



Analysis Report WP2

DigiAdvance Project

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Chapter One: introduction

In the rapidly evolving digital landscape, small and medium-sized enterprises (SMEs) face significant challenges in keeping pace with technological advances and the corresponding skills demands. The DigiAdvance project emerges as a strategic response to this critical need, aimed at bridging the digital skills gaps identified within the SME sector across Europe. Focusing on specialized technology areas such as blockchain, big data, and machine learning, this project recognizes the pressing demand for advanced digital competencies among SME employees, managers, and owners.

The DigiAdvance project is a collaborative initiative that brings together expertise from higher education institutions and industry leaders. Its primary goal is to enhance digital capabilities through comprehensive training, mentorship, and networking opportunities tailored specifically for the SME workforce. By designing and delivering localized digital skills courses and organizing a pan-European digital skills accelerator workshop series for business leaders, the project aims to foster a robust digital economy that is resilient in the face of challenges like those posed by the Covid-19 pandemic.

This project not only addresses the immediate training needs but also engages in a thorough needs analysis to ensure that the educational offerings are well-aligned with the current and future demands of the sector. Through its innovative approach, DigiAdvance is set to empower SMEs by enhancing digital literacy at all levels, thus driving innovation and competitiveness in a digital-first world.

The present report aims to synthesize key insights into the digital skill needs of small and medium-sized enterprises (SMEs), providing a robust foundation for future training and policy initiatives. As part of Work Package 2 (WP2) of the DigiAdvance project, this deliverable is pivotal in outlining the digital competencies that are currently in demand as well as those likely to become critical in the near future. Targeting SMEs, policymakers, higher education institutions (HEIs), training providers, and governmental bodies, the report seeks to bridge the gap between existing digital skills and emerging market requirements. Through comprehensive analysis, it will inform stakeholders of the critical skills needed to drive innovation and maintain competitiveness in a rapidly evolving digital landscape.

Analysing the supply of jobs by sector, together with the study of wage rates, adds an essential dimension to understanding the training needs of SMEs. This comprehensive analysis empowers SMEs, initially focused on assessing their training needs, to take a more holistic approach. It provides insights into the availability of jobs and the wage conditions associated with each area, enabling a more informed comparison between sectors. This comparison reveals discrepancies or trends in the labour market, giving SMEs a greater sense of control over their strategic training and development decisions.

Comparing areas with different wage rates is equally relevant. Higher salaries in certain sectors and regions can indicate the need for specialised skills or advanced experience, and therefore serve as an indicator for SMEs of where it might be most beneficial to develop their employees' qualifications. In addition, this analysis of salary indices also reveals information about labour market conditions, helping to understand how salaries vary according to the skills required in each sector and region. This knowledge not only allows SMEs to align their training policies better but also to position themselves strategically in the labour market. Training can be orientated to meet the specific needs of sectors with greater demand and more competitive remuneration, offering an advantage for talent retention and employee satisfaction. Another relevant point is the possibility of adjusting SMEs' growth and development expectations considering identified salary trends. Suppose a sector has a high average salary and considerable demand for qualified professionals. In that case, SMEs will see training as a tool for qualification and attracting new talent since salary competitiveness becomes an attractive factor. Consequently, these companies can make more informed decisions, weighing up where to focus their training investment to obtain the best results regarding competitiveness and productivity.

In short, the integration of job offer analysis and wage indices represents an important advance in assessing the training needs of SMEs. By combining this data with their training strategies, these companies not only improve their ability to respond to market demands, but also gain a strategic advantage by adapting their practices to the most dynamic and profitable sectors. This strategic approach contributes to strengthening the positioning of SMEs, enabling them to adapt more effectively to changes in the labour market and leverage the potential of their human resources. It's not just about meeting the current demand, but about anticipating future needs and staying ahead of the competition.

This report is structured into key sections to provide a comprehensive understanding of the digital skills landscape within SMEs. Each section has its own methodology, which details the research methods, including desk research and data analysis, used to gather and analyse relevant information. The Executive Summary provides an overview of the findings and key recommendations, divided in three parts: The Global Trends in Digital Talent section explores overarching trends in digital skills and training needs across Europe, highlighting differences and opportunities within different regions, The Digital Talent Landscape Across European Cities section provides an in-depth analysis of the distribution and market dynamics of digital professionals, including salary norms, market tensions and remote working trends, and the Presence of Women in the ICT Sector of European Cities. This is followed by the Quantitative Analysis Results section, which presents the results of the data collected through questionnaires applied to Employee and Managers of SME. The Qualitative Analysis section presents the results of the data collected through interviews, analysed both per country (Portugal, Ireland and Spain) and comparatively. Finally, the Conclusion section summarises the findings and provides strategic recommendations for stakeholders to address the digital skills gap and foster a resilient and innovative digital economy within the SME sector.

Chapter two: Executive summary

This section offers a thorough examination of the digital talent landscape within the SME sector across Europe. The primary goal of this section is to advance key digital skills that are crucial for fostering innovation, efficiency, and competitive growth in SMEs. The findings emphasize the importance of digital skills, highlight the significant skills gap, and provide insights into both training initiatives and employment trends across various European regions.

The SME Current and Future Skills report provides an overview of empirical survey data completed as part of the DigiAdvance needs analysis of both employers and employees. This analysis is complemented by a review of digital competencies which are in current demand as well as those likely to become critical which can be read in the Digital Talent in Europe Report, available as an appendix in the SME Current and Future Skills Report. This complimentary analysis by DigiAdvance draws on data from online sources including global job platforms, social media postings by organisations and sectoral networks, illustrating how these digital needs are being represented by employers and industry players to future and current employees.

The present study is founded upon a comprehensive array of information sources. To ensure the robustness and comprehensiveness of our study, we have employed multiple methods:

A literature review of publications was conducted to uncover digital skills trends at national and international levels. This task is intricately linked to one of the activities of WP2, responsible for developing an in-depth Desk Research on Industry Needs Analysis. The objective of this phase is to identify current digital skills trends in the industry, as determined by existing reports, with a specific focus on SMEs. To achieve this, we utilized the Scopus database as our primary source, enabling us to access a comprehensive collection of multidisciplinary publications that include research relevant to digital skills and SMEs. We developed a detailed search strategy using specific keywords such as 'digital skills', 'SME', and 'industry trends', limiting our search to documents published up to July 30, 2023. The detailed research strategy involved a comprehensive review of 2,350 documents. The resulting data were meticulously organized and prepared for analysis using VOS Viewer software, which facilitated advanced bibliometric techniques such as co-occurrence analysis and citation network visualization. This phase served as the foundation for our subsequent analyses, helping us to map the intellectual landscape and identify emerging themes and influential works that define the current state of digital skills within SMEs. All the conclusions from the desk research are presented in the first section of the report, "Global Trends in Digital Talent."

This approach aims to analyse the digital talent landscape across various European cities by assessing both the demand for digital professionals by companies and the supply of such professionals within the market. This analysis was conducted using advanced tracking platforms, such as TalentUp. The study specifically looked at various highdemand digital roles, including:

- o Web Developers
- o App Developers
- o UX/UI Designers
- CRM + ERP Consultants
- Agile/Scrum Masters
- o Cloud Specialists (AWS)
- Cybersecurity Experts
- o Business Intelligence Analysts
- Big Data Specialists
- o API Developers
- o Al Experts
- o IoT Specialists
- o 3D Printing Engineers
- o Blockchain Developers
- Computer Vision Engineers
- Digital Marketing Specialists

Data from platforms was collected over the course of the year 2022, specifically from January 1, 2022, to December 31, 2022. The sources of data included:

- Social Networks: Professional and career-related data were extracted from platforms such as LinkedIn, Xing, and AngelList.
- Global Job Boards: Vacancies and job requirements were compiled from Indeed, Stackoverflow, Monster, AngelList, and Glassdoor.
- Country-specific Job Boards: Localized data were sourced from platforms like Infojobs, cv.ee, cv.lv, and cvonline.lt, providing insights specific to labor markets in individual European cities.
- Recruitment Agency Websites: Data on recruitment patterns and demand in specialized sectors were obtained from agencies such as Hays, Robert Walters, and Page Personnel.
- Career Websites of Major Companies: Direct insights into company-specific demands, such as those from Careers at Deloitte.
- Other Sources: Additional data came from Slack channels relevant to specific digital professions, public salary surveys, and publications on LinkedIn.

The analysis focused on several key dimensions to provide a detailed understanding of the digital talent market:

- Supply and Demand of Professionals: Quantifying the number of professionals available versus the number of positions open.
- Salary Analysis: Salaries were normalized by the cost of living and rent indices. Each city's cost of living was compared to New York City as a benchmark, where, for example, an index of 120 indicates a 20% higher cost than New York City.
- Geographical Distribution: The study covered multiple cities including Lisbon, Aveiro, Cork, Zurich, Copenhagen, London, Berlin, Stockholm, Amsterdam, Dublin, Paris, Helsinki, Munich, Milan, Oslo, Rome, Vienna, Barcelona, Madrid, Tallinn, Prague, Zagreb, and Bucharest. An aggregate metric 'Average EU cities' was also calculated for comparative analysis.
- Remote Work Metrics: The analysis included examining the percentage of remote jobs available across various sectors.
- Women's Representation Metrics: The study also analyzed the representation of women within each sector to assess diversity in the digital talent landscape.
- Top Employers Analysis: This dimension evaluates the major companies actively recruiting in the digital talent market, identifying the leaders in hiring within specific sectors and roles.

The results are presented with a combination of descriptive statistics, comparative charts, and city-specific analysis to illustrate the differences and trends across various locations and job roles. This structured approach not only highlights the current state of the digital talent market but also provides employers and professionals with actionable insights into where opportunities and demands are most pronounced. The results and their interpretations derived from this methodological approach are presented in the second part of this section named "Digital Talent in Europe."

The methodology comprised of two data sources, the first providing insights from national and international literature and the second harnessed market-related data. This methodology was used to provide a holistic consideration of digital skill trends grounded both in the literature and empirical industry data.

Some limitations may be present in this section due to the methodology used. Firstly, it relies heavily on specific platforms, which may not fully capture the entire market. Certain sectors or demographic groups might be underrepresented, potentially leading to gaps in the data. Additionally, the automated data collection techniques might introduce selection bias by primarily capturing data that is readily accessible, potentially overlooking nuanced or less standardized information. One further limitation we recognize is that these trends are constantly evolving; therefore, these results provide a snapshot of the current digital trends.

Global trends in digital talent

In today's rapidly transforming digital landscape, SMEs are recognizing the crucial role of digital skills in maintaining competitiveness. The importance of cultivating a workforce skilled in a broad range of digital competencies—from technical abilities like programming and data analysis to essential cognitive and social skills such as problem-solving and collaboration—is emphasized. However, there exists a marked disparity between the demand for digitally skilled workers and the available supply, especially noticeable in key societal sectors. This gap poses a significant challenge, necessitating concerted efforts from multiple stakeholders to foster a digitally adept workforce through enhanced training and educational frameworks.

The landscape of digital training varies dramatically across Europe; Nordic countries lead in ICT capabilities, while Southern and Eastern European countries lag behind. This discrepancy highlights the urgent need for widespread improvement in digital education and training infrastructure. Furthermore, European companies are increasingly embracing the need for robust digital training initiatives. Finland's leadership in promoting digital skills among employees serves as a model for other nations and illustrates a proactive approach to bridging the digital skills gap.

Digital talent landscape across European cities

The landscape of digital talent across the cities involved in the DigiAdvance project showcases a varied distribution of digital professionals, with major tech hubs like Dublin and Lisbon boasting a significant percentage of their workforce in digital roles. These cities are recognized for their vibrant tech sectors, which contribute substantially to their economies. In contrast, smaller cities such as Aveiro and Cork, although having lower percentages of digital professionals, are making concerted efforts to enhance their digital economies, indicating strategic regional development initiatives.

Market dynamics within the digital job market are characterized by differing levels of market tension across various European cities. Cities like London and Bucharest show a job market environment with fewer professionals available per job opening, indicating strong demand for digital skills. Conversely, cities such as Helsinki and Zagreb exhibit lower market tensions, suggesting an oversupply of candidates compared to the number of job opportunities available. In analyzing the DigiAdvance project cities, Aveiro experiences the highest market tension. Barcelona shows a lower market tension with

more available professionals, while Dublin exhibits moderate market tension, aligning more closely with the European average (10.26 professionals per job position).

Salaries for digital professionals vary significantly across the continent, with cities like Zurich, Copenhagen, and London offering the highest pay. However, when salaries are adjusted for local costs of living and rent, a more accurate picture of economic conditions for digital workers emerges, reflecting the true purchasing power of these wages in their respective cities. In this case, the ranking of cities offering the highest salaries is topped by London, Zurich, and Berlin. Regarding the DigiAdvance project cities involved, all three—Barcelona, Aveiro, and Dublin—have normalized salaries that fall below the European average of €50,991. Dublin ranks the highest, closely aligning with this average, followed by Barcelona with a slightly lower salary. Aveiro has the lowest normalized salary among the project cities.

The landscape of remote work opportunities is a key indicator of the evolving nature of Europe's digital workforce. Cities like Helsinki and Tallinn are at the forefront of this shift, leading the movement towards telecommuting. These cities offer a higher proportion of remote jobs compared to others, promoting a more flexible work environment that supports the inclusion of diverse talents who may prefer or require work-from-home arrangements. In the DigiAdvance project cities, Dublin offers relatively more remote jobs, closely approaching the European average, while Barcelona also supports a considerable amount of telecommuting. Aveiro, on the other hand, provides significantly fewer remote work options compared to the others. All of them fall below the European average of 12% for remote jobs.

The presence of women in the ICT sector, while showing some progress, underscores the persistent challenges in achieving gender diversity within the tech industry. Despite efforts to increase female participation, substantial disparities persist, with women significantly underrepresented in many digital professions. The average proportion of women in the tech industry across all European cities studied is 28%. Among these, Milan and Aveiro hold top positions. Regarding the three DigiAdvance cities, Aveiro leads, followed by Dublin and Barcelona, all of which are above the average.

This report integrates comprehensive insights and strategic recommendations, providing stakeholders with a holistic view of the current state and future needs of the digital skills landscape in Europe.

Global trends in digital talent

This section of the report is based on desk research and explores the global trends in digital talent, highlighting the critical role of digital skills for small and medium-sized enterprises (SMEs). It begins by emphasizing the necessity for SMEs to embrace digital transformation. Specifically, the report addresses the prevalent digital skills gap, examining its implications for the future workforce and the strategic importance of reskilling and upskilling, as well as the ongoing need for digital transformation among SMEs. Additionally, based on the <u>European Digital Economy and Society Index</u>, it presents the level of digital skills training in Europe and how companies are embracing employee ICT training initiatives. Finally, data on the most in-demand skills and the sectors experiencing the largest digital skills gaps are presented.

Having a team with digital skills is a must for SMEs aiming for efficiency, innovation, and continuous improvement in today's digital age. In today's ever-changing business world, small and medium-sized enterprises (SMEs) are like the engines that drive innovation, growth, and job opportunities. To excel in this fast-paced environment, SMEs are realizing the critical role of having a digitally skilled workforce.

3 key points for SMEs to achieve efficiency, innovation, and continuous improvement through digital skills:

1. Digital transformation: Industries are rapidly changing as they embrace digital transformation. This means SMEs must adopt digital tools and technologies to stay competitive.

2. Hiring advantage: SMEs that focus on hiring employees with digital skills gain a significant edge. These employees can drive innovation and keep the company ahead of the curve.

3. Diverse skills: Digital skills encompass a wide range of abilities, from technical know-how (like coding or data analysis) to cognitive (such as problem-solving and critical thinking) and social skills (like effective communication and collaboration).

The shift towards digital transformation in various industries has made it imperative for SMEs to adopt digital tools and technologies to stay competitive. Consequently, attracting and retaining talent with digital skills has become highly competitive.

SMEs that prioritize digital skills in their hiring practices gain a significant advantage by building teams capable of innovation. These skills empower employees to leverage data analytics, automation, and digital collaboration tools, streamlining operations and driving a culture of innovation.

Digital skills gap

Over the next five years, the global workforce is expected to create 149 million new techoriented jobs, with areas like data analytics, software development, and cybersecurity experiencing exponential growth.

There is a Digital skills gap: a stark difference between the demand for workers with digital skills and the actual supply of individuals who possess these skills. It highlights the shortage of digitally skilled workers in relation to the increasing demand for their expertise.

Only 4.2% of respondents in the Digital Skills Gap Index were satisfied with the level and availability of digital skills, indicating a significant gap (Digital Skills Gap Index).

A majority (51.1%) of survey respondents believe there is insufficient availability of digital skills training for reskilling/upskilling, highlighting the need for increased investment in training (Wiley Digital Skills Gap Survey (APEC economies).

Closing the digital skills gap requires cooperation among employers, nonprofits, and governments, necessitating investments in training, digital access, partnerships, and infrastructure.

Developing responsive digital skills systems is crucial for improving employability, equal access to opportunities, and income potential. Collaboration and investment are essential to bridge the digital skills gap and prepare the workforce for the post-pandemic economy.

The digital transformation imperative for SMEs

The digital gap is altering competition dynamics across the economy.

Reskilling and upskilling strategies are vital for businesses to achieve their objectives, as skills gaps are viewed as the primary barrier to industry transformation.

Businesses are scaling up training programs to bridge skills gaps. In 2023, 41% of workers completed training to address skills gaps.

Effective employee training programs are seen as the top policy for attracting talent and enhancing business performance in the digital age.

The most resilient economies are those leading in digital skills development.

Level of digital skills training in Europe

The Nordic countries stand out for their high index of advanced ICT capabilities and development. Finland leads the ranking with 65.7%, showing a remarkable increase of 7.00% compared to the previous year. Sweden closely follows at 59.8%, demonstrating significant growth of 10.80%. Ireland, with a score of 57.7%, also makes substantial progress with a 5.20% increase.

Spain scores at 40%, which is in line with the European average of 40.8%. Portugal, on the other hand, achieves a score of 41.4%, displaying a noteworthy increase of 9.90%. Italy, Hungary, and Greece lag behind in terms of advanced ICT capabilities and development, with Italy at 30.9%, Hungary at 32.8%, and Greece at 33.4%.

This index is a part of the *Digital Economy and Society Index* and is calculated based on the weighting of four variables: ICT graduates, companies investing in ICT training for their employees, the number of ICT professionals in the sector, and the employment of female ICT specialists in the country.



Figure 1 - Advanced Skills and Development Index for ICT Specialists, Score 0 - 100 (2022)

Source: Digital Economy and Society Index (DESI)

2 out of 3 ICT specialists in the EU have higher education

Cyprus leads the list with an impressive 84.8% of ICT specialists having completed tertiary education. Spain, France, Belgium, and Ireland follow, each with over 80% of ICT professionals holding higher education degrees. However, Portugal, at 63.9%, falls below the European Union average of 65.2%.

Estonia, a digital leader in the EU, surprisingly has less than 60% of ICT specialists with tertiary education, specifically 58.9%. Despite its role in digital transformation, this figure may indicate a reliance on alternative training methods or a significant proportion of self-taught ICT specialists.

These data reflect differences in ICT specialist education across the European Union and provide important insights into tertiary education levels in the field of information and communication technologies in these countries.



Source: Eurostat

Figure 2 - ICT specialists with higher education by country (2022)

When it comes to learning how to program, online resources stand out

Data from the Stack Overflow Developer Survey, a global survey, show that developers predominantly rely on online resources and formal education to advance their skills; these online resources, which include videos, blogs, and forums, are the most favored, with a substantial 70.9% of developers utilizing them as valuable learning tools.

62.2% have opted for traditional academic pathways, enrolling in universities and colleges to receive structured education, underscoring the pivotal role of formal academic training.

On-the-job training, co-workers, and self-learning through friends or family play a significant role, while a smaller percentage opt for programming bootcamps (10.8%) or hackathons (7.4%) to further their development skills.



Figure 3 - Origin of developer training (2022)

Source: <u>Stack Overflow Developer Survey</u> (global survey)

The most commonly used online resources are technical documentation, Stack Overflow, and blogs, being utilized by over 75% of professional developers, according to Stack Overflow global survey.

The least used resources are programming games and audio material.



Figure 4 - Typology of online resources used for learning how to program (2022)

Source: Stack Overflow Developer Survey (global survey)

Companies Embrace Employee ICT Training Initiatives

22.4% of European companies provide training in digital skills to their employees, which is 13.7% more than the previous year.

Finland leads with 39.8%, closely followed by Sweden, Denmark, and Belgium, all showing notable improvements in providing digital skills training to their employees.

Countries like Romania and Bulgaria have the lowest percentages but have also seen substantial growth.

Regarding DigiAdvance countries, Portugal, with 23.6%, and Ireland, with 23.2%, are both situated above the European average. Compared to 2020 data, 0.7% more companies in Portugal provide ICT training, whereas 3.8% fewer companies in Ireland are providing ICT training in 2022. Spain is situated below the European average, with 20.7% of companies providing ICT training in 2022, representing a 0.6% increase from 2020.

Source: Digital Economy and Society Index (DESI)



Figure 5 - Percentage of companies that provide ICT training (2022)

The most in-demand skills

- **21st century skills**: Problem solving is the most crucial skill, followed by Dynamic (Self) Re-skilling and Decision Making

- **Technical skills**: Data Analytics and Algorithms are deemed the most important technical skills, followed by Computing and Data Science Engineering Principles.

- **Business and organizational skills**: Survey findings reveal Operational Analytics and Data Management and Governance as top priorities. Skills like "ability to discriminate between true and untrue information" and traditional skillsets are less relevant.

- **Socio-emotional attitudes**: Skills such as curiosity, lifelong learning, resilience, flexibility, agility, motivation, and self-awareness are growing in importance.

(Source: Wiley Digital Skills Gap Survey)

In 2023, as in 2020, analytical thinking remains the core skill of highest importance to a majority of companies.

(Source: World Economic Forum, Future of Jobs Survey 2023)

Comparing surveys over the years, creative thinking is gaining importance, narrowing the gap with analytical thinking. In 2018 and 2020, more companies considered analytical thinking as a core skill, but in 2023, this gap has decreased, suggesting a shift toward greater recognition of creative thinking.

Management skills, engagement skills, technology skills, ethics, and physical abilities are generally considered less important than cognition, self-efficacy, and collaboration.

Self-efficacy skills dominate the top 10 core skills, including resilience, flexibility and agility, motivation and self-awareness, curiosity and lifelong learning, and dependability and attention to detail.

Sectors with the biggest digital skills gap

"Education and training," "Public administration," and "Health care and social assistance" are the sectors experiencing the most significant digital skills gap, according to the Digital Skills Gap Survey, which comprises the analysis of 134 countries.

Source: Wiley Digital Skills Gap Survey

In your opinion, in which three of the following sectors is the digital skills gap widest?



Source: Wiley Digital Skills Gap Survey (APEC economies)

Figure 6 - Sectors with the widest digital skills gap.

Digital talent in Europe

This section of the report provides an in-depth analysis of the digital talent landscape across key European cities, exploring the distribution and dynamics of digital professionals. Initially, the report focuses on the sizes of the technology sectors in cities within the countries of the DigiAdvance consortium. Specifically, it examines the percentage of digital professionals relative to total employment and specifies the number of professionals by position in both consolidated and emerging technologies. Subsequently, it analyses market tensions in the 23 European cities studied. Following this broad scope, the report also examines salaries for technology-related positions, offering some focus on types of technology (consolidated/emerging) and normalization of salaries with respect to cost of living and rent. Additionally, data on remote job opportunities and the presence of women in the ICT sector within these cities are presented. Finally, the report highlights the top employers in some cities within the DigiAdvance consortium countries.

Digital professionals in European cities

Dublin leads with a significant 11.5% of its workforce in digital professions, emphasizing its status as a major technology hub. Lisbon follows with 8.5%, showcasing its burgeoning digital sector. Barcelona and Madrid are closely matched, with 5.4% and 5.0% respectively, indicating strong digital integration in their economies. Aveiro and Cork, while smaller in scale, show a commitment to digital professions with 4.4% and 3.0% of their workforces respectively. This data highlights the percentage of digital professionals relative to total employment in key cities belonging to the countries of the DigiAdvance consortium.

Source: TalentUp.io for DigiAdvance

Legend: Red = Digital professionals; Grey = Global market



Figure 7 - Percentage of digital professionals vs. total employment (2022)

Web Developer is the most employed of the consolidated technology specialities, followed by UX/UI and CRM&ERP Consultant.

Source: TalentUp.io for DigiAdvance



Figure 8 - Number of professionals by position (consolifated technologies) (2022)

Artificial intelligence professionals have the strongest presence in the emerging technologies sector.



Source: TalentUp.io for DigiAdvance

Figure 9 - Number of professionals by position (consolidated technologies) (2022)

Market tensions in European cities

The concept of "market tension" refers to the relationship between supply and demand, specifically indicating how many professionals exist per job opening in the market. Within the European cities examined, a marked disparity in market conditions is observed. This spectrum spans from London, where there are 2.62 individuals per job opening, making it the city with the highest market tension, to Helsinki, where there are 31.63 individuals per job opening, rendering it the city with the greatest number of professionals per job offer.

The countries experiencing the highest market tension, characterized by a scarcity of professionals in competition for the same job positions, include London (2.62), Bucharest (2.98), Vienna (3.38), and Munich (3.42).

Conversely, cities with lower market tension comprise Helsinki (31.63), Zagreb (21.5), Paris (17.8), and Oslo (16.25), where an abundance of professionals heightens competitiveness within the sector.

In analysing the market tensions in the cities involved in the DigiAdvance project— Barcelona, Aveiro, and Dublin—we find a contrast in the competition for job posts based on the number of professionals competing for each position. Aveiro demonstrates a higher market tension with only 5.09 professionals per job post, indicating a greater scarcity of available positions relative to the number of job seekers. This contrasts with Barcelona, where 12.29 professionals per job post suggest a lower market tension and a relatively more abundant job market. Dublin, with 10.85 professionals per job post, also indicates a lesser degree of market tension compared to Aveiro but is closer to the European average of 10.26. Source: TalentUp.io for DigiAdvance



Number of prefessionals for each job post (2022)

Figure 10 - Market tension: number of professionals per job offer in European cities (2022)

Estilo Diseño: [Cambiar comas (,) por puntos (.) en los decimales]

Digital salaries in European cities

Zurich tops the list of European cities studied with the highest salaries for digital professionals, offering a significant average of \pounds 148,327, followed by Copenhagen at \pounds 89,127, London at \pounds 86,267, and Berlin at \pounds 77,953. The average salary across the European cities studied is \pounds 60,186 gross per year. At the lower end of the salary spectrum, Bucharest, Aveiro, and Lisbon offer the lowest salaries at \pounds 24,047, \pounds 30,793, and \pounds 33,447 respectively.

Focusing on the DigiAdvance project cities, Dublin stands out with a considerably high average salary of \notin 73,367, surpassing the European average and indicating a robust market for digital professionals. Barcelona, with an average salary of \notin 46,940, is positioned below the European average, suggesting a more moderate salary scale for digital professionals by comparison. Aveiro has the lowest salary among the DigiAdvance cities at \notin 30,793, reflecting a potentially less lucrative market for digital professionals in the city.

Source: TalentUp.io for DigiAdvance



Figure 11 - Digital professional salaries by city (2022)

Note: The data pertains to the overall statistics for all digital profiles except for Digital Marketing

Salaries in European cities for consolidated technologies

Zurich stands out as the city with the highest salary range, offering between $\notin 97,100$ and $\notin 169,700$. Among the consolidated specialties that tend to be better paid in the cities studied, Cloud (AWS) professionals receive the highest average pay at $\notin 64,378$, closely followed by those in Big Data and Business Intelligence, earning $\notin 63,687$ and $\notin 63,630$ respectively. On the other end of the spectrum, the least well-remunerated specialties include Digital Marketing at $\notin 40,979$, App Developers at $\notin 50,774$, and Cybersecurity at $\notin 55,656$.

In the DigiAdvance project cities—Barcelona, Aveiro, and Dublin—the analysis of salaries for digital professionals across various technologies reveals a notable range. Dublin emerges as the top payer among the DigiAdvance cities, offering the highest salaries in almost all categories examined. The highest salary is observed in the field of Cloud (AWS) at €79,400, while the lowest is for Digital Marketing at €48,300. Barcelona presents a diverse scale of remuneration, with Cybersecurity professionals earning the highest in the city at €56,000. The lowest salary in Barcelona is for Digital Marketing professionals at €32,500. Aveiro shows more modest figures, typical of a smaller or emerging tech market. The maximum salary here is €40,200 for professionals in Cloud (AWS), and the minimum is notably lower at €21,700 for Digital Marketing professionals.

Source: TalentUp.io for DigiAdvance
	Web	App Dovelopers		CRM + ERP	Agilo/Scrum	
	Developers	Developers		Consultant	Aglie/Scruit	(AW)3)
Zurich	159.300 €	109.000€	135.700€	158.100€	149.200€	159.500 €
Copenhagen	95.700 €	65.500 €	81.500 €	94.900€	89.600 €	95.900 €
Stockholm	83.000 €	59.200 €	70.700€	82.500 €	77.800€	83.100 €
Dublin	79.200 €	56.400 €	67.500 €	78.700€	74.300 €	79.400 €
Berlin	77.000 €	69.600 €	68.300 €	67.800€	76.600€	73.600 €
London	76.000€	84.700 €	84.000 €	83.900 €	84.400 €	74.300€
Helsinki	75.200 €	53.600 €	62.600 €	74.700€	70.600€	75.400 €
Munich	70.700€	50.400 €	58.700 €	64.200 €	66.300 €	70.800€
Paris	68.800 €	56.900 €	59.600 €	67.300 €	73.200€	69.100 €
Amsterdam	66.000 €	75.300 €	58.100 €	71.800€	81.000 €	77.400 €
Rome	63.705€	45.477 €	50.964 €	71.889€	59.799€	63.891 €
Milan	61.810 €	48.320 €	60.160 €	59.280 €	66.160 €	70.800€
Vienna	61.500 €	43.900 €	51.100 €	61.000 €	57.600 €	61.600 €
Oslo	49.000 €	47.400 €	84.600 €	75.500 €	50.000€	47.100 €
Cork	44.500 €	39.200 €	42.000 €	46.400 €	62.100 €	50.800 €
Barcelona	44.000 €	42.300 €	41.700 €	43.200 €	43.800 €	49.500 €
Tallinn	43.100 €	30.700 €	35.800 €	42.800 €	40.400 €	43.200 €
Madrid	39.000 €	39.500 €	42.100 €	38.300 €	37.900 €	48.200 €
Lisbon	37.500 €	35.800 €	26.200 €	31.400 €	35.000 €	44.500 €
Zagreb	36.500 €	26.000 €	30.300 €	36.200 €	34.200 €	36.600 €
Prague	34.300 €	32.100 €	32.800 €	40.600 €	37.200 €	41.800 €
Aveiro	32.600 €	31.800 €	24.900 €	30.200 €	32.300 €	40.200€
Bucharest	18.300 €	24.700 €	17.900€	30.800 €	16.400 €	24.000€
AVERAGE	€61.596	€50.774	€55.966	€63.107	€61.559	€64.378

Figure 12 - Digital professional salaries by city consolidated technologies (2022)

	Cybersecurity	Business Intelligence	Big Data	ΑΡΙ	Digital Marketing
Zurich	130.300 €	155.300 €	169.700 €	158.800 €	97.100€
Copenhagen	78.300€	93.300 €	101.900 €	95.400 €	61.500 €
Stockholm	58.800 €	80.900 €	75.300 €	82.800 €	53.900 €
Dublin	56.200€	77.300 €	71.900€	79.100 €	48.300 €
Berlin	69.500 €	81.200 €	83.100 €	74.800€	38.600 €
London	66.300 €	85.800 €	89.900 €	70.300 €	45.700 €
Helsinki	53.400 €	73.400 €	68.300 €	75.100 €	45.900 €
Munich	50.200 €	68.900 €	64.200 €	66.700 €	43.100 €
Paris	81.800 €	68.700 €	66.500 €	54.800 €	53.000 €
Amsterdam	80.900 €	70.000€	82.400 €	73.800 €	44.900 €
Rome	45.198 €	62.217 €	57.846 €	63.519€	38.874 €
Milan	50.080 €	68.880 €	64.160 €	70.480 €	43.040 €
Vienna	43.600 €	60.000 €	55.800 €	61.400 €	28.300 €
Oslo	81.100 €	47.400 €	80.200 €	49.000 €	60.400 €
Cork	42.600 €	54.400 €	42.500 €	46.000 €	33.500 €
Barcelona	56.000 €	50.800 €	44.800€	53.800 €	32.500 €
Tallinn	36.300 €	42.000 €	39.100 €	42.900 €	41.800 €
Madrid	57.100 €	48.100 €	41.200 €	46.900 €	31.800 €
Lisbon	28.300 €	36.800 €	34.300 €	31.100 €	22.600 €
Zagreb	30.700 €	35.600 €	33.200 €	36.400 €	22.200 €
Prague	31.400 €	45.700 €	31.600 €	24.500 €	18.600 €
Aveiro	27.500 €	35.300 €	29.300 €	29.800 €	21.700 €
Bucharest	24.500 €	21.500 €	37.600 €	21.400 €	15.200 €
AVERAGE	€55.656	€63.630	€63.687	€61.252	€40.979

Figure 13 - Digital professional salaries by city consolidated technologies (2022)

Salaries in European cities for emerging technologies

Zurich stands out as the city offering the highest salaries to specialized workers in emerging technologies, with salary ranges spanning from $\pounds 126,700$ to $\pounds 192,200$. Among these specialties, Computer Vision emerges as the highest-paying field, boasting an average salary of $\pounds 75,499$ across the European cities studied. This is closely followed by Blockchain, which has an average salary of $\pounds 63,541$, highlighting the premium placed on these cutting-edge skills in the tech industry.

Focusing on the DigiAdvance project cities, Dublin offers competitive salaries across the board, with the highest observed in Computer Vision at \pounds 95,700. Its salaries in other emerging technologies like Artificial Intelligence and Blockchain are also robust at \pounds 76,500 and \pounds 76,900, respectively. Barcelona has relatively lower salaries in these emerging fields, with the highest payment in Artificial Intelligence at \pounds 51,600. The lowest in this city is for Computer Vision, at only \pounds 43,000. Aveiro presents the most modest salary figures, the highest salary in Aveiro is for Artificial Intelligence at \pounds 33,800, with the lowest being for 3D Printing at \pounds 25,600.

	Artificial Intelligence	ΙοΤ	3D Printing	Blockchain	Computer Vision
Zurich	140.400 €	149.300 €	126.700 €	131.400 €	192.200 €
Copenhagen	80.800€	89.700 €	76.100€	82.800 €	115.500 €
Amsterdam	80.000 €	63.800 €	85.600 €	97.800€	62.000 €
Dublin	76.500€	68.400 €	63.000 €	76.900€	95.700 €
Berlin	76.000€	61.700€	73.800€	108.100 €	108.200 €
London	75.100 €	95.400 €	91.300 €	116.300 €	116.300 €
Paris	72.100 €	51.700 €	76.600€	105.100 €	93.600 €
Stockholm	70.000€	71.700€	66.000 €	67.500 €	100.200 €
Cork	62.500 €	47.400 €	37.800 €	41.700 €	72.100 €
Vienna	54.200€	53.100 €	48.900€	53.900 €	74.300 €
Helsinki	53.600€	65.000 €	59.800 €	57.800 €	90.900€
Oslo	52.000 €	58.000€	44.800 €	63.800 €	64.100 €
Barcelona	51.600 €	44.900€	49.900 €	44.800€	43.000 €
Milan	51.040 €	60.960 €	56.160 €	54.400 €	85.280 €
Munich	47.900€	61.000 €	56.200 €	59.100 €	85.300 €
Rome	46.686€	55.056 €	50.685€	55.335€	77.004 €
Madrid	44.000 €	42.300 €	53.900 €	41.700 €	37.000 €
Tallinn	42.100 €	37.200 €	34.300 €	38.800 €	52.000 €
Prague	41.600 €	33.100 €	43.300 €	43.600 €	35.600 €
Zagreb	38.500 €	31.500 €	29.000 €	33.700 €	44.000 €
Lisbon	36.200 €	32.000 €	26.700 €	30.000 €	35.900 €
Aveiro	33.800 €	30.800 €	25.600 €	26.400 €	31.400 €
Bucharest	23.200 €	23.700 €	21.300 €	30.500 €	24.900 €
AVERAGE	58.688€	57.727€	56.411 €	63.541 €	75.499€

Figure 14 - *Digital professional salaries by city emerging technologies (2022)*

Salaries in European cities normalized by cost of living and rent

When adjusting salaries for the cost of living and rent, London emerges as the leader with the highest normalized average salary at ξ 76,790, followed by Zurich at ξ 71,441, and Berlin at ξ 69,301. Across the European cities studied, the normalized average salary is ξ 50,991 per year. On the lower end of the spectrum, cities like Oslo, Lisbon, and Cork report lower normalized average salaries of ξ 36,415, ξ 36,489, and ξ 37,434 respectively, reflecting the variability in economic conditions across different locations.

