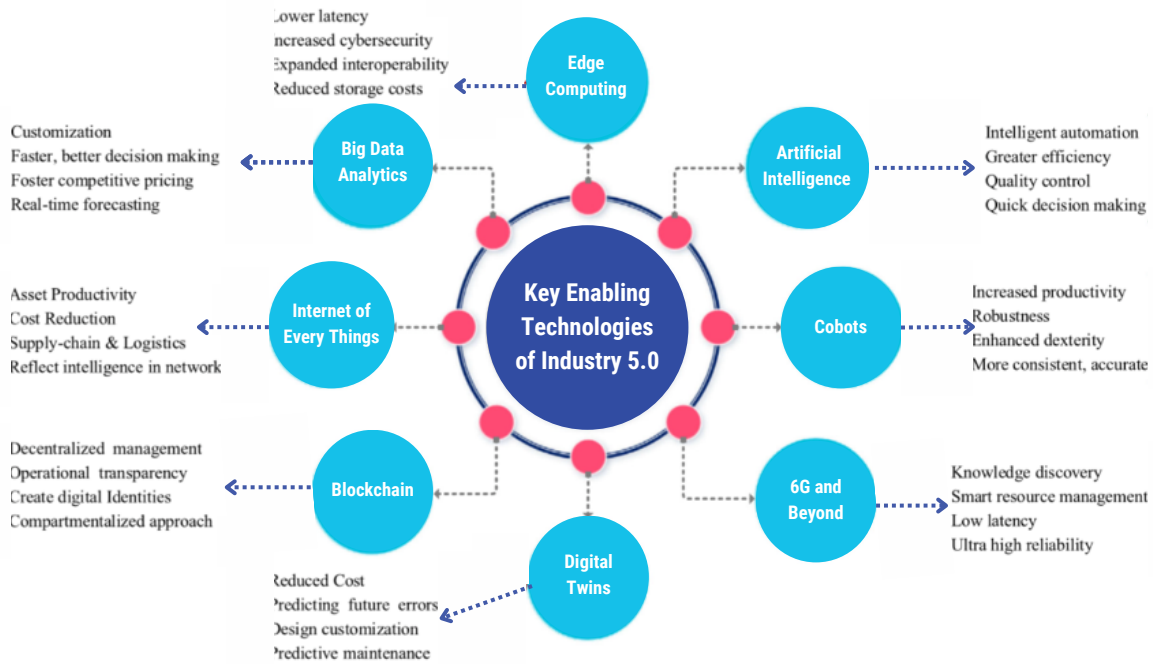
Figure 4 Key enabling technologies of Industry 5.0 (adapted from Maddikunta et al., 2022)

Not only technologies are required for the enablement of Industry 5.0, but also the participation of the society to increase trust and acceptance (Müller, 2020), as well as the diffusion of new skills and competencies for the personnel (Adel, 2022). The workforce now is required to interact with machines and operators. Thus, requiring expertise and knowledge in topics such as robotics and AI (Chowdhury et al., 2020; Zhang and Chen, 2020). The Directorate-General for Education, Youth, Sport and Culture (EAC) of the European Commission has promoted a digital education action plan, that aims at: increasing digital literacy, helping EU countries work together to adapt their education and training systems to the digital age, and harnessing the internet's potential to make online learning available to all.

Digital literacy refers to "*the mastery of simple and practical skills which bring profound enrichment and transformation of human thinking.*"
Reddy et al., 2020, p.81

Digital literacy helps to enable the development of information and communication technology, as well as the diffusion of required expertise in the context of digital transformation (Purnomo et al., 2020). **The employment of key technologies coupled with the diffusion of digital literacy and competencies are pivotal for the implementation of Industry 5.0**, where sustainability, resilience and human-centrism represent the three main characteristics according to the European Commission (Breque et al., 2021).

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To sum up, Figure 5, presents the framework that highlights the main features of goals, technological enablers, and challenges associated with the concept of Industry 5.0. The framework was developed by the European Commission in 2020 in collaboration and consultancy with Europe's technology leaders (Müller, 2020).
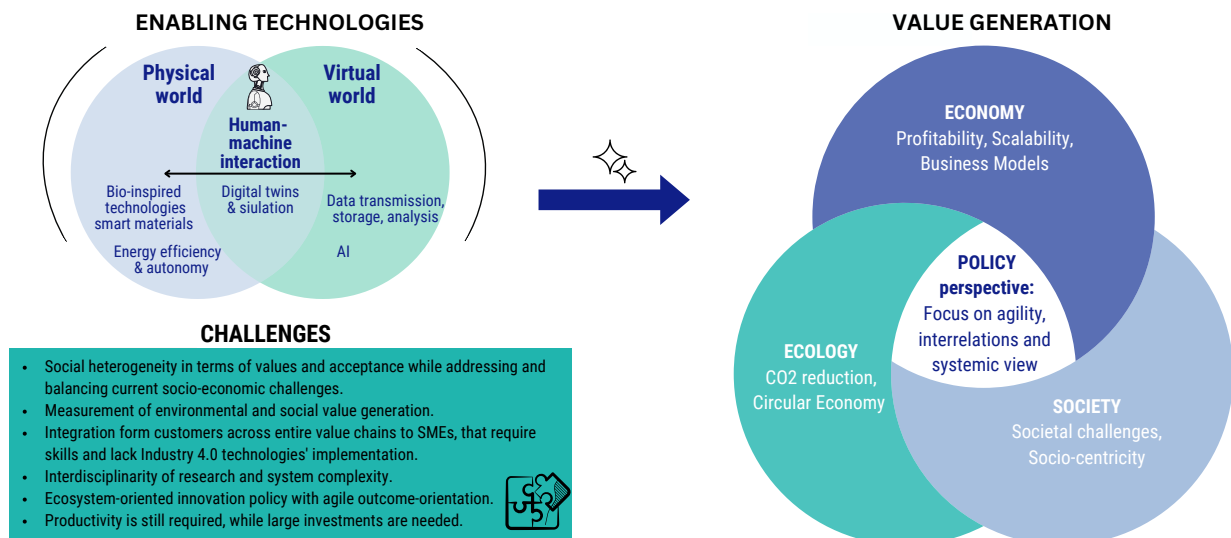

Figure 5 Main features of goals, technological enablers, and challenges associated with the concept of Industry 5.0 (adapted from Müller, 2020)

Based on this, the European Commission has recognized the need for a better integration of social and ecological needs in the development and implementation of new technologies. This approach requires a respect for the heterogeneous perception of values and needs in society, while also measuring and quantifying environmental and social value, which can be challenging.

The Commission suggests that **the combination of life sciences, engineering, and information technology disciplines will require a more systematic innovation approach that integrates different perspectives and takes a systemic view on entire ecosystems**. The resulting systems will be highly complex, interrelated, interdependent, and will have to cope with inhomogeneous data sets. While economic targets such as productivity and competitiveness remain important, they must be set within agreed ecological and social values. Business models that value ecological and social value creation or incentives from legislation can help achieve this balance.

To ensure a broad-scale implementation and value generation towards prosperity, the industrial landscape must be integrated with society, including customers and entire supply chains, up to small and medium-sized enterprises (SMEs). This requires **a collaborative effort to ensure that the benefits of Industry 5.0 are widely shared and contribute to European values**.

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1.3. Skills, Competencies and Challenges of the Workforce

Digital transformation has a socio-technical and socio-economic nature because it is people who enable organizations to implement technologies (Warner and Wäger, 2019; Fonseca and Picoto, 2020). Within the new digital work environments, digital transformation is changing the skills and competencies needed to perform job tasks (Trenerry et al., 2021). Competencies can be defined as complex collections of skills and accumulated knowledge that permit employees to perform through the organizational practice and manage activities by using their assets (Johnson et al., 2008). According to the World Economic Forum (WEF)'s data on average, by 2025, 15% of a company's employees are at risk of disruption and nearly 45% of the employees' skills will need to change to effectively perform their roles (WEF, 2020).

> **Competencies can be defined as complex collections of skills and accumulated knowledge that permit employees to perform through the organizational practice and manage activities by using their assets.**
> Johnson et al., 2008

Digital transformation brings challenges related to skill and competencies gaps and technology adoption. The three biggest challenges in order to close this gap are related to the **leadership, the education system, and skills** (Figure 6). Furthermore, technology adoption is a crucial factor to consider since attitudes to technologies can impact job performance (Trenerry et al., 2021).