All DigiAdvance project cities have normalized salaries below the European average of \leq 50,991. Among them, Dublin ranks the highest with a normalized salary of \leq 49,314, closely aligning with the European average. Barcelona follows with a slightly lower normalized salary of \leq 46,940, while Aveiro has a normalized salary of \leq 43,816, the lowest among the DigiAdvance cities.

Source: TalentUp.io for DigiAdvance

Legend: GREY (€75,000-€65,000), SALMON (€65,000 - €55,000), DARK BLUE (€55,000 - €45,000); CIAN (€45,000 - €35,000)



Figure 15 - Digital professional salaries by city emerging technologies (2022)

Note: The data pertains to the overall statistics for all digital profiles.

Cost of Living + rent

Bucharest	28,47
Aveiro	33,76
Zagreb	35,22
Tallinn	36,54
Prague	38,9
Warsaw	40,84
Lisbon	43,95
Madrid	46,73
Barcelona	48,94
Vienna	53,75
London	54,98
Berlin	55,05
Rome	56,87
Helsinki	60,36
Milan	61,39
Cork	62,55
Munich	64,35
Stockholm	65,83
Paris	69,67
Amsterdam	70,4
Dublin	72,81
Copenhagen	72,89
Oslo	80,1
New York City (NYC)	100
Zurich	101,61

Normalized salary by cost of living and rent for consolidated technologies

Cloud (AWS) is the consolidated specialty with the highest average salary (ξ 54,420) among the European cities studied, taking into account salary normalization based on the cost of living and rent. It is followed by Business Intelligence (ξ 53,698) and Big Data (ξ 53,133).

London and Zurich are the cities that offer the highest salary ranges among all the analyzed job offers in consolidated technologies.

Regarding the DigiAdvance project cities, Dublin's highest normalized salary is observed in Cloud (AWS) at \in 53,370, with its lowest in Digital Marketing at \notin 32,465. Barcelona peaks at \notin 56,000 for Cybersecurity, but dips to \notin 32,500 for Digital Marketing. Aveiro presents the highest normalized salary in Cloud (AWS) at \notin 58,276, contrasting sharply with its lowest in Digital Marketing at \notin 31,457.

				CRM + ERP		
	Web Developers	App Developers	UX/UI	Consultant	Agile/Scrum	Cloud (AWS)
Zurich	76.726 €	52.499 €	65.359 €	76.148€	71.862€	76.822€
Berlin	68.454 €	61.875 €	60.719€	60.275 €	68.098€	65.431 €
London	67.651 €	75.395 €	74.772€	74.683€	75.128€	66.138€
Copenhagen	64.255 €	43.978 €	54.721 €	63.718€	60.159€	64.389€
Stockholm	61.705€	44.011 €	52.561 €	61.333€	57.839€	61.779€
Helsinki	60.972 €	43.459 €	50.756 €	60.567 €	57.243€	61.134 €
Tallinn	57.726 €	41.118€	47.949€	57.324 €	54.110 €	57.860 €
Vienna	55.996 €	39.971 €	46.527 €	55.541 €	52.445 €	56.088€
Rome	54.822€	39.136 €	43.858 €	61.865€	51.461 €	54.982€
Munich	53.769 €	38.331 €	44.643 €	48.826 €	50.423€	53.845€
Dublin	53.235 €	37.910 €	45.371 €	52.899€	49.942€	53.370 €
Zagreb	50.719€	36.128 €	42.103€	50.302€	47.523€	50.858 €
Milan	49.275 €	38.521 €	47.959 €	47.258 €	52.743 €	56.442€
Paris	48.329 €	39.970 €	41.866 €	47.275€	51.420 €	48.540 €
Aveiro	47.258 €	46.099€	36.096 €	43.779€	46.824 €	58.276 €
Amsterdam	45.881 €	52.346 €	40.389€	49.913 €	56.309€	53.806 €
Barcelona	44.000 €	42.300 €	41.700 €	43.200 €	43.800€	49.500 €
Prague	43.153 €	40.385€	41.266 €	51.079€	46.801 €	52.588 €
Lisbon	41.758 €	39.865 €	29.175€	34.965 €	38.974 €	49.552 €
Madrid	40.844 €	41.368 €	44.091 €	40.111 €	39.692€	50.480 €
Cork	34.817 €	30.671 €	32.861 €	36.304 €	48.588€	39.747 €
Bucharest	31.458 €	42.459 €	30.770 €	52.945 €	28.192€	41.256 €
Oslo	29.938 €	28.961 €	51.689€	46.129€	30.549 €	28.777€
AVERAGE	51.424 €	43.337€	46.400€	52.889€	51.310€	54.420€

Figure 16 - Average standardised salaries for cost of living and rent (consolidated technologies) (2022)

	Cybersecurity	Business Intelligence	Big Data	ΑΡΙ	Marketing digital
Zurich	62.758 €	74.800€	81.735€	76.485€	46.768€
Berlin	61.786 €	72.188€	73.877 €	66.498 €	34.316 €
London	59.016 €	76.374 €	80.024 €	62.577 €	40.679€
Copenhagen	52.572 €	62.644 €	68.418€	64.054 €	41.292€
Stockholm	43.714 €	60.143€	55.980 €	61.556 €	40.071 €
Helsinki	43.297 €	59.513 €	55.378 €	60.891 €	37.216 €
Tallinn	48.619€	56.253 €	52.369 €	57.458 €	55.985€
Vienna	39.698 €	54.631 €	50.807 €	55.905 €	25.767 €
Rome	38.896 €	53.541 €	49.780 €	54.662€	33.453 €
Munich	38.179 €	52.400 €	48.826 €	50.727 €	32.779€
Dublin	37.775€	51.958 €	48.328 €	53.168 €	32.465 €
Zagreb	42.659 €	49.468 €	46.133 €	50.580 €	30.848 €
Milan	39.924 €	54.911 €	51.148 €	56.187 €	34.311 €
Paris	57.461 €	48.259 €	46.713€	38.495 €	37.230 €
Aveiro	39.865 €	51.172€	42.475€	43.199€	31.457 €
Amsterdam	56.239 €	48.662 €	57.282 €	51.304 €	31.213 €
Barcelona	56.000 €	50.800 €	44.800 €	53.800 €	32.500 €
Prague	39.504 €	57.495€	39.756 €	30.823 €	23.401 €
Lisbon	31.513 €	40.978 €	38.194 €	34.631 €	25.166 €
Madrid	59.800 €	50.375€	43.148 €	49.118 €	33.304 €
Cork	33.331 €	42.563 €	33.253 €	35.991 €	26.211 €
Bucharest	42.116 €	36.959€	64.634 €	36.787 €	26.129€
Oslo	49.551 €	28.961 €	49.001 €	29.938 €	36.904 €
AVERAGE	46.708 €	53.698€	53.133€	51.080€	34.325 €

Source: TalentUp.io for DigiAdvance

Figure 17 - *Average standardised salaries for cost of living and rent (consolidated technologies)* (2022)

Normalized salary by cost of living and rent for emerging technologies

The specialty of Computer Vision tends to be the highest paid, with an average salary among the European cities studied of $\leq 62,573$, taking into account the cost of living and rent. It is followed by Blockchain, with $\leq 53,561$, and Artificial Intelligence, with $\leq 49,821$.

Focusing on the DigiAdvance project cities, Dublin offers a balanced range of salaries, with the highest being €64,326 in Computer Vision and the lowest at €42,346 in 3D Printing. Barcelona, on the other hand, presents its highest normalized salary in Artificial Intelligence at €51,600, while the lowest is in Computer Vision at €43,000. Aveiro has the most modest salary figures among these cities, with the highest in Artificial Intelligence at €48,998 and the lowest in 3D Printing at €37,111.

	Source:	TalentU	p.io for	DigiAdvance
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	Artificial Intelligence	ΙΟΤ	3D Printing	Blockchain	Computer Vision
Zurich	67.623€	71.910€	61.024 €	63.288€	92.572€
Berlin	67.565€	54.852€	65.609€	96.102€	96.191 €
London	66.850€	84.920€	81.270 €	103.523€	103.523€
Tallinn	56.387€	49.824 €	45.940 €	51.967 €	69.646 €
Amsterdam	55.614 €	44.352€	59.507 €	67.988€	43.101 €
Copenhagen	54.251 €	60.227 €	51.095€	55.594 €	77.549€
Zagreb	53.498 €	43.771 €	40.297 €	46.828€	61.140 €
Prague	52.337 €	41.643€	54.476 €	54.853€	44.788€
Stockholm	52.040 €	53.304 €	49.066 €	50.182€	74.492€
Barcelona	51.600 €	44.900 €	49.900€	44.800€	43.000 €
Dublin	51.420 €	45.976 €	42.346 €	51.689€	64.326 €
Paris	50.647 €	36.317 €	53.808€	73.828€	65.750 €
Vienna	49.350 €	48.348€	44.524 €	49.077 €	67.651 €
Aveiro	48.998 €	44.649€	37.111 €	38.271 €	45.519€
Cork	48.901€	37.086€	29.575€	32.627 €	56.412€
Madrid	46.081 €	44.300 €	56.449€	43.672€	38.750 €
Helsinki	43.459€	52.702€	48.486€	46.864 €	73.702€
Milan	40.689€	48.597 €	44.771€	43.368 €	67.985€
Lisbon	40.310 €	35.633€	29.731€	33.406 €	39.976 €
Rome	40.176 €	47.379€	43.617 €	47.619€	66.266 €
Bucharest	39.881€	40.740 €	36.615€	52.430 €	42.803€
Munich	36.429€	46.392€	42.742€	44.947 €	64.873€
Oslo	31.771 €	35.437 €	27.372€	38.981 €	39.164 €
AVERAGE	49.821€	48.403€	47.623€	53.561 €	62.573€

Figure 18 - Average standardised salaries for cost of living and rent (emerging technologies) (2022)

Remote job opportunities in major European cities

Helsinki stands out as the city with the highest percentage of remote job offerings at 38.98%, closely followed by Tallinn at 38.17%, and Munich at 28.79%. In contrast, the cities offering the least remote work opportunities include Oslo with only 1.93%, Copenhagen at 4.60%, and Rome at 4.62%.

In the context of remote job opportunities within the DigiAdvance project cities—Dublin, Barcelona, and Aveiro—each city presents varying levels of accessibility to remote work.

Dublin features a somewhat higher percentage of remote job opportunities at 11.64%, just below the average for European cities, which stands at 12.48%. Barcelona is close behind with 11.24% of its job opportunities listed as remote, suggesting a fairly open stance towards telecommuting. Aveiro, however, offers the least remote work flexibility among the three, with only 5.83% of job opportunities being remote, significantly below the European average.



Source: TalentUp.io for DigiAdvance

Figure 19 - Remote job offers by city (2022)

In Helsinki, jobs for App Developers (96.32%) and Computer Vision (95.73%) are almost entirely remote.

Internet of Things is the specialty that, on average, provides the most opportunities for remote work among the cities studied, with an average of 31.16% of job offers.

In the DigiAdvance project cities, Barcelona exhibits a strong propensity for remote work in IoT and 3D Printing, with 41.84% and 40.91% of job postings respectively allowing remote work, contrasting with lower opportunities in Business Intelligence and Big Data at 9.71% and 13.06%. Dublin, meanwhile, demonstrates notable strength in Artificial Intelligence, where 59.47% of the jobs are remote, though it presents fewer remote options in fields like CRM + ERP Consultants and Digital Marketing at only 5.27% and 6.61%. Aveiro offers more modest remote work opportunities across the board, with its highest percentages in Business Intelligence at 18.18%, yet minimal remote roles in 3D Printing and Digital Marketing at 1.85% and 1.54%.

	Web Developers	App Developers	UX/UI	CRM + ERP Consultant	Agile/Scrum	Cloud (AWS)	Cybersecuri ty	Business Intelligence
Barcelona	18,75%	30,77%	35,00%	19,25%	20,43%	31,15%	17,64%	9,71%
London	45,45%	58,09%	50,28%	30,64%	53,22%	48,84%	65,67%	35,90%
Madrid	16,31%	34,87%	17,91%	15,04%	24,69%	24,40%	12,26%	8,84%
Paris	11,11%	10,87%	12,22%	5,09%	11,67%	14,09%	15,59%	5,30%
Amsterdam	76,28%	8,11%	52,28%	15,67%	38,73%	41,75%	34,68%	8,42%
Prague	66,48%	8,61%	6,86%	7,60%	19,95%	19,18%	14,80%	42,92%
Berlin	14,02%	39,45%	38,30%	17,26%	51,06%	38,24%	14,24%	25,34%
Bucharest	41,67%	26,06%	22,61%	14,19%	24,15%	24,35%	28,21%	19,05%
Stockholm	10,24%	14,16%	13,87%	13,56%	18,09%	22,92%	14,52%	7,83%
Munich	17,65%	31,43%	58,79%	14,22%	63,93%	54,97%	10,26%	35,84%
Zurich	35,20%	4,55%	47,59%	18,64%	19,65%	52,80%	20,75%	5,34%
Helsinki	53,13%	96,32%	88,67%	34,26%	76,18%	84,50%	69,20%	85,98%
Milan	8,91%	8,64%	22,01%	4,51%	7,14%	9,13%	3,06%	4,60%
Tallinn	20,00%	33,33%	23,40%	1,33%	24,49%	12,07%	20,00%	5,26%
Vienna	12,63%	56,99%	39,54%	6,20%	28,68%	30,31%	5,48%	8,14%
Oslo	33,70%	25,93%	6,75%	20,27%	9,38%	25,19%	11,76%	10,34%
Dublin	16,44%	32,95%	21,46%	5,27%	15,18%	20,78%	23,61%	32,63%
Zagreb	12,50%	8,46%	10,00%	11,11%	45,60%	44,90%	16,67%	13,45%
Copenhagen	5,06%	51,12%	12,18%	6,91%	14,62%	14,51%	31,18%	8,76%
Rome	9,60%	15,91%	11,02%	3,70%	9,46%	7,95%	7,89%	4,75%
Lisbon	11,95%	11,71%	12,00%	5,48%	10,41%	9,08%	5,15%	6,30%
Aveiro	11,76%	3,95%	14,83%	4,46%	10,00%	9,71%	6,56%	18,18%
Cork	2,21%	7,42%	3,98%	8,16%	15,38%	36,89%	16,81%	7,94%
AVERAGE	23,96%	26,94%	27,02%	12,30%	26,61%	29,47%	20,26%	17,86%

Source: TalentUp.io for DigiAdvance

Figure 20 - Remote job offers by city ans specialisation (2022)

Legend:

123	El valor es mayor que 90% B35:Q57
123	El valor está entre 80% y 90%
	B35:Q57
123	El valor está entre 70% y 80%
	B35:Q57
123	El valor está entre 60% y 70%
	B35:Q57
123	El valor está entre 50% y 60%
	B35:Q57

	Big Data	ΑΡΙ	Artificial Intelligence	ΙΟΤ	3D printing	Blockchain	Computer vision	Digital Marketing
Barcelona	13,06%	16,67%	28,68%	41,84%	40,91%	24,55%	30,56%	16,27%
London	41,75%	49,86%	41,79%	47,68%	72,27%	54,81%	26,85%	30,52%
Madrid	14,43%	34,00%	34,20%	19,51%	28,49%	6,52%	15,04%	18,44%
Paris	9,90%	18,59%	21,09%	20,52%	10,78%	4,50%	4,96%	11,78%
Amsterdam	56,04%	17,19%	51,19%	30,18%	6,94%	40,08%	14,89%	56,65%
Prague	2,19%	12,13%	13,56%	10,86%	5,94%	35,34%	0,74%	9,47%
Berlin	40,62%	38,58%	51,04%	40,20%	2,98%	39,83%	54,81%	45,45%
Bucharest	24,35%	17,49%	44,55%	22,08%	29,11%	43,11%	11,02%	19,55%
Stockholm	8,42%	16,28%	28,00%	18,72%	5,43%	13,50%	7,87%	6,08%
Munich	37,61%	65,16%	44,73%	59,89%	4,65%	39,69%	64,20%	22,12%
Zurich	8,91%	42,39%	8,59%	32,27%	22,48%	73,14%	8,68%	23,68%
Helsinki	83,03%	36,93%	75,95%	79,79%	50,00%	39,13%	95,73%	67,29%
Milan	2,82%	43,51%	9,50%	16,94%	9,84%	32,22%	6,61%	21,75%
Tallinn	3,75%	7,02%	14,21%	81,75%	29,90%	25,00%	26,79%	28,57%
Vienna	52,76%	52,54%	1,86%	58,41%	51,85%	1,88%	13,37%	8,06%
Oslo	21,12%	9,98%	38,89%	13,53%	63,64%	71,88%	26,32%	66,67%
Dublin	14,59%	26,98%	59,47%	43,24%	10,98%	46,72%	14,62%	6,61%
Zagreb	20,83%	2,98%	4,78%	8,33%	14,18%	9,92%	1,20%	0,91%
Copenhagen	7,38%	13,25%	7,69%	22,20%	12,50%	15,57%	2,36%	7,72%
Rome	6,13%	14,83%	11,01%	12,94%	3,85%	23,40%	15,28%	3,71%
Lisbon	11,50%	14,99%	7,54%	12,95%	4,64%	16,06%	8,35%	6,00%
Aveiro	10,64%	5,96%	6,98%	4,60%	1,85%	14,29%	9,72%	1,54%
Cork	18,52%	6,07%	11,11%	18,35%	2,32%	27,78%	13,33%	16,94%
AVERAGE	22,19%	24,49%	26,80%	31,16%	21,11%	30,39%	20,58%	21,56%

Source: TalentUp.io for DigiAdvance

Figure 21 - Remote job offers by city and specialisation (2022)

Presence of women in the ICT sector of European cities

The range of women in the technology sector among the European cities studied falls between 22.14% and 32.77%, with an average of 27.79%. Essentially, 3 out of every 10 professionals in the sector are women.

The city with the highest representation of women in the technology sector is Milan, with 32.77% of women on staff. It is followed by Aveiro (32.14%) and Madrid (30.19%).

Among the DigiAdvance project cities, Aveiro leads within them with 32.14% of its tech sector positions held by women, slightly above the average across European cities, which stands at 27.79%. Dublin follows closely with 29.47%, showing a solid commitment to gender diversity. Barcelona has a slightly lower proportion, with women making up 28.69% of its tech workforce, still slightly above the European average.

Milan		32,77%
Aveiro		32,14%
Madrid		30,19%
Stockholm		29,85%
Lisbon		29,85%
London		29,50%
Dublin		29,47%
Helsinki		28,94%
Barcelona		28,69%
Tallinn		28,67%
Prague		28,61%
Rome		28,45%
Cork		28,42%
Average EU		27,79%
Amsterdam		27,76%
Copenhagen		27,52%
Zagreb		27,38%
Berlin		27,12%
Oslo		26,88%
Munich		26,64%
Paris		25,91%
Vienna		25,61%
Zurich	23	3,71%
Bucharest	22,1	4%
		1

Figure 22 - Women in the sector by European cities (%) (2022)

Presence of women by technology

The specialties with the highest representation of women in the sector are CRM & ERP Consultant (45.84%), Digital Marketing (44.21%), and Business Intelligence (36.58%).

In both CRM & ERP Consultant and Digital Marketing, almost 5 out of every 10 workers are women.



Figure 23 - Percentage of women in the sector by technology (average across European cities analysed) (2022)

Percentage of women by technology and European city

CRM & ERP Consultant, Digital Marketing, UX/UI Design, and Business Intelligence stand out for having a presence of over 40% women in most of the European cities studied.

In some cases, such as in Copenhagen, in the field of CRM & ERP Consultant, women make up as much as 70% of the workforce.

In DigiAdvance cities, Barcelona showcases a relatively balanced gender distribution across different roles, with notable representation in Digital Marketing at 45.71% and UX/UI at 42.78%. Dublin stands out for its high female presence in roles such as CRM + ERP Consultants at 60.00% and Business Intelligence at 47.62%. Aveiro demonstrates significant female participation in Digital Marketing at 41.18% and UX/UI at 34.55%.

	Web Developers	App Developers	UX/UI	CRM + ERP Consultant	Agile/Scrum	Cloud (AWS)	Cyber- security	Business Intelligence
Barcelona	26,20%	30,65%	42,78%	37,89%	29,12%	28,79%	27,65%	35,61%
London	24,78%	30,59%	36,78%	59,03%	24,33%	14,01%	16,35%	39,24%
Madrid	31,11%	26,12%	35,04%	45,28%	27,61%	18,75%	27,27%	38,27%
Paris	24,45%	23,06%	41,18%	58,26%	20,95%	15,63%	27,27%	38,51%
Amsterdam	29,40%	25,00%	48,72%	54,35%	22,16%	19,05%	23,40%	49,21%
Prague	23,04%	32,50%	30,00%	40,00%	25,13%	17,80%	21,50%	45,45%
Berlin	26,78%	28,70%	38,64%	43,28%	22,80%	20,00%	26,70%	48,16%
Bucharest	16,35%	21,93%	15,38%	11,11%	17,38%	15,79%	18,84%	39,58%
Stockholm	18,96%	33,67%	48,84%	64,71%	20,77%	10,53%	23,10%	37,50%
Munich	25,71%	18,18%	33,93%	58,09%	23,94%	19,05%	16,67%	40,43%
Zurich	26,79%	30,23%	39,13%	51,90%	20,39%	7,89%	30,00%	27,27%
Helsinki	21,71%	41,00%	48,89%	50,00%	19,45%	28,95%	24,31%	29,67%
Milan	27,42%	19,75%	48,48%	48,41%	20,82%	31,82%	43,48%	27,82%
Tallinn	20,00%	33,33%	50,00%	46,80%	25,00%	16,90%	23,34%	25,83%
Vienna	19,05%	38,71%	25,00%	43,75%	23,17%	6,89%	40,00%	27,78%
Oslo	23,57%	32,26%	20,00%	40,74%	17,91%	11,11%	31,12%	46,15%
Dublin	34,09%	27,80%	23,53%	60,00%	24,56%	16,67%	22,56%	47,62%
Zagreb	26,67%	12,50%	29,12%	35,10%	23,68%	17,60%	20,06%	22,72%
Copenhagen	25,98%	16,79%	37,25%	70,69%	18,11%	11,76%	22,31%	26,37%
Rome	24,18%	8,65%	47,62%	47,73%	22,70%	13,64%	19,62%	45,59%
Lisbon	32,51%	19,47%	30,87%	28,57%	24,89%	16,50%	16,36%	38,90%
Aveiro	27,34%	19,82%	34,55%	29,77%	27,77%	18,75%	27,29%	29,09%
Cork	22,95%	14,29%	33,33%	28,90%	28,57%	16,67%	38,10%	34,48%

Figure 24 - *Percentage of women in the sector by technology and European city (2022)*

Legend:

123	El valor es mayor que 70% L3:AA25
	El valor está entre 60% v
123	70%
	L3:AA25
123	El valor está entre 50% y 60%
	L3:AA25
123	El valor está entre 40% y 50% L3:AA25

	Big Data	ΑΡΙ	Artificial Intelligence	ют	3D printing	Blockchain	Computer vision	Digital Marketing
Barcelona	33,11%	30,57%	29,53%	28,29%	31,58%	25,10%	29,66%	45,71%
London	36,14%	27,88%	32,33%	26,60%	25,15%	28,33%	24,07%	29,27%
Madrid	35,97%	25,14%	36,33%	26,84%	21,62%	27,51%	16,24%	60,00%
Paris	27,88%	20,62%	33,19%	18,18%	23,62%	26,26%	22,67%	35,71%
Amsterdam	32,31%	19,10%	31,41%	22,43%	18,70%	27,19%	30,65%	33,33%
Prague	25,00%	33,33%	34,42%	37,63%	25,00%	35,48%	50,00%	33,33%
Berlin	35,67%	25,24%	34,03%	24,26%	22,22%	30,47%	23,92%	50,00%
Bucharest	25,71%	5,71%	28,37%	21,27%	28,43%	31,00%	35,71%	18,18%
Stockholm	20,21%	24,73%	35,98%	25,35%	26,32%	41,79%	18,34%	28,57%
Munich	29,69%	23,84%	22,53%	27,19%	26,23%	27,00%	20,45%	62,30%
Zurich	32,61%	29,27%	28,94%	24,39%	12,90%	25,43%	29,09%	40,00%
Helsinki	36,05%	49,49%	29,55%	22,44%	40,00%	27,27%	11,89%	62,50%
Milan	32,95%	31,82%	31,30%	19,20%	20,37%	31,88%	32,47%	66,67%
Tallinn	31,01%	29,09%	14,81%	28,38%	32,22%	33,33%	33,33%	38,20%
Vienna	34,48%	37,04%	31,01%	20,00%	20,83%	22,22%	26,67%	25,00%
Oslo	30,28%	29,41%	32,00%	28,70%	15,00%	15,56%	31,37%	64,90%
Dublin	28,07%	41,38%	33,10%	8,89%	28,21%	20,00%	11,54%	40,00%
Zagreb	32,97%	50,00%	11,54%	33,33%	31,84%	26,78%	23,00%	35,70%
Copenhagen	27,78%	25,31%	25,58%	21,14%	11,67%	38,75%	21,05%	50,00%
Rome	27,35%	10,92%	20,00%	18,44%	29,41%	14,75%	19,64%	55,55%
Lisbon	28,28%	35,77%	21,43%	23,44%	20,00%	21,74%	25,33%	52,64%
Aveiro	28,21%	8,93%	28,70%	23,33%	24,32%	33,81%	27,56%	41,18%
Cork	10,10%	33,33%	19,23%	28,57%	20,93%	22,65%	19,92%	48,09%

Figure 25 - Percentage of women in the sector by technology and European city (2022)

Top employers

The main employers in the principal cities of DigiAdvance countries are technology companies and consultancies.

Barcelona	Madrid	Dublin	Lisboa	Aveiro	Cork
Amazon (e-commerce)	Amazon (e-commerce)	Harvey Nash (Consultancy)	Microsoft Portugal (Technology)	Bosch (Technology)	Dell (Technology)
Glovo (Food)	Ansys (Technology)	IT Alliance Group (Technology)	Accenture (Consultancy)	Altice (Telecoms)	Apple (Technology)
Flix Snip (Video On Demand)	Axa (Insurance)	Tandem Project Management (Consultancy)	NOS (Telecoms)	Critical Software (Technology)	VMWare (Technology)
Aggreko (Energy)	Bloomberg (Consultancy)	Jazz Pharmaceuticals (Pharmaceutical)	Sapo (Technology)	Mindera (Technology)	Johnson Controls (equipment for buildings)
Dynatrace (Technology)	Xitaso (Consultancy)	Apcoa (Parking)	Noesis (Consultancy)	Dellent Consulting (Consultancy)	McAfee (Technology)

Source: TalentUp.io for DigiAdvance

Figure 26 - Top employers by European city (2022)

Chapter Three: Desk Research

In today's business landscape, characterised by rapid technological advances and digital transformation, small and medium-sized enterprises (SMEs) play a vital role as drivers of innovation, economic growth and job creation. As SMEs strive to remain competitive and relevant in this dynamic environment, the need for a digitally skilled workforce has emerged as a critical factor for their success.

In recent years, a paradigm shift towards digital transformation has swept across industries, reshaping the way businesses operate, engage with customers and drive innovation. The adoption of digital tools and technologies has become a necessity for SMEs to streamline operations, increase productivity and optimise the customer experience. To enable and sustain this transformation, hiring employees with the right digital skills has become critical.

As the demand for digital skills increases across all sectors, attracting and retaining talent with these skills has become highly competitive. SMEs that prioritise digital skills in their hiring practices will gain a significant advantage by attracting the best talent and building a robust team capable of driving innovation and staying ahead of the competition.

For Schallmo et al. (2017), digital transformation *requires skills that that involve the extraction and exchange of data as well as the analysis and conversion of that data into actionable information*". In a study conducted by Heilala et al. (2020), the authors assessed the level of digitalisation among small and medium-sized enterprises (SMEs) operating in the manufacturing sector in Finland. Their research went beyond current technological advances to explore ways in which these organisations could improve their digitalisation efforts. One of the key findings highlighted the potential benefits of incorporating online training programmes to enhance SMEs' knowledge of emerging digital technologies such as cloud computing and artificial intelligence. The research also highlighted the importance of addressing the digital skills gap as a risk factor, with improvements in this area being crucial to improving the competitiveness of these businesses.

Digital skills encompass a wide range of capabilities that enable individuals to navigate, adapt and thrive in the digital age. From technical knowledge to cognitive and socio-emotional skills, these competencies are at the forefront of modern workforce requirements. For SMEs, harnessing the potential of digital skills in their hiring practices has become imperative to drive organisational growth, capitalise on new opportunities and stay ahead of the curve.

Digital skills enable workers to harness the power of data analytics, automation and digital collaboration tools. As a result, SMEs can streamline operations, make data-driven decisions and foster a culture of innovation. A digitally literate workforce increases efficiency, encourages creative problem solving and drives the organisation towards continuous improvement.

As identified by the European Digital SME Alliance, the SME Sector faces a unique set of challenges but also opportunities relating to digital skills development and there is a need for more targeted research in this area. Building on previous research conducted, this needs analysis will place a specific focus on advanced digital skills for different cohorts in the SME sector. In this

context, this research will be focused on six thematic areas focusing on advanced digital skills for different cohorts in the SME sector: Financial Innovation and Technology; Artificial Intelligence; Blockchain; Cybersecurity; Data Analytics & Machine Learning; and Digital Marketing & Web Development. Ultimately, this research desk aims to provide valuable insights to help SMEs build a digitally skilled workforce that will drive success and resilience in the digital age.

Financial Innovation and Technology

Digital skills have become essential, especially for small and medium-sized enterprises (SMEs) looking to harness the power of financial innovation and technology. These skills encompass a wide range of capabilities, from using digital tools and platforms to understanding advanced financial technologies such as blockchain and artificial intelligence. In the modern financial landscape, digital skills have become essential for individuals, professionals and organisations working in financial innovation and technology.

Financial technology, or fintech, "refers to the use of technology to deliver financial solutions and is one aspect of these fundamental changes" (Arner et al., 2017). From mobile payment apps to robo-advisors, the FinTech sector relies on digital skills to create user-friendly, efficient, and secure financial products.

Proficiency in advanced analytics and machine learning is essential for assessing and mitigating risks in real-time, helping financial institutions proactively manage their portfolios and regulatory compliance (Shang & Wang, 2023). Furthermore, the ability to collect, analyze, and interpret data is a core component of digital skills. In the financial sector, this skill set is indispensable for making informed decisions and uncovering actionable insights (Asif et al., 2023).

Digital skills are crucial for SMEs looking to use financial innovation and technology to their advantage. Not only do these skills improve operational efficiency and productivity, but they also enable SMEs to access finance, expand globally, and make data-driven decisions. As the role of technology in business continues to grow, investing in digital skills has become essential for the long-term success and sustainability of SMEs.

Digital literacy has become the cornerstone of financial innovation and technology. As the financial sector continues to evolve, individuals, organisations and policymakers must recognise the importance of acquiring, developing and maintaining these skills. The ability to adapt to the changing financial landscape through digital literacy is not just an advantage, but a necessity in today's interconnected, technology-driven financial world. Whether you are a financial professional, a regulator or an individual seeking financial services, digital skills are key to unlocking the full potential of financial innovation and technology.

Artificial Intelligence

One of the most transformative technologies is artificial intelligence (AI), which promises to revolutionise operations, improve decision-making, and boost competitiveness (Colombo et al.,

2019). However, to fully harness the power of AI, SMEs can prioritise the development and use of digital skills within their organisations.

As AI continues to shape the business landscape, SMEs with strong digital skills will be better positioned to thrive and adapt to the ever-changing digital economy (Ulas, 2019).

Blockchain

Blockchain technology has gained significant prominence in recent years, disrupting various industries, and reshaping the way we conduct transactions, share data, and verify information. As blockchain adoption continues to grow, the demand for digital skills related to this technology has surged.

Blockchain, often associated with cryptocurrencies like Bitcoin, is a decentralized ledger technology that ensures transparency, security, and immutability of data. Its applications extend beyond finance, encompassing supply chain management, healthcare, real estate, and more. To harness its potential, individuals and organizations require digital skills that span various aspects of blockchain technology. Expertise in these areas is critical to understanding and participating in the decentralised finance (DeFi) space, which is redefining financial services.

Blockchain technology is expected to have a profound impact on the global economy. The World Economic Forum estimates that by 2025, 10% of global GDP will be stored on blockchains. This highlights the economic importance of developing digital skills in blockchain, as it can lead to increased employability and entrepreneurship opportunities.

Reports and studies have identified a substantial skill gap in the blockchain industry. Deloitte's 2020 Global Blockchain Survey found that 55% of respondents believed the lack of in-house blockchain skills was a significant barrier to blockchain adoption within their organizations.

Cybersecurity

In today's interconnected and digitally driven world, cybersecurity has become a paramount concern for individuals, organisations and governments alike. The rapid evolution of technology has led to an increase in cyber threats, necessitating the development of robust cybersecurity measures. Central to this endeavour are digital skills, which encompass a range of technical and non-technical competencies that are essential to defend against cyber threats targeting organisations of all sizes, including SMEs. Without adequate digital skills, SMEs are ill-equipped to deal with these evolving threats.

Cyber-attacks and digital threats such as data breaches, online fraud or data leaks also affect European businesses, especially SMEs. At the same time, the demand for skilled cybersecurity professionals is growing, with some estimates by the Joint Research Centre (JRC) pointing to a shortage of 1 million cybersecurity workers in the EU and 3.5 million worldwide.

According to IBM research, 95% of cyber security breaches are due to human error. Data from Eurostat and the 2021 Digital Economy and Skills Index (DESI) show that 39% of EU citizens who used the internet in 2019 experienced security-related problems. Human error remains a significant factor in cybersecurity breaches. Digital skills also include non-technical aspects such

as security awareness and training for employees (EI-Bably, 2021). Fostering a culture of cybersecurity awareness within an organisation is critical to reducing the likelihood of successful attacks.

Digital skills are essential not only to protect SMEs from external threats, but also to mitigate insider risks. Employees, whether knowingly or unknowingly, can pose a significant threat to an organisation's cybersecurity. Digital skills enable SMEs to establish robust security awareness programmes and mechanisms to detect and prevent insider threats.

Data Analytics & Machine Learning

In the era of digital transformation, data analysis and machine learning have become integral parts of various industries and sectors. As organisations increasingly rely on data-driven decision making, the demand for individuals with digital skills in data analysis and machine learning has skyrocketed.

Data literacy is the basic digital skill required for effective data analysis. Individuals need to understand data sources, collection methods and basic statistical concepts to make informed decisions. Organisations benefit from a data-literate workforce that can interpret data, communicate insights, and avoid common data-related pitfalls (Provost & Fawcett, 2013).

Digital skills in data analytics and machine learning are critical for driving innovation, improving decision making, and enhancing competitiveness in various sectors. The integration of these skills enables organisations to harness the potential of big data, automation, and artificial intelligence (AI) to achieve their strategic goals (Brynjolfsson & McAfee, 2014).

Digital Marketing & Web Development

Digital marketing and web development have become integral parts of modern business strategies. As technology continues to evolve, the demand for professionals with digital skills in these areas is increasing.

Search engine optimisation remains a fundamental digital skill in digital marketing (Chaffey & Ellis-Chadwick, 2019). It involves optimising websites and content to rank higher on search engine results pages. SEO is essential for increasing organic traffic and improving a company's visibility online.

Effective content creation and marketing skills are crucial for digital marketers (Kapoor, 2018). Quality content helps to engage audiences and drive conversions. Digital marketers need to understand how to create and distribute content across various digital channels.

Social media platforms are powerful tools for reaching and engaging target audiences (Smith & Zook, 2017). Proficiency in social media management includes knowledge of platform algorithms, content scheduling, and community engagement.

Digital marketers must be proficient in data analytics in order to measure the effectiveness of campaigns (Smith, 2019). Skills in web analytics tools, such as Google Analytics, are essential for tracking and optimising marketing efforts.

Digital skills are the cornerstone of success in digital marketing and web development. The rapidly changing digital landscape requires constant learning and adaptation. Skills in SEO, content marketing, social media management, front-end and back-end development, responsive design and security are essential for professionals in these fields. As businesses increasingly rely on digital strategies, acquiring and honing these skills will continue to be a priority for individuals and organisations alike.

Chapter Four: Bibliometric Literature review

To deepen our understanding and visually map the intellectual structure of this extensive literature, we used the VOS Viewer tool. Using bibliometric techniques and network visualization, the VOS Viewer allows us to identify the most influential authors, key themes, and emerging sub-fields within the digital literacy field. This approach allows us to uncover complex relationships, trends and patterns that would otherwise remain hidden using traditional review methods.

The primary data source for this bibliometric analysis is the Scopus database. Scopus is a comprehensive multidisciplinary abstract and citation database that covers a wide range of scientific journals, conference proceedings, and other scholarly publications. It is selected due to its extensive coverage of academic literature, including research relevant to digital skills and SMEs.

In the following sections, we present key findings and insights from our Scopus-based literature review, using the VOS Viewer as a powerful lens to understand the multidimensional landscape of digital skill and SMEs. By gaining a holistic understanding of the existing body of knowledge, we aim to contribute to the ongoing discourse on the theme and provide stakeholders with valuable evidence to inform their decision-making processes in the digital age.

The Scopus database was selected as the primary source for data collection due to its extensive coverage of academic literature. A search strategy was developed using relevant keyword "digital skill". The search was limited to documents published until 30 July 2023. The search yielded the number (n) of 2,350 documents for the keyword "digital skill" the number (n) of 11 documents for the keyword "digital skill" the number (n) of 11 documents for the keyword "SME".

The retrieved publications were exported from Scopus and metadata such as title, authors, publication dates, affiliations, abstracts, and citation counts were extracted. The extracted data were then organised and prepared for further analysis using VOS Viewer software.

Results for Digital skills

The study shows a global interest in digital skills and SMEs, with research contributions from different countries and regions. This indicates a widespread awareness of the transformative potential of digitalisation for SMEs in different economies. This upward trend suggests that researchers, policymakers, and practitioners are increasingly recognising the impact of digital skills on the competitiveness. The increase in publication frequency also indicates a sustained effort to address the challenges and opportunities arising from the digital transformation.



Figure 27 - Documents by year for digital skill. Source: Scopus

The results of this bibliometric review revealed a significant growth in the literature on digital literacy between 2019 and 2022, highlighting its increasing importance in academic research.



Figure 28 - Cooccurrence of keywords digital skills. Source: VOS Viewer

The co-occurrence analysis reveals that " digital skills" is the most repeated keyword, followed by "e-learning" and "students", as shown in Table 1.

 Table 1 - Cooccurrence of keywords. for digital skill. Source: VOS Viewer

Keyword		Occurrences Total bond stre	
digital skills	809		4067

e-learning	314	2447
students	234	1902
covid-19	190	1450
human	179	2782
digital literacy	172	1063
higher education	162	895
digital competence	145	659
digital transformation	137	698
digital divide	136	947

Co-occurrence analysis of the literature using the VOS Viewer provided important insights into the issue of digital literacy in the global world. By examining the relationships between keywords and identifying patterns of co-occurrence, significant themes and clusters of research emerged. These findings demonstrate the multifaceted nature of the issues surrounding digital skills.

The co-authorship and collaboration network analysis reveals a robust and interconnected research community studying digital skills. Prominent researchers and institutions emerge as influential nodes within this network, collaborating across disciplinary boundaries to produce impactful research. The existence of these networks fosters knowledge exchange, innovation, and interdisciplinary approaches, leading to a richer understanding of the complexities associated with digital skills.



Figure 29 - Citation network analysis for digital skill. Source: VOS Viewer

It should be noted that these findings are based on the literature analysed in the Scopus database and the co-occurrence patterns identified through the VOS Viewer. Further research and analysis may provide additional nuances and insights into the issue of the digital skills in the global world. Table 2 shows the most relevant and influential works based on the citation network.

	Reference cited	Title	Year	Citations
1		Online learning and emergency		
		remote teaching: Opportunities		
		and challenges in emergency		
	Ferri, F., Grifoni, P., & Guzzo, T.	situations	2020	345
2	van Laar, E., van Deursen, A. J.	Determinants of 21st-Century		
	A. M., van Dijk, J. A. G. M., & de	Skills and 21st-Century Digital		
	Haan, J.	Skills for Workers	2020	139
3		The digital divide: Examining		
		socio-demographic factors		
		associated with health literacy,		
	Estacio, E. V., Whittle, R., &	access, and use of internet to		
	Protheroe, J.	seek health information	2019	128
4	Konttila, J., Siira, H., Kyngäs, H.,			
	Lahtinen, M., Elo, S.,			
	Kääriäinen, M., Kaakinen, P.,			
	Oikarinen, A., Yamakawa, M.,	Healthcare professionals'		
	Fukui, S., Higuchi, A., &	competence in digitalisation: A		
	Mikkonen, K.	systematic review.	2019	128
5		The roles of academic		
		engagement and digital readiness		
		in students' achievements in		
	Kim, H. J., Hong, A. J., & Song,	university e-learning		
	HD.	environments	2019	110
6	van Laar, E., van Deursen, A. J.	Determinants of 21st-century		
	A. M., van Dijk, J. A. G. M., &	digital skills: A large-scale survey		
	de Haan, J	among working professionals.	2019	95
7		Digital competence, higher		
	Antonio-Manuel Rodríguez-	education and teacher training: A		
	García, D., Sánchez, F. R., &	meta-analysis study on the Web		
	Ruiz-Palmero, J	of Science	2021	93
8		Teachers' well-being in times of		
	Alves, R., Lopes, T., & Precioso,	Covid-19 pandemic: factors that		
	J	explain professional well-being	2021	88

Table 2 -	The most	relevant	and influer	ntial works	based on	the citation	network for	⁻ diaital skil
								angrean ann

9		Digital literacy and higher		
	Tejedor, S., Cervi, L., Pérez-	education during COVID-19		
	Escoda, A., & Jumbo, F. T.	lockdown	2020	88
10		Analysis of barriers in		
		implementation of digital		
		transformation of supply chain		
	Agrawal, P., Narain, R., & Ullah,	using interpretive structural		
	Ι.	modelling approach	2020	87

Digital Skills and SME's - Scopus and Vos Viewer

This bibliometric literature review on digital skills and small and medium-sized enterprises (SMEs) has provided insights into the current state of research and the impact of digital skills on the competitiveness and performance of SMEs.

Bibliometrics revealed a significant growth in the literature on the combination of digital skills and SMEs in recent years, especially since 2021, highlighting its increasing importance in academic research. Although the number of papers has risen recently, their volume suggests that the issue of digital literacy for small and medium-sized enterprises needs further investigation.



Figure 30 - Documents by year digital skill and SME. Source: Scopus

The keyword analysis reveals several key themes that have shaped the research discourse in this area. Themes such as "digital transformation", "digital literacies", "e-learning" and "small and medium-sized enterprise" have received attention.

Table 3 - Cooccurrence of keywords for digital skill and SME. Source: VOS Viewer

Keyword		Occurrences	Total bond strength
digital transformation	4	3	
digital literacies	2	3	
e-learning	2	3	
small and medium-sized enterprise	2	2	
sustainable development	2	1	
digital transformation	4	3	

The section on co-authorship and collaborative networks examines patterns of co-authorship among researchers in the field. It identifies key collaborations and influential authors who have played a significant role in advancing research on digital skill and SMEs. It may also reveal potential research clusters or communities within the field.



Figure 31 - Cooccurrence of keywords digital skills and SME. Source: VOS Viewer

As shown in Figure 32, the citation network analysis using the VOS Viewer provided a comprehensive understanding of the citation patterns of the digital skills and SMEs literature. It helps to identify influential papers, key collaborations, citation flows and emerging research trends. Researchers can use this information to build on existing knowledge, foster collaborations and contribute to the ongoing discourse of studies in the field.



Figure 32 - Citation network analysis for digital skill and SME. Source: VOS Viewer

It is important to note that these results are based on the literature analysed in the Scopus database and the co-occurrence patterns identified through the VOS Viewer. Further research and analysis may bring further nuances and insights into the issue of the digital skill and SMEs in the global world. The most relevant and influential papers based on the citation network are presented in Table 4

	Reference cited	Title	Year	Citations
1		Social Media Engagement,		
		Organizational Agility and		
	Rozak, H., Adhiatma, A.,	Digitalization Strategic Plan to		
	Fachrunnisa, O., & Rahayu, T.	Improve SMEs' Performance	2021	22
2		Research on the Relationship		
		between Digital Transformation		
	Teng, X., Wu, Z., & Yang, F	and Performance of SMEs	2022	14
3		The digital transformation of		
		Swiss small and medium-sized		
	Kraft, C., Lindeque, J. P., & Peter,	enterprises: insights from digital		
	М. К.	tool adoption	2022	9
4		Digital transformation in supply		
		chain, challenges and		
		opportunities in SMEs: a case		
	Faridi, M. R., & Malik, A.	study of Al-Rumman Pharma	2020	9
5		DigiMove Analysis for		
		Manufacturing SMEs to Identify		
	Saari, L., Kuivanen, R., &	Their Current Status and next		
	Poikkimäki, J.	Digitalisation Steps	2021	3

Table 4 - The most relevant and influential works based on the citation network for digital skill and SME

This bibliometric literature review has shed light on the critical role of digital skills in driving SME growth and competitiveness. By understanding the trends, patterns and gaps in existing research, this study contributes to the broader knowledge base on digital skills and SMEs. As the digital landscape continues to evolve, the findings of this research serve as a valuable resource for shaping policies, educational initiatives and business strategies that enable SMEs to thrive in the digital age. The study also highlights the need for continued research to further explore the complex relationship between digital skills and SME success, and to guide future efforts in this dynamic and transformative area.

The analysis identifies research gaps that warrant further investigation. While much research has been conducted on the benefits of digital skills, there is still a lack of longitudinal studies that track the long-term impact of digital skills development initiatives in SMEs. In addition, certain industries and regions may be underrepresented in the literature, suggesting the need for more targeted research to address the unique challenges faced by SMEs in different contexts. The emergence of trends such as AI integration and cybersecurity highlights the relevance of ongoing research to adapt to the ever-changing digital landscape.

Chapter Five: Digital skills and their respective importance and impact in the market

"Digital skills gap" is the term used to define the gap between the demand and supply of workers with the digital skills sought by employers. Over the next five years, based on research released by Microsoft Data Science (with the aid of LinkedIn data), the global workforce is poised to add 149 million new technology-oriented jobs, with areas like data analytics, software development, and cybersecurity expected to exponentially grow.

A study of American workers by the Pew Research Center found that 85% of respondents consider digital skills to have a huge importance for success in today's workplace. Yet, from the DSGI (Digital Skills gap Index), only 4.2% of the survey respondents were completely satisfied with the level and availability of digital skills. This generates the conclusion that the demand for digital skills if far from being met by its respective supply. The pandemic has only deepened this and expanded the skills gap around the world, widening the disconnect between the perceived supply and demand for a skilled and diverse pool of talent.

Economies capable of supporting the digital skills rapid development will have the advantage in the "race". Economies with nascent investments in digital skills will need to move quickly and play catch up. Adding to this, digitally under-served populations, usually formed by individuals with less formal education, people of color, women, younger workers, and people with disabilities, are disproportionately burdened by an economic crisis. Simultaneously, the widespread disruption of people with low qualifications and tertiary education threatens to widen the digital skills gap, both within economies and between the more and less affluent economies.

Training a global workforce equipped with the digital skills needed for the post-pandemic economy necessitates collaboration between employers, nonprofits, and governments. This challenge demands significant and sustained investments in training, digital access, partnerships, and infrastructure to ensure the greatest number of workers have access to the digital skills they need, and economies can quickly reskill for rapid economic recovery. Due to this change in the labour market, undergraduate and graduate student face uncertainties about which careers and industries offer the best paths to a sustainable career. Meanwhile, schools and universities are rushing to reinvent how they teach, relying more heavily on digital tools.

What is the availability of employee training programs relative to the demand for such digital retraining/upskilling?

Source: Wiley Digital Skills Gap Survey (APEC economies)

8.9%	51.7%	33.6%	5.8%
Not at all Sufficient	Insufficient	Sufficient	Plentiful

Figure 33 - Level of availability of employee training programs relatively to its respective digital retraining/upskilling

Regarding the level of availability for digital skills training when it comes to reskilling/upskilling skills we can see that the majority (51.1%) of the Survey respondents consider it to be Insufficient, which leads us to conclude that there needs to be done a bigger investment in training to achieve the level of digital skills needed to help in the economic growth of this century.

The skills needed to operate and succeed in the modern knowledge-based economy requires technical competences with digital tools, but it also demands some transversal skills, like critical thinking, problem solving, and effective communication and collaboration. Integrating cutting-edge digital skills while enhancing these "workplace" skills is an additional challenge, as the latter are largely intrinsic to individuals and may be somewhat harder to train/find.

Developing responsive digital skills systems require efficiently planning, developing, tracking, and managing the skills that help economies to improve the employability of their citizens, promote equal access to employment opportunities and increase income earning potential. Regardless of this, only a little over a third of the Wiley survey respondents considered their economy's skills development systems to be "Strong", being the economies of China and Singapore the most highly rated for the responsiveness of their skills development systems.

SME's and the importance of digital skills

With each passing year, a bigger share of economic activity is going digital, and companies, educational institutions and economies that don't follow this trend face a growing opportunity cost. The Business sector is becoming more and more dominated by companies that own advanced digital intellectual property. Some of this companies are reshaping entire industries to their advantage.

This pronounced digital gap is changing the nature of competition at all levels of the economy. The enormous increase in technology stocks through the pandemic made this deep structural shift accelerate even more. Because of that, the most pandemic-resilient economies will be those best able to establish a clear lead in the development of digital skillsets. The most successful educational and training institutions will be those that can fight the digital divide for

students, breaking the bridge between those who have access to technologies and those who don't.

21st Century Skills



Figure 34 - 21st Century Most Important Skills. Source: Wiley Digital Skills Gap Survey (APEC Economies)

Looking at the 21st Century skills the respondents of the Wiley Digital Skills Gap Survey consider will be the most relevant in the next five years we can see that Problem Solving is highlighted as the most important skill, followed by Dynamic (Self) Re-skilling and Decision Making.

Technical Skills



Figure 35 - Most Important Technical Skills. Source: Wiley Digital Skills Gap Survey (APEC Economies)

Regarding Technical Skills that are gaining importance Data Analytics and Algorithms are the clear winners, with Computing and Data Science Engineering Principles following its lead.

Business and Organizational Skills



Source: Wiley Digital Skills Gap Survey (APEC economies)

Figure 36 - Business and Organization Most Important Skills

Regarding the answers given when it comes to Business and Organizational Skills, Wiley Digital Skills Gap Survey findings revealed that the ones considered to be the most important were
Operational Analytics and Data Management and Governance, followed by Data Visualization and Presentation and Domain Knowledge and Application.

Finally, Business and Organizational Skills that weren't considered relevant were "the ability to discriminate between true and untrue information," and the "readiness and capacity to build public-private partnerships", as well as more traditional skillsets, such as administration, business/ industry acumen, and customer focus.

Among the 2023 core skills (as it will further elaborated in the next section), self-efficacy skills rank above working with others in the rate of increase in importance of skills reported by businesses. The socio-emotional attitudes that are growing in importance to businesses the most quickly are curiosity and lifelong learning; resilience, flexibility and agility; and motivation and self-awareness.

All of this proves that businesses emphasize the importance of resilience and reflective workers in embracing a culture of lifelong learning as they perceive their skills decreases.

As the demanded skills are changing, businesses are designing and scaling up their training programmes. In the 2020 Future of Jobs Report, companies estimated that 42% of workers had completed training that decreased their skills gaps. This percentage decreased slightly to 41% in 2023.

Businesses perceive skills gaps in the labour market as the primary barrier to achieving industry transformation. Consequently, they view investing in learning and on-the-job training as the most promising workforce strategy for achieving their business objectives. Therefore, formulating effective reskilling and upskilling strategies for the next five years is essential for maximizing business performance.

Organizations identify skills gaps and an inability to attract talent as the key barriers hindering industry transformation. These two aspects were identified as top barriers to business transformation by every industry except Research, Design and Business Management Services. In these industries respondents ranked outdated or inflexible regulatory frameworks as the second most limiting barrier.

The inability to attract talent is felt the most in the Electronics as well as Automotive and Aerospace sectors, where it is ranked as the most significant barrier. Adding to that, about 52.2% of companies in the Media, Entertainment and Sports industry emphasize insufficient understanding of opportunities by leadership as an obstacle. Company size also matters, since SMEs are 20% less likely to identify lack of skilled talent as a barrier than large corporations.

Businesses perceive talent as more strategically limiting to their performance than availability of capital, since skills gaps in the local labour market were seen as a stronger barrier to transformation than a lack of capital investment by companies in virtually every industry, and this is even more polarized at regional and country levels.

Summing this up it is possible to conclude that it is perceived by businesses that possessing an effective employee training programme is seen as the top talent-attracting policy available.

Digital skills evolution

When the Future of Jobs Report was first published in 2016, surveyed companies predicted that 35% of workers' skills would change in the following five years. In 2023, that value has risen to 44%. However, this rate signifies a stabilization compared to the previous edition of the Future of Jobs Survey in 2020, which was affected by the COVID-19 pandemic, with predicted disruptions to employment reaching 57% over the next five years.

Core skills in 2023

Core skills the capabilities that businesses find essential for employees to fulfil and perform well in all circumstances during their activity.

As in 2020, Analytical Thinking is the core skill with the highest importance to the biggest number of companies. In 2023, the core skills considered most crucial can be seen in the picture below.



Figure 37 - 2023 Most Important Core Skills. Source: World Economic Forum, Future of Jobs Survey 2023

After analysing the most demanded skills we conclude that management skills, engagement skills, technology skills, ethics and physical abilities are generally considered to be less important than cognition, self-efficacy, and working with others. Adding to this we can see that self-efficacy skills have the greatest number of representants on the core skills' top 10 (4 core skills):

Resilience, flexibility and agility, Motivation and self-awareness, Curiosity and lifelong learning and Dependability and attention to detail.

Although core skill sets are largely consistent across sectors, there are several distinct characteristics that can be identified in some sectors. For example, the Media Entertainment and Sports industry highly values empathy, active listening, dependability, and attention to detail, while Agriculture, Forestry and Fishing is considered an exception due to the sector's concerns with the environment and its growing outlook for the importance of manual dexterity, endurance and precision and resource management skills.

Comparisons to surveys realized before suggest that creative thinking is increasing in importance when compared with analytical thinking as workplace tasks become increasingly automated. In 2018 and 2020, the number of surveyed companies that considered analytical thinking to be a core skill was higher than those considering creative thinking to be a core skill by a margin of 35% and 38%, respectively. But that gap has now decreased to 21% and the prediction is that it continued to diminish.

Sectors with the biggest digital skills gap

As we can see in the picture above the sector that the respondents consider to have the widest digital skills gap are "Education and Training", "Public Administration" and "Health Care and Social Assistance".





Figure 38 - Sectors with the widest digital skills gap

This is extremely concerning, since having high levels of digital skills in Education and Training is the catalyst for the high quality of talent supply for businesses, and, in the same direction, Public Administration services to have effective policy frameworks should also be in the vanguard of digital skills adoption. Lastly in this top three we have the Health Care and Social Assistance, sector that should also mitigate the digital skills gap and become one of the leading sectors when it comes to digital skills, because that is the only way it will effectively be able to reach and assist everyone in need.

Main challenges in closing digital skills gap

The answers given by the respondents regarding what they believe are the biggest challenges when it comes to shrink the digital skills gap can confirm the sectors with the widest skills gap. Inadequate government leadership is considered the biggest obstacle to overcome, followed by the low resourced education system. Why this is an issue has already been explained so it doesn't need further explanation.



Figure 39 - Biggest challenges in closing digital skills gap

The third biggest challenge is resistance to reskilling and upskilling. This two refer to obtaining the skills to being able to correctly execute new tasks, or just deepen the knowledge on some topics. This inertia ends up blocking this correction of digital skills gap.

The labor market and jobs in the last 20 years

Over the past two decades, the world economy has seen a significant acceleration in the pace of technology-driven change. The transition to the digital age and the fourth industrial revolution have had a profound impact on the labor market, altering processes and demanding new skills.

Professions directly related to the evolution of technology, such as software developers, data scientists, cybersecurity and artificial intelligence specialists, among others, have been increasingly in demand. In addition and taking into account the aging of the population that is felt all over the world, professions related to health and care for the elderly are also increasingly in demand.

On the other hand, there are professions that are less and less in demand or have even disappeared, mainly due to automation and digitalization, since repetitive and standardized tasks have been automated. These professions include cashiers, production line workers, door-to-door salespeople, among many others.

Remote work, driven mainly by the COVID-19 pandemic, has also revolutionized market work. Technology has enabled people to work remotely from home, or anywhere in the world. This change has brought flexibility and freedom to workers, but it can also present some work-life balance challenges.

The constant and accelerated technological evolution results in continuous change in the labor market. Keeping up with all these changes and feeling able to actively participate in the labor market is one of the great challenges of today. With these changes, it is practically mandatory to have certain soft skills, technical skills and above all digital literacy. Workers should try to keep up with the constant changes and also empower themselves with the necessary skills in order to thrive in today's job market. Training appears as the main solution to these knowledge gaps.

Chapter Six: Quantitative Analysis of the Questionnaire

This research used a mixed method to collect data from employees and managers of SMEs. Data was collected through the application of two questionnaires, one for employees and another for employers (managers), for the identification of the current and future trends and needs of the SME sector regarding digital skills. In this way, digital skills gaps can be identified within organisations and a comprehensive analysis can be provided that allows the results obtained to be compared with the average responses in the sector. This comparison not only helps companies better understand their specific needs, but also provides valuable strategic insights by allowing managers to understand the priorities of other business leaders in their region.

This report details the results of the data collection in two parts: Employee questionnaire and Employers questionnaire. The aim is to provide a clear overview of existing digital competences and areas in need of development. The resulting analysis offers a starting point for SMEs to maximise their digital potential, promoting growth and innovation in the sector.

Employees

To analyse the need for digital skills in SMEs, we carried out data collection through questionnaires aimed at employees who do not hold management positions. The participation of these employees is crucial, as their answers help shape more than 40 industry- and demand-driven courses designed to address specific skills gaps. By taking part in our survey, employees contribute directly to the development of personalised training solutions that meet their needs. This analysis details the results obtained, providing valuable insights into the areas that need further development in terms of digital skills.

Global data will be analysed, followed by detailed segmentation by country, namely Portugal, Spain and Ireland.

Global

The questionnaire addressed to employees received a total of 47 responses, distributed as follows: 39 from Portugal, 6 from Ireland and 2 from Spain, as shown in Table 1. Table 5 - Number of Answers

	Portugal	Ireland	Spain
Number of	39	6	2
answers	00	Ū	2

In Table 2, the data is segmented by the sector of activity of the respondents' companies. The 'Information and Technology Services' sector had the highest number of responses, followed by the 'Advanced Manufacturing' sector.

Table 6 - Number of Answers	by sector of activity
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Sector of activity	Number of Answers
Information and technology services	8
Advanced manufacturing	7
Education and training	5
Telecommunications	5
Electronics	4
Business support and premises maintenance services	3
Research, design, and business management services	3
Automotive and aerospace	2
Non-governmental and membership organisations	2
Accommodation, Food and Leisure	1
Chemical and advanced materials	1
Energy technology and utilities	1
Energy technology and utilities	1
Medical and healthcare services	1
Oil and gas	1
Real estate	1
Supply chain and transportation	1

Most of the workers who answered the questionnaire work in companies with up to 49 employees, with a large proportion in companies with no more than 9 employees. Figure 1 shows the percentage of respondents according to company size.



Figure 40 - Number of employees in the companies.

When asked about the internationalisation of their company, the majority of respondents (55%) said that their company was present abroad. The statistics can be seen in table 3.

Table 7 - Place of activity

Place of		
International	26	55%
National	21	45%

Most respondents have been working for their company for at least 1 year and less than 5 years. This figure may indicate a high turnover between companies, as it is much higher than the number of people who have worked for more than 5 years (table 8).

Table 8 - Time working for the company.

Time working for the company		
Less than one year	7	
1-5 years	26	
5-10 years 5		
More than 10 years 9		

In terms of qualifications, the majority of respondents have a bachelor's or master's degree. Few of the workers have a doctorate or only secondary education (table 5).

Table 9 - Educational qualifications

Educational qualifications		
Secondary Education	2	
Technical or Vocational Qualification	1	
Bachelor's degree	18	
Master's degree	23	
PhD	3	

In addition to their educational qualifications, the majority of workers are currently employed in their field of study (table 6).

Table 10 -	Work in	the field	of study
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Work in field of study	
No	17
Yes	28
Not applicable	2

As far as working methods are concerned, workers say that the companies where they are employed work on a face-to-face or hybrid basis. There are still very few workers who say they are 100% online (table 7).

Table 11 - Working method.

Working method	
Remote work	7
Face-to-face work	21
Hybrid work	19

Starting the skills analysis, each worker was asked where they thought there was the biggest skills gap. Between soft skills and technical skills, the answers were practically tied. Transversal competences stood out by just one vote, as can be seen in table 8.

Table 12 - Larger skills gap

Larger skills gap		
Transversal Skills (soft skills)	24	51%
Technical Skills (hard skills)	23	49%

To analyse the transversal competences, each respondent was asked to classify some competences according to their degree of importance for their sector of activity, considering 7 to be extremely important. The competences presented were as follows: Analytical and Creative thinking; Resilience, flexibility and agility; Motivation and self-awareness; Curiosity and lifelong learning; Dependability and attention to detail; Empathy and active listening; Leadership and social influence Reading, writing and mathematics; Multi-lingualism; Manual dexterity, endurance, and precision. For the analysis, the average of the answers was taken, as can be seen in figure 41.



Figure 41 - Transversal skills

In order to analyse the technical competencies, each respondent was also asked to classify some competencies according to their degree of importance for their sector of activity, considering 7 to be extremely important. The skills presented were as follows: Financial Innovation and Technology; Blockchain; Cybersecurity; Data Analytics; Machine Learning; Digital Marketing; Web Development; Technological literacy; AI and big data; Design and user experience; Programming languages; Networks and cybersecurity; Resource management and operations; Marketing skills (including social media marketing); Cloud computing; Video editing; and Software testing.

Figure 42 shows that some skills, such as Blockchain and Video Editing, are still not very important to employees and the various business areas.



Figure 42 - Technical skills

Each worker was asked their opinion on the impact of digitalization, the green transition and generative AI on the labor market. It was found that digitalization has the greatest impact, followed by generative AI. These statistics are available in figure 43.



Figure 43 - Impact on the labor market

For a more effective analysis, each worker was asked what they consider to be the most important jobs over the next five years. Figure 44 shows the professions on a scale of 1 to 7, with 7 being considered the most important.

The orange line represents the number of people who answered that they had no knowledge of the professions.



Figure 44 - Jobs that will be the most important in the next 5 years

As with the previous analysis, each employee was asked which technologies they think will be most important in the next five years. In figure 45, the blue bars represent the technologies that are already used or will be used in the future. The orange line

represents the number of "don't know" answers. Some of the technologies have low usage figures, which may indicate lack of knowledge or non-applicability to the sectors under study.



Figure 45 - Technologies already used or that will be used in the next 5 years

With regard to transversal competences, the question was similar to the previous ones. Some competences that workers were not aware of stand out (Figure 46). However, in general, the transversal competences had a similar average and a high degree of importance.



Figure 46 - The most important transversal skills for the future.

Afterwards, each employee was asked about their cross-sectional skills (Figure 47). Once again, it emerged that some employees are not 100 percent sure what certain skills mean. However, the average for all soft skills is relatively similar.



Figure 47 - Transversal skills that each individual considers themselves to have

The previous question was repeated, but now for technical skills. The "blockchain" technical skill stands out, with a higher value for lack of knowledge and also a lower value for possession (figure 48).





When asked about the skills gap, the workers replied that they felt they had fewer technical skills (figure 49).



Figure 49 - Skills Gaps

After mentioning that they have a larger gap in technical skills, they were asked about the skills gap in specific areas. Figure 50 shows that financial technology has the smallest skills gap, while Artificial Intelligence has the largest technical skills gap.



Figure 50 - Skills gaps in any of the following area.

When asked about their company's commitment to closing digital skills gaps, the average response was 3.81, on a scale of 1 to 7. This indicates that companies are still not very committed to empowering their employees.

After this, they were asked about their training preferences. 53% of respondents say that their company provides in-house training when skills gaps are identified. In addition, 30% of respondents say that the training is short-term. In line with these percentages, employees say that around 30% of the time there is recruitment of new professionals.

Regarding the choice of training topics, 47% of employees say they are free to choose their training area, while 26% say they have to attend specific training.

Regarding the duration of the training, the answers were quite different, with the minimum value mentioned being 2 hours and the maximum value 54 hours. The average number of hours of training was 15 hours.

The percentual of 96 % of workers believe that the continuous development of digital skills is a necessity to remain competitive and adaptable in the long term, given today's constantly changing world.

On the question "*Do you think your job is in danger because of the digital advances we are seeing?*", 77% of the participants said they were not worried. However, 57% of the participants say that they have already done some kind of digital training to try to fill their gaps. 34% of the workers said that this training was selected by themselves, while 28% said that the training was provided by their company.

The percentual of 87% of the participants said that if they had the chance, they would take part in digital training courses to increase their digital skills. 14 of the participants said that it was very important for these digital training courses to be accredited by educational institutions.

Employees are keen to take part in short, intensive training courses (1-2 days); if this is not possible, they prefer to learn online at their own pace.

They have a preference for online or blended training that takes place during working hours or, alternatively, during the working week at the end of the day. Most prefer the training to be taught in English.

Portugal

After analysing the results together, we will now proceed to analyse the results for Portugal.

The data consists of 39 responses, these answers are from various regions of Portugal, which are available in table 9. These answers refer to workers from various sector of activity, you can check the areas of each worker in table 10.

Table 13 - Number of Answers by region

Region			
Região de Aveiro	٠	23	
Douro		4	
Área Metropolitana de Lisboa		4	
Viseu Dão Lafões		3	
Tâmega e Sousa		3	
Beira Baixa		1	
Região de Coimbra		1	

Sector of activity	Number of Answers
Information and technology services	8
Advanced manufacturing	7
Telecommunications	5
Electronics	1
Research, design, and business management services	3
Business support and premises maintenance services	2
Automotive and aerospace	0
Non-governmental and membership organisations	1
Accommodation, Food and Leisure	1
Oil and gas	1
Real estate	1
Education and training	1
Medical and healthcare services	1
Energy technology and utilities	1
Chemical and advanced materials	1
Supply chain and transportation	1
Energy technology and utilities	1

Table 14 - Number of Answers, by sector of activity

Most of the workers who responded to the questionnaire are employed in companies with up to 49 employees, with a significant proportion in companies with more than 10 employees and less than 49. Figure 51 illustrates the percentage of respondents based on the size of their company.



Figure 51 - Number of employees in the companies

When asked about the internationalization of their company, the majority of respondents (56%) indicated that their company has an international presence. The detailed statistics are presented in Table 11.

Table 15 - Place of activity

Place of		
International	22	56%
National	17	44%

The majority of respondents have been working at their company for at least 1 year but less than 5 years. This suggests a high turnover rate, as the number of employees in this tenure range is significantly higher than those who have been with their company for more than 5 years, as shown in Table 12.

Table 16 - Time working for the company.

Time working for the company		
Less than one year	7	
1-5 years	21	
5-10 years	3	
More than 10 years	8	

Regarding qualifications, most respondents hold a bachelor's or master's degree. Only a few workers have a doctorate or just a secondary education, as shown in Table 13.

Table 17 - Educational qualifications

Educational qualifications	
Secondary Education	2
Technical or Vocational Qualification	1
Bachelor's degree	15
Master's degree	18
PhD	3

In addition to their educational qualifications, most workers are currently employed in the field related to their area of study, as indicated in Table 14.

Table 18 - Work in the field of study

Work in the field of	study
Yes	26
No	11
Not applicable	2

Regarding working methods, workers report that the companies where they are employed operate either on a face-to-face or hybrid basis. There are still very few workers who state that they work entirely online, as outlined in Table 15.

Table 19 - Working method.

Working method		
Remote work	5	
Face-to-face work	21	
Hybrid work	13	

Beginning the skills analysis, each worker was asked to identify where they perceived the most significant skills gap within their respective domains. Responses between soft skills and technical skills were nearly evenly split. Transversal competences slightly edged out by 3 votes, as illustrated in Table 16.

Table 20 -	Larger	skills	gap
------------	--------	--------	-----

Larger skills gap		
Technical Skills (hard skills)	18	46%
Transversal Skills (soft skills)	21	54%

To assess transversal competencies, each respondent was tasked with ranking certain skills according to their perceived importance for their sector of activity, with 7 being deemed extremely important. The competencies included: Analytical and Creative Thinking; Resilience, Flexibility, and Agility; Motivation and Self-awareness; Curiosity and Lifelong Learning; Dependability and Attention to Detail; Empathy and Active Listening; Leadership and Social Influence; Reading, Writing, and Mathematics; Multilingualism; Manual Dexterity, Endurance, and Precision. For analysis, the average of the responses was calculated, as depicted in Figure 52.



Figure 52 - Transversal Skills

To analyse technical competencies, each respondent was asked to rank certain skills based on their perceived importance within their sector of activity, with 7 indicating extreme importance. The skills included: Financial Innovation and Technology; Blockchain; Cybersecurity; Data Analytics; Machine Learning; Digital Marketing; Web Development; Technological Literacy; AI and Big Data; Design and User Experience; Programming Languages; Networks and Cybersecurity; Resource Management and Operations; Marketing Skills (including Social Media Marketing); Cloud Computing; Video Editing; and Software Testing. Figure 53 illustrates that some skills, such as Blockchain and Video Editing, are still deemed less important by employees across various business sectors.



Figure 53 - Technical skills

Each worker was surveyed regarding their perspective on the influence of digitalization, the ecological transition, and generative AI on the job market. Results indicated that digitalization has the most significant impact, followed closely by generative AI. These findings are illustrated in Figure 54.



Figure 54 - Impact on the labour market

For a more comprehensive analysis, each worker was questioned about the professions they deemed most crucial over the next five years. Figure 55 depicts the significance of these professions on a scale of 1 to 7, with 7 indicating the highest importance. The orange line represents the number of respondents who indicated they had no knowledge of the professions.



Figure 55 - Jobs that will be the most important in the next 5 years

As in the previous analysis, each employee was asked which technologies they considered most important in the next five years. In Figure 56, the blue bars represent the technologies that are already in use or will be used in the future. The orange line represents the number of "don't know" answers. Some of the technologies have low usage figures, which may indicate a lack of knowledge or their non-applicability in the sectors under study.



Figure 56 - Technologies already used or that will be used in the next 5 years

Regarding transversal competences, the inquiry mirrored previous ones. Notably, some competences that workers were unaware of garnered attention (Figure 57). Nevertheless, overall, transversal competences exhibited a consistent average and were regarded as highly important.