Existing studies have also mainly focused on strategic or business processes rather than on employee-related variables at the individual, group, and organizational levels (Trenerry et al., 2021). For instance, studies by Fonseca and Picoto (2020) and Warner and Wäger (2019) outline the experience of senior executives and the skills and competencies they think are needed. Trenerry et al. (2021) findings help to confirm that existing digital transformation research has focused mainly on executives' and organizational leaders' perspectives rather than those of employees. Thus, the authors consider a priority for future research to include studies of employee attitudes and perceptions of digital transformation and individuals' abilities to acquire new skills and their receptiveness to training.
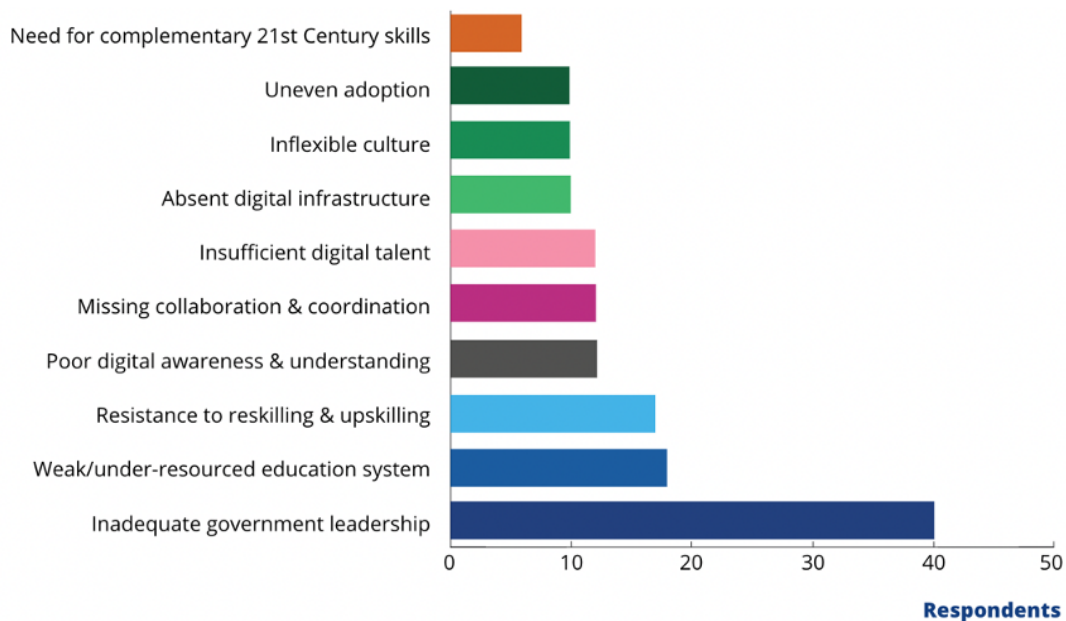
Figure 6 Response to "What are the biggest challenges in closing the digital skills gap?"
(from Digital Skills Gap Index 2021, OECD)

With globalization, technological progress, and demographic change, the world of work is changing, affecting quantity and quality of jobs available (OECD, 2017). The recent COVID-19 pandemic has accelerated many of these changes ("Digital Skills Gap Index 2021"). To keep up with these developments in organisations, it is fundamental for our current and future workforce to adjust and redirect skills and competencies (Schwab, 2018). As a report by the WEF shows (2020), technological change represents one fundamental factor impacting the workforce and requires whole generations to being able to adapt more dynamically to the increasingly technologically driven workplace (Schwab, 2018). And while it is widely argued that technology displaces labour, it also facilitates new areas for development of a workforce (Acemoglu and Restrepo, 2019).

Related to this, competencies such as a willingness to learn and openness to change are critical in robotization, machine learning, sensor technology, and big data (Osmundsen, 2020). With the growing amount of data enabled through these technologies and enabling these technologies vice versa, data access and management will be another key factor for digital transformation (World Economic Forum and Accenture, 2018) as well as its ethical consideration. While the technical/digital skills are important for the future workforce, there is also rising importance on non-technical skills such as problem-solving and organizational skills and leadership (Trenerry, et al., 2021). Faina and Almeida (2020) emphasize adaptability, creativity, resilience, and innovation. Other reports emphasize, the rising importance of skills groups such as critical thinking and analysis as well as skills in self-management such as active learning, resilience, stress tolerance and flexibility (WEF, 2020).

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In the context of technological change, often the so called "future of work" is discussed. **Where is our workforce headed?** Questions of who works, where, and how we work influence the workforce the most (Figure 7). Debates concerning the interplay of technology and the workforce however go back many years. In the 1970s, technology was described in the frame of deskilling, whereas the 1980s debate surrounded the significance of technology and how work was upgraded and shaped by it (Littler, 1991). Whilst technologies have changed the way we work, ongoing and rapid technological changes will continue to impact the workforce and the future of work. Future studies are focused on possible scenarios that lie ahead. According to Carmel and Sawyer (2022) the future of work, that we will see ourselves confronted with, will be defined by various places of work, algorithmic decision-making, work structures, technologies enhancing and substituting human workers, new mental models and needs, changes in expectations of workers as well as leaders, and, finally, value creation and the labour market structure in general. While many scenarios are possible, and some may be unthinkable, change is ongoing. The key to prepare for the forces expected to impact our workers of tomorrow, the way forward will be determined by preparing a future-ready workforce today.
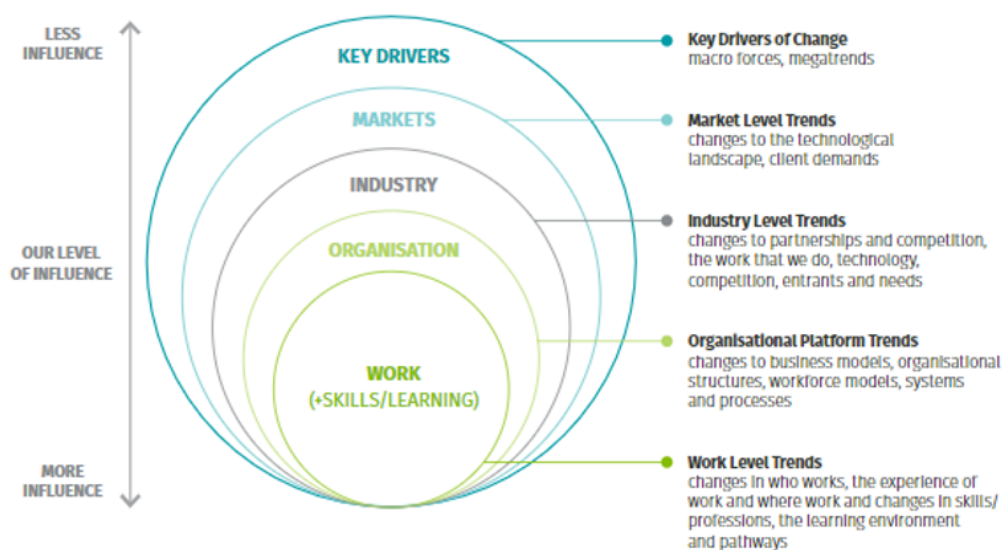
Figure 7 Levels and Types of Trends influencing the Future Workforce
(from Aurecon, 2021)

In the context of digital transformation, changes to the structure as well as the culture of an organization lead employees to assume roles that are traditionally outside of their functions (Vial, 2019). By 2030 up to 375 million workers are expected to change occupations (McKinsey, 2017). For example, in Germany, WEF identified the top three emerging specialists' roles of Data Analysts and Scientists, AI and Machine Learning, and Digital Transformation. At the same time, the top redundant roles are Data Entry Clerks, Administrative and Executive Secretaries, Accounting, Bookkeeping and Payroll Clerks (Figure 8).

Emerging and redundant job roles

Role identified as being in high demand or increasingly redundant within their organization, ordered by frequency

EMERGING

1.	Data Analysts and Scientists
2.	AI and Machine Learning Specialists
3.	Digital Transformation Specialists
4.	Big Data Specialists
5.	Internet of Things Specialists
6.	Information Security Analysts
7.	Project Managers
8.	Software and Applications Developers
9.	Database and Network Professionals
10.	Process Automation Specialists

REDUNDANT

1.	Data Entry Clerks
2.	Administrative and Executive Secretaries
3.	Accounting, Bookkeeping and Payroll Clerks
4.	Accountants and Auditors
5.	Business Services and Administration Managers
6.	General and Operations Managers
7.	Client Information and Customer Service Workers
8.	Financial and Investment Advisers
9.	Assembly and Factory Workers
10.	Human Resources Specialists

Emerging skills

Skills identified as being in high demand within their organization, ordered by frequency

1.	Active learning and learning strategies
2.	Analytical thinking and innovation
3.	Complex problem-solving
4.	Resilience, stress tolerance and flexibility
5.	Leadership and social influence
6.	Critical thinking and analysis
7.	Creativity, originality and initiative
8.	Technology design and programming
9.	Emotional intelligence
10.	Service orientation
11.	Systems analysis and evaluation
12.	Reasoning, problem-solving and ideation
13.	Technology use, monitoring and control
14.	Instruction, mentoring and teaching
15.	Troubleshooting and user experience

Figure 8 Emerging and Redundant Job Roles and Emerging Skills in Germany
(from WEF, the Future of Jobs Report, 2020)

While non-IT employees take the lead on technology-based projects, IT personnel are expected to be business savvy. Digital transformation, thus, requires employees to develop new skills. The new skills development for current and future business needs remains unclear, as well as the process of supporting employees in this transition. However, organizations have two options when in need of new skills for digital transformation, either they train the existing employees, or they hire new workers that already have these skills (Schislyaeva and Saychenko, 2022). The changes in skillsets that result from digital transformation can cause job polarization, given that skilled employees may feel included, while employees in low-skilled jobs may be excluded and more vulnerable to automation (Dąbrowska et al., 2022; Li, 2022).

> *"Educational systems have not kept pace with the changing nature of work, resulting in many employers saying they cannot find enough workers with the skills they need."*
> McKinsey, 2017

When companies decide to train current employees, they can follow an upskilling strategy to equip them with new skills to enhance their current practices or reskilling to help them take a different role (Li, 2022). Nonetheless, the pace at which technology advances complicates the skills development strategies because skills become outdated at the same pace, generating skills gaps (Kim and Park, 2020). Therefore, employees may need to review workers' skillsets and provide lifelong learning, given that formal education will become obsolete after some years (Kim and Park, 2020; Schislyaeva and Saychenko, 2022). **Ongoing reskilling and upskilling should be part of a career development plan**, making it attractive and accessible for the workforce so that they are motivated to acquire new skills (Li, 2022). After all, skills will become increasingly important in the labour market, more than titles or degrees (Schislyaeva and Saychenko, 2022).

Enabling a healthy work environment and facilitating innovation are global concerns on the United Nations 2030 agenda for sustainable development (Figure 9). Looking at skills development will help to promote culturally sustainable digital transformation, to ensure that the organizational changes lead to moral, social, and emotional upskilling or reskilling instead of making these skills obsolete (Ulhøi and Nørskov, 2020).