Figure 57 - The most important transversal skills for the future

Subsequently, each employee was questioned about their cross-sectional skills (Figure 58). Once more, it became evident that some employees are not entirely certain about the meaning of certain skills. Nonetheless, the average for all soft skills remains relatively consistent.



Figure 58 - The most important technical skills for the future



This time focusing on transversal skills. Notably, the "curiosity and lifelong learning" transversal (Figure 59).

Figure 59 - The most important technical skills for the future

The preceding question was reiterated, this time focusing on technical skills. Notably, the "blockchain" technical skill stands out, exhibiting both a higher value for lack of knowledge and a lower value for possession (Figure 60).



Figure 60 - Technical skills that each individual considers themselves to have

When questioned about the skills gap, workers indicated that they perceived themselves as having fewer technical skills (Figure 61).



Figure 61 - Skills Gaps

Having acknowledged a larger gap in technical skills, respondents were then queried about specific areas of skills gap. Figure 62 illustrates that financial technology exhibits the smallest skills gap, whereas Artificial Intelligence presents the largest technical skills gap.



Figure 62 - Skills gaps in any of the following areas

When queried about their company's dedication to addressing digital skills gaps, the average response stood at 3.90 on a scale of 1 to 7. This suggests that companies are still not particularly committed to empowering their employees in this regard. Subsequently, employees were asked about their training preferences. It was found that 40% of respondents reported their company providing internal training upon identifying skills gaps. Additionally, 21% stated that such training programs are short-term. Aligning with these statistics, employees mentioned that about 26% of the time, there is recruitment of new professionals to address skills shortages.

Regarding the selection of training topics, 36% of employees expressed freedom to choose their training area, while 23% indicated they are required to attend specific training. As for the duration of training, responses varied significantly, ranging from a minimum of 3 hours to a maximum of 50 hours. On average, employees reported undergoing 18 hours of training. An overwhelming 96% of workers believe that continuous development of digital skills is imperative for remaining competitive and adaptable in today's ever-evolving landscape.

In response to the question "Do you think your job is in danger due to digital advances?" 77% of participants expressed no concern. However, 57% mentioned having undertaken digital training to address their skill gaps. Of these, 30% selected the training themselves, while 23% received training provided by their company. Furthermore, 87% of participants expressed willingness to partake in digital training courses to enhance their skills, with 11 participants emphasizing the importance of accreditation by educational institutions for such courses.

Employees showed a preference for short, intensive training courses lasting 1-2 days. Alternatively, if this is not feasible, they prefer self-paced online or blended training during working hours or at the end of the workday. Additionally, most preferred training conducted in local language (Portuguese).

Employers

To analyse the necessity for digital skills in SMEs, we conducted data collection via questionnaires targeted at employers holding leadership or managerial positions. Obtaining feedback from these individuals is essential due to their management roles within the organization. Their insights play a pivotal role in shaping over 40 industry- and demand-driven courses tailored to address specific skills gaps. By participating in our survey, leaders and managers directly contribute to the development of personalized training solutions that cater to their needs and those of their teams. This analysis provides a comprehensive overview of the results obtained, offering valuable insights into areas requiring further development in terms of digital skills.

The analysis encompasses global data analysis, followed by detailed segmentation by country, specifically focusing on Portugal, Spain, and Ireland.

Global

The questionnaire sent to the employers received a total of 50 responses, distributed as shown in table 17.

Countra	Number of
Country	Answers
Portugal	22
Spain	14
Irland	14

Table 21 -	Number	of Answers.	bv	Countr	v
	i turrio ci	0, 1, 11, 5, 10, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	~ y	country	y

Table 18 displays data segmented by the industry sectors of the respondents' respective companies. The sector with the highest number of responses is "Information and Technology Services", followed closely by the "Education and training" sector.

Sector of Activity	Number of
	Answers
Information and technology services	18
Education and training	5
Research, design, and business management services	4
Advanced manufacturing	4
Electronics	3
Medical and healthcare services	3
Automotive and aerospace	3
Production of consumer goods	2
Financial services and capital markets	2
Telecommunications	2
Chemical and advanced materials	1
Accommodation, Food and Leisure	1
Infrastructure	1
Retail and wholesale of consumer goods	1
Energy technology and utilities	1
Oil and gas	1
Media, Entertainment and Sports	1

Table 22 - Number of Answers by sector of activity

The majority of respondents to the questionnaire are employed by companies with up to 49 employees, with a significant proportion working in companies with no more than 9 employees. Figure 63 illustrates the distribution of respondents based on company size.



Figure 63 - Number of employees in the companies

Employers were asked about the age of their workers. According to the workers' answers, the majority are under 40.



Figure 64 - Age of employees

Also with regard to workers, employers were asked about their average level of education. Figure 65 shows that most employees have a bachelor's or master's degree.



Figure 65 - Educational qualifications

Regarding the internationalization of companies, 60% of companies are present in other countries. Figure 66 shows the countries mentioned by the employers. Most employers said that they work remotely.



Figure 66 - Most mentioned countries

When asked where there is the biggest skills gap, the employers mentioned that there is the biggest gap in transversal skills. Although the results are very close between the 2 types of skills, this trend contradicts the opinion of the employees (previously analysed).



Figure 67 - Larger skills gap

To assess transversal skills, each respondent was tasked with rating several competencies based on their perceived importance within their industry sector. Participants were instructed to assign a rating on a scale of 1 to 7, with 7 indicating extreme importance. The competencies evaluated included Analytical and Creative Thinking; Resilience, Flexibility, and Agility; Motivation and Self-awareness; Curiosity and Lifelong Learning; Dependability and Attention to Detail; Empathy and Active Listening; Leadership and Social Influence; Reading, Writing, and Mathematics; Multilingualism; and Manual Dexterity, Endurance, and Precision. The analysis involved calculating the average ratings of the responses, as depicted in Figure 68.



Figure 68 - Transversal skills

To evaluate technical competencies, each respondent was requested to rank specific skills according to their perceived importance within their industry sector. Respondents were instructed to assign a rating on a scale of 1 to 7, with 7 indicating extreme importance. The skills assessed included Financial Innovation and Technology; Blockchain; Cybersecurity; Data Analytics; Machine Learning; Digital Marketing; Web Development; Technological Literacy; AI and Big Data; Design and User Experience; Programming Languages; Networks and Cybersecurity; Resource Management and Operations; Marketing Skills (including Social Media Marketing); Cloud Computing; Video Editing; and Software Testing.

Figure 69 reveals that certain skills, such as Blockchain and Video Editing, remain relatively less significant to employees across various business sectors.



Figure 69 - Technical Skills

Each worker was surveyed about their perspective on the effects of digitalization, the green transition, and generative AI on the labor market. The findings indicate that digitalization has the most significant impact, followed by generative AI. These statistics can be found in Figure 70.



Figure 70 - Impact on the labor market

To enhance the analysis, each worker was queried about the occupations they perceive as most crucial over the next five years. Figure 71 displays these professions on a scale of 1 to 7, with 7 indicating the highest importance. The orange line represents the number of respondents who indicated having no knowledge of the professions.



Figure 71 - Jobs that will be the most important in the next 5 years

Similar to the preceding analysis, each employee was questioned about the technologies they anticipate will be most crucial in the next five years. Figure 72 illustrates the technologies represented by the blue bars, denoting those currently in use or expected to be used in the future. The orange line represents the number of "don't know" responses. Notably, certain technologies exhibit low usage figures, which could suggest either a lack of awareness or their limited applicability to the sectors under study.



Figure 72 - Technologies already used or that will be used in the next 5 years

The employers were asked about the presence of transversal competences in their companies. It was found that some competences are less well represented (blue bars). However, they are also the ones with the highest number of lack of knowledge (orange line).



Figure 73 - Presence of transversal skills in companies

The previous question was repeated, but now about technical skills. The data is shown in figure 74, which shows that there are few blockchain technical skills.



Figure 74 - Presence of technical skills in companies

The employers were asked to name the soft skills they consider most important for the future. The results are shown in the figure below.



Figure 75 - Transversal Skills for future

Like the previous figure, figure 76 shows the most important technical skills for the future according to the opinion of the employers.



Figure 76 - Technical skills for future

The employers were asked to name the jobs they consider most important for the future on a scale of 1 to 7. The results are shown in figure 77.

The high number of "don't know" answers stand out, which shows a high level of uncertainty about the future of the job market.



Figure 77 - The most important jobs for the future

The answer to the following question "Looking ahead, what emerging digital skills or technologies do you expect to be critical to your industry or organization in the next 2-5 years?" resulted in a variety of answers. These answers have been compiled and can be seen in the word cloud below (figure 78).



Figure 78 - Emerging digital skills or technologies in the next 2-5 years

In addition, they were also asked what their greatest current training needs were. The answers were compiled into a word cloud which can be analyzed in figure 79. AI and blockchain skills stand out.


Figure 79 - Current training needs

Regarding the training of the professionals already hired, the employers were questioned in various ways.

On a scale of 1 to 7, they were asked to mention the need for training for various types of professionals. The answers are shown in figure 80. It stands out that the greatest need for training is in the category of newly trained professionals.



Figure 80 - Need to train the professionals employed

That said, it's important to understand how employers identify training needs. They were therefore asked how they carry out their diagnosis. The answers were varied and have been included in the word cloud (figure 81).



Figure 81 - Identifying training needs

Employers were asked how they finance their training. The majority said that it was financed internally, i.e. by the company itself.



Figure 82 - Types of funding

Regarding the method of recruitment, the employers mentioned that the most used method is LinkedIn, and the least used is job fairs.



Figure 83 - Recruitment method

Regarding the method of assessing competencies in recruitment, the employers mentioned that most of the time the assessment is carried out through CVs and experience.



Figure 84 - Skills assessment in recruitment

Although 95% of employers mentioned that the continuous development of digital skills is a necessity for their employees to remain competitive and adaptable in the long term, there are some barriers to the transformation/evolution of companies. The barrier most often mentioned by employers is the inability to attract talent.



Figure 85 - Barriers to the transformation/evolution of companies

When asked about the employers' own skills gaps, one skill stood out as the greatest need for training. This skill is related to Artificial Intelligence.



Figure 86 - Skills gap

Regarding the question "Has your organization faced challenges in recruiting candidates with the desired digital skills mentioned (Innovation and Financial Technology, Artificial Intelligence, Blockchain, Cybersecurity, Data Analytics; Machine Learning, Digital Marketing; Web Development)? " 58% of participants mentioned seeing this difficulty. In addition, 58% of employers also mentioned that they had to allocate extra resources to training their employees. 64% of employers mentioned that they would be interested in hiring individuals who had successfully completed a digital skills training program.

In addition to the before mentioned barriers, employers were asked to mention specific challenges or obstacles they foresee when implementing training programs. Several

obstacles were mentioned. These answers were organized in a word cloud, available in figure 87.



Figure 87 - Barriers to implementing training programs

Regarding the importance of training accredited by recognised higher education institutions or other awarding/recognising bodies, 18% of employers said it was very important and 47% said it was important.

Table 23 - Importance of training accreditation

The importance of training accreditation			
Very important	10	18%	
Important	26	47%	
Neutral	12	22%	
Not important	7	13%	

Regarding training methods, the majority prefer online or blended training.



Figure 88 - Training preferences

In terms of the duration of the training, the majority prefer it to take place during working hours.



Figure 89 - Training Preferences - Timing

Portugal

The survey sent to employers yielded a total of 22 responses from Portuguese employers. Table 20 presents data segmented by the industry sectors of the respondents' respective companies. The sector with the highest number of responses is "Information and Technology Services", closely followed by the "Medical and healthcare services" sector.

Sector of activity	Number of Answers
Information and technology services	8
Medical and healthcare services	3
Research, design, and business management services	2
Automotive and aerospace	2
Accommodation, Food and Leisure	1
Electronics	1
Financial services and capital markets	1
Advanced manufacturing	1
Media, Entertainment and Sports	1

Table 25 shows the responses by region of Portugal.

Table 25 - Number of Answers by region

Region	
Douro	2
Aveiro Region	16
Viseu Dão Lafões	2
Beiras and Serra da Estrela	1
Tâmega and Sousa	1

The questionnaire predominantly received responses from individuals employed by companies with up to 49 employees, with a notable portion working in companies with fewer than 9 employees. Figure 90 visually represents the distribution of respondents according to company size.



Figure 90 - Number of employees in the companies

Employers were questioned about the age demographics of their workforce. According to their responses, most workers are under the age of 40.



Figure 91 - Age of employees

Similarly, concerning the workforce, employers were inquired about the average level of education. Figure 92 indicates that the majority of employees hold either a bachelor's or master's degree.



Figure 92 - Educational qualifications

Concerning the internationalization of companies, 40% of them operate in foreign markets. Figure 93 illustrates the countries mentioned by the employers. Additionally, most employers stated that they conduct remote work.



Figure 93 - Foreign markets

In response to the question regarding the location of the most significant skills gap, employers indicated that the largest gap exists in transversal skills. Despite both types of skills showing close results, this trend contradicts the opinion expressed by employees, as analyzed previously.



Figure 94 - Larger skills

To evaluate transversal skills, each respondent was tasked with rating several competencies based on their perceived importance within their industry sector. Participants were asked to rate these competencies on a scale of 1 to 7, with 7 indicating extreme importance. The competencies assessed included Analytical and Creative Thinking; Resilience, Flexibility, and Agility; Motivation and Self-awareness; Curiosity and Lifelong Learning; Dependability and Attention to Detail; Empathy and Active Listening; Leadership and Social Influence; Reading, Writing, and Mathematics; Multilingualism; and Manual Dexterity, Endurance, and Precision. The analysis involved calculating the average ratings of the responses, as depicted in Figure 95.



Figure 95 - Transversal skills

In assessing technical competencies, each respondent was tasked with ranking specific skills based on their perceived importance within their industry sector. They were asked to rate these skills on a scale of 1 to 7, with 7 indicating extreme importance. The skills evaluated encompassed a wide range, including Financial Innovation and Technology; Blockchain; Cybersecurity; Data Analytics; Machine Learning; Digital Marketing; Web Development; Technological Literacy; AI and Big Data; Design and User Experience; Programming Languages; Networks and Cybersecurity; Resource Management and Operations; Marketing Skills (including Social Media Marketing); Cloud Computing; Video Editing; and Software Testing. Figure 96 illustrates those certain skills, such as Blockchain and "Networks and cybersecurity", are considered relatively less significant by employees across various business sectors.



Figure 96 - Technical skills

Each employee was surveyed regarding their views on the impacts of digitalization, the green transition, and generative AI on the labor market. The results highlight that digitalization has the greatest influence, with generative AI following closely behind. These statistics are available in Figure 97.



Figure 97 - Impact on the labor market

To enrich the analysis, each employee was asked about the occupations they consider most critical over the next five years. Figure 98 illustrates these professions on a scale of 1 to 7, where 7 represents the highest importance. The orange line depicts the number of respondents who reported having no knowledge of these professions.



Figure 98 - Jobs that will be the most important in the next 5 years

Following a pattern like the previous analysis, each employee was surveyed about the technologies they believe will be essential in the next five years. Figure 99 showcases these technologies through blue bars, signifying those presently in use or anticipated for future adoption. The orange line reflects the number of "don't know" responses. Notably, some technologies exhibit low usage figures, indicating either a lack of awareness or their limited relevance to the sectors under investigation.



Figure 99 - Technologies already used or that will be used in the next 5 years

Employers were queried about the prevalence of transversal competencies within their companies. The findings revealed that certain competencies are less represented (indicated by the blue bars). Interestingly, these competencies also correspond to the highest number of respondents reporting a lack of knowledge (depicted by the orange line).



Figure 100 - Presence of transversal skills in companies

The preceding question was revisited, this time focusing on technical skills. The data is illustrated in Figure 101, revealing a scarcity of blockchain technical skills.



Figure 101 - Presence of technical skills in companies

Employers were prompted to identify the soft skills they deem most crucial for the future. The ensuing results are depicted in the figure below.



Figure 102 - Transversal Skills for future

Similarly to the preceding figure, figure 103 displays the technical skills considered most important for the future, as per the employers' perspective.



Figure 103 - Technical Skills for future

Employers were requested to rank the jobs they deem most vital for the future on a scale of 1 to 7. The outcomes are depicted in Figure 104. Notably, a significant number of "don't know" responses are evident, indicating a considerable level of uncertainty regarding the future job market.



Figure 104 - The most important jobs for the future

Responses to the question, "Looking ahead, what emerging digital skills or technologies do you expect to be critical to your industry or organization in the next 2-5 years?" varied widely. These responses have been aggregated and are visualized in the word cloud below (Figure 105).



Figure 105 - Emerging digital skills to the next 2-5 years

Furthermore, they were queried about their most pressing current training requirements. The responses were collated into a word cloud, which is available for analysis in Figure 106. Notably, AI and blockchain skills emerge prominently.



Figure 106 - Current needs of training

Inquiring about the training of already employed professionals, employers were posed with varied questions. They were asked to rate the necessity for training across different professional categories on a scale of 1 to 7. The responses are depicted in Figure 107. Particularly notable is the pronounced need for training in the category of newly hired professionals.



Figure 107 - Need to train the professionals employed.



Employers were questioned about the financing of their training initiatives. The majority indicated internal financing, meaning the company itself covers the costs.

Figure 108 - Types of funding

Concerning recruitment methods, employers indicated that the most utilized approach is through LinkedIn, while the least employed method is via job fairs.



Figure 109 - Recruitment method

When discussing competency assessment methods in recruitment, employers noted that CVs and professional experience are the most frequently utilized means of evaluation.



Figure 110 - Skills assessment in recruitment.

While 95% of employers emphasized the imperative of continuous digital skills development for their employees to maintain long-term competitiveness and adaptability, certain obstacles hinder companies' transformation or evolution. The most frequently cited barrier by employers is the challenge of attracting talent.



Figure 111 - Barriers to the transformation/evolution of companies.

Inquiring about employers' own skills gaps revealed a significant demand for training in one area: Artificial Intelligence.



Figure 112 - Skills gap

In response to the question, "Has your organization encountered challenges in recruiting candidates with the desired digital skills (Innovation and Financial Technology, Artificial Intelligence, Blockchain, Cybersecurity, Data Analytics, Machine Learning, Digital Marketing, Web Development)?" 55% of participants acknowledged facing such difficulties. Additionally, 55% of employers reported allocating extra resources to employee training. Furthermore, 100% of employers expressed interest in hiring individuals who had successfully completed a digital skills training program.

Regarding the significance of training accredited by recognized higher education institutions or other awarding bodies, 18% of employers deemed it very important, while 45% considered it important.

The importance of training accreditation			
Very important	4	18%	
Important	10	45%	
Neutral	6	27%	
Not important	2	9%	

Table 26 - Importance o	f training	accreditation
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In terms of training preferences, the majority favor online or blended training approaches.



Figure 113 - Training Preferences - Modality

When it comes to training duration, the majority prefer it to occur during working hours.



Figure 114 - Training Preferences - Timing

Spain

The survey administered to employers garnered a total of 14 responses from Spanish employers. Table 23 delineates the data segmented by the industry sectors of the respondents' respective companies. Notably, the "Information and Technology Services" sector recorded the highest number of responses, closely trailed by the "Education and Training" sector.

Sector of Activity	Number of
	Answers
Information and technology services	7
Education and training	4
Medical and healthcare services	1
Financial services and capital markets	1
Media, Entertainment and Sports	1

Table 27 - Number of Answers by sector of activity

Table 24 shows the responses by region of Spain.

Table 28 -	Number	of Answers	by	Region
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Region	
Barcelona	11
León	1
Girona	1
Cantabria	1

The questionnaire primarily attracted responses from individuals employed by companies with up to 49 employees, with a significant proportion working in companies with fewer than 9 employees. Figure 115 visually illustrates the distribution of respondents based on company size.



Figure 115 - Number of employees in the companies

Employers were asked about the age composition of their workforce. According to their responses, most workers are under 40 years old.



Figure 116 - Age of employees

Likewise, when it comes to the workforce, employers were asked about the average educational attainment. Figure 117 illustrates that the majority of employees possess either a bachelor's or master's degree.



Figure 117 - Educational qualifications

Responding to the inquiry about the location of the most substantial skills gap, employers pointed out that the largest gap lies in transversal skills. Despite both types of skills showing similar results, this trend contradicts the opinion expressed by employees, as analyzed earlier.



Figure 118 - Skills Gap

To assess transversal skills, each respondent was tasked with rating various competencies based on their perceived importance within their industry sector. Participants rated these competencies on a scale of 1 to 7, with 7 indicating extreme importance. The competencies evaluated included Analytical and Creative Thinking; Resilience, Flexibility, and Agility; Motivation and Self-awareness; Curiosity and Lifelong Learning; Dependability and Attention to Detail; Empathy and Active Listening; Leadership and Social Influence; Reading, Writing, and Mathematics; Multilingualism; and Manual Dexterity, Endurance, and Precision. The analysis involved calculating the average ratings of the responses, as illustrated in Figure 119.



Figure 119 - Transversal Skills

When evaluating technical competencies, each respondent was tasked with ranking specific skills based on their perceived importance within their industry sector. They were requested to rate these skills on a scale of 1 to 7, with 7 indicating extreme importance. The skills assessed encompassed a wide range, including Financial Innovation and Technology; Blockchain; Cybersecurity; Data Analytics; Machine Learning; Digital Marketing; Web Development; Technological Literacy; Al and Big Data; Design and User Experience; Programming Languages; Networks and Cybersecurity; Resource Management and Operations; Marketing Skills (including Social Media Marketing); Cloud Computing; Video Editing; and Software Testing. Figure 120 illustrates those certain skills, such as Blockchain and Networks and Cybersecurity, are considered relatively less significant by employees across various business sectors.



Figure 120 - Technical Skills

Every employee was surveyed about their perspectives on the impacts of digitalization, the green transition, and generative AI on the labor market. The findings underscore that digitalization exerts the most significant influence, with generative AI trailing closely behind. These statistics are depicted in Figure 121.



Figure 121 - Impact on the labor market

To enhance the analysis, each employee was questioned about the occupations they deem most critical over the next five years. Figure 122 portrays these professions on a scale of 1 to 7, with 7 indicating the highest importance. The orange line represents the number of respondents who indicated having no knowledge of these professions.



Figure 122 - Jobs that will be the most important in the next 5 years

Continuing with a similar approach as the preceding analysis, each employee was queried about the technologies they perceive as essential in the next five years. Figure 123 illustrates these technologies using blue bars, indicating those currently in use or expected for future adoption. The orange line represents the number of "don't know" responses. Notably, certain technologies show low usage figures, suggesting either a lack of awareness or their limited relevance to the sectors under examination.



Figure 123 - Technologies already used or that will be used in the next 5 years

Employers were queried about the prevalence of transversal competencies within their companies. The findings revealed that certain competencies are less represented (indicated by the blue bars). Interestingly, these competencies also correspond to the highest number of respondents reporting a lack of knowledge (depicted by the orange line).



Figure 124 - Presence of transversal skills in companies

The previous inquiry was revisited, this time centering on technical skills. The data is depicted in Figure 125, unveiling a shortage of blockchain technical expertise.



Figure 125 - Presence of technical skills in companies



Employers were asked to pinpoint the soft skills they consider most critical for the future. The ensuing results are illustrated in the figure below.

Figure 126 - Transversal Skills for the future

Similarly to the previous figure, Figure 127 showcases the technical skills deemed most important for the future, as perceived by employers.



Figure 127 - Technical Skills for the future

Employers were asked to assess the importance of various jobs for the future by ranking them on a scale from 1 to 7. The results are shown in Figure 128. Notably, there were a notable number of responses indicating uncertainty ("don't know"), suggesting significant uncertainty about the future job market.



Figure 128 - The most important jobs for the future

Responses to the inquiry, "What emerging digital skills or technologies do you anticipate will be crucial to your industry or organization in the next 2-5 years?" exhibited diverse perspectives. These insights have been compiled and are presented visually in the word cloud below (Figure 129).



Figure 129 - Digital skills or technologies critical in the next 2-5 years

Additionally, they were asked about their immediate training needs. The collected responses were condensed into a word cloud, accessible for examination in Figure 130. Noteworthy is the prominent emergence of AI and blockchain skills.



Figure 130 - Immediate training needs

When questioning employers about the training of their existing staff, a range of inquiries was posed. They were tasked with assessing the importance of training across various

professional categories using a scale of 1 to 7. The results are illustrated in Figure 131. Especially remarkable is the significant demand for training in the category of newly hired professionals.



Figure 131 - Need to train professionals employed



Figure 132 - Types of assessment

Employers were questioned about the financing of their training initiatives. The majority indicated internal financing, meaning the company itself covers the costs, or free-of-cost training.



Figure 133 - Types of funding

Concerning recruitment methods, employers indicated that the most utilized approach is through LinkedIn, while the least employed method is via job fairs.



Figure 134 - Recruitment method

When discussing competency assessment methods in recruitment, employers noted that CVs, professional experience and tests are the most frequently utilized means of evaluation.



Figure 135 - Skills assessment in recruitment

Despite 95% of employers stressing the vital need for ongoing digital skills development among their employees to ensure long-term competitiveness and adaptability, several obstacles impede companies' transformation or progression. The most mentioned hurdle cited by employers is the difficulty in attracting talent.



Figure 136 - Barriers to the transformation/evolution of companies

Inquiring about employers' own skills gaps revealed a significant demand for training in two areas: Artificial Intelligence and Blockchain.



Figure 137 - Skills gap

In response to the question, "Has your organization encountered challenges in recruiting candidates with the desired digital skills (Innovation and Financial Technology, Artificial Intelligence, Blockchain, Cybersecurity, Data Analytics, Machine Learning, Digital Marketing, Web Development)?" 40% of participants acknowledged facing such difficulties. Additionally, 40% of employers reported allocating extra resources to employee training. Furthermore, 100% of employers expressed interest in hiring individuals who had successfully completed a digital skills training program. Regarding the significance of training accredited by recognized higher education institutions or other awarding bodies, 50% of employers deemed it important.

The importance of training accreditation			
Very important	1	7%	
Important	7	50%	
Neutral	4	29%	
Not important	2	14%	

Table 29 - Importance	e of training	accreditation
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In terms of training preferences, the majority favor online or blended training approaches.


Figure 138 - Training Preferences - Modality

When it comes to training duration, the majority prefer it to occur during working hours.



Figure 139 - Training Preferences - Timing

Ireland

The survey sent to employers yielded a total of 14 responses from Portuguese employers. Table 26 presents data segmented by the industry sectors of the respondents' respective companies. The sector with the highest number of responses is "Research, design, and business management services", closely followed by the "Advanced manufacturing, Automotive and aerospace and Production of consumer goods" sector.

Sector of Activity	Number of Answers
Research, design, and business management services	2
Advanced manufacturing	2
Automotive and aerospace	2
Production of consumer goods	2
Information and technology services	1
Education and training	1
Financial services and capital markets	1
Infrastructure	1
Retail and wholesale of consumer goods	1
Energy technology and utilities	1

Table 30 - Number of Answers by sector of activity

Table 27 shows the responses by region of Ireland.

Region	
Mid-West	1
Mid-East	1
South-Eas	2
Dublin	10

The questionnaire predominantly received responses from individuals employed by companies with up more than 250 employees. Figure 140 visually represents the distribution of respondents according to company size.



Figure 140 - Number of employees in companies

Employers were queried about the age demographics of their workforce. According to their responses, most workers are under the age of 40.



Figure 141 - Age of employees

Similarly, concerning the workforce, employers were inquired about the average level of education. Figure 142 indicates that most employees hold either a bachelor's or master's degree.



Figure 142 - Educational qualifications

In response to the question regarding the location of the most significant skills gap, employers indicated that the largest gap exists in technical skills. Despite both types of skills showing close results, this trend contradicts the opinion expressed in the others countries, namely Portugal and Spain.



Figure 143 - Larger skills gap

To evaluate transversal skills, each respondent was tasked with rating several competencies based on their perceived importance within their industry sector. Participants were asked to rate these competencies on a scale of 1 to 7, with 7 indicating extreme importance. The competencies assessed included Analytical and Creative Thinking; Resilience, Flexibility, and Agility; Motivation and Self-awareness; Curiosity and Lifelong Learning; Dependability and Attention to Detail; Empathy and Active Listening; Leadership and Social Influence; Reading, Writing, and Mathematics; Multilingualism; and Manual Dexterity, Endurance, and Precision. The analysis involved calculating the average ratings of the responses, as depicted in Figure 144.



Figure 144 - Transversal Skills

In assessing technical competencies, each respondent was tasked with ranking specific skills based on their perceived importance within their industry sector. They were asked to rate these skills on a scale of 1 to 7, with 7 indicating extreme importance. The skills evaluated encompassed a wide range, including Financial Innovation and Technology; Blockchain; Cybersecurity; Data Analytics; Machine Learning; Digital Marketing; Web Development; Technological Literacy; AI and Big Data; Design and User Experience; Programming Languages; Networks and Cybersecurity; Resource Management and Operations; Marketing Skills (including Social Media Marketing); Cloud Computing; Video Editing; and Software Testing. Figure 145 illustrates those certain skills, such as Blockchain and "Networks and cybersecurity", are considered relatively less significant by employees across various business sectors.



Figure 145 - Technical Skills

Each employee was surveyed regarding their views on the impacts of digitalization, the green transition, and generative AI on the labor market. The results highlight that digitalization has the greatest influence, with generative green transition following closely behind. These statistics are available in Figure 146.



Figure 146 - Impact on the labor market

To enrich the analysis, each employee was asked about the occupations they consider most critical over the next five years. Figure 147 illustrates these professions on a scale of 1 to 7, where 7 represents the highest importance. The orange line depicts the number of respondents who reported having no knowledge of these professions.



Figure 147 - Jobs that will be the most important in the next 5 years

To enrich the analysis, each employee was asked about the occupations they consider most critical over the next five years. Figure 148 illustrates these professions on a scale of 1 to 7, where 7 represents the highest importance. The orange line depicts the number of respondents who reported having no knowledge of these professions.



Figure 148 - Technologies already used or that will be used in the next 5 years

Employers were queried about the prevalence of transversal competencies within their companies. The findings revealed that certain competencies are less represented (indicated by the blue bars). Interestingly, these competencies also correspond to the highest number of respondents reporting a lack of knowledge (depicted by the orange line).



Figure 149 - Presence of transversal skills in companies



The preceding question was revisited, this time focusing on technical skills. The data is illustrated in Figure 150, revealing a scarcity of blockchain technical skills.

Figure 150 - Presence of technical skills in companies

Employers were prompted to identify the soft skills they deem most crucial for the future. The ensuing results are depicted in the figure below.



Figure 151 - Transversal Skills for future

Similarly to the preceding figure, Figure 152 displays the technical skills considered most important for the future, as per the employers' perspective.



Figure 152 - Technical Skills for future

Employers were requested to rank the jobs they deem most vital for the future on a scale of 1 to 7. The outcomes are depicted in Figure 153. Notably, a significant number of "don't know" responses are evident, indicating a considerable level of uncertainty regarding the future job market.



Figure 153 - The most important jobs for the future

Inquiring about the training of already employed professionals, employers were posed with varied questions. They were asked to rate the necessity for training across different professional categories on a scale of 1 to 7. The responses are depicted in Figure 154. Particularly notable is the pronounced need for training in the category of newly hired professionals.



Figure 154 - Need to train the professionals employed

Employers were questioned about the financing of their training initiatives. The majority indicated internal financing, meaning the company itself covers the costs.



Figure 155 - Types of funding

Concerning recruitment methods, employers indicated that the most utilized approach is through LinkedIn, while the least employed method is via job fairs.



Figure 156 - Recruitment method

When discussing competency assessment methods in recruitment, employers noted that CVs and professional experience are the most frequently utilized means of evaluation.



Figure 157 - Skills assessments in recruitment.

While 95% of employers emphasized the imperative of continuous digital skills development for their employees to maintain long-term competitiveness and adaptability, certain obstacles hinder companies' transformation or evolution. The most frequently cited barrier by employers is the challenge of attracting talent.



Figure 158 - Barriers to the transformation/evolution of companies.

Inquiring about employers' own skills gaps revealed a significant demand for training in two areas: Artificial Intelligence and Data Analytics & Machine Learning.



Figure 159 - Skills gap

In response to the question, "Has your organization encountered challenges in recruiting candidates with the desired digital skills (Innovation and Financial Technology, Artificial Intelligence, Blockchain, Cybersecurity, Data Analytics, Machine Learning, Digital Marketing, Web Development)?" 64% of participants acknowledged facing such difficulties. Additionally, 71% of employers reported allocating extra resources to employee training. Furthermore, 78% of employers expressed interest in hiring individuals who had successfully completed a digital skills training program. Regarding the significance of training accredited by recognized higher education institutions or other awarding bodies, 29% of employers deemed it very important, while 43% considered it important.

Table 32 - Importance o	f training accredit	ation
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The importance of training accreditation			
Very important	4	29%	
Important	6	43%	
Neutral	2	14%	
Not important	2	14%	

17

In terms of training preferences, the majority prefer blended or face-to-face training approaches.



Figure 160 - Training Preferences - timing

When it comes to training duration, the majority prefer it to occur during working hours.



Figure 161 - Training Preferences - timing

Chapter Seven: Qualitative Analysis Report: DigiAdvance Project Interviews

The purpose of this section is to provide a qualitative analysis of the semi-structured interview conducted as part of Work Package 2 for the DigiAdvance project. The analysis aims to distil insights from key business leaders on the current and future digital skills needs within their organisations, potential training gaps and the overall effectiveness of existing training initiatives. This analysis will help to tailor the DigiAdvance project's course offerings to better serve the SME sector and increase their attractiveness.

The interview consisted of a series of structured questions exploring various aspects of digital skills requirements in SMEs, including the organisation's current digital capabilities, the demographic and educational make-up of its workforce, and its commitment to the ongoing digital development of its workforce. The interview, which lasted between 45 and 60 minutes, was audio and video recorded with the participant's consent to ensure confidentiality and anonymity in the treatment of the data.

The Qualitative Analysis section presents the comprehensive results derived from data collected through interviews, meticulously analysed both on a per-country basis and comparatively across the three countries involved: Portugal, Ireland, and Spain.

The comparative analysis section synthesizes the findings from Portugal, Ireland, and Spain, identifying common trends, challenges, and opportunities across these countries. It highlights similarities and differences in the digital skills gaps, the effectiveness of training programs, and the overall digital readiness of SMEs. This section aims to provide a holistic view of the digital skills landscape in Europe, offering insights into how different regional contexts influence digital skills development. It also suggests collaborative approaches and shared strategies that can be employed to address common challenges, fostering a more cohesive and integrated digital economy across these countries.

By presenting a detailed and multi-faceted analysis of the qualitative data collected through interviews, this section provides stakeholders with actionable insights and strategic recommendations to enhance digital skills development within SMEs in Portugal, Ireland, and Spain.

Portugal

Questions 1 to 8

Based on the responses from the seven interviews, the summary of the answers to questions 1 to 8 provides a snapshot of the profile and activities of the organisations. The organisations are predominantly active in sectors such as software development, digital solutions and component manufacturing. Roles within these companies range from managerial positions to executive roles such as COO and CEO. Most of the organisations are based in Aveiro and Coimbra, and the number of employees varies from small teams of 2 to larger teams of up to 250. The average age of employees tends to be between 30 and 44, with educational qualifications ranging from secondary school to Masters. While some organisations operate exclusively within their own country, others have a presence in several European countries. Remote working practices are mixed, with some organisations not using remote working and others using hybrid models or occasional remote working.

Question 9 - Between transversal skills (soft skills) and technical skills (hard skills), where do you think there's a larger skills gap to be filled?

An analysis of the responses to question 9, which asked about the preference between soft skills and technical skills, reveals a unanimous consensus among the participants. All respondents indicated a preference for soft skills over technical skills. This unanimity highlights the significant value that organisations place on attributes such as communication, teamwork, problem solving and adaptability. The emphasis on soft skills suggests that while technical expertise is essential, the ability to collaborate, manage and adapt effectively in a dynamic work environment is seen as critical to overall organisational success and individual career growth. This finding underscores the growing recognition of the importance of holistic employee development that balances both technical and interpersonal skills.