Figure 9 United Nations 2030 Agenda for Sustainable Development, Goals 8 and 9

Overall, DT requires new managerial capabilities apart from the development of new human resource management practices (Fernandez-Vidal et al., 2022). Schrage et al. (2021) have identified that attempts to lead digital transformation are probably unsuccessful without a leader's own digital transformation—one which puts intentions, engagement, and fairness as important as data-driven agility and efficiency. On the other hand, Tomičić, Tomičić-Pupek and Pihir (2020) found that **digital transformation leaders are usually external project members**, which shows that companies strongly rely on outsourcing this task to management consulting professionals to facilitate successful digital transformation.

Yet, it can also be observed that many companies decide to **create centralized digital transformation roles by appointing Chief Digital (Transformation) Officers** (Firk et al., 2021) and/or creating digital transformation/innovation units (Schumm et al., 2022) to drive the digital transformation in organizations. Common skills and competencies of those who manage corporate transformation in the digital age are linked with organizational agility, technical know-how, and emotional intelligence to manage talent (Singh and Hess, 2017; Cortellazzo et al., 2019; Sousa and Rocha, 2019; Usai et al., 2020). The following chapter will provide further insights on these emerging Digital Transformation professionals roles.

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KEY TAKEAWAYS

Digital Transformation disrupts industries, the way of working and living by blurring the lines between physical and digital assets.

Depending on the level of pervasion, Digital Transformation represents the final development phase, incrementally building up on Digitization and Digitalization.

Knowledge intense business fields, such as IT & Communication, are among the most advanced digital sectors, while localized sectors, such as agriculture, lack digital development.

New work environments require new skillsets and competencies - reconsidering the education system and traditional leadership styles.

The mindset of the future workforce should entail willingness to learn and openness to change, while from the managerial perspective organizational agility, technical know-how and emotional intelligence is key.

2.DIGITAL TRANSFORMATION
CURRENT SKILLS DEMANDS

Digital transformation is an emerging area of professional activity. In recent years, new functions and roles have emerged, while others are being transformed to respond to the needs and challenges of digital transformation. Analysing current job advertisements can provide valuable insights into emerging job roles and current expectations in terms of responsibilities, skills, and competencies needed for managing digital transformation.

In this section, we provide insights based on an **analysis of 145 European job advertisements** with "Digital Transformation" in the job title or job description, published in English language on LinkedIn platform between September and October 2022. LinkedIn was chosen for being considered one of the most popular networking and job searching platforms, with 875 million members in more than 200 countries and territories worldwide. One of the main limitations of this study is that the job posts were required to be published in English, thus limiting our analysis to job ads published in other languages. Nevertheless, with increased mobility of skilled workers and a global demand for emerging professionals, many companies choose to post job advertisements in English.
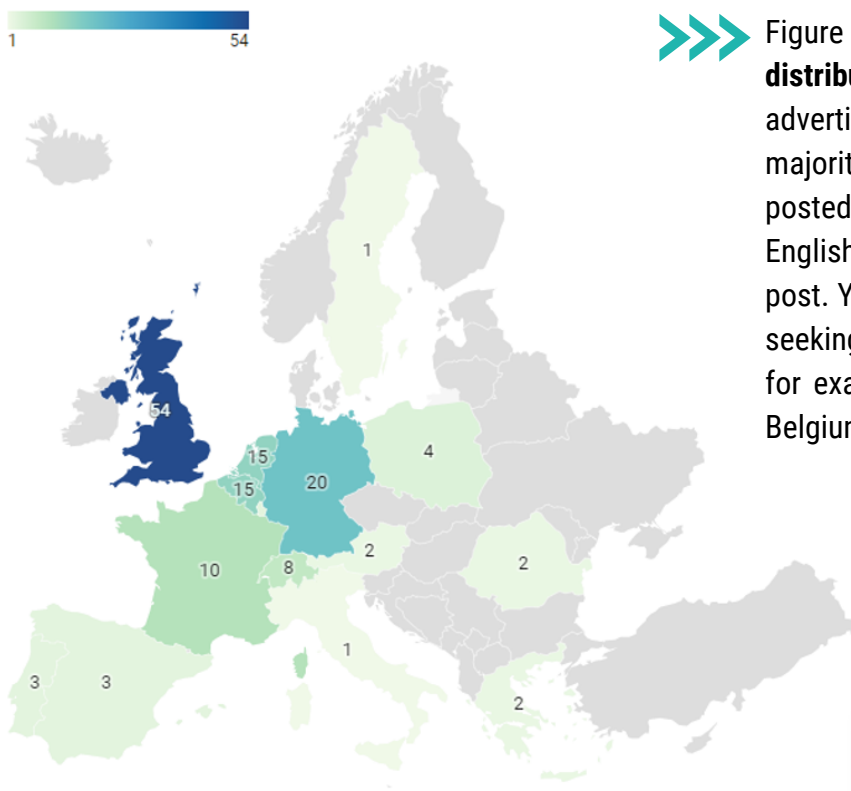
Figure 10 presents the **geographical distribution** of analysed job advertisements. Not surprisingly, the majority of job posts (nearly 40%) were posted in the United Kingdom, due to English as primary language of job post. Yet, a large number of companies seeking DT professionals also operate, for example, in Germany, Netherlands, Belgium, France, and Switzerland.

Figure 10 Distribution of Job Advertisements (created with Datawrapper)

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Most **job titles** relate to Digital Transformation Consultant, (nearly 25% of all job advertisement), followed by Digital Transformation Manager (nearly 20% of all job advertisement), and Digital Transformation Project Manager or Advisory Director. Other job titles linked to Digital Transformation include DT Officer, roles broadly defined as "Marketing, Strategy, and Digital Transformation" specialists, Customer Experience, Scrum Master, Change Leader or executive roles as Vice President, Head of Digital Transformation or Chief Digital Transformation Officer (ChiefDTOfficer) (Figure 11).

Figure 11 Word Cloud for Job Titles related to Digital Transformation

The analysis of job advertisements revealed a strong link with **job functions** in consulting, information technology, business development, project management and engineering (Figure 12).
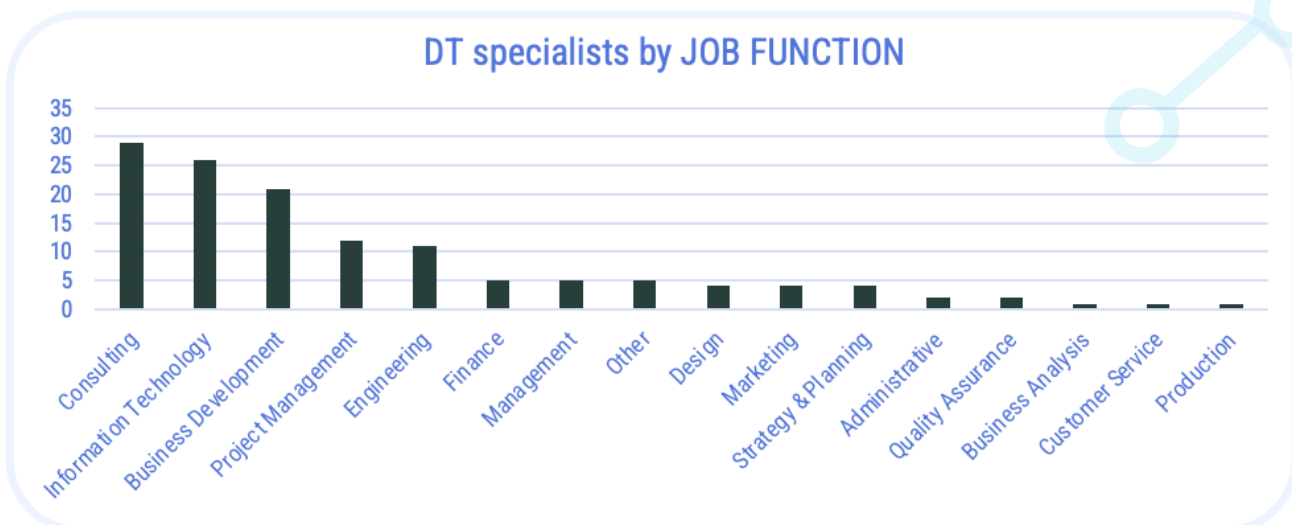

Figure 12 Digital Transformation by Job Function

Figure 13 Word Cloud for Job Functions related to Digital Transformation

Consulting

The largest portion of positions advertised were consulting roles. These positions were diverse, but in general, they sought experts that could provide strategic, operational, and technical support to client companies for digital transformation. Assuming that consulting firms are likely to hire new personnel for services in high demand, this may indicate that traditional firms seek external support for the development and implementation of digital transformation.

Information Technology

The second largest portion of positions were in IT and technical roles, most of which were posted by IT service and solution providers. These positions focused on digital and technological solution in customer experience, process automation, and IT and data transformation. They also focused on providing support for the development of new digital products and services. The expectations for these roles often included, in addition to solution design, development and implementation, the support for technology adoption, including coaching, advisory, and training to facilitate the change process.

IT and technical roles are also sought by companies undergoing digital transformation and were largely focussed on internal IT and Data transformation. Some roles, however, were focused on building new digital products and services, working together with business functions.

Business Development

Business Development roles were largely associated with consulting and technology service providers and focused on engaging and gaining customers and building customer pipelines. These roles, however, also included the provision of strategic advice to clients and the development of digital transformation plans and roadmaps, including costing, as part of the sales process. In some cases, it also included the gathering of requirements from customers and translation of business into technical requirements.

24

Project Management

Project Management positions were largely focussed on the planning, development and implementation of digital solutions or business, technology, or data transformation projects. Project Managers were sought by consulting forms, service providers and firms undergoing digital transformation alike, indicating a strong focus on project level initiatives. Project Managers were expected to be the bridge between business and technology, requiring an understanding of both worlds. They often were expected to have competencies in agile methodologies as well as product design and development.

Engineering

Engineering roles related mainly to process automation and data transformation initiatives, especially in manufacturing and supply chains. These functions required strong technical capabilities and were sought by consulting firms, service providers and firms undergoing digital transformation.

The analysis of job functions and related roles and responsibilities revealed a strong focus on digitalization e.g., **improving business processes and existing customer experiences leveraging digital technologies**. Most roles focused on using or adapting existing solutions based on industry and sector practices and trends or undergoing more complex digitalization of multiple processes, products and services in the organisation.

A smaller share of roles focused on **leveraging digital technologies to build new business systems, business models or creating new value to customers** levering emerging technologies. Only a few job advertisements focused on managing complex and multifaceted transformation, including technology, organizational and business and people transformation.

Almost **84%** of the positions analyzed were more closely associated with **digitalization**.

The focus on digitization, digitalization or digital transformation is worth highlighting for its impact on the skills and competencies employers might demand for what they might consider as digital transformation. For instance, the significant share of consulting and IT service advertisements aligned with the focus on digitalization initiatives. Research has shown that **firms struggle to digitally transform by themselves** and engage with external actors to acquire the necessary knowledge and expertise.

In addition, looking at the industry type, not surprisingly, the biggest demand for digital transformation professionals came from management consulting and information technology & service industries (Figure 14). Yet, the data shows that the demand for DT professionals is spread across various high-tech but also low-tech industries i.e. NGOs and fundraising, sports, real estate.
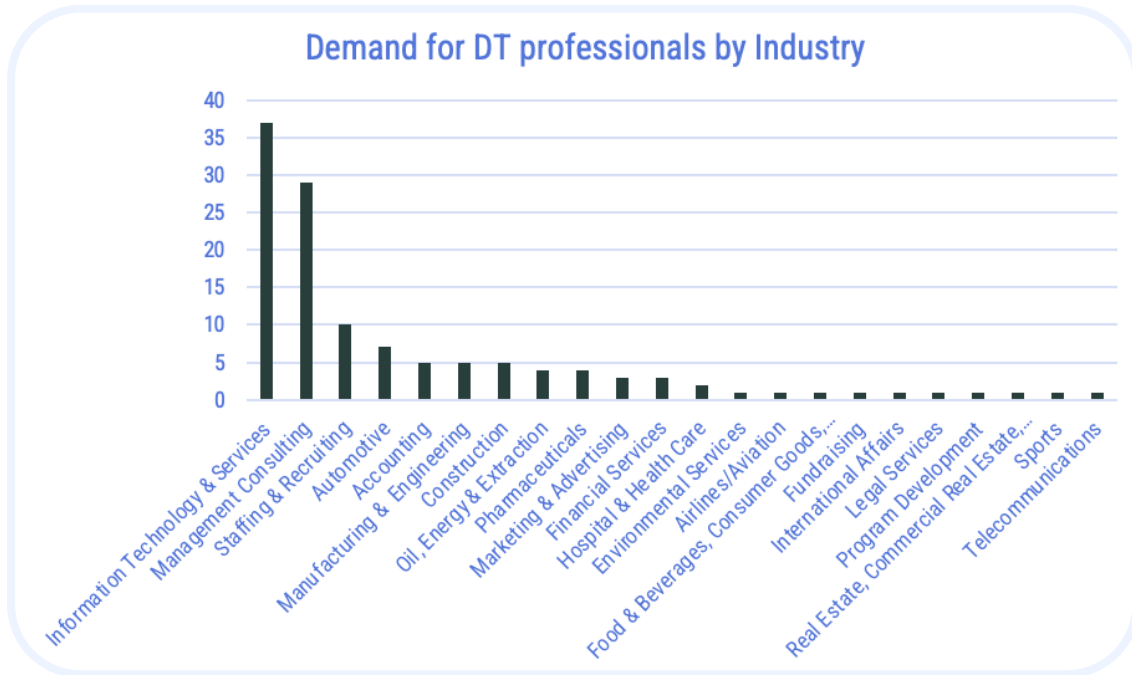
Figure 14 Digital Transformation Professionals' Demand per Índustry

Figure 15 Word Cloud for Digital Transformation Professionals' Demand per Índustry

2.1. Roles and Responsibilities

The analysis of job advertisements also revealed a significant focus on roles strongly associated with the implementation of digital transformation activities – indeed, words such as delivery, design, implementation, execution appeared 172 times across the 145 analysed advertisements. Furthermore, the positions have a strong focus on project level activities. The word 'project(s)' appears 123 times. Aligned, most of the positions analysed are at the associate and mid-senior levels. The roles and responsibilities of employees at this level may include the management of project teams, with a strong focus on the implementation of activities.

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Word	Occurrences
Deliver/delivery	76
Design	55
Implement/implementation	31
Execute/execution	10

>>> Digital transformation roles are strongly associated with the delivery and design of digital transformation, and least with the execution.

>>> Most digital transformation positions are at the associate and mid-senior level.

EXPERIENCE LEVEL

Level	
Executive	3
Director	10
Mid-Senior level	67
Associate	53

DIGITAL TRANSFORMATION JOB PROFILES

Digital Transformation Manager | Civil Engineering, Management Consulting, Construction

Examples of job responsibilities:

- "Management of project work streams, from solution design and activity planning to successful delivery, (…) designing and implementing solutions that can demonstrate benefits and value delivered (…)"
- "Manage and deliver CRM and CX transformation projects at clients, in an Agile mode"
- "Drive the urgent delivery / implementation of our current technology plan for each capability with the Digital Product Owner."

Linkedin

EXAMPLE

Chief Digital Transformation Officer / Head of Digital Transformation | Machinery

Examples of job responsibilities:

- "Develop overarching digital strategy, transformation programs, and interdisciplinary initiatives"
- "Define strategic goals and build a culture of collaboration driven by innovation and accountability"
- "Managing the implementation of digital transformation projects and the introduction of digital technologies within company"
- "Build international partnerships and maintain them responsibly and professionally"

Linkedin

EXAMPLE

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2.2. Desired Skills and Competencies

The T-shaped model describes professionals who can combine deep technical skills and competencies in a specific field (the vertical bar on the letter T) with the ability to collaborate across disciplines and to apply knowledge in areas of expertise other than their own (the horizontal bar on the letter T). Researchers have further defined these as **technical and cognitive dimensions**.
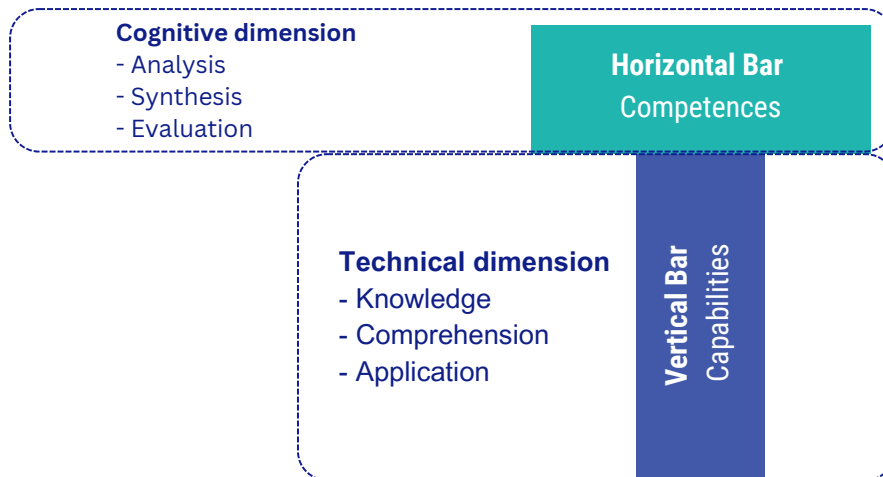

Figure 16 Building T-shaped Professionals for mastering Digital Transformation (adapted from Caputo et al., 2022)

Further, scholars highlight that the need for T-shaped skills and competencies emerge in any context in which problem solving is required across different functional and application areas as T-shaped professionals can shape their knowledge to fit the problem rather than expect problems to appear in recognizable forms (Caputo et al., 2022).

In the case of DT, "both technical and cognitive dimensions have a high relevance because the environment in which organizations act has been strongly modified by the emergence of new rules and behavioral path[s]" (Caputo et al., 2022). The need for T-shape professionals is, thus, pressing.