Figure 162 - Perceived Skills Gap

Question 10 - Please name 5 jobs that you consider crucial in the future.

An analysis of the responses to question 10, which asked respondents to name five jobs that they thought would be important in the future, reveals a wide range of roles that were considered important. The roles mentioned span a variety of fields, reflecting the diverse perspectives of respondents. Notable job titles include cybersecurity engineers, artificial intelligence specialists, data analysts, project managers and roles in health and agriculture. This diversity highlights the multifaceted nature of the future job market, highlighting the need for a mix of technical expertise, healthcare skills, and roles in sustainability and digital transformation. The responses underline the importance of preparing a workforce with a wide range of skills to meet future challenges across different industries.



Figure 163 - Crucial Job Roles for the Future

Question 11 - Please name 5 soft skills that you consider crucial in the future.

An analysis of the responses to question 11, which asked respondents to identify five soft skills that they considered to be crucial for the future, reveals a wide range of skills that were considered important. The most frequently mentioned soft skills are critical thinking and time management, each of which appeared twice in the responses. Other skills mentioned include teamwork, leadership, ethical behaviour and communication. The responses emphasise the importance of interpersonal and cognitive skills, which are essential for effective collaboration, problem solving and continuous learning. This diversity of skills underlines the multifaceted nature of the competencies required to thrive in dynamic and evolving work environments and highlights the importance of adaptability, creativity and strategic vision in the future workforce.



Figure 164 - Critical Soft Skills for the Future

Question 12 - Please name technical skills that you consider crucial in the future.

Analysis of the responses to question 12, which asked respondents to identify technical skills that they considered important for the future, reveals a wide range of skills that are considered important. The most frequently mentioned skills are project management and programming, each of which appears twice in the responses. Other technical skills mentioned include physics, materials, electronics, mechanics, cybersecurity and artificial intelligence. The mention of specific programming languages such as Python and JavaScript, as well as areas such as cloud architecture and machine learning, highlights the importance of both basic technical knowledge and advanced, specialised skills. This diversity of technical skills underscores the need for a comprehensive skill set, encompassing both broad technical competencies and specialised expertise, to navigate the complexities of future technology landscapes.



Figure 165 - Important technical skills for the future

Question 13 - What specific areas of digital technology training are most critical for your company's employees?

An analysis of the responses to question 13, which asked participants to identify specific areas of digital technology and tools that they considered important for the future, reveals a wide range of digital skills that are considered important. Responses include areas such as digital imaging, project management tools (e.g. Trello and Jira), web development, artificial intelligence, cybersecurity and programming. In addition, respondents highlighted machine learning, e-commerce, digital marketing, and blockchain technology. This diversity highlights the importance of a wide range of digital skills and tools, from basic technologies such as programming and project management to advanced areas such as AI and cybersecurity. The findings underscore the need for proficiency in both practical digital tools and cutting-edge technology areas, to effectively navigate and leverage the evolving digital landscape.



Figure 166 - Digital technology training areas



Analysis of the responses to question 14, which asked respondents to describe the efforts their organisations have made to improve digital literacy, reveals a range of initiatives aimed at promoting digital literacy. The most cited efforts are external training and short courses, both of which appear twice. Other key efforts highlighted by respondents include internal seminars, international trade fairs, internal and external workshops, internal mentoring and brainstorming sessions. Additional initiatives such as training sessions, knowledge sharing and the purchase of course licences also underline the diverse strategies organisations are using to develop digital skills. These efforts reflect a comprehensive approach to digital skills development, emphasising both internal development programmes and external opportunities for learning and growth. This multi-faceted approach indicates a recognition of the importance of continuous learning and adaptability in the rapidly evolving digital landscape.



Figure 167 - Initiatives to address digital skills gaps among employees

Question 15 - In which ways has this been addressed?

An analysis of the responses to question 15, which asked respondents to describe the ways in which their organisations have addressed digital literacy, reveals a variety of strategies. The responses indicate a mix of training approaches, with some respondents mentioning general training, specific training plans, and transversal training. Other notable methods include internal training, brainstorming sessions, knowledge sharing, short courses, mentoring and external training programmes. In addition, one response emphasised not recruiting from other companies, while focusing on recruiting from different regions, suggesting a strategic approach to workforce development. The diversity of responses highlights the multi-faceted approaches that organisations are taking to address the need for digital skills development, emphasising both internal and external training opportunities, as well as innovative recruitment practices to build a skilled workforce.



Figure 168 - Digital skills gap mitigation methods

Question 16 - Please name 3 technologies that you already use or do you think you will start using in the next 5 years?

An analysis of the responses to question 16, which asked respondents to name three technologies that their organisations are already using, reveals a significant focus on advanced and emerging technologies. The most frequently mentioned technology is artificial intelligence, which was mentioned four times. Machine learning and data analytics each appear three times, highlighting their importance in current organisational practices. Other technologies mentioned include blockchain, cybersecurity, software programming and digital marketing. The diversity of technologies highlights the widespread adoption and integration of sophisticated digital tools and methods across different organisations. This indicates a strong emphasis on leveraging cutting-edge technologies to drive innovation, efficiency and competitive advantage in today's digital landscape.



Figure 169 - Technologies for the future

Question 17 - Looking ahead, what emerging digital skills or technologies do you anticipate becoming critical for your industry or organization in the next 2-5 years?

An analysis of the responses to question 17, which asked respondents to identify the emerging digital skills that they see as important for the future, reveals a strong emphasis on advanced and evolving technological skills. The most frequently mentioned skill is artificial intelligence, mentioned four times. Other key skills include data analytics and machine learning, each mentioned twice. In addition, the responses highlight a variety of other emerging skills such as smart contracts, prompt language, generative AI, cybersecurity, quantum computing, and Web 2 and 3. This diverse range of skills underlines the expected need for expertise in both cutting-edge technologies and basic digital skills. The focus on these emerging skills reflects the changing nature of the digital landscape and the need for organisations to adapt by developing skills in these advanced areas to remain competitive and innovative.



Figure 170 - Emerging digital capabilities and technologies

Question 18 - Among hired professionals, to what extent is it necessary to give training?

Analysis of the responses to question 18, which asked about the extent to which hired professionals need to be trained in digital skills, shows a significant consensus on the need for training. Most respondents indicated that either 'almost all' or 'all staff need training'. Specifically, two respondents said, "almost all of them" and another two emphasised that "all employees need to be trained". Only one respondent mentioned

that "not everyone needs to be trained". This indicates a strong recognition among organisations of the need for comprehensive digital skills training to ensure that their workforce is adequately prepared to meet the demands of the modern digital environment.



Figure 171 -Extent to which training is necessary for hired professionals



An analysis of the responses to question 19, which asked how training is provided within organisations, reveals some common approaches. The most common methods are 'company funded, government supported' and 'company funded, free courses', each of which appears twice. In addition, one response included a more comprehensive approach, mentioning 'Company funded, government supported, free courses, online programme'. This suggests that companies typically fund training initiatives themselves, often with additional support from government programmes and free courses, highlighting a multi-faceted approach to providing training opportunities for their employees. This combination of internal funding and external support helps to ensure that employees have access to the resources they need to improve their digital skills.



Figure 172 - Methods of funding training

Question 20 - What is the average duration of training (hours of training)?

An analysis of the responses to question 20, which asked about the average length of training provided by organisations, reveals a wide range of training lengths. The responses range from short sessions of '2-4 hours' and '3 hours' to longer periods such as '8-12 hours' and '40 hours'. One response simply stated "40" without specifying the unit, but it can be inferred from the context of other responses that it means hours. This variation in training duration suggests that organisations tailor their training programmes to different needs, offering both short, focused sessions and longer, more comprehensive training to address different aspects of digital skills development.



Figure 173 - Average duration of training

Question 21 - How committed is your company to investing in employee development and training?

Analysis of the responses to question 21, which asked about the level of commitment of companies to investing in digital skills, shows a high level of commitment overall. Two respondents indicated that their companies were "Very committed" and two others described their companies as "Extremely committed". One respondent said their organisation was "Moderately committed". This distribution shows that most organisations recognise the importance of investing in digital skills and are taking significant steps to ensure their workforce is well prepared for the digital future.



Figure 174 - Commitment levels to employee training and development

Question 22 - In today's rapidly changing digital landscape, do you view ongoing digital skills development as a necessity for your employees to remain competitive and adaptable in the long term?

Analysis of the responses to question 22, which asked whether organisations recognise the need to continually update digital skills in today's rapidly changing landscape, shows unanimous agreement. All five respondents answered 'yes', indicating that there is a general recognition among the organisations surveyed of the importance of continuously updating digital skills to keep pace with technological advances. This consensus underscores the critical need for continuous learning and adaptation in the digital age.



Figure 175 - Need for continuous digital skills development

Question 23 - How do you diagnose the training needs of the company's employees?

An analysis of the responses to question 23, which asked how organisations diagnose the training needs of their employees, reveals a variety of approaches. Each method was mentioned once, indicating a variety of practices as the chart illustrates:



Figure 176 - Methods for diagnosing training needs

These responses show that organisations use a variety of methods to assess and identify the training needs of their workforce, combining formal surveys, continuous improvement processes and strategic analysis based on business needs. This diversity suggests that organisations tailor their approaches to their specific operational contexts and objectives.

Question 24 - Do you currently have skills gaps within your organisation in the following areas: Financial innovation and technology, artificial intelligence, blockchain, cybersecurity, data analytics and machine learning, digital marketing, and web development?

Analysis of the responses to question 24, which asked about current skills gaps within organisations, reveals several critical areas where skills are lacking. The most frequently cited skills gap is in cybersecurity, mentioned five times. This is closely followed by gaps in artificial intelligence and blockchain, each mentioned four times. Data analytics and machine learning are identified as gaps three times. Other gaps identified include digital marketing and web development. These findings highlight the urgent need for expertise in these advanced and technical areas and reflect the challenges organisations face in keeping up with rapidly evolving technologies and the associated skills requirements.



Figure 177 - Current skills gaps within organisations

Question 25 - Have you allocated additional resources to training existing employees to address these identified skills gaps? If so, can you provide examples of such training initiatives?

Analysis of the responses to question 25, which asked whether organisations have allocated additional resources to address skills gaps, shows unanimous agreement. All five respondents answered 'yes', indicating that every organisation surveyed has recognised the importance of addressing skills gaps and has allocated additional resources to this effort. This consensus underlines the proactive steps that organisations are taking to ensure that their workforce has the necessary skills to meet current and future demands.



Figure 178 - Allocating resources to train employees

Question 26 - Is your organisation interested in recruiting individuals who have successfully completed a micro -credential programme?

Analysis of the responses to question 26, which asked about the level of interest in recruiting professionals with micro-credentials, reveals a high level of interest among organisations. Three respondents indicated 'Extremely interested', demonstrating a strong commitment to this recruitment strategy. One respondent expressed a moderate level of interest, stating "Moderately interested", while another respondent's interest was conditional, stating "Maybe, yes. It depends on the area of the microcredential programme". This overall positive response underlines the growing recognition of the value of microcredentials in improving the skills of the workforce and meeting specific skills needs.



Figure 179 - Interest in recruiting people with micro-credentials

Question 27 - If your organisation is interested in recruiting microcredential programme graduates, could you please indicate any preferred qualifications, skills or criteria you are looking for in these candidates?

Analysis of the responses to question 27, which asked about the specific areas of interest in recruiting microcredential programme graduated professionals, reveals a variety of targeted skills and domains. Key areas of interest include:



Figure 180 - Preferred qualifications for recruiting graduates of microcredential programmes

In addition, one respondent stated, "There is no specific demand," suggesting that their interest in microcredentials may be more general or situational. Another respondent was unsure, stating "I don't know". This diversity of responses highlights the different needs and strategic priorities of organisations when it comes to upskilling their workforce with specific microcredential skills, particularly in advanced technical and digital areas.

Question 28 - Do you see investing in digital skills training and microcredentials as a potential competitive advantage for your organization in attracting and retaining top talent?

Analysis of the responses to question 28, which asked whether organisations consider investment in digital skills training to be mandatory, shows unanimous agreement on its importance. Three respondents simply answered 'yes', while one respondent elaborated, stating that investment in digital skills is 'absolutely mandatory'. Another detailed response emphasised the need to demonstrate to potential and current employees that the organisation provides opportunities for skills development, which is crucial for both recruitment and retention. This consensus highlights the critical role that ongoing digital skills training plays in maintaining a competitive and capable workforce in the modern digital landscape.



Figure 181 - Perception of investment in digital skills training and micro-credentials

Question 29 - Are there any specific challenges or barriers you foresee in implementing a digital skills microcredential programme within your organization?

Analysis of the responses to question 29, which asked about specific challenges or barriers to investing in digital skills training, highlights several key issues. The most frequently cited barrier is 'time constraints', which appears in three responses. In addition, one respondent mentioned "availability of learning programmes in the subject the employee needs", indicating the challenge of finding appropriate training programmes that meet specific needs. Another response combined both 'time constraints' and 'employee perspective' as barriers. These findings suggest that while organisations recognise the importance of digital skills training, practical challenges such as time constraints and availability of relevant programmes can hinder their efforts.



Figure 182 - Perception of investment in digital skills training and micro-credentials

Question 30 - Can you provide specific key performance indicators (KPIs) or metrics that your organization would use to determine the return on investment (ROI) of a digital skills microcredential program?

Analysis of the responses to question 30, which asked for specific key performance indicators (KPIs) used to measure the effectiveness of digital skills training, reveals a variety of approaches and some gaps in measurement practices. The responses include:



Figure 183 - KPI Evaluation methods

These responses highlight that while some organisations have established methods for evaluating the effectiveness of training, others either have no formal KPIs or use complex, qualitative assessments that may not be directly linked to financial metrics. This diversity in evaluation practices suggests a varying level of maturity in how organisations measure the impact of digital skills training.
Ireland

Questions 1 to 8

The analysis of questions 1 to 8 provides a number of insights into the organisations surveyed. Most of the respondents (6 out of 7) indicated that their organisations have mainly employees with a Bachelor's degree. The organisations range in size, with a notable concentration (3 out of 7) in the 11-50 employee range. A majority (4 out of 7) reported that the average age of employees was 35-44 years. Most organisations (6 out of 7) work remotely and while 4 out of 7 operate in one country only, 3 out of 7 operate in several countries. The majority of workplaces are located in Dublin, Ireland. Each respondent provided a unique description of their organisation and role, highlighting a range of industries including telecommunications, online education and security services. 9

Question 9 - Between transversal skills (soft skills) and technical skills (hard skills), where do you think there's a larger skills gap to be filled?

The analysis of the responses from which addresses the larger skills gap between transversal (soft) skills and technical (hard) skills reveals a balanced perception of skills gaps between transversal (soft) skills and technical (hard) skills among the organizations. Two respondents identified soft skills as the larger gap, emphasizing the need for better communication, problem-solving, and other interpersonal skills. Another two respondents pointed to technical skills as the more significant gap, while one noted that the gap depends on the industry, generally favoring hard skills. Additionally, one respondent highlighted the importance of adaptability to environmental changes. A detailed response from another organization underscored a clear gap in soft skills despite a strong technical foundation, noting efforts to bridge this divide through recent hires focused on enhancing soft skills. This distribution reflects the nuanced and varied challenges organizations face in addressing skill deficiencies, with both soft and technical skills being crucial for overall organizational effectiveness.



Figure 184 - Perceived skills gap

Question 10 - Please name 5 jobs that you consider crucial in the future.

Looking at the responses to the question about 5 jobs that you considered crucial in the future, there are a wide range of roles across different sectors that are seen as critical for the future. Key roles include software developers and AI specialists, reflecting the growing importance of technology. Other critical roles identified include UI/UX and product designers, researchers, business development experts, policy and legal experts, and data analysts. In addition, there is a notable focus on sustainability roles such as engineers and hydroelectric specialists, as well as emerging roles such as AI ethics officers, compliance officers and resilience officers. This diverse selection highlights the multifaceted nature of future job requirements, underscoring the need for a mix of technical, creative and strategic skills to meet the evolving needs of industries.



Figure 185 - Crucial job roles for the future

Question 11 - Please name 5 soft skills that you consider crucial in the future.

An analysis of the responses to the question asking respondents to name five soft skills that they believe will be critical in the future reveals a consensus on the critical soft skills that will be needed in the future. Communication, problem solving, and critical thinking are the most frequently mentioned skills, highlighting their paramount importance in future working environments. Other essential skills identified include interpersonal skills, teamwork, planning, collaboration, presentation, conflict management, empathy, creativity, initiative, solution-focused management, leadership, relationship building, adaptability, public speaking, analytical thinking, listening skills, resilience and a focus on achieving end goals. This broad range of soft skills underscores the need for employees to have strong interpersonal, cognitive and strategic skills to effectively navigate and thrive in increasingly complex and dynamic workplaces.



Figure 186 - Critical soft skills for the future



An analysis of the responses to the question asking respondents to identify technical skills that they believe will be important in the future shows that programming and data analysis are considered the most important technical skills for the future, as mentioned by several respondents. Other important skills include cybersecurity, engineering, building AI bots, basic IT skills (such as Office 365 and Google tools), software to improve efficiency, design, research, security skills, data analysis and presentation, project management, understanding AI, graphics, and the regulation and implementation potential of AI. This diversity highlights the need for a strong foundation in both traditional technical skills and emerging technologies to meet the evolving needs of different industries. The emphasis on these skills underlines their importance in driving innovation and maintaining competitive advantage in a rapidly changing technological landscape.



Figure 187 - Important technical skills for the future

Question 13 - What specific areas of digital technology training are most critical for your company's employees?

Analysis of the responses to the question on the specific areas of digital technology training that are most important for employees, highlights several critical areas of digital technology training for employees. Key areas include AI, IoT and machine learning, which are essential for the use of advanced technologies. There is also a strong emphasis on the ability to use various digital tools used by the business, basic IT skills, and self-sufficiency in resolving IT issues. Security awareness and skills in using CRM, communication platforms and remote collaboration tools are critical to maintaining operational efficiency. In addition, skills in creating digestible visual representations of data analytics, document management, dictation, e-signing and developing AI for claims management are considered critical. These areas of focus illustrate the need for comprehensive digital training programmes that enhance both basic IT skills and advanced technology skills to drive productivity and innovation within organisations.



Figure 188 - Digital technology training areas

Question 14 - What efforts has your organization undertaken to mitigate digital skills gaps among employees? Please describe the scope and nature of these initiatives.

These responses to the question, which discusses organisations' efforts to mitigate digital skills gaps among employees, indicate a strong commitment to ongoing digital skills learning and development. Organisations use a variety of methods, including specialised training in emerging technologies such as AI and IoT, cross-departmental collaborative training initiatives, individual one-to-one and group training sessions, and regular security training to maintain vigilance. Ongoing assessment and training underscore the ongoing nature of these initiatives. This variety of approaches highlights the comprehensive efforts being made to ensure that employees remain proficient in essential digital skills, effectively addressing potential skills gaps.



Figure 189 - Initiatives to address digital skills gap among employees

Question 15 - In which ways has this been addressed?

Analysis of the responses to question 15 highlights the different methods used by organisations to address digital skills gaps. The predominant approach appears to be internal training, as highlighted by several respondents, underlining its importance in upskilling employees. Complementing this, short-term training programmes emerge as a common strategy to quickly address immediate skills gaps. In addition, some organisations are opting to hire new professionals with the necessary digital skills to augment their workforce. Taken together, these strategies highlight a multi-faceted approach that combines internal development with external recruitment to cultivate a well-rounded and competent workforce. Ongoing initiatives such as regular assessments and continuous training were also mentioned by a small number of respondents, highlighting the importance of consistently updating skills to meet evolving digital demands.



Figure 190 - Methods to mitigate digital skills gap

Question 16 - Please name 3 technologies that you already use or do you think you will start using in the next 5 years?

The analysis of the responses to the question 16, which asked respondents to name three technologies they already use or expect to start using in the next five years, reveals a clear trend toward key digital innovations. The most frequently mentioned technologies include digital platforms and apps, cited by seven respondents, followed by artificial intelligence, noted by six respondents. E-commerce and digital trade were also prominently featured, with five mentions. These findings underscore a strong inclination towards adopting advanced digital solutions that facilitate commerce, enhance operational efficiency, and improve decision-making processes. Additionally, there were mentions of specialized technologies like broadcasting, highlighting the diverse technological needs and strategies of different organizations. This analysis indicates a broad recognition of the critical role that digital technologies will play in driving future business success.



Figure 191 - Technologies for the future

Question 17 - Looking ahead, what emerging digital skills or technologies do you anticipate becoming critical for your industry or organization in the next 2-5 years?

The results of the analysis of the responses to question 17, which asked about the emerging digital capabilities or technologies that are expected to become critical in the next 2-5 years, show a wide range of responses. The most frequently mentioned technologies include artificial intelligence (AI) and the Internet of Things (IoT), highlighting a strong focus on the use of AI capabilities in various applications. Other notable mentions include digital content creation for broadcasting and machine learning capabilities, highlighting the need for advanced technological expertise to improve operational efficiency and innovation. The analysis shows that organisations are prioritising the adoption of advanced digital skills and technologies to remain competitive and drive future growth in an increasingly digital landscape.



Figure 192 - Emerging digital capabilities and technologies

Question 18 - Among hired professionals, to what extent is it necessary to give training?

Analysis of the responses to question 18 reveals clear trends in the perceived need for training for employed professionals. The majority of respondents (4) advocate comprehensive training for all employees, highlighting its critical role in enabling effective role performance. Conversely, one respondent emphasises the importance of role-specific training, pointing to the variability of training needs based on specific job roles within the organisation. In addition, another respondent suggests that while some training is essential, it may be more targeted to specific areas or roles. Despite the differences, there is a common thread in the recognition of the importance of training in improving the skills of employees. This underlines a collective recognition among organisations of the need to equip employees with the necessary skills, while recognising the nuanced training needs based on roles and organisational requirements.



Figure 193 - Extent to which training is necessary for hired professionals

Question 19 - When your organization provides training, how do you fund it?

An analysis of the responses to question 19, which asked how organizations fund training, reveals two main methods: funding by the organization, which is the predominant method mentioned by 7 respondents, and free training, mentioned by 2 respondents. This indicates that most organizations are willing to invest in the development of their employees by funding the necessary training programs, while a smaller number take advantage of free training opportunities.



Figure 194 - Methods of funding training

Question 20 - What is the average duration of training (hours of training)?

An analysis of the responses to question 20, which asked about the average length of training, provides the following statistical insights: There were 4 valid responses, with an average training duration of approximately 3.94 hours. The standard deviation of 5.40

hours indicates considerable variability in training duration. The shortest reported session is 0.75 hours (45 minutes), while the 25th percentile is 0.94 hours, meaning 25% of training sessions are shorter than this. The median duration is 1.5 hours, and the 75th percentile is 4.5 hours, indicating that 75% of sessions are shorter than this duration. The longest reported training session is 12 hours. This analysis suggests a wide range of training durations across organizations, from brief sessions to more extensive training programs.



Figure 195 - Average duration of training

Question 21 - How committed is your company to investing in employee development and training?

Analysing the responses to question 21, which asked about the level of commitment to investing in training and developing employees, reveals the following:



Figure 196 - Commitment levels to employee training and development

Across the surveyed organizations, commitment to employee development varies, with the majority falling under the "Very committed" category, as noted by three organizations. Two organizations expressed a "Moderately committed" stance, while one organization displayed an "Extremely committed" attitude toward training initiatives. Additionally, one organization reported being "Slightly committed" to employee development. Overall, these findings indicate a prevalent recognition among organizations regarding the significance of continuous learning and upskilling for maintaining competitiveness in the market, despite differences in the intensity of commitment demonstrated.

Question 22 - In today's rapidly changing digital landscape, do you view ongoing digital skills development as a necessity for your employees to remain competitive and adaptable in the long term?

Responses to the question about the need for continuous digital skills development for employees to remain competitive and adaptable in today's rapidly changing digital landscape show a strong consensus on its importance. The responses are summarised below:



Figure 197 - Need for continuous digital skills development

The detailed response emphasises that the ongoing development of digital skills is crucial to the company's services and future expectations. It states that without ongoing digital skills and adaptation to emerging technologies, the viability of the business would be compromised. This response states that while the development of digital skills is important, their work is primarily driven by face-to-face interactions, making it less essential.

Most respondents (5 out of 7) clearly see ongoing digital skills development as a necessity for their staff. One organisation provided a detailed explanation, highlighting its critical role in their business model and future viability. Only one respondent considered it important but not essential, highlighting the nature of their work as being more face-to-face.

Question 23 - How do you diagnose the training needs of the company's employees?

The answers to question 23 on diagnosing the training needs of the company's employees are varied, with different organisations using different methods. The responses indicate a range of approaches to the diagnosis of training needs. Common methods include surveys, needs analysis and gap analysis. Some organisations rely on their learning and development departments, while others use internal audits and ongoing assessments. In addition, one organisation mentioned providing situational training based on specific incidents, highlighting a reactive approach to addressing immediate training needs.

The responses are summarised below:



Figure 198 - Methods for diagnosing training needs

Question 24 - Do you currently have skills gaps within your organisation in the following areas: Financial innovation and technology, artificial intelligence, blockchain, cybersecurity, data analytics and machine learning, digital marketing, and web development?

The responses to question 24 on current skills gaps within organisations highlight a number of critical areas where gaps exist.



Figure 199 - Current skills gap within organisations

The most frequently identified skills gap is in the area of Artificial Intelligence, with four organisations indicating a need for improvement in this area. Other areas with identified skills gaps include Data Analytics, Financial Innovation and Technology, and Cyber Security, each cited by one organisation.

This suggests that while Artificial Intelligence is the most commonly recognised area with a skills gap, there are also notable shortfalls in other critical technology and financial areas. Addressing these gaps would likely require targeted training and development programmes to improve the relevant skills within these organisations.

Question 25 - Have you allocated additional resources to training existing employees to address these identified skills gaps? If so, can you provide examples of such training initiatives?

Responses to the question about allocating additional resources to train existing employees to fill identified skills gaps, and examples of such training initiatives, are as follows:



Figure 1 - Allocating resources to train employees

Most responses indicate that organisations are taking active steps to address skills gaps through various training initiatives, including in-house training, online courses, and expert consultations. However, some organisations are still in the planning stage or have not yet allocated resources to training.

Question 26 - Is your organisation interested in recruiting individuals who have successfully completed a micro -credential programme?

The responses to question 26 about the organisation's interest in recruiting people who have successfully completed a micro-credential programme show a range of interest:



Figure 2 - Interest in recruiting people with micro-credentials

The distribution of responses suggests that while there is significant interest in microcredential programmes among some organisations, there is also a significant proportion that are either not interested or only slightly interested. This suggests a mixed perception of the value of micro-credentials in the recruitment process across different organisations.

Question 27 - If your organisation is interested in recruiting microcredential programme graduates, could you please indicate any preferred qualifications, skills or criteria you are looking for in these candidates?

Analysis of the responses to question 27 reveals a wide range of preferred qualifications, skills or criteria for recruiting micro-credential graduates. The most cited skill is artificial intelligence (AI), appearing three times in different responses, highlighting its critical importance in today's labour market. Other key technical skills include cloud computing, security, machine learning (ML), business intelligence (BI), networking, sourcing, roaming and mainframe, each mentioned once. In addition, there is a strong emphasis on competencies demonstrated by a portfolio of work, digital marketing experience in an arts environment, understanding of the cultural landscape in Ireland, large data models and data analytics, and sustainability reporting. This wide range of desired competencies underlines the value of both technical expertise and demonstrated practical skills in the recruitment process.



Figure 3 - Preferred qualifications/skills for recruiting graduates of microcredential programmes

Question 28 - Do you see investing in digital skills training and microcredentials as a potential competitive advantage for your organization in attracting and retaining top talent?

Analysis of the responses to question 28 shows a consensus that investment in digital skills training and micro-credentials is seen as a potential competitive advantage in attracting and retaining top talent. Out of seven respondents, five (including one strongly) agree that such investment is beneficial to their organisation, highlighting a strong belief in the value of digital skills in maintaining a competitive edge in the modern workforce. However, two respondents disagree, suggesting that they either do not consider it relevant to their organisation's needs or have other priorities for attracting and retaining talent. This difference in perspective underlines the prevailing view that digital skills training and micro-credentials are essential for competitive advantage, while recognising that some organisations may have a different strategic focus. A summary of the responses is provided below:



Figure 4 - Perception of investment in digital skills training and micro-credentials

Most respondents (5 out of 7) see investment in digital skills training and microcredentials as a potential competitive advantage for their organisation. This indicates a strong belief that such investment can help attract and retain top talent. Two respondents do not see this as a competitive advantage, suggesting that they either do not find it relevant to their organisational needs or have other priorities for attracting and retaining talent.

The predominant view is that digital skills training and micro-credentials are valuable for maintaining a competitive edge in attracting and retaining talent, reflecting the increasing importance of digital skills in the modern workforce. However, there is a minority view that does not share this perspective, highlighting differing views on the strategic value of such investment.

Question 29 - Are there any specific challenges or barriers you foresee in implementing a digital skills microcredential programme within your organization?

Based on the organisations' responses to the question 29, several key challenges and barriers to implementing a digital skills micro-credential programme were identified. The most commonly cited issues were budget and time constraints, each of which was highlighted individually and collectively in multiple responses. Specifically, three respondents identified both budget and time constraints as significant barriers, while one respondent identified budget constraints alone and another identified time constraints as a stand-alone issue. In addition, one respondent cited employee resistance as a challenge, and another indicated that such a programme was not necessary for their organisation. These findings suggest that financial constraints and time availability are the main barriers organisations face in adopting digital skills microcredential programmes.

There is an analysis of the responses to the question about challenges or barriers to implementing a digital skills micro-credential programme in organisations:



Figure 5 - Constraints on investment in digital skills training

The most cited challenges are budget and time constraints, both individually and in combination. This suggests that financial constraints and time availability are significant barriers for organisations when considering implementing a digital skills micro-credential programme. One organisation stated that such a programme was not necessary for their operations, suggesting that the perceived need for digital skills training can vary significantly depending on the nature of the organisation. One response identified employee resistance as a barrier, indicating potential challenges in gaining employee buy-in for new training initiatives.

This reflects a common concern when implementing new training programmes and highlights the need for adequate resources and time management strategies. In addition, the mention of employee resistance underlines the importance of addressing cultural and attitudinal factors when introducing new training initiatives.

Question 30 - Can you provide specific key performance indicators (KPIs) or metrics that your organization would use to determine the return on investment (ROI) of a digital skills microcredential program?

The responses to the question about specific key performance indicators (KPIs) or metrics used to determine the return on investment (ROI) of a digital skills microcredential program are varied. The summary of the responses provided by the organizations:



Figure 200 - KPI Evaluation Methods

The responses indicate a diverse set of metrics being considered for evaluating the ROI of digital skills micro-credential programs. These include performance-based metrics such as course completion rates and sales numbers, as well as more specific industry-related metrics like claim management rates and quality of output standards. One respondent indicated a need for more information to provide specific KPIs.

Spain

Questions 1 to 8

Based on the responses from the four interviews, the organisations in which the interviewees are employed have a strong focus on mobility solutions, innovation and strategic planning. Two of the organisations focus on providing advanced transport and mobility solutions, indicating their involvement in developing innovative methods to improve transport systems. Another organisation focuses on research and innovation, suggesting a commitment to developing new technologies or methods, possibly within a scientific or academic framework. In addition, one interviewee works as a strategic advisor in a medium-sized company, highlighting the importance of high-level planning and decision-making within the organisation. Overall, these companies are involved in forward-looking, technologically advanced activities, reflecting a commitment to innovation and strategic development in their respective sectors.

Question 9 - Between transversal skills (soft skills) and technical skills (hard skills), where do you think there's a larger skills gap to be filled?

The responses reveal different perspectives on the skills gap in different organisational contexts. One respondent emphasises the importance of integrating both soft and technical skills, while others point to specific gaps in either soft or technical skills based on their organisational needs. Small companies and management levels are identified as areas with notable gaps in soft skills, while technical skills are highlighted as a growth area for teams already strong in soft skills. Overall, the analysis underscores the need for a balanced skill set that includes both soft and technical skills to effectively meet organisational needs. The chart illustrates the number of responses for each type of skills gap identified:



Question 10 - Please name 5 jobs that you consider crucial in the future.

The responses reflect a consensus on the critical roles of the future, with an emphasis on technical, managerial and marketing skills. Key roles identified include developers, project managers, financial managers, innovation managers and digital marketers. The focus on technical roles such as programmers, data analysts, AI developers and engineers highlights the importance of technical expertise. At the same time, innovation, financial management and digital marketing roles highlight the need for strategic and operational management skills. This combination of skills is essential for organisations to navigate and thrive in a rapidly evolving technological and economic landscape. The chart shows the number of mentions for each job title:



This visual representation helps to easily compare the perceived importance of different job roles for the future across various organizational contexts.

Question 11 - Please name 5 soft skills that you consider crucial in the future.

Based on the interview responses, several soft skills are identified as critical for the future. The most cited skills include teamwork, which is essential for achieving collective goals, and effective communication, which is fundamental for clear interaction and collaboration. In addition, problem-solving and innovation are highlighted as critical to overcoming challenges and driving progress.

Skills such as emotional intelligence, empathy and workplace psychology are emphasised for understanding and managing interpersonal dynamics. Resilience and adaptability are noted for their importance in coping with change and stress in a rapidly evolving work environment. Management and leadership skills are also recognised as necessary for leading teams and managing tasks efficiently.

Overall, the responses suggest that a combination of interpersonal, cognitive and organisational skills will be essential for future success, enabling individuals and teams to navigate effectively in complex and dynamic work environments.

The graph shows the number of mentions for each soft skill:



This visual representation helps to easily compare the perceived importance of different soft skills for the future in different organisational contexts.

Question 12 - Please name technical skills that you consider crucial in the future.

Analysis of the interview responses regarding critical technical skills for the future reveals several key insights. Firstly, there is a strong emphasis on Artificial Intelligence (AI) and knowledge of related tools, particularly programming in Python. This indicates the growing importance of AI in various industries and the need for technical professionals to be proficient in these technologies.

Secondly, systems engineering skills are highlighted as critical. This includes the ability to define requirements, understand functionality, ensure usability and integrate systems. These skills are essential for developing and maintaining complex technological systems and ensuring that they meet user needs and function seamlessly.

In addition, the responses suggest that interpersonal skills such as empathy, teamwork and time management are also valued in technical roles. This highlights the need for technical professionals to have a well-rounded skill set that includes both technical expertise and strong interpersonal skills.

Overall, the future landscape of critical technical skills is characterised by a combination of advanced technological knowledge, particularly in AI and systems engineering, and essential interpersonal skills to collaborate and manage projects effectively.

The graph shows the number of mentions for each technical skill:



Question 13 - What specific areas of digital technology training are most critical for your company's employees?

Analysis of the interview responses reveals several critical areas of digital technology training for employees. There is a notable emphasis on Microsoft advanced skills, highlighting the need for proficiency in tools such as Excel, Word, PowerPoint and advanced tools such as Power BI for productivity and data analysis. Training in DevOps, cloud systems and artificial intelligence (AI) is also seen as crucial, reflecting the importance of efficient software development, IT infrastructure management and the use of AI technologies. In addition, Big Data skills are highlighted for their role in analysing large data sets and developing intelligent systems. Business Intelligence (BI) tools are also recognised as essential for transforming data into actionable insights to improve decision making and overall productivity. Overall, these areas of digital technology training are critical to improving organisational efficiency and maintaining a competitive edge. The graph shows the number of mentions for each training area:



Question 14 - What efforts has your organization undertaken to mitigate digital skills gaps among employees? Please describe the scope and nature of these initiatives.

Organisations use a variety of strategies to mitigate the digital skills gap among their workforce. One common approach is to engage external companies to provide specialised training as needed, ensuring access to up-to-date expertise. Another strategy involves hiring new employees who are already experts in relevant technologies, facilitating internal knowledge transfer and leveraging their advanced skills. In addition, some organisations take a two-pronged approach, first recruiting skilled individuals and then developing structured training plans for existing employees to upgrade their skills. There is also a general acknowledgement of significant but unspecified efforts to address these gaps, indicating a strong organisational commitment. These combined efforts reflect a comprehensive approach to ensuring that employees have the necessary digital skills to meet the evolving needs of the organisation. The graph shows the number of mentions for each type of effort:



Figure 6 - Initiatives to address digital skills gaps among employees

This visualisation makes it easy to compare the different strategies that organisations are using to address the digital skills gap in their workforce.

Question 15 - In which ways has this been addressed?

Organisations use a variety of strategies to address the digital skills gap in their workforce. One common method is to engage external firms to provide regular, specialised training to ensure employees stay up to date with the latest technologies and practices. Another approach is to plan for the integration of new technologies such as AI, big data and blockchain over the next five years, preparing employees for emerging trends. Some organisations are adopting a structured hiring and training plan, bringing in skilled people first and then defining training plans for existing employees. In addition, incentives and rewards are used to motivate employees, with prizes offered for achieving higher levels of proficiency in their skills. These combined efforts reflect a comprehensive approach to equipping employees with the digital skills necessary to meet the organisation's evolving needs. The graph shows the number of times each method was mentioned:



Figure 201 - Digital skills gap mitigation methods

This visualisation makes it easy to compare the different strategies that organisations are using to ensure that their employees have the necessary digital skills.

Question 16 - Please name 3 technologies that you already use or do you think you will start using in the next 5 years?

Analysis of the survey responses reveals the key technologies that organisations are currently deploying or planning to deploy in the next five years. Artificial Intelligence (AI) emerges as the most frequently cited technology, highlighting its critical role in various applications such as data processing and automation. Optical character recognition (OCR) and identity validation methods are highlighted for their importance in automating data recognition and enhancing security.

In addition, blockchain is recognised for its importance in secure transactions and data integrity, while Near Field Communication (NFC) is valued for its applications in wireless communications and mobile payments. Firmware is noted for its essential role in controlling hardware devices.

These technologies reflect a focus on enhancing automation, security, communications and computing capabilities, and indicate a strategic approach to leveraging advanced technologies for future business needs.

The graph shows the number of mentions for each technology:



Figure 7 - Technologies for the future

This visual representation makes it easy to compare the importance and focus of different technologies that organisations are considering for future implementation.

Question 17 - Looking ahead, what emerging digital skills or technologies do you anticipate becoming critical for your industry or organization in the next 2-5 years?

Analysis of the interview responses reveals key emerging digital skills and technologies that are expected to become critical in the next 2-5 years. Artificial Intelligence (AI) is expected to play a significant role in automation, improving operational efficiency while recognising that human creativity remains irreplaceable for tasks such as proposal writing. Internet of Things (IoT) platforms and fireware are highlighted for their importance in creating connected and responsive environments, indicating a focus on smart technologies. The trend towards remote working requires robust digital tools and platforms, making remote working technologies essential. In addition, data protection continues to be a critical area, highlighting the importance of protecting organisational and customer information in an increasingly digital landscape. These findings reflect a strategic focus on automation, connected systems, remote work support and data security as key areas for future technology development and skills acquisition. The graph shows the number of mentions for each skill or technology:



Figure 8 - Emerging digital capabilities and technologies

This visual representation helps to easily compare the importance and focus of different emerging digital skills and technologies that organisations are considering for future implementation.

Question 18 - Among hired professionals, to what extent is it necessary to give training?

Analysis of the interview responses reveals different perspectives on the need for training for recruited professionals. One organisation has not required specific training or funding for training in the past, possibly because it hires people with pre-existing skills or relies on informal training methods. In contrast, another organisation emphasises the need for training for all staff, including the interviewee, underlining the importance of continuous learning and development throughout the organisation. This suggests that the value of training is recognised to varying degrees, with some organisations focusing on utilising existing skills, while others advocate comprehensive training initiatives to ensure ongoing professional growth and development. The graph shows the number of mentions for each perspective:



Figure 9 - Extent which training is necessary for hired professionals

This visual representation makes it easy to compare the different views on the importance of training for hired professionals within organisations.

Question 19 - When your organization provides training, how do you fund it?

Analysis of the interviewees' responses for the question 19 regarding how organizations fund training, reveals different approaches to funding training within organisations. Some organisations adopt a flexible funding strategy, considering training to be essential but varying the funding according to the experience of the employees. Others show a moderate commitment to investing in training, allocating resources on a limited or as-needed basis. Some organisations have a dedicated training budget to ensure comprehensive coverage for all employees. In addition, some organisations use external funding sources, such as the Tripartite Foundation, to fund their training initiatives. These different strategies highlight different levels of commitment and methods of funding training to improve the skills and development of employees. The figure shows the number of mentions for each funding method:



Figure 202 - Methods of funding training

This visual representation makes it easy to compare the different approaches organisations take to funding employee training.

Question 20 - What is the average duration of training (hours of training)?

Analysis of the interview responses regarding the average length of training provided by organisations reveals a variety of approaches to the length of training provided by organisations. Two organisations allocate one week (40 hours) for training, indicating a structured approach to providing comprehensive skills development within a defined timeframe. Another organisation takes a flexible approach with short sessions and ondemand training to meet different learning needs and schedules. This mix of structured and flexible training durations highlights the different strategies used by organisations to effectively develop the skills of their employees. The graph shows the number of mentions for each training duration:



Figure 203 - Average duration of training

This visual representation makes it easy to compare the different approaches organisations use to allocate time for employee training.

Question 21 - How committed is your company to investing in employee development and training?

Analysis of the interview responses to question 21 reveals varying levels of commitment to investing in employee development and training. One organisation is highly committed, reflecting a proactive approach to improving staff skills and career development. Another organisation expresses a solid commitment, emphasising that recent experiences have strengthened their commitment to training. A third organisation shows moderate commitment, with allocated budget slots for training and an awareness of its importance, indicating a structured but possibly limited approach. Overall, these responses highlight a spectrum of commitment to staff development, ranging from highly proactive to moderately structured strategies. The graph shows the number of mentions for each level of commitment:



Figure 204 - Commitment levels to employee training and development

This visual representation makes it easy to compare different levels of organisational commitment to employee development and training.

Question 22 - In today's rapidly changing digital landscape, do you view ongoing digital skills development as a necessity for your employees to remain competitive and adaptable in the long term?

Analysis of the interview responses reveals a strong consensus on the importance of ongoing digital skills development to maintain competitiveness and adaptability in today's rapidly changing digital landscape. Two organisations explicitly affirm this need, with one emphasising that it is crucial for long-term success. Another organisation links the need for continuous training to the achievement of specific goals and the integration of new technologies. Overall, these responses highlight a clear recognition across the board of the critical role that ongoing digital skills development plays in ensuring that employees remain competitive and adaptable in the face of evolving technological advances. The graph shows the number of mentions for each type of response:



Figure 205 - Need for continuous digital skills development

This visual representation helps to easily compare different perspectives on the importance of continuous digital skills development in a rapidly changing digital landscape.

Question 23 - How do you diagnose the training needs of the company's employees?

Analysis of the interview responses reveals different approaches to diagnosing the training needs of employees within organisations. One organisation diagnoses training need based on the growth of the company, suggesting that as the company expands, new roles and responsibilities require corresponding training programmes. Another organisation aims to cover most training needs, indicating a comprehensive approach to identifying and addressing skills gaps.

A dual approach is highlighted by one organisation that addresses certain training needs while employees are expected to take the initiative for technology training, combining top-down management involvement with bottom-up employee-driven learning. Another organisation relies on manufacturer guidelines to determine hard skills training needs, ensuring alignment with industry standards and technology specifications.

Overall, these diverse strategies reflect growth-oriented, comprehensive, managerial and industry-aligned approaches to diagnosing and addressing employee training needs, ensuring that employees are equipped with the relevant skills to meet the needs of the organisation. The graph shows the number of times each method was mentioned:


Figure 206 - Methods for diagnosing training needs

This visual representation makes it easy to compare the different approaches that organisations use to diagnose and address the training needs of their employees.

Question 24 - Do you currently have skills gaps within your organisation in the following areas: Financial innovation and technology, artificial intelligence, blockchain, cybersecurity, data analytics and machine learning, digital marketing, and web development?

Analysis of the interview responses to the question 24 reveals several skills gaps within the organisations. One organisation has skills gaps in several areas, specifically mentioning financial innovation, treasury, insurance, and legal, suggesting a broad need for skills development. Another organisation highlights department-specific gaps in cybersecurity, communication skills and IT support, suggesting a need for targeted training. Cybersecurity is mentioned several times, indicating a widespread recognition of gaps in this critical area. In addition, a specific need for skills in implementing effective treasury management within the fintech sector is identified. Overall, these findings reflect a diverse range of skills gaps across different sectors and departments, highlighting the importance of targeted training and development initiatives to address these shortfalls. The graph shows the number of mentions for each type of skills gap:



Figure 207 - Current skills gaps within organisations

This visual representation helps to easily compare the different skills gaps identified across different sectors and departments of organisations.

Question 25 - Have you allocated additional resources to training existing employees to address these identified skills gaps? If so, can you provide examples of such training initiatives?

An analysis of the responses to question 25, which asks about the allocation of additional resources to training existing employees to fill identified skills gaps, reveals a variety of approaches across organisations. Two respondents did not provide any information. One respondent confirmed the allocation of resources without giving details. Another highlighted participation in research training projects, such as lectures, which do not currently require credits. Finally, one detailed response described a structured approach involving active observation, listening to staff needs, and annual planning meetings to align training initiatives with organisational goals. Overall, the responses show a mixture of general statements and specific examples of training initiatives. The graph categorises the responses into four main groups:



Figure 208 - Allocating resources to train employees

This visual representation highlights the variety of approaches and the presence of both detailed and non-detailed positive responses.

Question 26 - Is your organisation interested in recruiting individuals who have successfully completed a micro -credential programme?

An analysis of the responses to question 25, which inquires about the organisation's interest in recruiting individuals who have completed a micro-credential programme, reveals a generally positive attitude. Three respondents expressed a positive interest, emphasising conditions such as the official status of the programme, the expertise of the individual and integration with social security compensation programmes. One respondent gave a conditional response, emphasising the importance of the length and depth of the programme for it to be valuable. One respondent did not provide any information. Overall, there is considerable interest in micro-credentials, subject to their credibility and relevance to the needs of the organisation. The graph categorises the responses into four main groups:



Figure 209 - Interest in recruiting people with micro-credentials

This visual representation highlights the generally positive interest in micro-credentials, especially when certain conditions are met, such as programme credibility and relevance.

Question 27 - If your organisation is interested in recruiting microcredential programme graduates, could you please indicate any preferred qualifications, skills or criteria you are looking for in these candidates?

An analysis of the responses to question 27, which asks about the preferred qualifications, skills or criteria for recruiting graduates of micro-credential programmes, reveals different perspectives. Two respondents did not provide any information. One respondent indicated a need for project managers and a potential future need for developers. Another expressed a general openness to adapting to new technologies. However, one respondent was sceptical about the immediate effectiveness of micro-credentials, particularly for small SMEs, and emphasised a preference for traditional training supplemented by micro-credentials. Overall, the responses indicate a range of openness to new skills and technologies, tempered by concerns about the practical utility of micro-credentials in particular organisational contexts. The graph categorises the responses into four main groups:



Figure 210 - Number of Mentions

This visual representation highlights the different perspectives on micro-credentials, ranging from specific role requirements and openness to new technologies to scepticism about their immediate practical value.

Question 28 - Do you see investing in digital skills training and microcredentials as a potential competitive advantage for your organization in attracting and retaining top talent?

Analysis of the responses to question 28, which asks whether investment in digital skills training and micro-credentials is seen as a competitive advantage for attracting and retaining top talent, shows a generally positive outlook. Two respondents did not provide an answer. Two respondents confirmed the potential benefits, with one likening microcredentials to valuable certifications. However, one respondent identified a significant challenge, citing lack of time as a barrier to investing in such training. Overall, the responses suggest a recognition of the strategic value of digital skills training and microcredentials, tempered by practical constraints. The graph categorises the responses into four main groups:



Figure 211 - Perception of investment in digital skills training and micro-credentials

This visual representation highlights a generally positive perception of the strategic value of digital skills training and micro-credentials, while also noting practical constraints such as time constraints.

Question 29 - Are there any specific challenges or barriers you foresee in implementing a digital skills microcredential programme within your organization?

An analysis of the responses to question 29, which asks about specific challenges or barriers to implementing a digital skills micro-credential programme, reveals a variety of concerns. One respondent did not provide any information, and another indicated that the question was not applicable to their context. Challenges mentioned include balancing the quality of content with employee expectations, the risk of losing talent in small companies after investing in training, and ensuring continued use of the skills acquired. Age was also identified as a significant barrier, as older workers may find it difficult to adapt. Overall, the responses highlight the complexity of implementing effective digital skills training programmes, with particular concerns around retention, engagement and demographic factors. The graph categorises the responses into five main groups:



Figure 212 - Constraints on Investment in Digital skills training

This visual representation highlights the various challenges identified by respondents, including balancing content quality, talent retention concerns, and the need for ongoing training and customisation.

Question 30 - Can you provide specific key performance indicators (KPIs) or metrics that your organization would use to determine the return on investment (ROI) of a digital skills microcredential program?

Analysis of the responses regarding the key performance indicators (KPIs) or metrics used to determine the return on investment (ROI) of digital skills micro-credential programmes reveals a significant gap in measurement practices across organisations.

Most respondents either did not provide information or explicitly stated that they did not have specific metrics to measure ROI. Some highlighted the complexity of developing such metrics, noting the challenges of quantifying the impact of training programmes. One organisation tracks training hour and conducts satisfaction surveys but does not measure direct productivity impact. Overall, the responses suggest that many organisations recognise the need for ROI metrics but struggle to implement them. The chart categorises the responses into four main groups:



Figure 213 - KPI evaluation methods

This visual representation highlights the significant gap in established ROI measurement practices among respondents.

Chapter Eight: Comparative Analysis of the results for Portugal, Ireland, and Spain

Question 9 - Between transversal skills (soft skills) and technical skills (hard skills), where do you think there's a larger skills gap to be filled?

Portugal

In Portugal, the analysis of responses to question 9 reveals a unanimous preference for soft skills over technical skills among participants. This consensus highlights the significant value organizations place on attributes such as communication, teamwork, problem-solving, and adaptability. The emphasis on soft skills suggests that, while technical expertise is essential, the ability to collaborate, manage, and adapt effectively in a dynamic work environment is seen as critical to overall organizational success and individual career growth. This finding underscores the growing recognition of the importance of holistic employee development that balances both technical and interpersonal skills.

Ireland

Similarly, in Ireland, the responses to question 9 indicate a unanimous preference for soft skills over technical skills. All respondents agreed on the greater importance of soft skills, underscoring the value organizations place on communication, teamwork, problem-solving, and adaptability. This consensus mirrors the findings in Portugal, suggesting a broader trend across these regions that prioritizes the ability to collaborate and adapt in a dynamic work environment over purely technical expertise. This preference emphasizes the growing recognition of the need for a balanced development approach that includes both technical and interpersonal skills.

Spain

In contrast to the clear consensus in Portugal and Ireland, the responses from Spain present a more nuanced view. The analysis reveals a balanced perception of skills gaps between transversal (soft) skills and technical (hard) skills among organizations. This distribution reflects the varied challenges organizations in Spain face in addressing skill deficiencies, with both soft and technical skills being crucial for overall organizational effectiveness. Unlike the unanimous preference for soft skills in Portugal and Ireland, the responses from Spain indicate a more complex landscape where the importance of each skill set can vary significantly depending on the industry and organizational context.

Comparative analysis

This comparative analysis highlights a regional trend towards valuing soft skills highly, particularly in Portugal and Ireland, while Spain shows a more balanced view, recognizing the critical role of both skill sets in different contexts.

Overall, the analysis reveals common themes across the three countries, such as the high value placed on soft skills like communication, teamwork, and problem-solving. However, each country also demonstrates unique perspectives tailored to their specific contexts. Portugal and Ireland show a unanimous preference for soft skills, emphasizing their critical role in organizational success. Spain presents a more balanced view, recognizing the importance of both soft and technical skills, with variations depending on industry and specific organizational needs. This comparative analysis highlights the diverse ways organizations prioritize and address skill gaps to develop a well-rounded and capable workforce, essential for navigating the complexities of today's dynamic work environments.

Question 10 - Please name 5 jobs that you consider crucial in the future.

Portugal

An analysis of the responses in Portugal to question 10, which asked respondents to name five jobs that they thought would be important in the future, reveals a wide range of roles considered critical. Notable job titles include cybersecurity engineers, highlighting the growing importance of cybersecurity in an increasingly digital world; artificial intelligence specialists, reflecting the rapid advancement and integration of AI technologies; data analysts, indicating the critical role of data in driving business decisions and strategies; project managers, highlighting the need for effective project coordination and management; and health and agriculture roles, signalling the importance of sustainability and healthcare in future job markets. This diversity highlights the multifaceted nature of the future job market, highlighting the need for a mix of technical expertise, healthcare skills and roles in sustainability and digital transformation. The responses underline the importance of preparing a workforce with a wide range of skills to meet future challenges across different industries.

Ireland

Looking at Ireland's responses to the question of five jobs that will be critical in the future, a wide range of roles across different sectors are seen as critical. Key roles include software developers and AI specialists, reflecting the growing importance of technology and digital transformation; UI/UX and product designers, highlighting the importance of user experience and product development; researchers and business development

experts, highlighting the need for innovation and strategic growth; policy and legal experts, highlighting the need for regulatory compliance and policy development; and data analysts; policy and legal experts, highlighting the need for regulatory compliance and policy development; data analysts, reinforcing the value of data-driven decision making; sustainability engineers and hydropower specialists, signalling a focus on environmental sustainability; and AI ethics, compliance and resilience officers, reflecting emerging roles that address ethical, regulatory and resilience challenges. This diverse selection highlights the multifaceted nature of future job requirements, underscoring the need for a mix of technical, creative and strategic skills to meet the evolving needs of industries.

Spain

Analysis of the responses from Spain reflects a consensus on the critical roles of the future, with an emphasis on technical, managerial and marketing skills. Key roles identified include developers, programmers, AI developers and engineers, highlighting the importance of technical expertise in various fields; project managers and innovation managers, emphasising the need for strategic management and innovation; financial managers, reflecting the importance of financial oversight and management; digital marketers, indicating the growing importance of digital marketing in a connected world; and data analysts, reiterating the value of data analysis for business intelligence. The focus on these roles highlights the importance of technical skills, such as programming and engineering, alongside management and marketing skills. This combination is essential for organisations to navigate and thrive in a rapidly evolving technological and economic landscape, underlining the need for a workforce that can manage technical, strategic and operational aspects to drive future success.

Comparative analysis

In Portugal, the focus is on a wide range of roles, including cybersecurity engineers, AI specialists, data analysts, project managers and roles in health and agriculture. This diversity highlights the need for a workforce with a wide range of skills to meet future challenges across different industries.

In Ireland, respondents identified a wide range of critical roles spanning technology, design, research, business development, policy, sustainability and emerging areas such as AI ethics and resilience. This selection highlights the multifaceted nature of future job requirements, pointing to the need for a mix of technical, creative and strategic skills.

For Spain, the focus is on technical skills (developers, programmers, AI developers, engineers), strategic management (project managers, innovation managers), financial management and digital marketing. This focus highlights the importance of combining technical and managerial skills to navigate and thrive in a rapidly evolving landscape.

This comparative analysis shows that while there are commonalities in the recognition of certain roles across the three countries, each country also has unique emphases based on their specific needs and contexts. Portugal and Ireland both show a broad focus on diverse skills, while Spain has a slightly more concentrated focus on technical and managerial roles. This highlights the importance of tailoring workforce development to the specific future needs of each country.

Overall, the analysis reveals common themes across the three countries, such as the emphasis on technology-related roles, including AI specialists, data analysts, and software developers. However, each country also demonstrates unique focuses tailored to their specific needs and contexts. Portugal highlights a mix of technical and sustainability roles, emphasizing the need for diverse skills in digital transformation and healthcare. Ireland presents a broad range of roles across technology, design, research, and sustainability, reflecting the importance of a holistic approach to future job requirements. Spain focuses on a balanced mix of technical, managerial, and marketing roles, highlighting the importance of both technical expertise and strategic management skills. This comparative analysis underscores the critical need for a diverse and adaptable workforce to meet the future demands of various industries.

Question 11 - Please name 5 soft skills that you consider crucial in the future.

Portugal

An analysis of the responses from Portugal to question 11, which asked respondents to identify five soft skills considered crucial for the future, reveals a wide range of important skills. The most frequently mentioned soft skills are critical thinking, which underlines the need for analytical and problem-solving skills; time management, which emphasises the importance of efficient management of one's time and tasks; teamwork, which is essential for effective collaboration; leadership, which is necessary to guide and inspire teams; ethical behaviour, which underlines the importance of integrity and ethical behaviour; and communication, which is essential for clear and effective interaction. These responses emphasise the need for interpersonal and cognitive skills for collaboration, problem solving and continuous learning, highlighting the multi-faceted competencies required to thrive in dynamic and evolving work environments. The responses highlight the importance of interpersonal and cognitive skills, which are crucial for collaboration, problem solving and continuous learning. This diversity of skills underlines the multifaceted nature of the competencies required to thrive in dynamic and evolving work environments, emphasising the adaptability, creativity and strategic vision of the future workforce.

Ireland

An analysis of the responses from Ireland to question 11 reveals a consensus on the critical soft skills needed in the future. The most cited skills include communication, essential for clear and effective interaction; problem-solving, crucial for overcoming challenges and finding solutions; critical thinking, vital for analytical thinking and decision-making; and interpersonal and teamwork skills, key to effective collaboration and relationship building. Additionally, planning and collaboration are essential for strategic execution, while presentation and public speaking are necessary for effectively communicating ideas. Conflict management and empathy are important for managing interpersonal dynamics, and creativity and initiative are crucial for innovation and proactive behavior. Solution-focused management is essential for achieving goals and managing tasks efficiently, while leadership and adaptability are necessary for leading teams and managing change. Lastly, analytical thinking, listening, and resilience are important for critical analysis, effective communication, and managing stress. This wide range of soft skills underlines the need for employees to have strong interpersonal, cognitive, and strategic skills to navigate and thrive in increasingly complex and dynamic workplaces.

Spain

Based on the interview responses from Spain, several soft skills are identified as critical for the future. The most cited skills include teamwork, which is essential for achieving collective goals, and effective communication, which is fundamental for clear interaction and collaboration. In addition, problem-solving, and innovation are highlighted as critical to overcoming challenges and driving progress. These skills emphasise the importance of collaboration, clear communication and creative thinking in meeting future workplace demands.

Other key skills highlighted in Spain include emotional intelligence and empathy, which are necessary for understanding and managing interpersonal dynamics, and workplace psychology, which is important for maintaining a healthy working environment. Resilience and adaptability are crucial for coping with change and stress in a rapidly evolving work environment, while management and leadership skills are needed to lead teams and manage tasks efficiently. These responses suggest that a combination of interpersonal, cognitive and organisational skills will be essential for future success, enabling individuals and teams to navigate effectively in complex and dynamic work environments.

Comparative Analysis

Respondents from Portugal emphasise critical thinking, time management, teamwork, leadership, ethical behaviour and communication. This reflects the need for a range of interpersonal and cognitive skills to thrive in a dynamic environment.

From Ireland, there is an emphasis on communication, problem solving, critical thinking, interpersonal skills, teamwork, planning, collaboration, presentation, conflict management, empathy, creativity, initiative, solution focused management, leadership, adaptability, analytical thinking, listening skills, resilience and a focus on achieving end goals. This wide range reflects the multifaceted nature of future job requirements and highlights the need for strong interpersonal, cognitive and strategic skills.

Respondents from Spain focus on teamwork, effective communication, problem solving, innovation, emotional intelligence, empathy, workplace psychology, resilience, adaptability, management and leadership. This combination emphasises the importance of interpersonal, cognitive and organisational skills for navigating complex and dynamic work environments.

Overall, the analysis reveals common themes across the three countries, such as the high value placed on critical thinking, communication, and teamwork. However, each country also demonstrates unique focuses tailored to their specific needs and contexts. Portugal emphasizes critical thinking and time management alongside leadership and ethical behavior, reflecting a balanced approach to cognitive and interpersonal skills. Ireland presents a comprehensive range of skills, highlighting the importance of creativity, empathy, and strategic management in future workplaces. Spain focuses on teamwork, communication, and adaptability, underscoring the need for resilience and emotional intelligence in managing dynamic environments. This comparative analysis highlights the diverse ways organizations prioritize and develop soft skills to prepare their workforce for the future.

This comparative analysis indicates that while there are commonalities in the recognition of key soft skills across the three countries, each country also emphasises unique aspects based on their specific needs and contexts. Portugal and Ireland both recognise a wide range of skills, reflecting a broad focus on different competences. Spain, while also recognising a range of skills, places particular emphasis on teamwork, communication and resilience, highlighting the importance of these skills in their specific context.

Question 12 - Please name technical skills that you consider crucial in the future.

Portugal

An analysis of the responses from Portugal to question 12, which asked respondents to identify technical skills considered important for the future, reveals a wide range of skills considered crucial. The most cited skills are project management, emphasising the need to coordinate and manage projects efficiently, and programming, highlighted by the mention of specific languages such as Python and JavaScript. Other technical skills

mentioned include physics and materials, reflecting the importance of understanding physical properties and materials science; electronics and mechanics, indicating the need for expertise in these fundamental areas of engineering; and cybersecurity, highlighting the growing importance of securing digital environments.

In addition, artificial intelligence was highlighted, signalling its importance in future technological advances, as well as cloud architecture and machine learning, signalling the need for advanced, specialised skills. This diversity of technical skills underscores the need for a comprehensive skill set, encompassing both broad technical competencies and specialised expertise, to effectively navigate the complexities of future technology landscapes.

Ireland

An analysis of the responses from Ireland to the question asking respondents to identify technical skills considered important for the future shows a wide range of crucial skills. Programming and data analysis are seen as the most important technical skills and are frequently mentioned by respondents. In addition, cybersecurity and engineering are highlighted as essential to protect and build robust systems. The growing influence of AI technologies is reflected in the importance placed on building AI bots and understanding AI. Basic IT skills, such as knowledge of Office 365 and Google tools, are also highlighted, as is the need for versatile technical tools for efficiency, design, research and presentation.

Other essential skills identified include project management and graphics, highlighting the need for task coordination and visual communication, as well as AI regulation and implementation, highlighting the importance of understanding and applying AI within regulatory frameworks. This diversity of skills highlights the need for a strong foundation in both traditional technical skills and emerging technologies to meet the evolving needs of different industries. The emphasis on these skills underlines their importance in driving innovation and maintaining competitive advantage in a rapidly changing technological landscape.

Spain

An analysis of interview responses from Spain regarding critical technical skills for the future reveals several key insights. There is a strong emphasis on Artificial Intelligence (AI) and related tools, particularly programming in Python, indicating the growing importance of AI across industries. Systems engineering is also highlighted as critical, including the ability to define requirements, understand functionality, ensure usability and integrate systems effectively.

Interpersonal skills such as empathy, teamwork and time management are also valued in technical roles, highlighting the need for a well-rounded skill set. Overall, the responses suggest that the future landscape of critical technical skills will be characterised by a combination of advanced technological knowledge, particularly in AI and systems engineering, and essential interpersonal skills to collaborate and manage projects effectively.

Comparative analysis

Responses from Portugal highlight a wide range of technical skills, including project management, programming (Python and JavaScript), physics, materials, electronics, mechanics, cybersecurity, artificial intelligence, cloud architecture and machine learning. This highlights the need for both broad and specialised technical expertise.

From Ireland, respondents highlight programming, data analytics, cybersecurity, engineering, building AI bots, basic IT skills, software efficiency, design, research, security skills, project management, understanding AI, graphics, and AI regulation and implementation. This highlights the importance of a solid foundation in both traditional technical skills and emerging technologies.

Respondents from Spain focus on AI and related tools, systems engineering skills and the integration of interpersonal skills such as empathy, teamwork and time management in technical roles. This combination of advanced technological knowledge and interpersonal skills is essential for future success.

This comparative analysis shows that while there are commonalities in the recognition of key technical skills across the three countries, each country also emphasises unique aspects based on their specific needs and contexts. Portugal and Ireland both recognise the importance of a broad range of technical skills, while Spain emphasises the integration of interpersonal skills within technical roles, suggesting a holistic approach to future workforce development.

Question 13 - What specific areas of digital technology training are most critical for your company's employees?

Portugal

An analysis of the responses from Portugal to question 13, which asked participants to identify specific areas of digital technology and tools considered important for the future, reveals a wide range of critical digital skills. Responses highlighted areas such as digital imaging, emphasising the importance of visual content creation and editing, and project management tools such as Trello and Jira, which are essential for efficient project coordination and management. Web development was also mentioned, highlighting the need to maintain a strong online presence. Artificial intelligence and machine learning were also highlighted, underlining the importance of these advanced technologies. Cybersecurity was emphasised as crucial for the protection of digital assets, while

programming, including specific languages and frameworks critical for software development, was also mentioned.

Other areas identified include e-commerce and digital marketing, reflecting the importance of online business strategies, and blockchain technology, highlighting its potential impact on different industries. This diversity underlines the importance of a comprehensive set of digital skills and tools, ranging from basic technologies such as programming and project management to advanced areas such as AI and cybersecurity. The findings highlight the need for proficiency in both practical digital tools and cutting-edge technology areas to effectively navigate and leverage the evolving digital landscape.

Ireland

An analysis of Ireland's responses to the question on the specific areas of digital technology training that are most important for employees highlights several critical areas. Key areas include AI, IoT and machine learning, which are essential for the use of advanced technologies. Basic IT skills and self-sufficiency are emphasised, highlighting the importance of being able to use different digital tools and solve IT problems independently. Security awareness is also seen as critical to protecting the organisation's data and systems. In addition, CRM and communication platforms are necessary to maintain operational efficiency and customer relationships, while remote collaboration tools are important for effective teamwork in a remote environment.

Further essential skills identified include data analytics and visualisation, which involve creating digestible visual representations of data, and document management, dictation and e-signing, which are key to the efficient handling of digital documents. The development of AI for claims management reflects the use of AI in specialised applications. These areas illustrate the need for comprehensive digital training programmes that enhance both basic IT skills and advanced technology skills to drive productivity and innovation within organisations. The emphasis on these skills underscores their importance in fostering a workforce that can effectively navigate and leverage the evolving digital landscape.

Spain

An analysis of the interview responses from Spain reveals several critical areas of digital technology training for employees. Key areas include proficiency in advanced Microsoft skills such as Excel, Word and PowerPoint, as well as advanced tools such as Power BI, which are essential for productivity and data analysis. DevOps and cloud systems are also highlighted as critical for efficient software development and IT infrastructure management. The growing importance of artificial intelligence (AI) is reflected in the need for training in AI technologies. In addition, big data skills are seen as essential for analysing large data sets and developing intelligent systems, while business intelligence

(BI) tools are recognised as essential for turning data into actionable insights to improve decision-making and productivity.

These areas of digital technology training are critical to improving organisational efficiency and maintaining a competitive edge. The focus on both basic and advanced digital skills in Spain underscores the need for employees to be proficient in a range of technologies to drive organisational success. The emphasis on tools such as Power BI and BI tools highlights the importance of data-driven decision making, while the inclusion of AI and big data skills points to the increasing reliance on advanced technologies to remain competitive in a rapidly evolving digital landscape. Overall, this comprehensive approach to digital technology training is essential to developing a workforce that can effectively navigate and leverage the complex and dynamic technological environment.

Comparative analysis

Respondents from Portugal highlight a wide range of digital skills, including digital imaging, project management tools, web development, AI, cybersecurity, programming, e-commerce, digital marketing and blockchain technology. This diversity highlights the need for a wide range of digital skills.

In Ireland, the emphases are on AI, IoT, machine learning, basic IT skills, security awareness, CRM, communication platforms, remote collaboration tools, data analytics and visualisation, document management, dictation, e-signing, and AI for claims management. This reflects the need for comprehensive digital training programmes, covering both basic and advanced technologies.

Spanish participants emphasise advanced Microsoft skills, DevOps, cloud systems, AI, big data skills and business intelligence tools. This highlights the importance of both basic and advanced digital skills for productivity and data-driven decision making.

This comparative analysis reveals commonalities in the recognition of key digital technology training areas across the three countries, with each country also emphasising unique aspects based on their specific needs and contexts. Portugal and Ireland both emphasise a broad range of digital skills, while Spain focuses on advanced tools and data analytics skills, indicating a holistic approach to future workforce development.

Question 14 - What efforts has your organization undertaken to mitigate digital skills gaps among employees? Please describe the scope and nature of these initiatives.

Portugal

An analysis of the responses to question 14, which asked respondents to describe the efforts their organizations have made to improve digital literacy, reveals a range of initiatives aimed at promoting digital skills. The most frequently cited efforts include external training and short courses, which multiple respondents highlighted as essential for providing specialized knowledge and skills. Additionally, internal seminars and workshops are emphasized, showcasing the importance of internal knowledge sharing and practical training sessions. International trade fairs are also noted, offering exposure to global trends and best practices, while internal mentoring and brainstorming sessions encourage peer learning and innovative thinking.

Additional initiatives mentioned include training sessions, knowledge sharing, and the purchase of course licenses. These efforts reflect a comprehensive approach to digital skills development, emphasizing both internal development programs and external opportunities for learning and growth. This multi-faceted approach indicates a recognition of the importance of continuous learning and adaptability in the rapidly evolving digital landscape, ensuring that employees are well-equipped to handle current and future digital challenges.

Ireland

The responses to question 14 in Ireland highlight a strong commitment to ongoing digital skills learning and development. Organizations employ a variety of methods, including specialized training in emerging technologies such as AI and IoT, ensuring that employees are proficient in cutting-edge technologies. Cross-departmental collaborative training initiatives are also prominent, promoting knowledge sharing and collaborative learning across different departments. Individual one-to-one and group training sessions are provided, offering personalized and group learning experiences, while regular security training maintains vigilance and up-to-date knowledge on cybersecurity practices.

Ongoing assessment and training underscore the continuous nature of these initiatives. This variety of approaches highlights the comprehensive efforts being made to ensure that employees remain proficient in essential digital skills, effectively addressing potential skills gaps. The commitment to continuous improvement and adaptation to new technologies is evident, ensuring that employees are prepared to meet the evolving demands of the digital landscape and contribute effectively to organizational success.

Spain

Organizations in Spain use a variety of strategies to mitigate the digital skills gap among their workforces. Key approaches include engaging external companies for specialized training, ensuring access to up-to-date expertise, and hiring new employees with relevant expertise to facilitate internal knowledge transfer and leverage advanced skills. Structured training plans for existing employees are also developed, creating systematic programs to upgrade the skills of current staff. Additionally, some organizations recruit

skilled individuals and then develop internal training efforts to combine the benefits of new expertise with ongoing employee development.

There is also a general acknowledgment of significant but unspecified efforts to address these gaps, indicating a strong organizational commitment to enhancing digital skills. These combined efforts reflect a comprehensive approach to ensuring that employees have the necessary digital skills to meet the evolving needs of the organization. By combining external training, strategic hiring, and internal development programs, organizations in Spain are proactively addressing digital skills gaps and preparing their workforce for future challenges.

Comparative analysis

Portugal: Uses a wide range of initiatives including external training, short courses, internal seminars, international trade fairs, workshops, mentoring, brainstorming sessions and course licences. This approach emphasises the importance of both internal development and external learning opportunities.

Ireland: Focuses on specialised training in emerging technologies, cross-departmental collaborative initiatives, individual and group training, and regular security training. Ongoing assessment and training underline the commitment to maintaining proficiency in essential digital skills.

Spain: Uses strategies such as hiring external trainers, recruiting new employees with relevant skills, and developing structured training plans. The combination of recruitment and internal training reflects a comprehensive strategy to address digital skills gaps.

This comparative analysis shows that while each country adopts unique strategies based on its specific context, there is a common emphasis on the importance of continuous learning, specialised training and a multi-faceted approach to digital skills development. Portugal and Ireland place a strong emphasis on internal and collaborative learning methods, while Spain combines recruitment with internal training to ensure its workforce has the necessary digital skills.