The analysis of job advertisements revealed a strong focus on T-shaped professionals. For instance, data experts (data scientists, data analysts, data managers, etc.) are expected to understand and possess the skills and competencies to manage the change or transformation associated with the application of data for digitalization and digital transformation. Business leaders are expected to share knowledge and contribute to the overall transformation efforts, while maintaining a strong focus on delivering results in their specific business units.
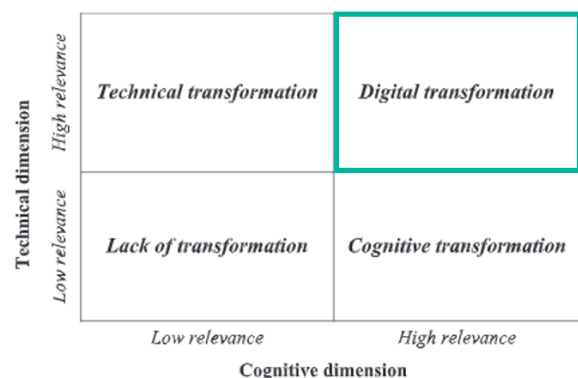

Figure 17 A Matrix Map for Depicting Transformations Scenarios (from Caputo et al., 2022)

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DIGITAL TRANSFORMATION JOB PROFILE

Data-Business Analyst - Digital Transformation | Oil & Energy, Renewables & Environment

- *"Understanding of business transformation projects, including data and process change activities."*
- *"Experience of analysing data and data models to understand patterns and structures in data including ways to match disparate data sets. (…)"*
- *"Proven ability to collaborate with subject matter experts, across the technology landscape to develop data & analytic solutions to meet current and future needs."*
- *"Ability to build consensus around the data value and gaining support from peers and organisation for the data agenda, leveraging broad technical knowledge, expertise and understanding in data management concepts, including physical implementation across the data life cycle to create business value and impact."*
- *"Significant business experience (preferably in energy sector) with demonstrated skills in designing, building and operating data services for a business - including concepts, standards, practices, tools, and technologies across the data life cycle."*
- *"Experience in supporting initiatives that drive integration, quality improvement, standards, and compliance and/or a culture of valuing data as an asset."*
- *"Promote a culture of innovation and relentless improvement across all aspects of the data management life cycle."*

Linked in

Likewise, it can be observed that **digital transformation drives employees to assume roles that were traditionally outside of their functions**. In the context of digital transformation, employees who are not part of IT functions take the lead on technology-focussed projects, while IT personnel are expected to be business savvy and contribute to business results (Vial, 2019).

The analysis of job advertisements largely corroborates this phenomenon. **The ability to bridge business and technology is a desired competency across functions and industries**. Employers are particularly interested in employees that understand both technical and non-technical aspects of solutions and can be a bridge between business and technical teams. Business acumen and technology know-how are, thus, desired for both technology and non-technology roles. The difference is in the weight given to each business acumen vs. technical competencies in each role.

Business focused roles (Project Managers, Consultants, Analysts, Product Owners, etc.)

Business acumen	Technology know-how

Technical roles (Software Developments, Data Scientists, etc.)

Business acumen	Technology know-how

DIGITAL TRANSFORMATION JOB PROFILES

Digital Transformation Analyst | Computer & Network Security

"You can seamlessly navigate through business and technology landscape of the project; can communicate in both technical and non-technical terms to effectively, understand business and technical aspects creating a bridge between both areas. You have experience in a business analysis area, and you are familiar with some of the following activities: requirements gathering, creating/deploying solutions to end users, writing user acceptance test scripts and facilitating UAT sessions"

IT Business Analyst - ERP Digital Transformation | Staffing & Recruiting

"Bridge the gap between IT and Business by assessing the processes & requirements and deliver recommendations and reports to the different stakeholders"

EXAMPLE

Linked in

The investigation of the skills and competencies desired by employers unearthed a combination of what could be categorised as soft skills, individual traits, hard skills, and preferred/demanded knowledge of software/tools.

Communication skills is the single most desired soft skill across DT roles, functions and industries (Figure 18). In fact, among the five most desired soft skills, three relate to effectively engaging with other individuals. These are, in addition to communications skills, client-orientation & engagement and stakeholders' engagement & management. While the other two, problem solving and analytical skills both relate to managing the challenges of digital transformation.
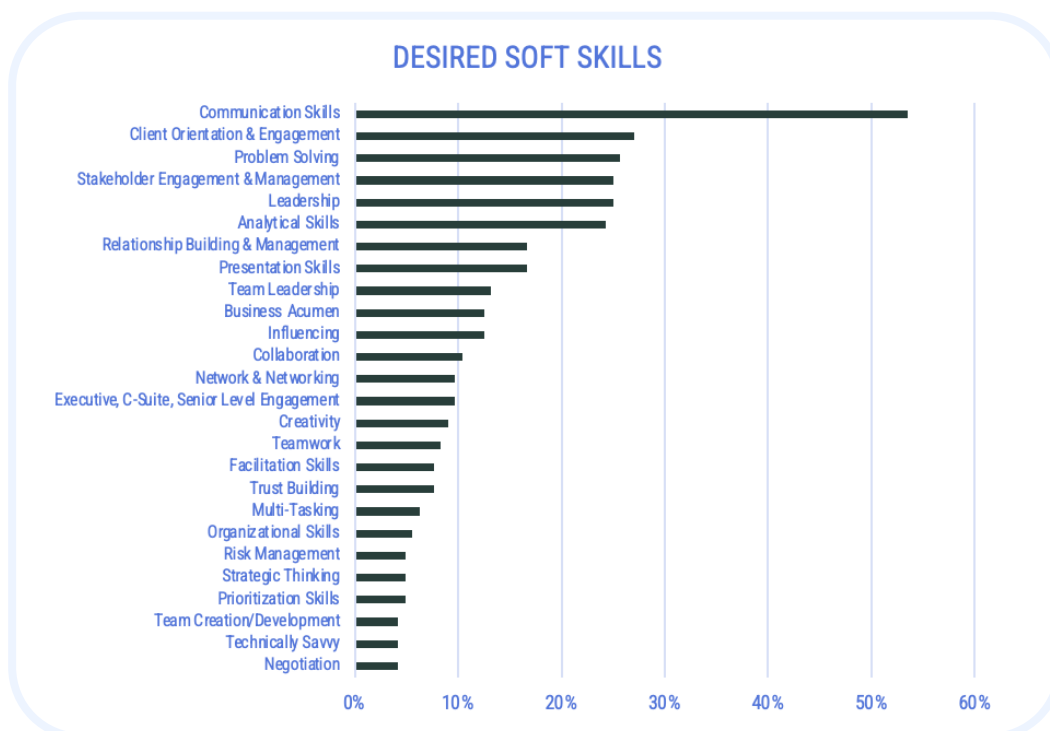
DESIRED SOFT SKILLS

Figure 18 Most Desired Soft Skills across DT Roles, Functions and Industries

2.3 Managing Uncertainties and Complexities of Digital Transformation

"We are looking for someone who takes pride to involve him or herself in the work and in the topics that one comes across within a complex transformational environment."

The analysis of job advertisements revealed a strong focus on emotional, relational, or human-centred competencies, aligned to academic and industry research that argue that digital transformation, much more than technology, is about people.

Employers connect human capabilities to managing the challenges and complexities of digital transformation. Digital transformation employees and managers are expected to be comfortable navigating complex environments and implementing complex projects, especially due to the need to involve and manage multiple stakeholders, requirements, and expectations. Furthermore, having experience of implementing complex transformation initiatives and projects is desired by employers.

Relationship building, stakeholder management, interpersonal skills, communication skills or broader emotional intelligence are highly desired. For digital transformation, employers expect to rely strongly on the individual and relationship capital of its employees. Digital transformation professionals are expected to be able to build and maintain strong relationships across the organisation and with external stakeholders. They are expected to utilize interpersonal and communication skills to bring clarity, convince, and build trust. Other related competencies desired by employers included trust building, persuasion, negotiation, influencing and conflict management.

About you

"Demonstrated track record of partnering with business stakeholders and handling multiple complex transformation projects."

Research also highlighted that far from removing the need for human capital, digital transformation requires employees to rely strongly on their analytical skills to solve increasingly complex business problems (Vial, 2019). Aligned, analytical skills and problem solving are among the most desired competencies.

About you

"You like complex tasks, and you convince with your analytical skills and your structured thinking ability."

In addition, employers valued competencies such as resilience, adaptability, and positivity to face the challenges and complexities of digital transformation. Digital transformation employees and managers are expected to be comfortable with uncertainties in complex environments.

> **About you**
>
> *"You are resilient and tenacious with a propensity to persevere. You are flexible and adaptable, able to work in ambiguous situations."*

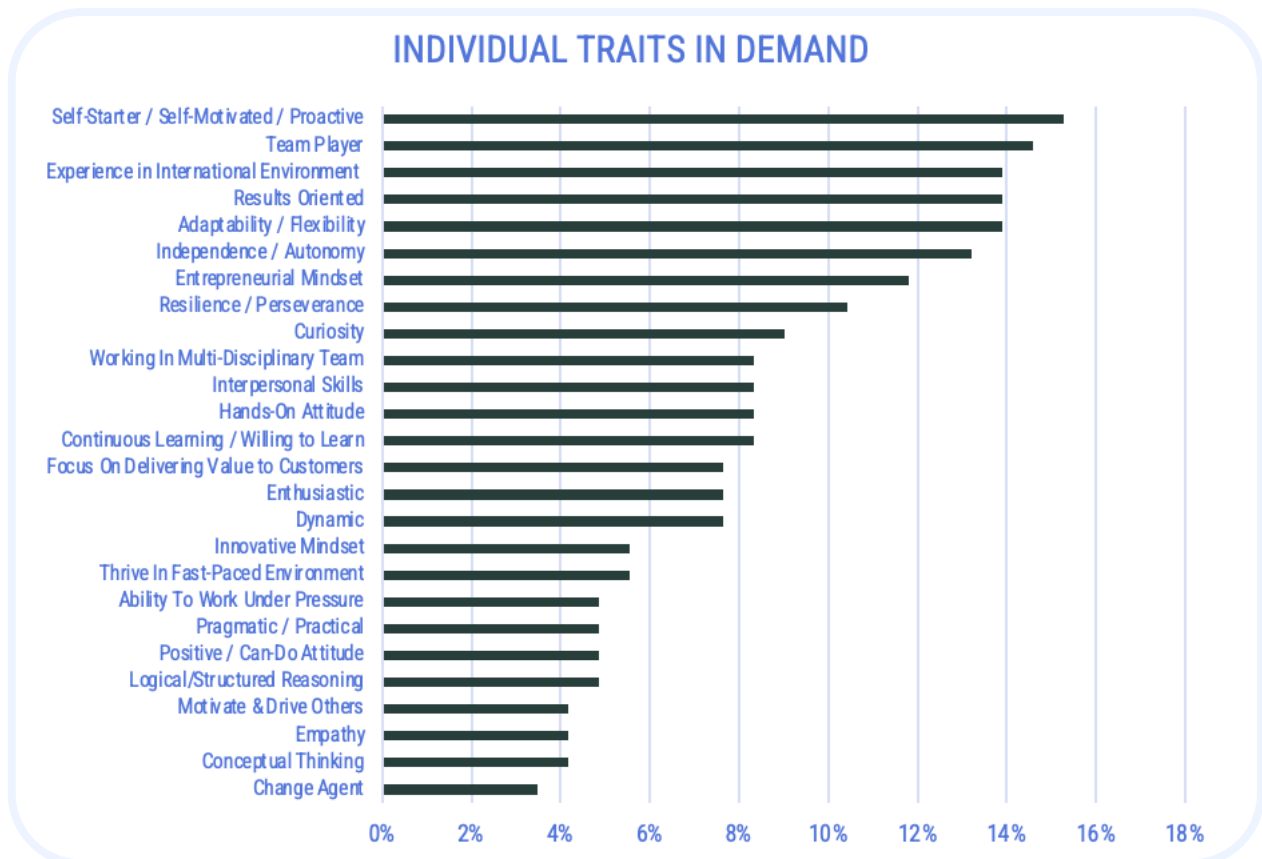## INDIVIDUAL TRAITS IN DEMAND

Figure 19 Most Desired DT Traits in Individuals

Individual traits refer to natural abilities that the professional is expected to have. Employers are attentive of individual traits – almost all job advertisements included at least one desired individual trait. Among these, being a self-starter, self-motivated, and proactive individual were the most desired personal characteristics. Digital transformation professionals should be proactive in identifying challenges and opportunities and self-motivated to pursue or tackle these.

Being a team-player is also a highly desired trait. Beyond having soft skills such as communication, collaboration, desired professionals are those that truly enjoy working in teams and are capable of prioritising team efforts and goals over their own. Having had experience in international and/or multicultural environments, or being comfortable in such, is also highly desired given the cross-borders nature of digital transformation projects in Europe. Further, this indicates a capture of talent from across the globe by European companies.

Among the five most desired individual traits is being results oriented, while being adaptable and flexible, as previously discussed. Digital transformation professionals are expected to deliver strong results. Yet, given the complex, challenging, and often-changing nature of digital transformation, professionals are expected to be comfortable with ambiguity and uncertainty and be quick to adapt in order to achieve goals.

HARD SKILLS IN DEMAND

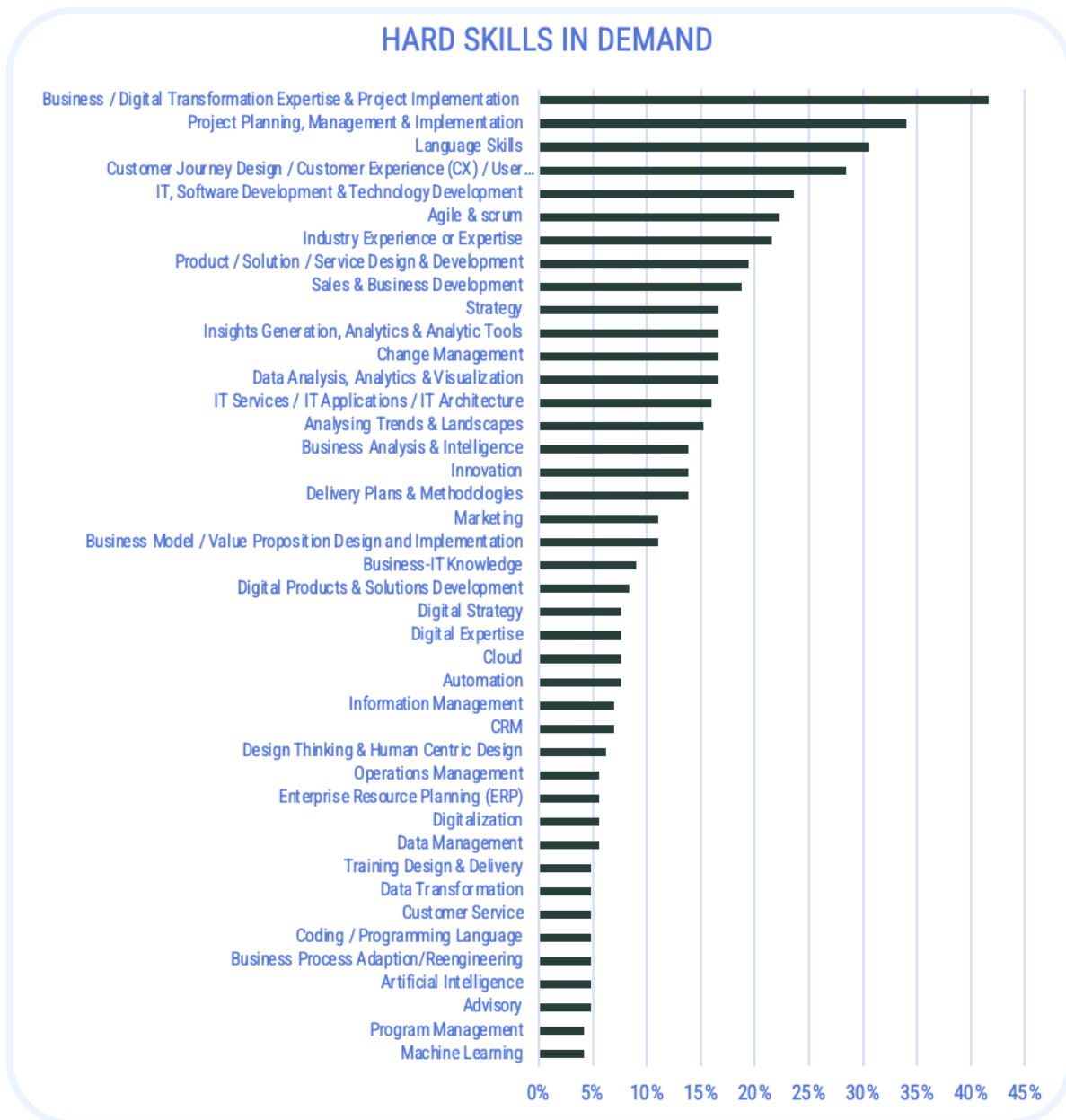| Skill	
Business / Digital Transformation Expertise & Project Implementation	~42%
Project Planning, Management & Implementation	~34%
Language Skills	~30%
Customer Journey Design / Customer Experience (CX) / User…	~28%
IT, Software Development & Technology Development	~24%
Agile & scrum	~22%
Industry Experience or Expertise	~21%
Product / Solution / Service Design & Development	~19%
Sales & Business Development	~19%
Strategy	~17%
Insights Generation, Analytics & Analytic Tools	~17%
Change Management	~17%
Data Analysis, Analytics & Visualization	~17%
IT Services / IT Applications / IT Architecture	~16%
Analysing Trends & Landscapes	~15%
Business Analysis & Intelligence	~14%
Innovation	~14%
Delivery Plans & Methodologies	~14%
Marketing	~11%
Business Model / Value Proposition Design and Implementation	~11%
Business-IT Knowledge	~9%
Digital Products & Solutions Development	~8%
Digital Strategy	~7%
Digital Expertise	~7%
Cloud	~7%
Automation	~7%
Information Management	~6%
CRM	~6%
Design Thinking & Human Centric Design	~6%
Operations Management	~5%
Enterprise Resource Planning (ERP)	~5%
Digitalization	~5%
Data Management	~5%
Training Design & Delivery	~5%
Data Transformation	~5%
Customer Service	~5%
Coding / Programming Language	~4%
Business Process Adaption/Reengineering	~4%
Artificial Intelligence	~4%
Advisory	~4%
Program Management	~4%
Machine Learning	~4%

Figure 20 Most Desired Hard Skills across DT Roles, Functions and Industries

Desired technical and hard skills for digital transformation are diverse and multi-faceted. In broad terms, **core areas of expertise** include

- Information technology;

- Data Science;

- Business & Strategy;

- Transformation and Change Management;

- Sales & Business Development;

- Operations Management and Process Optimization;

- Project, Program and Portfolio Management;

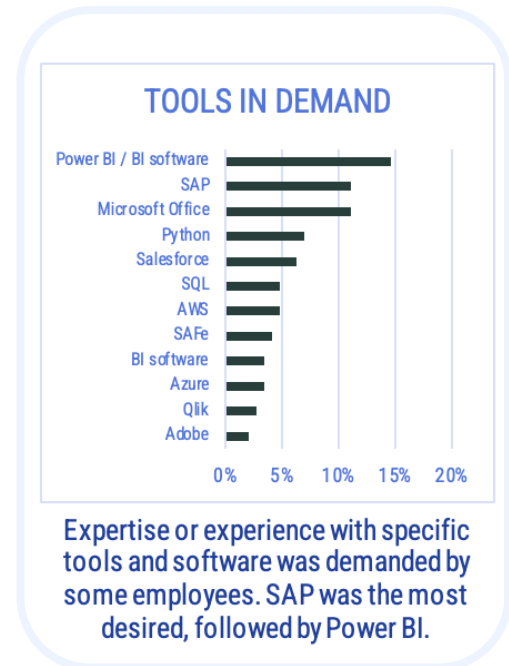- Product Development and Management;

- Design & Innovation.

TOOLS IN DEMAND

Expertise or experience with specific tools and software was demanded by some employees. SAP was the most desired, followed by Power BI.