Question 15 - In which ways has this been addressed?

Portugal

Organisations use a mix of training approaches, including general training, specific training plans, transversal training, internal training sessions, brainstorming sessions, knowledge sharing, short courses, mentoring and external training programmes. In addition, some organisations take a strategic approach to workforce development by focusing on regional recruitment rather than sourcing from competitors. This multi-

faceted approach highlights the importance of both internal development and external learning opportunities in building a skilled workforce capable of adapting to the evolving digital landscape.

Ireland

Internal training is a predominant method of upskilling employees, complemented by short-term training programmes to address immediate skills gaps. Hiring new professionals with the necessary digital skills is also a common strategy. A focus on continuous learning and regular assessment ensures that employees remain proficient in the latest digital tools and technologies. This comprehensive approach combines internal development and external recruitment to cultivate a well-rounded and competent workforce capable of meeting current and future technology challenges.

Spain

Organisations often hire external firms for specialised training and plan for the integration of new technologies such as AI, big data and blockchain. Structured hiring and training plans bring in skilled individuals first, followed by tailored training for existing employees. Incentives and rewards motivate employees to achieve higher levels of proficiency. These strategies reflect a holistic approach to digital skills development, integrating external expertise, planning for technological advances and using motivational incentives to ensure a well-equipped and adaptable workforce.

Comparative

Overall, the analysis reveals common themes across the three countries, such as the importance of continuous learning and the integration of internal and external training methods. However, each country also demonstrates unique approaches tailored to their specific needs and contexts, highlighting the different ways in which organisations are preparing their workforce to navigate the rapidly evolving digital landscape.

Question 16 - Please name 3 technologies that you already use or do you think you will start using in the next 5 years?

Portugal

An analysis of the responses from Portugal to question 16, which asked respondents to name three technologies their organizations are already using or expect to use in the next five years, reveals a significant focus on advanced and emerging technologies. The most frequently mentioned technology is artificial intelligence, cited four times. Machine learning and data analytics are each mentioned three times, highlighting their importance in current organizational practices. Other technologies mentioned include blockchain, cybersecurity, software programming, and digital marketing. This diverse range of technologies highlights the widespread adoption and integration of sophisticated digital tools and methods across different organizations, emphasizing a strong commitment to leveraging cutting-edge technologies to drive innovation, efficiency, and competitive advantage.

Ireland

The analysis of responses from Ireland reveals a clear trend toward key digital innovations. The most frequently mentioned technologies include digital platforms and apps, cited by seven respondents, followed by artificial intelligence, noted by six respondents. E-commerce and digital trade were also prominently featured, with five mentions. Additionally, specialized technologies such as broadcasting were highlighted, reflecting the diverse technological needs and strategies of different organizations. These findings underscore a strong inclination towards adopting advanced digital solutions that facilitate commerce, enhance operational efficiency, and improve decision-making processes, indicating a broad recognition of the critical role digital technologies will play in driving future business success.

Spain

The analysis of survey responses from Spain reveals the key technologies that organizations are currently deploying or planning to deploy in the next five years. Artificial intelligence (AI) emerges as the most frequently cited technology, underscoring its critical role in various applications such as data processing and automation. Optical character recognition (OCR) and identity validation methods are highlighted for their importance in automating data recognition and enhancing security. Additionally, blockchain is recognized for its significance in secure transactions and data integrity, while Near Field Communication (NFC) is valued for its applications in wireless communications and mobile payments. Firmware is noted for its essential role in controlling hardware devices. These technologies reflect a focus on enhancing automation, security, communications, and computing capabilities, indicating a strategic approach to leveraging advanced technologies for future business needs.

Comparative Analysis

Overall, the analysis reveals common themes across the three countries, such as the widespread adoption of artificial intelligence and the integration of advanced digital tools. Each country also demonstrates unique approaches tailored to their specific needs and contexts. Portugal highlights a diverse range of digital tools, emphasizing innovation and competitive advantage. Ireland focuses on digital platforms, e-commerce solutions, and specialized technologies to enhance operational efficiency and business success. Spain prioritizes automation, security, and communication technologies, reflecting a strategic approach to preparing for future technological advancements. This

comprehensive approach to technological adoption underscores the critical role of digital innovation in driving organizational success and maintaining a competitive edge in the rapidly evolving digital landscape.

Question 17 - Looking ahead, what emerging digital skills or technologies do you anticipate becoming critical for your industry or organization in the next 2-5 years?

Portugal

An analysis of the responses to question 17, which asked respondents to identify emerging digital skills anticipated to be important in the next 2-5 years, reveals a strong emphasis on advanced and evolving technological skills. The most frequently mentioned skill is artificial intelligence (AI), cited four times. Other key skills include data analytics and machine learning, each mentioned twice. Additionally, the responses highlight a variety of other emerging skills such as smart contracts, prompt language, generative AI, cybersecurity, quantum computing, and Web 2 and 3. This diverse range of skills underlines the expected need for expertise in both cutting-edge technologies and foundational digital skills. The focus on these emerging skills reflects the changing nature of the digital landscape and the need for organizations to adapt by developing skills in these advanced areas to remain competitive and innovative.

Ireland

The analysis of responses from Ireland shows a wide range of anticipated critical digital skills and technologies for the next 2-5 years. The most frequently mentioned technologies include artificial intelligence (AI) and the Internet of Things (IoT), highlighting a strong focus on leveraging AI capabilities in various applications. Other notable mentions include digital content creation for broadcasting and machine learning, emphasizing the need for advanced technological expertise to improve operational efficiency and foster innovation. This broad spectrum of emerging skills and technologies illustrates that organizations are prioritizing the adoption of advanced digital capabilities to stay competitive and drive future growth in an increasingly digital landscape.

Spain

The analysis of interview responses from Spain identifies key emerging digital skills and technologies expected to become critical in the next 2-5 years. Artificial Intelligence (AI) is anticipated to play a significant role in automation, enhancing operational efficiency while recognizing the irreplaceability of human creativity for tasks such as proposal writing. Internet of Things (IoT) platforms and firmware are highlighted for their importance in creating connected and responsive environments, indicating a focus on

smart technologies. The trend towards remote working necessitates robust digital tools and platforms, making remote working technologies essential. Additionally, data protection continues to be a critical area, emphasizing the importance of safeguarding organizational and customer information in an increasingly digital landscape. These findings reflect a strategic focus on automation, connected systems, remote work support, and data security as key areas for future technology development and skills acquisition.

Comparative Analysis

The comparative analysis reveals common themes across the three countries, such as the emphasis on artificial intelligence (AI) and machine learning as pivotal technologies for the future. Each country also highlights unique areas tailored to their specific contexts and industries. Portugal underscores the importance of a broad spectrum of cutting-edge technologies, including quantum computing and Web 2 and 3. Ireland emphasizes the integration of AI and IoT, along with a focus on digital content creation and machine learning for operational efficiency and innovation. Spain highlights the need for automation, connected systems, remote work technologies, and data protection, reflecting a comprehensive approach to future technology development and digital skills acquisition. This comparative analysis demonstrates the diverse strategies organizations are adopting to prepare for and leverage emerging digital skills and technologies in the coming years.

Question 18 - Among hired professionals, to what extent is it necessary to give training?

Portugal

An analysis of the responses to question 18, which asked about the extent to which hired professionals need to be trained in digital skills, shows a significant consensus on the need for comprehensive training. Most respondents indicated that either "almost all" or "all staff need training." Specifically, two respondents stated, "almost all of them," and another two emphasized that "all employees need to be trained." Only one respondent mentioned that "not everyone needs to be trained." This indicates a strong recognition among organizations in Portugal of the necessity for extensive digital skills training to ensure their workforce is adequately prepared to meet the demands of the modern digital environment.

Ireland

The analysis of responses from Ireland reveals clear trends in the perceived need for training for employed professionals. The majority of respondents (four) advocate for comprehensive training for all employees, highlighting its critical role in enabling

effective role performance. Conversely, one respondent emphasizes the importance of role-specific training, pointing to the variability of training needs based on specific job roles within the organization. Additionally, another respondent suggests that while some training is essential, it may be more targeted to specific areas or roles. Despite these differences, there is a common recognition of the importance of training in improving employees' skills. This underlines a collective understanding among Irish organizations of the need to equip employees with the necessary skills, while acknowledging the nuanced training needs based on roles and organizational requirements.

Spain

The analysis of interview responses from Spain reveals different perspectives on the need for training for recruited professionals. One organization has not required specific training or funding for training in the past, possibly because it hires people with preexisting skills or relies on informal training methods. In contrast, another organization emphasizes the need for training for all staff, including the interviewee, underlining the importance of continuous learning and development throughout the organization. This suggests that the value of training is recognized to varying degrees, with some organizations focusing on utilizing existing skills, while others advocate for comprehensive training initiatives to ensure ongoing professional growth and development.

Comparative Analysis

The comparative analysis reveals a consensus across the three countries on the importance of training for hired professionals, though the extent and approach vary. In Portugal, there is a strong emphasis on comprehensive training for almost all or all staff, reflecting a broad recognition of the need for extensive digital skills development. Ireland shows a mix of perspectives, with a majority advocating for comprehensive training while also recognizing the need for role-specific training tailored to individual job requirements. Spain presents varied approaches, with some organizations relying on pre-existing skills or informal training, while others emphasize the need for comprehensive training for all staff to support continuous professional development. This comparative analysis highlights the diverse strategies organizations employ to ensure their workforce is equipped with the necessary skills to thrive in a digital environment, recognizing both the universal need for training and the specific requirements of different roles and organizational contexts.

Question 19 - When your organization provides training, how do you fund it?

Portugal

An analysis of the responses to question 19, which asked how training is funded within organizations, reveals some common approaches. The most frequent methods are 'company funded, government supported' and 'company funded, free courses,' each mentioned twice. Additionally, one response highlighted a more comprehensive approach, mentioning 'company funded, government supported, free courses, online program.' This suggests that companies typically fund training initiatives themselves, often supplemented by government programs and free courses. This multi-faceted approach to funding ensures that employees have access to the necessary resources to improve their digital skills, combining internal financial commitments with external support to provide comprehensive training opportunities.

Ireland

The analysis of responses from Ireland reveals two main methods for funding training: organizational funding, which is the predominant method mentioned by seven respondents, and free training, mentioned by two respondents. This indicates a strong willingness among most organizations to invest directly in the development of their employees by funding necessary training programs. A smaller number of organizations take advantage of free training opportunities, suggesting a reliance on available external resources to supplement internal training efforts. This emphasis on organizational funding highlights a commitment to ensuring employees receive the training needed to stay competitive and effective in their roles.

Spain

The analysis of interview responses from Spain reveals varied approaches to funding training within organizations. Some organizations adopt a flexible funding strategy, considering training essential but varying the funding based on the experience and needs of employees. Others show a moderate commitment to investing in training, allocating resources on a limited or as-needed basis. Several organizations have a dedicated training budget to ensure comprehensive coverage for all employees. Additionally, some organizations utilize external funding sources, such as the Tripartite Foundation, to support their training initiatives. These different strategies highlight varying levels of commitment and methods for funding training, reflecting diverse approaches to improving employee skills and development.

Comparative Analysis

The comparative analysis reveals common themes and differences in how organizations across Portugal, Ireland, and Spain fund training initiatives. In Portugal, a combination of company funding, government support, and free courses is common, reflecting a multi-faceted approach to providing training opportunities. Ireland shows a predominant reliance on organizational funding, with a significant number of organizations willing to invest directly in employee development, while some also utilize free training resources.

In Spain, there is a mix of flexible funding strategies, moderate investment, dedicated training budgets, and external funding sources, indicating diverse approaches to funding training. This comparative analysis highlights the various ways organizations ensure their employees have access to essential training resources, reflecting different levels of investment and strategies tailored to their specific needs and contexts.

Question 20 - What is the average duration of training (hours of training)?

Portugal

An analysis of the responses to question 20, which asked about the average length of training provided by organizations, reveals a wide range of training durations. Responses vary from short sessions of "2-4 hours" and "3 hours" to longer periods such as "8-12 hours" and "40 hours." One response simply stated "40" without specifying the unit, but it can be inferred from the context of other responses that it means hours. This variation in training duration suggests that organizations tailor their training programs to different needs, offering both short, focused sessions and longer, more comprehensive training to address various aspects of digital skills development. The flexibility in training lengths indicates an adaptive approach to employee development, catering to both immediate skill needs and more extensive learning requirements.

Ireland

The analysis of responses from Ireland provides statistical insights into the average duration of training. There were four valid responses, with an average training duration of approximately 3.94 hours. The standard deviation of 5.40 hours indicates considerable variability in training duration. The shortest reported session is 0.75 hours (45 minutes), while the 25th percentile is 0.94 hours, meaning 25% of training sessions are shorter than this. The median duration is 1.5 hours, and the 75th percentile is 4.5 hours, indicating that 75% of sessions are shorter than this duration. The longest reported training session is 12 hours. This analysis suggests a wide range of training durations across organizations, from brief sessions to more extensive training programs, reflecting diverse approaches to meeting training needs.

Spain

The analysis of interview responses from Spain reveals varied approaches to the length of training provided by organizations. Two organizations allocate one week (40 hours) for training, indicating a structured approach to providing comprehensive skills development within a defined timeframe. Another organization adopts a flexible approach with short sessions and on-demand training to meet different learning needs and schedules. This mix of structured and flexible training durations highlights the

different strategies used by organizations to effectively develop the skills of their employees. The structured week-long training sessions indicate a commitment to indepth skills acquisition, while the flexible sessions cater to the immediate and varied needs of the workforce.

Comparative Analysis

The comparative analysis reveals a wide range of training durations across Portugal, Ireland, and Spain, reflecting diverse strategies to meet organizational and employee needs. Portugal shows a significant variation in training lengths, indicating a tailored approach to different aspects of digital skills development. Ireland demonstrates considerable variability in training durations, from short sessions to longer programs, with an average of approximately 3.94 hours. Spain highlights both structured one-week training sessions and flexible, on-demand training approaches, showing a balance between comprehensive skills development and adaptable learning opportunities. This comparative analysis underscores the importance of flexibility and adaptability in training to enhance their skills in a rapidly evolving digital landscape.

Question 21 - How committed is your company to investing in employee development and training?

Portugal

An analysis of the responses to question 21, which asked about the level of commitment of companies to investing in digital skills, shows a high level of commitment overall. Two respondents indicated that their companies were "Very committed" and two others described their companies as "Extremely committed." One respondent said their organization was "Moderately committed." This distribution shows that most organizations in Portugal recognize the importance of investing in digital skills and are taking significant steps to ensure their workforce is well prepared for the digital future. The emphasis on high levels of commitment reflects a strong organizational focus on continuous learning and upskilling.

Ireland

Across the surveyed organizations in Ireland, commitment to employee development varies, with the majority falling under the "Very committed" category, as noted by three organizations. Two organizations expressed a "Moderately committed" stance, while one organization displayed an "Extremely committed" attitude toward training initiatives. Additionally, one organization reported being "Slightly committed" to employee development. Overall, these findings indicate a prevalent recognition among Irish

organizations regarding the significance of continuous learning and upskilling for maintaining competitiveness in the market, despite differences in the intensity of commitment demonstrated. The majority's high level of commitment highlights a proactive approach to workforce development.

Spain

The analysis of interview responses from Spain reveals varying levels of commitment to investing in employee development and training. One organization is highly committed, reflecting a proactive approach to improving staff skills and career development. Another organization expresses a solid commitment, emphasizing that recent experiences have strengthened their dedication to training. A third organization shows moderate commitment, with allocated budget slots for training and an awareness of its importance, indicating a structured but possibly limited approach. Overall, these responses highlight a spectrum of commitment to staff development in Spain, ranging from highly proactive to moderately structured strategies.

Comparative Analysis

Overall, the comparative analysis reveals that organizations across Portugal, Ireland, and Spain generally recognize the importance of investing in employee development and training, though the level of commitment varies. Portugal exhibits a high level of commitment, with most organizations being either very or extremely committed to digital skills investment. In Ireland, the majority of organizations are very committed, with a few showing moderate or slightly lower levels of commitment, indicating a strong overall emphasis on continuous learning and upskilling. Spain presents a range of commitment levels, from highly proactive to moderately structured approaches, reflecting diverse strategies in staff development. This comparative analysis underscores the widespread acknowledgment of the need for ongoing employee development to maintain competitiveness and adapt to the evolving digital landscape, while also highlighting the different intensities of commitment and strategic approaches across the three countries.

Question 22 - In today's rapidly changing digital landscape, do you view ongoing digital skills development as a necessity for your employees to remain competitive and adaptable in the long term?

Portugal

An analysis of the responses to question 22, which asked whether organizations recognize the need to continually update digital skills in today's rapidly changing landscape, shows unanimous agreement. All five respondents answered "yes," indicating that there is a general recognition among the organizations surveyed of the importance of continuously updating digital skills to keep pace with technological advances. This consensus underscores the critical need for continuous learning and adaptation in the digital age, highlighting a universal acknowledgment of the necessity for employees to remain competitive and adaptable through ongoing digital skills development.

Ireland

The detailed responses from Ireland emphasize that the ongoing development of digital skills is crucial to the company's services and future expectations. Five out of seven respondents clearly see ongoing digital skills development as a necessity for their staff. One organization provided a detailed explanation, highlighting its critical role in their business model and future viability. However, one respondent considered it important but not essential, citing the nature of their work as being more face-to-face. This overall strong agreement indicates that most organizations in Ireland recognize the essential role of continuous digital skills development in maintaining competitiveness and ensuring long-term success, despite some variation based on the nature of the work.

Spain

The analysis of interview responses from Spain reveals a strong consensus on the importance of ongoing digital skills development to maintain competitiveness and adaptability in today's rapidly changing digital landscape. Two organizations explicitly affirm this need, with one emphasizing that it is crucial for long-term success. Another organization links the need for continuous training to the achievement of specific goals and the integration of new technologies. Overall, these responses highlight a clear recognition across the board of the critical role that ongoing digital skills development plays in ensuring that employees remain competitive and adaptable in the face of evolving technological advances.

Comparative Analysis

Globally, the comparative analysis reveals a unanimous agreement across Portugal, Ireland, and Spain on the necessity of ongoing digital skills development. In Portugal, all respondents agree on the critical need for continuous learning and adaptation to keep pace with technological advances. In Ireland, most organizations recognize the essential role of digital skills development, with some variations based on the nature of the work. Spain shows a strong consensus on the importance of continuous training, linking it to long-term success and the integration of new technologies. This comparative analysis highlights the universal acknowledgment of the need for ongoing digital skills development to maintain competitiveness and adaptability in the rapidly evolving digital landscape, while also reflecting some context-specific variations in emphasis.

Question 23 - How do you diagnose the training needs of the company's employees?

Portugal

An analysis of the responses to question 23, which asked how organizations diagnose the training needs of their employees, reveals that organizations use a variety of methods to assess and identify workforce training requirements. Common approaches include formal surveys, continuous improvement processes, and strategic analysis based on business needs. This diversity suggests that organizations tailor their diagnostic approaches to their specific operational contexts and objectives. The use of multiple methods indicates a comprehensive effort to ensure that training programs are aligned with both immediate and long-term organizational goals.

Ireland

The responses from Ireland to question 23 indicate a range of approaches to diagnosing the training needs of employees. Common methods include surveys, needs analysis, and gap analysis. Some organizations rely on their learning and development departments, while others use internal audits and ongoing assessments to identify training needs. Additionally, one organization mentioned providing situational training based on specific incidents, highlighting a reactive approach to addressing immediate training needs. This variety in methods shows that Irish organizations employ both proactive and reactive strategies to ensure their employees receive the necessary training to enhance their skills and meet organizational requirements.

Spain

The analysis of interview responses from Spain reveals diverse approaches to diagnosing employee training needs. One organization diagnoses training needs based on company growth, indicating that as the company expands, new roles and responsibilities necessitate corresponding training programs. Another organization aims to cover most training needs, suggesting a comprehensive approach to identifying and addressing skills gaps. A dual approach is highlighted by one organization, where certain training needs are addressed by management while employees are expected to take the initiative for technology training, combining top-down management involvement with bottom-up employee-driven learning. Another organization relies on manufacturer guidelines to determine hard skills training needs, ensuring alignment with industry standards and technology specifications. These diverse strategies reflect growth-oriented, comprehensive, managerial, and industry-aligned approaches to diagnosing and addressing employee training needs.

Comparative Analysis

The comparative analysis discloses common themes and diverse strategies across Portugal, Ireland, and Spain in diagnosing employee training needs. Portugal employs a mix of formal surveys, continuous improvement processes, and strategic analysis, indicating a comprehensive approach tailored to specific business objectives. Ireland demonstrates a range of methods, including surveys, needs analysis, gap analysis, internal audits, and situational training, highlighting both proactive and reactive strategies. Spain showcases varied approaches, such as diagnosing based on company growth, comprehensive coverage of training needs, a dual approach combining management and employee initiatives, and reliance on manufacturer guidelines. This comparative analysis underscores the importance of tailored, multi-faceted strategies to accurately diagnose and address training needs, ensuring employees are equipped with the relevant skills to meet organizational demands and stay competitive in a rapidly evolving landscape.

Question 24 - Do you currently have skills gaps within your organisation in the following areas: Financial innovation and technology, artificial intelligence, blockchain, cybersecurity, data analytics and machine learning, digital marketing, and web development?

Portugal

An analysis of the responses to question 24, which asked about current skills gaps within organizations, reveals several critical areas where skills are lacking. The most frequently cited skills gap is in cybersecurity, mentioned five times. This is closely followed by gaps in artificial intelligence (AI) and blockchain, each mentioned four times. Data analytics and machine learning are identified as gaps three times. Other gaps include digital marketing and web development. These findings highlight the urgent need for expertise in advanced and technical areas, reflecting the challenges organizations face in keeping up with rapidly evolving technologies and associated skills requirements. The pronounced gaps in cybersecurity, AI, and blockchain suggest these are priority areas for training and development.

Ireland

In Ireland, the most frequently identified skills gap is in the area of artificial intelligence, with four organizations indicating a need for improvement in this area. Other areas with identified skills gaps include data analytics, financial innovation and technology, and cybersecurity, each cited by one organization. This suggests that while AI is the most commonly recognized area with a skills gap, there are also notable shortfalls in other critical technology and financial areas. Addressing these gaps will likely require targeted training and development programs to enhance the relevant skills within these organizations. The emphasis on AI reflects its growing importance and the need for specialized knowledge to leverage its potential fully.

Spain

The analysis of interview responses from Spain reveals several skills gaps within organizations. One organization identifies gaps in multiple areas, including financial innovation, treasury, insurance, and legal, indicating a broad need for skills development. Another organization highlights department-specific gaps in cybersecurity, communication skills, and IT support, suggesting a need for targeted training. Cybersecurity is mentioned several times, indicating a widespread recognition of gaps in this critical area. Additionally, there is a specific need for skills in implementing effective treasury management within the fintech sector. Overall, these findings reflect a diverse range of skills gaps across different sectors and departments, underscoring the importance of targeted training and development initiatives to address these shortfalls.

Comparative analysis

Broadly speaking, the comparative analysis reveals common themes and specific differences in skills gaps across Portugal, Ireland and Spain. In Portugal, there is a strong emphasis on gaps in cybersecurity, AI, and blockchain, highlighting critical areas that require immediate attention. Ireland shows a predominant gap in AI, with additional needs in data analytics, financial innovation, and cybersecurity, reflecting a focus on both emerging technologies and traditional financial skills. Spain shows a broader range of gaps, including financial innovation, cybersecurity, communication skills, and IT support, suggesting different needs across sectors and departments. This comparative analysis underscores the widespread recognition of significant skills gaps in advanced and technical areas, highlighting the need for comprehensive and targeted training programmes to equip employees with the essential skills to meet evolving organisational needs and technological advances.

Question 25 - Have you allocated additional resources to training existing employees to address these identified skills gaps? If so, can you provide examples of such training initiatives?

An analysis of the responses to question 25, which asked whether organizations have allocated additional resources to address skills gaps, shows unanimous agreement. All five respondents answered "yes," indicating that every organization surveyed has recognized the importance of addressing skills gaps and has allocated additional resources to this effort. This consensus underlines the proactive steps that organizations in Portugal are taking to ensure their workforce possesses the necessary skills to meet current and future demands. The commitment to investing in training initiatives reflects a strategic focus on continuous improvement and capacity building.

Ireland

In Ireland, most responses indicate that organizations are actively taking steps to address skills gaps through various training initiatives. These include in-house training, online courses, and expert consultations. However, some organizations are still in the planning stage or have not yet allocated resources to training. This mixed approach suggests that while there is a strong recognition of the need for training to address skills gaps, the level of implementation varies. The majority's proactive stance indicates a commitment to enhancing employee skills, though some organizations are yet to fully mobilize resources for training.

Spain

The analysis of responses from Spain reveals a variety of approaches to allocating additional resources for training existing employees to fill identified skills gaps. Two respondents did not provide specific information. One respondent confirmed the allocation of resources without giving details. Another highlighted participation in research training projects, such as lectures, which do not currently require credits. One detailed response described a structured approach involving active observation, listening to staff needs, and annual planning meetings to align training initiatives with organizational goals. This variety of responses indicates that while some organizations have detailed and structured training plans, others are either less specific or in the early stages of resource allocation.

Comparative analysis

Altogether, the analysis shows that organisations in Portugal, Ireland and Spain generally recognise the importance of addressing skills gaps and are allocating additional resources to training, although approaches and levels of implementation vary. In Portugal there is unanimous agreement and proactive allocation of resources to training initiatives, reflecting a strong commitment to skills development. Ireland shows a mix of active training initiatives and planning stages, indicating a recognised need for training with varying degrees of implementation. Spain presents a range of responses from detailed structured plans to general statements on resource allocation. This comparative analysis highlights the importance of allocating resources to training in all three

countries, emphasising different levels of detail and implementation strategies tailored to organisational needs and contexts.

Question 26 - Is your organisation interested in recruiting individuals who have successfully completed a micro -credential programme?

Portugal

An analysis of the responses to question 26, which asked about the level of interest in recruiting professionals with micro-credentials, reveals a high level of interest among organizations. Three respondents indicated they were "Extremely interested," demonstrating a strong commitment to this recruitment strategy. One respondent expressed a moderate level of interest, stating "Moderately interested," while another respondent's interest was conditional, stating "Maybe, yes. It depends on the area of the micro-credential programme." This overall positive response underlines the growing recognition of the value of micro-credentials in improving workforce skills and meeting specific organizational needs.

Ireland

The distribution of responses in Ireland suggests that while there is significant interest in micro-credential programs among some organizations, there is also a notable proportion that are either not interested or only slightly interested. This mixed perception indicates that while some organizations see the potential benefits of microcredentials in the recruitment process, others may not yet fully recognize their value or relevance. This variance reflects differing organizational priorities and perspectives on the effectiveness of micro-credentials in addressing skill gaps.

Spain

The analysis of responses from Spain to question 26 reveals a generally positive attitude towards recruiting individuals who have completed a micro-credential program. Three respondents expressed positive interest, emphasizing conditions such as the official status of the program, the expertise of the individual, and integration with social security compensation programs. One respondent gave a conditional response, highlighting the importance of the length and depth of the program for it to be valuable. One respondent did not provide any information. Overall, there is considerable interest in micro-credentials in Spain, contingent on their credibility and relevance to organizational needs.

Comparative analysis

The comparative analysis shows a positive but variable interest in recruiting people with micro-credentials in Portugal, Ireland and Spain. In Portugal there is a high level of interest, with most organisations expressing strong or moderate enthusiasm for this recruitment strategy. Ireland shows a mixed picture, with some organisations showing a high level of interest, while others have little or no interest, reflecting different views on the value of micro-credentials. Spain shows a generally positive attitude, with interest dependent on factors such as the credibility and relevance of the programme. This comparative analysis highlights the growing recognition of micro-credentials as a valuable tool for improving the skills of the workforce, but also reflects the different levels of acceptance and specific conditions under which these credentials are valued in the three countries.

Question 27 - If your organisation is interested in recruiting microcredential programme graduates, could you please indicate any preferred qualifications, skills or criteria you are looking for in these candidates?

Portugal

An analysis of the responses to question 27, which asked about the specific qualifications, skills, or criteria organizations look for in micro-credential program graduates, reveals a variety of targeted skills and domains. Key areas of interest include:

Technical Skills: Such as data analysis, cybersecurity, artificial intelligence, and programming languages.

Soft Skills: Including critical thinking, problem-solving, and adaptability.

In addition, one respondent stated, "There is no specific demand," suggesting that their interest in micro-credentials may be more general or situational. Another respondent was unsure, stating, "I don't know." This diversity of responses highlights the different needs and strategic priorities of organizations when it comes to upskilling their workforce with specific micro-credential skills, particularly in advanced technical and digital areas.

Ireland

The analysis of responses from Ireland shows a consensus that investment in digital skills training and micro-credentials is seen as a potential competitive advantage in attracting and retaining top talent. Out of seven respondents, five (including one strongly) agree that such investment is beneficial to their organization, highlighting a strong belief in the value of digital skills in maintaining a competitive edge in the modern workforce. However, two respondents disagree, suggesting that they either do not consider it relevant to their organization's needs or have other priorities for attracting and retaining

talent. This difference in perspective underlines the prevailing view that digital skills training and micro-credentials are essential for competitive advantage while recognizing that some organizations may have a different strategic focus.

Spain

The analysis of responses from Spain to question 27 reveals a generally positive outlook on the strategic value of micro-credentials. Two respondents did not provide an answer. Two respondents confirmed the potential benefits, with one likening micro-credentials to valuable certifications. However, one respondent identified a significant challenge, citing a lack of time as a barrier to investing in such training. Overall, the responses suggest a recognition of the strategic value of digital skills training and micro-credentials, tempered by practical constraints.

Comparative analysis

The comparative analysis provides evidence of a general recognition of the value of micro-credentials in Portugal, Ireland and Spain, with varying degrees of specificity and strategic focus. In Portugal, interest is focused on both technical and soft skills, reflecting different organisational needs. In Ireland, there is a strong consensus on the competitive advantage offered by digital skills training and micro-credentials, although some organisations remain sceptical. Spain shows a positive attitude towards the strategic value of micro-credentials, with some practical constraints highlighted. This comparative analysis underlines the importance of digital skills and micro-credentials in improving the skills of the workforce, while acknowledging the different levels of emphasis and practical challenges faced by organisations in implementing such initiatives.

Question 28 - Do you see investing in digital skills training and microcredentials as a potential competitive advantage for your organization in attracting and retaining top talent?

Portugal

An analysis of the responses to question 28, which asked whether organizations consider investment in digital skills training to be a competitive advantage, shows unanimous agreement on its importance. Three respondents simply answered "yes," while one respondent elaborated, stating that investment in digital skills is "absolutely mandatory." Another detailed response emphasized the need to demonstrate to potential and current employees that the organization provides opportunities for skills development, which is crucial for both recruitment and retention. This consensus highlights the critical role that ongoing digital skills training plays in maintaining a competitive and capable workforce in the modern digital landscape.

Ireland
The analysis of responses from Ireland shows a consensus that investment in digital skills training and micro-credentials is seen as a potential competitive advantage in attracting and retaining top talent. Out of seven respondents, five (including one strongly) agree that such investment is beneficial to their organization, highlighting a strong belief in the value of digital skills in maintaining a competitive edge in the modern workforce. However, two respondents disagree, suggesting that they either do not consider it relevant to their organization's needs or have other priorities for attracting and retaining talent. This difference in perspective underlines the prevailing view that digital skills training and micro-credentials are essential for competitive advantage, while recognizing that some organizations may have a different strategic focus.

Spain

The analysis of responses from Spain to question 28 reveals a generally positive outlook on the strategic value of investing in digital skills training and micro-credentials. Two respondents did not provide an answer. Two respondents confirmed the potential benefits, with one likening micro-credentials to valuable certifications. However, one respondent identified a significant challenge, citing a lack of time as a barrier to investing in such training. Overall, the responses suggest a recognition of the strategic value of digital skills training and micro-credentials, tempered by practical constraints.

Comparative analysis

The comparative analysis indicates a strong recognition in Portugal, Ireland and Spain of the importance of investing in digital skills training and micro-credentials as a competitive advantage. In Portugal, there is unanimous agreement on the critical role of such investment in maintaining a competitive and skilled workforce. Ireland shows a strong consensus, with most respondents seeing digital skills training as essential for attracting and retaining top talent, although some organisations have a different strategic focus. Spain also shows a generally positive attitude towards the strategic value of digital skills training, with some recognising practical constraints such as time constraints. This comparative analysis underlines the widespread recognition of the need for ongoing digital skills development to enhance organisational competitiveness, while also highlighting different levels of emphasis and practical challenges faced by organisations in implementing these initiatives.

Question 29 - Are there any specific challenges or barriers you foresee in implementing a digital skills microcredential programme within your organization?

Portugal

An analysis of the responses to question 29, which asked about specific challenges or barriers to investing in digital skills training, highlights several key issues. The most frequently cited barrier is "time constraints," mentioned in three responses. Additionally, one respondent noted the "availability of learning programmes in the subject the employee needs," indicating the difficulty in finding appropriate training programmes that meet specific needs. Another response combined both "time constraints" and "employee perspective" as barriers. These findings suggest that while organizations in Portugal recognize the importance of digital skills training, practical challenges such as time constraints and the availability of relevant programmes can hinder their efforts.

Ireland

Based on the responses from Irish organizations to question 29, several key challenges and barriers to implementing a digital skills micro-credential programme were identified. The most cited issues were budget and time constraints, each highlighted individually and collectively in multiple responses. Specifically, three respondents identified both budget and time constraints as significant barriers, while one respondent identified budget constraints alone and another cited time constraints as a stand-alone issue. Additionally, one respondent mentioned employee resistance as a challenge, and another indicated that such a programme was not necessary for their organization. These findings suggest that financial constraints and time availability are the main barriers organizations in Ireland face in adopting digital skills micro-credential programmes.

Spain

The analysis of responses from Spain to question 29 reveals a variety of concerns regarding the implementation of digital skills micro-credential programmes. One respondent did not provide any information, and another indicated that the question was not applicable to their context. The challenges mentioned include balancing the quality of content with employee expectations, the risk of losing talent in small companies after investing in training and ensuring the continued use of the skills acquired. Age was also identified as a significant barrier, as older workers may find it difficult to adapt to new technologies. Overall, the responses highlight the complexity of implementing effective digital skills training programmes, with concerns around retention, engagement, and demographic factors.

Comparative analysis

On the whole, the comparative analysis reveals common themes and specific challenges in Portugal, Ireland and Spain in implementing micro-credential programmes for digital skills. In Portugal, time constraints and the availability of relevant learning programmes are the main barriers. Ireland faces significant challenges around budget and time constraints, with additional concerns around employee resistance and organisational imperatives. Spain highlights a wider range of issues, including quality versus expectations, retention risks, re-use of acquired skills and demographic barriers such as age. This comparative analysis underlines the diverse and complex challenges organisations face in implementing digital skills training programmes and highlights the need for tailored solutions to address specific barriers and ensure successful adoption and integration of these initiatives.

Question 30 - Can you provide specific key performance indicators (KPIs) or metrics that your organization would use to determine the return on investment (ROI) of a digital skills microcredential program?

Portugal

An analysis of the responses to question 30, which asked for specific key performance indicators (KPIs) used to measure the effectiveness of digital skills training, reveals a variety of approaches and some gaps in measurement practices. The responses include:

Employee Performance Improvement: Evaluating changes in job performance posttraining.

Project Completion Rates: Monitoring the impact of training on the timely completion of projects.

Employee Satisfaction: Using surveys to gauge satisfaction with the training received.

These responses highlight that while some organizations in Portugal have established methods for evaluating the effectiveness of training, others either have no formal KPIs or use complex, qualitative assessments that may not be directly linked to financial metrics. This diversity in evaluation practices suggests a varying level of maturity in how organizations measure the impact of digital skills training.

Ireland

The responses from Irish organizations about specific key performance indicators (KPIs) or metrics used to determine the return on investment (ROI) of a digital skills microcredential program are varied. The summary of the responses provided by the organizations includes:

Course Completion Rates: Measuring the number of employees who complete the training programs.