Figure 21 Tools in Demand for DT

Finally, the analysis of job advertisements indicated that industry expertise is appreciated and sought by employers. Of the positions analysed, 32% indicated **industry expertise** as a required or desired competency, including the job advertisements categorized as management consulting and information technology & services.
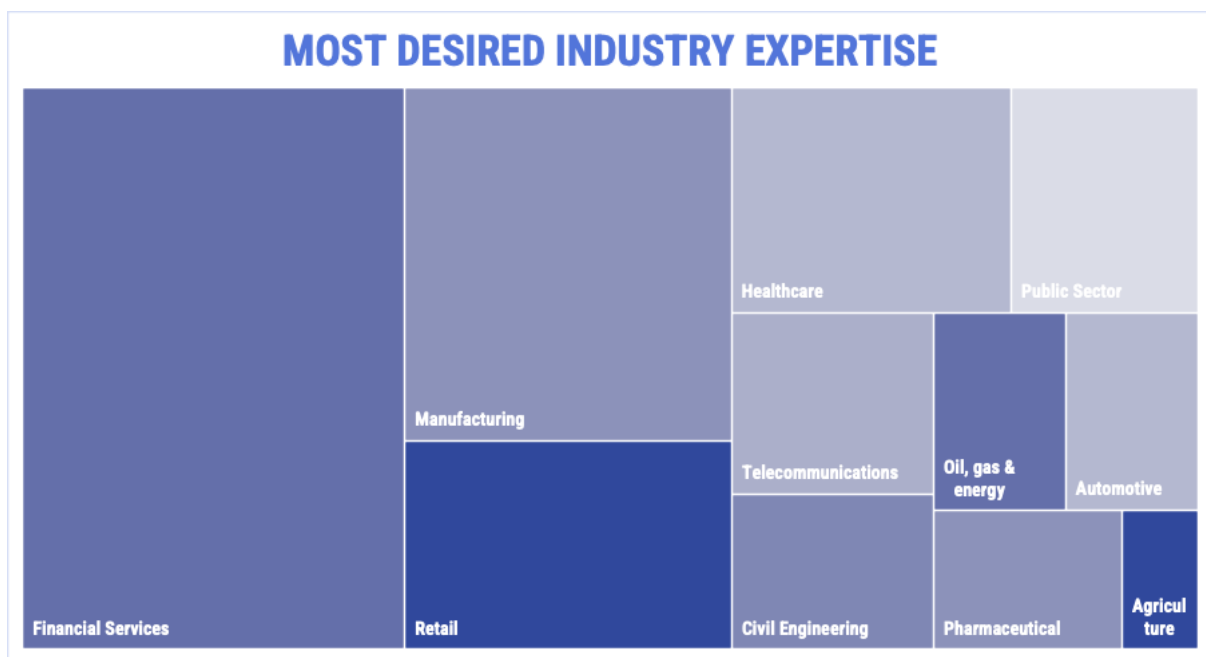

Figure 22 Most Desired Industry Expertise

KEY TAKEAWAYS

Digital Transformation professionals are in demand, as shown by the increasing job titles related to Digital Transformation, including Consultants, Managers and Advisory Directors.

Digitally advanced sectors IT & Services, Management Consulting and Staffing represent sectors with the greatest demand of specialists.
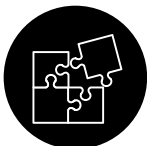
Analyses of job ads revealed desired skills with a strong focus on implementation activities, delivery, design and execution.

The ability to bridge business and technology is among the most valuable skill across industries and functions.

Apart from industry oriented hard skills, a special emphasize should be allocated to soft skills, such as communication skills, problem-solving and engagement which are needed to manage digital transformation.

DIGITAL TRANSFORMATION JOB PROFILE

EXAMPLE

Digital Transformation Advisory Director | Insurance

"You will be the industry expert tasked with bringing your knowledge of both industry and digital to bring a continual change strategy to bear. (…) You will have a wealth of knowledge within your industry sector married with consulting skills, strategy development and execution and you'll be opening our client's & colleague' eyes to the opportunities where digital and industry meet."

"As someone who has experience within insurance sector, you are considered an expert and advocate by your peers and colleagues, and alongside this you are passionate about digital. It's role across business, and the potential it can have when married to your industry knowledge and experience to drive opportunities that others might miss."

LinkedIn

3. DIGITAL TRANSFORMATION INDUSTRY VIEWS

This section displays a series of short case studies showcasing how companies are currently approaching skills and competencies for digital transformation and their expectations and plans for the future.

3.1. Leadership for Digital Transformation

Participants from nine different companies and industries were asked to rank the top 10 competencies and skills related to the management of digital transformation that their organization is currently looking for (Figure 23), as well as the top 10 that they believe will be needed in the future (Figure 24).
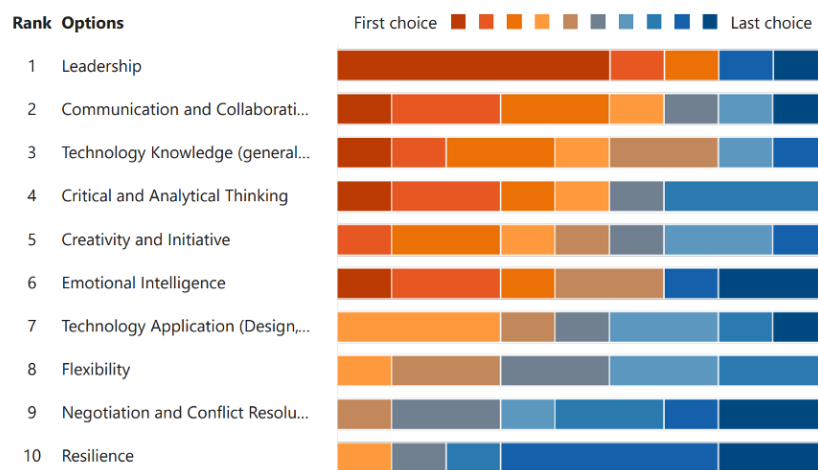

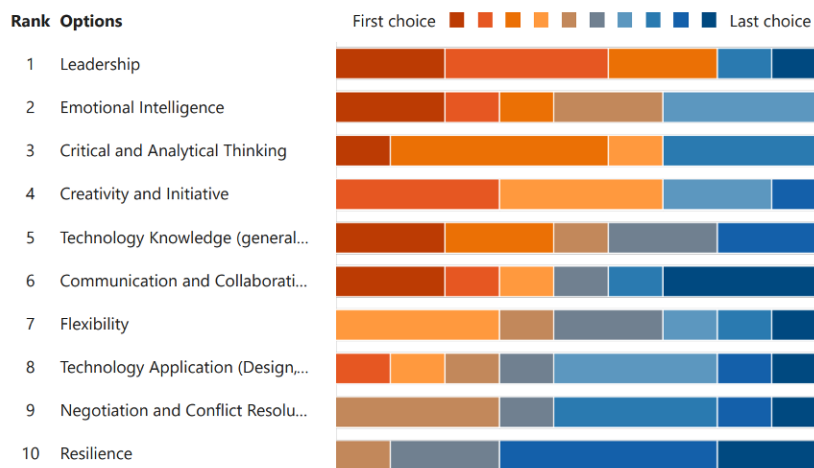Figure 23 Top 10 Competencies and Skills Companies currently look for

Figure 24 Top 10 Competencies and Skills Companies need in the Future

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Leadership is ranked as the number 1 for both current and future organizational needs for digital transformation. Overall, participants believe that the role of leadership in DT is what inspires and motivates team members to work towards a new way of working, a vision of the future that requires employees to innovate and embrace the risks associated with any transformational process. As put by one participant, leadership within DT is about "Being able to portray an exciting and believable big-picture with a clear vision and roadmap to achieving that vision." Participants agreed that management differs from leadership because the former is project-oriented and it focuses on execution of the digital transformation strategy, while the latter is team-oriented and deals with motivation, encouragement, and connection with the team.

The second place for the current needs for competencies and skills related to the management of digital transformation is **Communication and Collaboration**, while for future needs it was **Emotional Intelligence**. These results show the relevance of soft skills for DT. Some participants mentioned that empathy is also important for their companies, and they think it is challenging to find this capability in team members. Empathetic team members will help colleagues internally and clients externally to gain confidence in new digital tools.

3.2. Partners' Insights

In this section, we further unpack the current and future challenges related to the current and future challenges related to skills and competencies in digital era, based on insights from six partnering organizations of EINST4INE project.

Main challenge

Business strategy skills plus technological expertise.

Innoget is currently looking for skills and competencies in AI, NLP, ML, Big Data, Open Source and Blockchain as well as cyber security solutions. These skills and competencies on technologies need to be applied to their business so they can create new value. Thus, there is a need for business strategy skills plus technological expertise. Innoget is able to access the desired skills and competencies for their team because they can define clear objectives and ask for the new knowledge and skills deemed appropriate for process design, development, and implementation.

How to address it

Focusing on people's skills but also on the mindset and leadership attitude.

Innoget is not only looking for skills and competencies when recruiting new talent, they also consider their way of thinking and leadership attitude.

Future difficulties

Hard to define.

Future challenges for Innoget are still not clear, as put by an Innoget team member "There is a long journey to go through, and we will learn from doing. We are constantly connecting to organizations that can add value to our business and have open discussions about complementary competences and ways for mutual cooperation." Thus, Innoget will create partnerships with relevant companies to overcome future challenges.

innoget

Sector: Open Innovation Services
Country: Spain

Main challenge

Find motivated team members.

As mentioned by Mediate Srl's member "In my experience, the most difficult part is to find good people that are motivated and able to learn and work autonomously". The participant also emphasized the challenges related to trust in new collaborators and learning to delegate important activities. To illustrate "These two aspects are crucial for creating a good working team without bottlenecks on activities, technical and not [technical]".

Thus, the human side of management and teamwork that involve values such as motivation and trust play a key role in digital transformation.

How to address it

Flexibility and teamwork.

Mediate Srl is a SME, flexibility, and teamwork are thus fundamental aspects. Mediate Srl's members argues that good communication and sharing of information between workers is an effective way of creating a stimulating and inclusive work environment. The participant mentioned "I expect that digital transformation will allow all workers to save time for focusing on really important activities, in order to reach a good work-life balance."

Future difficulties

Skills for data analysis and AI.

Difficulties related to negotiation and conflict resolution skills might be experienced by Mediate Srl. The participant mentioned that it is difficult to apply these skills in R&D projects, because companies find it very difficult to understand the difference between R&D/prototypes/pilots and industrial products/applications.

MEDIATE

Sector: Medical and industrial robotics, mechatronics, and automation.
Country: Italy

Main challenge
Finding and retaining talent.

Their main challenge is finding cyber securing experts. The organization needs both hard skills and competencies that cyber security experts, data engineers, and data scientists may portray. Digital transformation means rethinking the way business is conducted through digital tools, thus, they need people with "holistic" profiles who have both digital technologies expertise and a clear idea of how business is performed. Also, retaining digital talents is a challenge for Enel. The participants mentioned that the organization is able to attract talent, but the market is limited for some positions.

Sector: Utility
Country: Italy

How to address it
Brand reputation, standardizing recruitment processes and collaboration.

Having a strong brand helps them attract talent, nonetheless the cost of integrating new skills has been increasing. The organization is augmenting digital skills in different ways such as following a standard recruiting process to integrate new talent. Also, Enel promotes disciplined collaboration and long-term partnerships with start-ups and tech giants to secure talent synergies.

Future difficulties
Emotional intelligence skills.

Emotional intelligence will play a critical role because future businesses need employees to be strong in self-management and context understanding. Enel believes that "[emotional intelligence] skills are the prerequisite to see where one is positioned is terms of soft and hard skills and where the organization is going." Enel looks for six attitudes when searching for young talent: inspirational leadership, cooperation and inclusion, decisiveness and delivery, customer orientation, innovation, and personal agility. These attitudes will serve to predict the long-term cultural fit with the overall organization.

Main challenge
Identifying digital transformation opportunities.

Blue Ocean Robotics has not set digital transformation goals yet, thus, the first challenge is to identify the opportunities and next steps.

BLUE OCEAN ROBOTICS
– for humans

Sector: Service Robotics
Country: Denmark

How to address it
Multi-level skilled workers.

As put by one participant "Our employees are skilled on several levels, not only specifically in their field. This makes it easier to access the necessary skills and competencies [for digital transformation]."

The way to address this challenge is by identifying who has the necessary skills and competencies for digital transformation and plan accordingly. To aid this stage, a Growth pilot was recently hired in the area of digitization. This helps the company to approach DT and set a plan and structure for the future.

Future difficulties
Skills for data analysis and AI.

Blue Ocean Robots expects that data and AI will play a big role in the upcoming stages for digital transformation. For this, analytical skills will be needed.

Main challenge
Growing a diverse team with strong gender and ethnic representation.

AMPLYFI's biggest challenge is to continue to build a rich and diverse team with strong gender and ethnic representation across the board. Even though it is significantly ahead of its industry average, the pool of candidates that apply for positions generally lacks female applicants for some of the more technical roles.

The core ingredient in any new employee is the ability to operate in and contribute effectively to diverse, multi-functional teams. The aptitude to be flexible and adaptable is critical when working with agile methodologies and within small, specialist sprint teams for short bursts of software development activities.

How to address it
Brand reputation and working culture.

AMPLYFI's brand reputation and culture are major factors in enabling it to attract the very best talent. With rigorous recruitment and onboarding processes, it ensures the selection of the very best candidates and rapidly integrates them into the wider team, making them feel valued contributors. This, in turn, also aids talent retention.

Future difficulties
Drive adoption of technologies across its client base through a skilled and dedicated team.

Strong empathetic and analytical skills are critical in onboarding, training, and giving new technology users the confidence to use its tools. Increasing usage is critical to driving adoption of its deep-tech products across AMPLYFI's client base. This helps clients enhance their own digital transformation efforts and is something that AMPLYFI has consciously strengthened its account management and user onboarding capabilities and activities to achieve. As the company notes: "This includes both recruiting staff with strong analytical, communication, and empathetic skill sets and developing a comprehensive set of procedures and strategies for proactively engaging new clients and users."

AMPLYFI

Sector: Software, AI
Country: UK

Main challenge
Soft skills gap.

Jakamo helps other organizations, their customers, with their digital transformation. Even when their clients are mainly looking for supply chain-related skills and competencies, they identify that the biggest gaps are related to social skills such as leadership, empathy and communication.

How to address it
Leadership and empathy.

As illustrated by Jakamo's team member "Leadership, in my opinion, is about, how to coach, support and inspire people to succeed in their work by creating a psychologically safe work environment." The participant highlighted the relevance of empathy for overcoming the current challenges of digital transformation.

Future difficulties
The human side of technology.

Future challenges involve the human side of technology, as put by Jakamo's member "empathy and social skills are becoming even more and more important when technology develops."

JAKAMO

Sector: SaaS Platform
Country: Finland

KEY TAKEAWAYS

Leadership is necessary to boost the human side of digital transformation.

Big-picture and business strategy thinking is a relevant competence for digital transformation. This means understanding not only the technology but also how to adopt it in a specific business. Companies are looking for skills in both specific technology and in the digital business space.

Finding and retaining diverse and skilled talent is a common challenge, however, a strong brand reputation, a clear recruitment process and collaboration with other companies may help to overcome such challenges.

Empathetic team members will help colleagues internally and clients externally to gain confidence in new digital tools.

CONCLUSION

Digital Transformation disrupts industries and the way of working and living by blurring the lines between physical and digital assets. It fundamentally changes how organizations operate and deliver value to customers. As such, the management of digital transformation requires a unique set of skills and competencies to be successful. These include the ability to think strategically about technology, lead and manage change, have strong technical skills, and excel at communication and collaboration. Digital transformation often involves working with a wide range of stakeholders, including employees, customers, partners, and vendors. Effective managers of digital transformation will be able to build strong relationships with these stakeholders and ensure that they are all working towards the same goals. As organizations continue to embrace digital transformation, these skills and competencies will become increasingly important for managers.

Knowledge intense business fields, such as IT & Communication, are among the most advanced digital sectors, while localized sectors, such as agriculture, lack digital development.

New work environments require new skillsets and competencies – reconsidering the education system and traditional leadership styles.

The mindset of the future workforce should entail willingness to learn and openness to change, while from the managerial perspective organizational agility, technical know-how and emotional intelligence is key.

Digital Transformation professionals are in demand, as shown by the increasing job titles related to Digital Transformation.

Finding and retaining diverse and skilled talent is a common challenge, however, a strong brand reputation, a clear recruitment process, and collaboration with other companies may help to overcome such challenges.

"We now accept the fact that learning is a lifelong process of keeping abreast of change. And the most pressing task is to teach people how to learn."
Peter Drucker

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APPENDIX

RESEARCH METHODOLOGY

Digital Transformation Professionals - Job Advertisements

To collect a significant number of relevant job adverts, the same search was carried out over multiple days during the months of September and October 2022 on LinkedIn platform. The search criteria included:

- o Search Title: "Digital Transformation"
- o City, State or Zip Code: Europe
- o Date posted: Previous 24h
- o Levels: all, excluded "internship" and "entry level"
- o Job Type: Full-time
- o On-site/remote: all

Limitations: First, LinkedIn only displays the first 1000 results of a search. This means that, even if LinkedIn indicated that more jobs advertisements were found, it is only possible to access the first 1000 at a time.

Second, when a user runs a search, LinkedIn will list as results jobs that are associated with that search. Thus, when searching for "digital transformation", LinkedIn will list all jobs that it judges to be similar or related to digital transformation. Given that it would be difficult to judge the validity of these, and the focus of the research on skills and competencies for the management of digital transformation, only job advertisements with roles with "digital transformation" in the title were selected.

We acknowledge there are other job titles linked with digital transformation, yet not directly emphasized in the job tittle. These jobs are out of scope in this research.

Because LinkedIn search results are automatically adapted according to the previous searches and behaviours of users, a new user profile was created for this research to avoid user related bias.

Finally, LinkedIn automatically lists job advertisements is all languages. Given the limitations of the research team, only advertisements originally published in English were included in the analysis.

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After five years of work experience in various industries and learning in international contexts, Alejandra is currently researching robotics from an organizational perspective for the EINST4INE project. Fascinated by the intersection of humans, technology, and sustainability, she believes in research that contributes to the well-being of people.

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With a strongly interdisciplinary academic background, Chiara has in recent years developed a strong interest in innovation and its effects on individuals and their behaviour. To date, she is a young EINST4INE Early Stage Researcher and explores the organisational capabilities that support and drive digital transformation, with a particular focus on human capabilities.

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About the EINST4INE Project

The European Training Network for InduStry Digital Transformation across Innovation Ecosystems (EINST4INE) is a consortium of universities, research organisations and industry partners working in the domain of industrial digital transformation. EINST4INE aims to develop new concepts, approaches and methods in the area of digital transformation and brings together a unique group of world-leading experts in the areas of Open Innovation, Industry 4.0, digital transformation and innovation ecosystems.

About the Work Package 1: Human side of digital transformation
The general objective of WP1 is to develop the knowledge base on the human side of Industry 4.0 - skills, capabilities, knowledge transfer between individuals within and across organizational networks and effects of digital transformation and human/robot interaction on organizational performance and behaviour. It will investigate the effects of the introduction of emerging process technologies (e.g. social, collaborative robotics, mobile telepresence robots, robo-advisors) in terms of organizational and change both at the firm level and at the individual level.

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