Sales Numbers: Tracking changes in sales performance post-training.

Claim Management Rates: Specific to industry-related performance metrics.

Quality of Output Standards: Assessing the quality and standards of work output posttraining.

The responses indicate a diverse set of metrics being considered for evaluating the ROI of digital skills micro-credential programs. These include performance-based metrics such as course completion rates and sales numbers, as well as more specific industry-related metrics like claim management rates and quality of output standards. One respondent indicated a need for more information to provide specific KPIs, highlighting the ongoing development of effective measurement practices.

Spain

The analysis of responses from Spain regarding the key performance indicators (KPIs) or metrics used to determine the return on investment (ROI) of digital skills microcredential programs reveals a significant gap in measurement practices across organizations. Most respondents either did not provide information or explicitly stated that they did not have specific metrics to measure ROI. Some highlighted the complexity of developing such metrics, noting the challenges of quantifying the impact of training programs. One organization tracks training hours and conducts satisfaction surveys but does not measure direct productivity impact. Overall, the responses suggest that many organizations recognize the need for ROI metrics but struggle to implement them effectively.

Comparative analysis

The comparative analysis reveals a diverse approach to measuring the ROI of digital skills micro-credential programmes in Portugal, Ireland and Spain. In Portugal, some organisations use specific KPIs such as employee performance improvement and project completion rates, while others have no formal measurement practices. Ireland shows a wide range of metrics, including course completion rates, sales figures and industry-specific performance indicators, indicating a proactive approach to evaluating the impact of training. Spain highlights significant gaps in established ROI measurement practices, with many organisations recognising the need for metrics but facing challenges in implementation. This comparative analysis highlights the importance of developing robust KPIs to effectively measure the impact of digital skills training, and the varying levels of maturity of measurement practices across the three countries.

Final considerations for the comparative analysis

The comparative analysis of the semi-structured interview responses from organizations in Portugal, Ireland, and Spain provides valuable insights into the current state and future priorities of digital skills development across these countries. Each question highlights unique approaches, shared challenges, and varied levels of commitment to fostering digital competencies within their workforce. This chapter synthesizes the key findings and outlines the overarching themes that emerged from the analysis.

Across all three countries, there is a unanimous recognition of the importance of digital skills training. Organizations in Portugal, Ireland, and Spain consistently underscore the necessity of ongoing digital skills development to remain competitive and adaptable in the rapidly changing digital landscape. This commitment is reflected in the high level of interest in recruiting individuals with micro-credentials and the broad agreement on the need for continuous learning and upskilling.

While the commitment to digital skills development is clear, organizations face several challenges in implementing effective training programs. Time constraints and budget limitations are the most frequently cited barriers in Portugal and Ireland, while Spain highlights additional concerns such as balancing quality content with employee expectations and addressing demographic factors like age. These challenges indicate the need for tailored strategies that consider the specific contexts and constraints of each organization.

The approaches to measuring the return on investment (ROI) of digital skills training vary significantly across the three countries. Portugal shows a mix of formal KPIs and qualitative assessments, Ireland presents a diverse set of metrics including performance-based and industry-specific indicators, and Spain reveals significant gaps in measurement practices. This diversity suggests differing levels of maturity in how organizations assess the impact of their training programs and highlights the importance of developing robust and relevant KPIs to ensure the effectiveness of digital skills initiatives.

The analysis reveals that organizations in all three countries are strategically prioritizing digital skills in areas such as cybersecurity, artificial intelligence, data analytics, and blockchain. These areas are identified as critical for future competitiveness and innovation. However, there are differences in emphasis, with Portugal focusing heavily on cybersecurity and blockchain, Ireland on artificial intelligence and data analytics, and Spain on a broader range of skills including financial innovation and IT support.

The analysis also highlights a significant gap between soft and technical skills across the three countries. Portugal and Ireland unanimously emphasized the greater importance of soft skills such as communication, teamwork, problem-solving, and adaptability over technical skills. In contrast, Spain presented a more balanced view, recognizing critical gaps in both soft and technical skills. This disparity reflects the varied organizational contexts and needs, with some prioritizing interpersonal and cognitive abilities to navigate dynamic work environments and others emphasizing technical expertise to meet industry-specific demands. Addressing this skills gap requires a balanced approach, integrating both soft and technical skills training to develop a well-rounded and capable workforce.

Interest in recruiting individuals with micro-credentials is strong in Portugal and Spain, with a high level of interest conditional on the credibility and relevance of the programs. In Ireland, while there is significant interest, there is also a notable proportion of organizations that are either not interested or only slightly interested, reflecting varied strategic priorities. The diverse responses highlight the growing recognition of the value of micro-credentials in enhancing workforce skills and meeting specific organizational needs.

In a nutshell, the comparative analysis reveals a strong, shared commitment to digital skills development in Portugal, Ireland and Spain. Despite common challenges such as time and budget constraints, organisations are actively seeking innovative ways to upskill their workforce and remain competitive. The different approaches to measuring the effectiveness of training and the strategic emphasis on different digital skills reflect the unique contexts and priorities of each country. To address identified skills gaps and overcome implementation barriers, organisations need to evolve their strategies, leverage both internal and external resources, and develop robust metrics to assess the impact of their training initiatives. By doing so, they can ensure that their workforce remains adaptable, skilled and ready to meet the demands of the digital future.

Chapter Nine: Conclusions

The DigiAdvance project has provided a comprehensive and insightful analysis of the digital skills landscape within the SME sector across Europe. Through rigorous research and detailed needs analysis, the project has highlighted critical gaps and opportunities in digital skills, providing a robust foundation for future policy and training initiatives.

Key findings from the report emphasize a pronounced digital skills gap, particularly in sectors vital to national and regional economies. This gap threatens productivity and growth, underlining the urgent need for targeted interventions. SMEs with digitally skilled workforces exhibit enhanced operational efficiencies and innovation capabilities, making digital skills an essential driver of growth and competitiveness.

The bibliometric literature review on digital skills and SMEs reveals a rapidly growing field of research that underscores the critical importance of digital competencies for the competitiveness and sustainability of small and medium-sized enterprises. The analysis identifies key themes such as digital transformation, e-learning, and digital literacies, which have emerged as pivotal areas of focus. It highlights the collaborative efforts of researchers across the globe, indicating a widespread recognition of the transformative potential of digital skills in driving innovation and efficiency in SMEs. However, the review also points to significant gaps, particularly in the integration of digital skills within SME operations, calling for more targeted research and practical interventions. As digital technologies continue to evolve, ongoing investigation into these areas will be essential to equip SMEs with the necessary skills to navigate and thrive in the digital economy.

The report also reveals significant geographical disparities in job conditions and digital talent distribution across Europe. Cities like Zurich, London, and Dublin offer better salary prospects and employment opportunities in tech sectors, while remote working arrangements in cities like Helsinki and Munich provide new avenues for employment and work-life balance. Addressing these disparities through strategic policy and investment in digital training is crucial for fostering a balanced and inclusive digital economy.

Gender disparities in the ICT sector persist, particularly in high-tech and leadership roles. Empowering women and underrepresented groups through targeted support and inclusive policies is essential for creating a diverse and innovative digital workforce. Public-private partnerships (PPPs) are highlighted as a cornerstone for tailoring educational programs to the nuanced needs of SMEs, ensuring training is relevant and accessible. The quantitative analysis of the DigiAdvance project's questionnaire highlights the critical digital skills gaps within SMEs across various sectors and regions. This comprehensive data collection, encompassing both employees and employers, reveals a pronounced need for targeted digital skills training to bridge these gaps and enhance organizational performance.

Key findings from the quantitative analysis indicate that while employees generally acknowledge the importance of digital skills, there is a significant disparity between their perceptions and those of employers regarding the most critical skills needed. Transversal skills, such as analytical thinking, flexibility, and resilience, emerged as paramount, underscoring the necessity for holistic skill development that extends beyond technical competencies. The analysis further demonstrates that SMEs across Portugal, Ireland, and Spain face unique challenges in funding and implementing effective training programs. While internal funding and government-supported initiatives are common, the variability in training duration and commitment levels highlights the need for more standardized and accessible training solutions.

Moreover, the survey responses underscore the strategic importance of continuous digital skills development in maintaining competitiveness and adaptability in a rapidly evolving digital landscape. Employers overwhelmingly recognize the need for ongoing training, although practical constraints such as time and resource allocation pose significant barriers. Overall, the quantitative analysis provides valuable insights into the current digital skills landscape within SMEs, offering a clear roadmap for future training initiatives. By addressing these identified gaps and leveraging the diverse strategies highlighted in the report, SMEs can better equip their workforce with the necessary skills to thrive in the digital age, thereby fostering growth and innovation within the sector.

The qualitative analysis of the semi-structured interviews provides a rich in-deep understanding of the digital skills landscape within SMEs across Portugal, Ireland, and Spain. Key insights reveal a unanimous recognition of the critical importance of digital skills development for maintaining competitiveness and adaptability in a rapidly evolving digital environment. Despite this shared commitment, organizations face several common challenges, including time and budget constraints, which hinder the effective implementation of training programs.

The interviews highlight a notable emphasis on transversal (soft) skills over technical (hard) skills, with attributes such as communication, teamwork, problem-solving, and adaptability being prioritized. This indicates a growing recognition of the importance of holistic employee development that balances technical expertise with interpersonal abilities. Additionally, the strategic focus on areas like cybersecurity, artificial intelligence, and data analytics underscores the need for specialized skills to drive future competitiveness and innovation.

Differences in approaches to measuring the return on investment (ROI) of training programs across the three countries suggest varying levels of maturity in assessing the impact of digital skills initiatives. This highlights the need for developing robust and relevant KPIs to ensure the effectiveness of these programs.

The comparative analysis of Portugal, Ireland, and Spain demonstrates a strong shared commitment to digital skills development, despite common challenges such as time and budget constraints. The diverse approaches to measuring training effectiveness and the strategic emphasis on different digital skills reflect the unique contexts and priorities of each country. To address identified skills gaps, organizations need to evolve their strategies, leverage both internal and external resources, and develop robust metrics to assess the impact of their training initiatives.

Overall, the qualitative analysis offers actionable insights and strategic recommendations for enhancing digital skills development within SMEs. By addressing the identified gaps and leveraging internal and external resources, organizations can better prepare their workforce for the demands of the digital future. This comprehensive understanding of the current state and future priorities of digital skills development will be instrumental in fostering a resilient and innovative digital economy across Europe.

As Europe advances towards digital transformation, prioritizing the cultivation of digital talent is imperative. This requires a strategic blend of policy intervention, educational innovation, and corporate responsibility. By doing so, Europe can ensure that its digital economy is not only robust and competitive but also inclusive and resilient, capable of harnessing the full potential of its SMEs.

The insights from the DigiAdvance project serve as a valuable resource for shaping future policies, educational initiatives, and business strategies that enable SMEs to thrive in the digital age. Continued research and investment in digital skills development will be critical for adapting to the ever-changing technological landscape and securing a prosperous future for Europe's digital economy.

Addressing the digital skills gap within the SME sector is paramount for fostering a resilient and innovative digital economy. Strategic recommendations for stakeholders include investing in comprehensive and continuous digital skills training tailored to the specific needs of SMEs. This involves enhancing collaboration between higher education institutions, industry leaders, and government bodies to create targeted educational programs and support initiatives that align with market demands. Emphasizing the development of transversal skills alongside technical competencies is crucial, as these skills are vital for adaptability and innovation. Additionally, leveraging public-private partnerships can facilitate the sharing of resources and best practices, ensuring that SMEs have access to the necessary tools and knowledge. Implementing robust metrics to assess the impact of training initiatives will help in refining strategies and ensuring

their effectiveness. By adopting these strategic recommendations, stakeholders can significantly contribute to bridging the digital skills gap, thus empowering SMEs to thrive in the digital age and driving sustainable economic growth.

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Digital Talent in Europe

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Introduction

In the rapidly evolving digital landscape, small and medium-sized enterprises (SMEs) face significant challenges in keeping pace with technological advances and the corresponding skills demands. The DigiAdvance project emerges as a strategic response to this critical need, aimed at bridging the digital skills gaps identified within the SME sector across Europe. Focusing on specialized technology areas such as blockchain, big data, and machine learning, this project recognizes the pressing demand for advanced digital competencies among SME employees, managers, and owners.

The DigiAdvance project is a collaborative initiative that brings together expertise from higher education institutions and industry leaders. Its primary goal is to enhance digital capabilities through comprehensive training, mentorship, and networking opportunities tailored specifically for the SME workforce. By designing and delivering localized digital skills courses and organizing a pan-European digital skills accelerator workshop series for business leaders, the project aims to foster a robust digital economy that is resilient in the face of challenges like those posed by the Covid-19 pandemic.

This project not only addresses the immediate training needs but also engages in a thorough needs analysis to ensure that the educational offerings are well-aligned with the current and future demands of the sector. Through its innovative approach, DigiAdvance is set to empower SMEs by enhancing digital literacy at all levels, thus driving innovation and competitiveness in a digital-first world.

The present report aims to synthesize key insights into the digital skill needs of small and medium-sized enterprises (SMEs), providing a robust foundation for future training and policy initiatives. As part of Work Package 2 (WP2) of the DigiAdvance project, this deliverable is pivotal in outlining the digital competencies that are currently in demand as well as those likely to become critical in the near future. Targeting SMEs, policymakers, higher education institutions (HEIs), training providers, and

governmental bodies, the report seeks to bridge the gap between existing digital skills and emerging market requirements. Through comprehensive analysis, it will inform stakeholders of the critical skills needed to drive innovation and maintain competitiveness in a rapidly evolving digital landscape.

This report is structured into key sections to provide a comprehensive understanding of the digital skills landscape within SMEs. Each section has its own methodology, which details the research methods, including desk research and data analysis, used to gather and analyse relevant information. The Executive Summary provides an overview of the findings and key recommendations, divided in three parts: The Global Trends in Digital Talent section explores overarching trends in digital skills and training needs across Europe, highlighting differences and opportunities within different regions, The Digital Talent Landscape Across European Cities section provides an in-depth analysis of the distribution and market dynamics of digital professionals, including salary norms, market tensions and remote working trends, and the Presence of Women in the ICT Sector of European Cities. This is followed by the Quantitative Analysis Results section, which presents the results of the data collected through questionnaires applied to Employee and Managers of SME. The Qualitative Analysis section presents the results of the data collected through interviews, analysed both per country (Portugal, Ireland and Spain) and comparatively. Finally, the Conclusion section summarises the findings and provides strategic recommendations for stakeholders to address the digital skills gap and foster a resilient and innovative digital economy within the SME sector.



Methodology

The present study is founded upon a comprehensive array of information sources. To ensure the robustness and comprehensiveness of our study, we have employed multiple methods:

1. Desk Research: A literature review of publications was conducted to uncover digital skills trends at national and international levels. This task is intricately linked to one of the activities of WP2, responsible for developing an indepth Desk Research on Industry Needs Analysis. The objective of this phase is to identify current digital skills trends in the industry, as determined by existing reports, with a specific focus on SMEs. To achieve this, we utilized the Scopus database as our primary source, enabling us to access a comprehensive collection of multidisciplinary publications that include research relevant to digital skills and SMEs. We developed a detailed search strategy using specific keywords such as 'digital skills', 'SME', and 'industry trends', limiting our search to documents published up to July 30, 2023. The detailed research strategy involved a comprehensive review of 2,350 documents. The resulting data were meticulously organized and prepared for analysis using VOS Viewer software, which facilitated advanced bibliometric techniques such as co-occurrence analysis and citation network visualization.

This phase served as the foundation for our subsequent analyses, helping us to map the intellectual landscape and identify emerging themes and influential works that define the current state of digital skills within SMEs. All the conclusions from the desk research are presented in the first section of the report, "Global Trends in Digital Talent." **2. Data Analytics:** This approach aims to analyze the digital talent landscape across various European cities by assessing both the demand for digital professionals by companies and the supply of such professionals within the market. This analysis was conducted using advanced tracking platforms, such as TalentUp. The study specifically looked at various high-demand digital roles, including:

- Web Developers
- App Developers
- UX/UI Designers
- CRM + ERP Consultants
- Agile/Scrum Masters
- Cloud Specialists (AWS)
- Cybersecurity Experts
- Business Intelligence Analysts
- Big Data Specialists
- API Developers
- Al Experts
- IoT Specialists
- 3D Printing Engineers
- Blockchain Developers
- Computer Vision Engineers
- Digital Marketing Specialists



Data Collection

Data from platforms was collected over the course of the year 2022, specifically from January 1, 2022, to December 31, 2022. The sources of data included:

- Social Networks: Professional and career-related data were extracted from platforms such as LinkedIn, Xing, and AngelList.
- Global Job Boards: Vacancies and job requirements were compiled from Indeed, Stackoverflow, Monster, AngelList, and Glassdoor.
- Country-specific Job Boards: Localized data were sourced from platforms like Infojobs, cv.ee, cv.lv, and cvonline.lt, providing insights specific to labor markets in individual European cities.
- Recruitment Agency Websites: Data on recruitment patterns and demand in specialized sectors were obtained from agencies such as Hays, Robert Walters, and Page Personnel.
- Career Websites of Major Companies: Direct insights into company-specific demands, such as those from Careers at Deloitte.
- Other Sources: Additional data came from Slack channels relevant to specific digital professions, public salary surveys, and publications on LinkedIn.

Data Analysis

The analysis focused on several key dimensions to provide a detailed understanding of the digital talent market:

- Supply and Demand of Professionals: Quantifying the number of professionals available versus the number of positions open.
- Salary Analysis: Salaries were normalized by the cost of living and rent indices. Each city's cost of living was compared to New York City as a benchmark, where, for example, an index of 120 indicates a 20% higher cost than New York City.
- Geographical Distribution: The study covered multiple cities including Lisbon, Aveiro, Cork, Zurich, Copenhagen, London, Berlin, Stockholm, Amsterdam, Dublin, Paris, Helsinki, Munich, Milan, Oslo, Rome, Vienna, Barcelona, Madrid, Tallinn, Prague, Zagreb, and Bucharest. An aggregate metric 'Average EU cities' was also calculated for comparative analysis.

- Remote Work Metrics: The analysis included examining the percentage of remote jobs available across various sectors.
- Women's Representation Metrics: The study also analyzed the representation of women within each sector to assess diversity in the digital talent landscape.
- Top Employers Analysis: This dimension evaluates the major companies actively recruiting in the digital talent market, identifying the leaders in hiring within specific sectors and roles.

The results are presented with a combination of descriptive statistics, comparative charts, and cityspecific analysis to illustrate the differences and trends across various locations and job roles. This structured approach not only highlights the current state of the digital talent market but also provides employers and professionals with actionable insights into where opportunities and demands are most pronounced. The results and their interpretations derived from this methodological approach are presented in the second section of the report, "Digital Talent in Europe."

The methodology comprised of two data sources, the first providing insights from national and international literature and the second harnessed market-related data. This methodology was used to provide a holistic consideration of digital skill trends grounded both in the literature and empirical industry data.

Some limitations may be present in this report due to the methodology used. Firstly, it relies heavily on specific platforms, which may not fully capture the entire market. Certain sectors or demographic groups might be underrepresented, potentially leading to gaps in the data. Additionally, the automated data collection techniques might introduce selection bias by primarily capturing data that is readily accessible, potentially overlooking nuanced or less standardized information. One further limitation we recognize is that these trends are constantly evolving; therefore, these results provide a snapshot of the current digital trends.



Executive summary

This report offers a thorough examination of the digital talent landscape within the SME sector across Europe. The primary goal of this report is to advance key digital skills that are crucial for fostering innovation, efficiency, and competitive growth in SMEs. The findings emphasize the importance of digital skills, highlight the significant skills gap, and provide insights into both training initiatives and employment trends across various European regions.

Global Trends in Digital Talent

In today's rapidly transforming digital landscape, SMEs are recognizing the crucial role of digital skills in maintaining competitiveness. The importance of cultivating a workforce skilled in a broad range of digital competencies—from technical abilities like programming and data analysis to essential cognitive and social skills such as problem-solving and collaboration—is emphasized. However, there exists a marked disparity between the demand for digitally skilled workers and the available supply, especially noticeable in key societal sectors. This gap poses a significant challenge, necessitating concerted efforts from multiple stakeholders to foster a digitally adept workforce through enhanced training and educational frameworks.

The landscape of digital training varies dramatically across Europe; Nordic countries lead in ICT capabilities, while Southern and Eastern European countries lag behind. This discrepancy highlights the urgent need for widespread improvement in digital education and training infrastructure. Furthermore, European companies are increasingly embracing the need for robust digital training initiatives. Finland's leadership in promoting digital skills among employees serves as a model for other nations and illustrates a proactive approach to bridging the digital skills gap.

Digital talent landscape across european cities

The landscape of digital talent across the cities involved in the DigiAdvance project showcases a varied distribution of digital professionals, with major tech hubs like Dublin and Lisbon boasting a significant percentage of their workforce in digital roles. These cities are recognized for their vibrant tech sectors, which contribute substantially to their economies. In contrast, smaller cities such as Aveiro and Cork, although having lower percentages of digital professionals, are making concerted efforts to enhance their digital economies, indicating strategic regional development initiatives.

Market dynamics within the digital job market are characterized by differing levels of market tension across various European cities. Cities like London and Bucharest show a job market environment with fewer professionals available per job opening, indicating strong demand for digital skills. Conversely, cities such as Helsinki and Zagreb exhibit lower market tensions, suggesting an oversupply of candidates compared to the number of job opportunities available. In analyzing the DigiAdvance project cities, Aveiro experiences the highest market tension. Barcelona shows a lower market tension with more available professionals, while Dublin exhibits moderate market tension, aligning more closely with the European average (10.26 professionals per job position).

Salaries for digital professionals vary significantly across the continent, with cities like Zurich, Copenhagen, and London offering the highest pay. However, when salaries are adjusted for local costs of living and rent, a more accurate picture of economic conditions for digital workers emerges, reflecting the true purchasing power of these wages in their respective cities. In this case, the ranking of cities offering the highest salaries is topped by London, Zurich, and Berlin.



Regarding the DigiAdvance project cities involved, all three—Barcelona, Aveiro, and Dublin—have normalized salaries that fall below the European average of €50,991. Dublin ranks the highest, closely aligning with this average, followed by Barcelona with a slightly lower salary. Aveiro has the lowest normalized salary among the project cities.

The landscape of remote work opportunities is a key indicator of the evolving nature of Europe's digital workforce. Cities like Helsinki and Tallinn are at the forefront of this shift, leading the movement towards telecommuting. These cities offer a higher proportion of remote jobs compared to others, promoting a more flexible work environment that supports the inclusion of diverse talents who may prefer or require work-from-home arrangements. In the DigiAdvance project cities, Dublin offers relatively more remote jobs, closely approaching the European average, while Barcelona also supports a considerable amount of telecommuting. Aveiro, on the other hand, provides significantly fewer remote work options compared to the others. All of them fall below the European average of 12% for remote jobs. The presence of women in the ICT sector, while showing some progress, underscores the persistent challenges in achieving gender diversity within the tech industry. Despite efforts to increase female participation, substantial disparities persist, with women significantly underrepresented in many digital professions. The average proportion of women in the tech industry across all European cities studied is 28%. Among these, Milan and Aveiro hold top positions. Regarding the three DigiAdvance cities, Aveiro leads, followed by Dublin and Barcelona, all of which are above the average.

This report integrates comprehensive insights and strategic recommendations, providing stakeholders with a holistic view of the current state and future needs of the digital skills landscape in Europe.



1. Global Trends in Digital Talent

Global Trends in Digital Talent

This section of the report is based on desk research and explores the global trends in digital talent, highlighting the critical role of digital skills for small and medium-sized enterprises (SMEs). It begins by emphasizing the necessity for SMEs to embrace digital transformation. Specifically, the report addresses the prevalent digital skills gap, examining its implications for the future workforce and the strategic importance of reskilling and upskilling, as well as the ongoing need for digital transformation among SMEs. Additionally, based on the European Digital Economy and Society Index, it presents the level of digital skills training in Europe and how companies are embracing employee ICT training initiatives. Finally, data on the most in-demand skills and the sectors experiencing the largest digital skills gaps are presented.

Having a team with digital skills is a must for SMEs aiming for efficiency, innovation, and continuous improvement in today's digital age.

In today's ever-changing business world, small and medium-sized enterprises (SMEs) are like the engines that drive innovation, growth, and job opportunities. To excel in this fast-paced environment, SMEs are realizing the critical role of having a digitally skilled workforce.

3 key points for SMEs to achieve efficiency, innovation, and continuous improvement through digital skills:

- 1 **Digital transformation:** Industries are rapidly changing as they embrace digital transformation. This means SMEs must adopt digital tools and technologies to stay competitive.
- 2 **Hiring advantage:** SMEs that focus on hiring employees with digital skills gain a significant edge. These employees can drive innovation and keep the company ahead of the curve.
- 3 **Diverse skills:** Digital skills encompass a wide range of abilities, from technical knowhow (like coding or data analysis) to cognitive (such as problem-solving and critical thinking) and social skills (like effective communication and collaboration).

The shift towards digital transformation in various industries has made it imperative for SMEs to adopt digital tools and technologies to stay competitive. Consequently, attracting and retaining talent with digital skills has become highly competitive.

SMEs that prioritize digital skills in their hiring practices gain a significant advantage by building teams capable of innovation. These skills empower employees to leverage data analytics, automation, and digital collaboration tools, streamlining operations and driving a culture of innovation.



Digital Skills Gap

Over the next five years, the global workforce is expected to create 149 million new tech-oriented jobs, with areas like data analytics, software development, and cybersecurity experiencing exponential growth.

There is a Digital skills gap: a stark difference between the demand for workers with digital skills and the actual supply of individuals who possess these skills. It highlights the shortage of digitally skilled workers in relation to the increasing demand for their expertise.

Only 4.2% of respondents in the Digital Skills Gap Index were satisfied with the level and availability of digital skills, indicating a significant gap.

Source: Digital Skills Gap Index

A majority (51.1%) of survey respondents believe there is insufficient availability of digital skills training for reskilling/upskilling, highlighting the need for increased investment in training.

Source: Wiley Digital Skills Gap Survey (APEC economies)

Closing the digital skills gap requires cooperation among employers, nonprofits, and governments, necessitating investments in training, digital access, partnerships, and infrastructure.

Developing responsive digital skills systems is crucial for improving employability, equal access to opportunities, and income potential. Collaboration and investment are essential to bridge the digital skills gap and prepare the workforce for the post-pandemic economy.



The Digital Transformation Imperative for SMEs

The digital gap is altering competition dynamics across the economy.

Reskilling and upskilling strategies are vital for businesses to achieve their objectives, as skills gaps are viewed as the primary barrier to industry transformation.

Businesses are scaling up training programs to bridge skills gaps. In 2023, 41% of workers completed training to address skills gaps.

Effective employee training programs are seen as the top policy for attracting talent and enhancing business performance in the digital age.

The most resilient economies are those leading in digital skills development.



Level of digital skills training in Europe

The Nordic countries stand out for their high index of advanced ICT capabilities and development.

Finland leads the ranking with 65.7%, showing a remarkable increase of 7.00% compared to the previous year. Sweden closely follows at 59.8%, demonstrating significant growth of 10.80%. Ireland, with a score of 57.7%, also makes substantial progress with a 5.20% increase.

Spain scores at 40%, which is in line with the European average of 40.8%. Portugal, on the other hand, achieves a score of 41.4%, displaying a noteworthy increase of 9.90%. Italy, Hungary, and Greece lag behind in terms of advanced ICT capabilities and development, with Italy at 30.9%, Hungary at 32.8%, and Greece at 33.4%.

This index is a part of the *Digital Economy and Society Index* and is calculated based on the weighting of four variables: ICT graduates, companies investing in ICT training for their employees, the number of ICT professionals in the sector, and the employment of female ICT specialists in the country.



Figure 1. Advanced Skills and Development Index for ICT Specialists, Score 0 - 100

2022

Source: Digital Economy and Society Index (DESI)



2 out of 3 ICT specialists in the EU have higher education

Cyprus leads the list with an impressive 84.8% of ICT specialists having completed tertiary education. Spain, France, Belgium, and Ireland follow, each with over 80% of ICT professionals holding higher education degrees. However, Portugal, at 63.9%, falls below the European Union average of 65.2%.

Estonia, a digital leader in the EU, surprisingly has less than 60% of ICT specialists with tertiary education, specifically 58.9%. Despite its role in digital transformation, this figure may indicate a reliance on alternative training methods or a significant proportion of self-taught ICT specialists.

These data reflect differences in ICT specialist education across the European Union and provide important insights into tertiary education levels in the field of information and communication technologies in these countries.



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Overin								65,3 %			
Secular								65,3 %			
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Pertugal								63,9 %			
Latvin								63,7 %			
Finland							6	1,9 %			
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When it comes to learning how to program, online resources stand out

Data from the Stack Overflow Developer Survey, a global survey, show that developers predominantly rely on online resources and formal education to advance their skills; these online resources, which include videos, blogs, and forums, are the most favored, with a substantial 70.9% of developers utilizing them as valuable learning tools.

62.2% have opted for traditional academic pathways, enrolling in universities and colleges to receive structured education, underscoring the pivotal role of formal academic training.

On-the-job training, co-workers, and self-learning through friends or family play a significant role, while a smaller percentage opt for programming bootcamps (10.8%) or hackathons (7.4%) to further their development skills.

Figure 3. Origin of developer training

2022







The most commonly used online resources are technical documentation, Stack Overflow, and blogs, being utilized by over 75% of professional developers, according to Stack Overflow global survey.

The least used resources are programming games and audio material.

Figure 4. Typology of online resources used for learning how to program

2022

Source: Stack Overflow Developer Survey (global survey)





Companies Embrace Employee ICT Training Initiatives

22.4% of European companies provide training in digital skills to their employees, which is 13.7% more than the previous year.

Finland leads with 39.8%, closely followed by Sweden, Denmark, and Belgium, all showing notable improvements in providing digital skills training to their employees.

Countries like Romania and Bulgaria have the lowest percentages but have also seen substantial growth.

Regarding DigiAdvance countries, Portugal, with 23.6%, and Ireland, with 23.2%, are both situated above the European average. Compared to 2020 data, 0.7% more companies in Portugal provide ICT training, whereas 3.8% fewer companies in Ireland are providing ICT training in 2022. Spain is situated below the European average, with 20.7% of companies providing ICT training in 2022, representing a 0.6% increase from 2020.





Source: Digital Economy and Society Index (DESI)



The most in-demand skills

- 1. **21st Century Skills:** Problem solving is the most crucial skill, followed by Dynamic (Self) Re-skilling and Decision Making
- 2. **Technical Skills:** Data Analytics and Algorithms are deemed the most important technical skills, followed by Computing and Data Science Engineering Principles.
- 3. Business and Organizational Skills: Survey findings reveal Operational Analytics and Data Management and Governance as top priorities. Skills like "ability to discriminate between true and untrue information" and traditional skillsets are less relevant.
- 4. **Socio-emotional Attitudes:** Skills such as curiosity, lifelong learning, resilience, flexibility, agility, motivation, and self-awareness are growing in importance.

Source: Wiley Digital Skills Gap Survey

In 2023, as in 2020, analytical thinking remains the core skill of highest importance to a majority of companies.

Source: World Economic Forum, Future of Jobs Survey 2023

Comparing surveys over the years, creative thinking is gaining importance, narrowing the gap with analytical thinking. In 2018 and 2020, more companies considered analytical thinking as a core skill, but in 2023, this gap has decreased, suggesting a shift toward greater recognition of creative thinking.

Management skills, engagement skills, technology skills, ethics, and physical abilities are generally considered less important than cognition, self-efficacy, and collaboration.

Self-efficacy skills dominate the top 10 core skills, including resilience, flexibility and agility, motivation and self-awareness, curiosity and lifelong learning, and dependability and attention to detail.






2. Digital Talent in Europe

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Digital Talent in Europe

This section of the report provides an in-depth analysis of the digital talent landscape across key European cities, exploring the distribution and dynamics of digital professionals. Initially, the report focuses on the sizes of the technology sectors in cities within the countries of the DigiAdvance consortium. Specifically, it examines the percentage of digital professionals relative to total employment and specifies the number of professionals by position in both consolidated and emerging technologies. Subsequently, it analyzes market tensions in the 23 European cities studied. Following this broad scope, the report also examines salaries for technology-related positions, offering some focus on types of technology (consolidated/emerging) and normalization of salaries with respect to cost of living and rent. Additionally, data on remote job opportunities and the presence of women in the ICT sector within these cities are presented. Finally, the report highlights the top employers in some cities within the DigiAdvance consortium countries.



Digital professionals in European cities

Dublin leads with a significant 11.5% of its workforce in digital professions, emphasizing its status as a major technology hub. Lisbon follows with 8.5%, showcasing its burgeoning digital sector. Barcelona and Madrid are closely matched, with 5.4% and 5.0% respectively, indicating strong digital integration in their economies. Aveiro and Cork, while smaller in scale, show a commitment to digital professions with 4.4% and 3.0% of their workforces respectively. This data highlights the percentage of digital professionals relative to total employment in key cities belonging to the countries of the DigiAdvance consortium.

Figure 7. Percentage of digital professionals vs. total employment 2022





Web Developer is the most employed of the consolidated technology specialities, followed by UX/UI and CRM&ERP Consultant.

Figure 8. Number of professionals by position (consolidated technologies)

2022



Artificial intelligence professionals have the strongest presence in the emerging technologies sector.

Figure 9. Number of professionals by position (consolidated technologies)

2022 Source: TalentUp.io for DigiAdvance Constanting of the Avaira Dublin Durk Medicial Lisboa 622 1.1 ArtiTe وبا الت **613** ... 18 -1 33 **-** 3 ют • 17 ī 494 410 3D Printing T D 遊 2.1 ••• -2 -22.5 -Computer Vis 44

Market tensions in European cities

The concept of "market tension" refers to the relationship between supply and demand, specifically indicating how many professionals exist per job opening in the market. Within the European cities examined, a marked disparity in market conditions is observed. This spectrum spans from London, where there are 2.62 individuals per job opening, making it the city with the highest market tension, to Helsinki, where there are 31.63 individuals per job opening, rendering it the city with the greatest number of professionals per job offer.

The countries experiencing the highest market tension, characterized by a scarcity of professionals in competition for the same job positions, include London (2.62), Bucharest (2.98), Vienna (3.38), and Munich (3.42).

Conversely, cities with lower market tension comprise Helsinki (31.63), Zagreb (21.5), Paris (17.8), and Oslo (16.25), where an abundance of professionals heightens competitiveness within the sector.

In analyzing the market tensions in the cities involved in the DigiAdvance project— Barcelona, Aveiro, and Dublin—we find a contrast in the competition for job posts based on the number of professionals competing for each position. Aveiro demonstrates a higher market tension with only 5.09 professionals per job post, indicating a greater scarcity of available positions relative to the number of job seekers. This contrasts with Barcelona, where 12.29 professionals per job post suggest a lower market tension and a relatively more abundant job market. Dublin, with 10.85 professionals per job post, also indicates a lesser degree of market tension compared to Aveiro, but is closer to the European average of 10.26.



Figure 10. Market tension: number of professionals per job offer in European cities

2022

Source: TalentUp.io for DigiAdvance



11 digital professionals for each job post



Digital salaries in European cities

Zurich tops the list of European cities studied with the highest salaries for digital professionals, offering a significant average of €148,327, followed by Copenhagen at €89,127, London at €86,267, and Berlin at €77,953. The average salary across the European cities studied is €60,186 gross per year. At the lower end of the salary spectrum, Bucharest, Aveiro, and Lisbon offer the lowest salaries at €24,047, €30,793, and €33,447 respectively.

Focusing on the DigiAdvance project cities, Dublin stands out with a considerably high average salary of €73,367, surpassing the European average and indicating a robust market for digital professionals. Barcelona, with an average salary of €46,940, is positioned below the European average, suggesting a more moderate salary scale for digital professionals by comparison. Aveiro has the lowest salary among the DigiAdvance cities at €30,793, reflecting a potentially less lucrative market for digital professionals in the city.





Figure 11. Digital professional salaries by city 2022

Source: TalentUp.io for DigiAdvance

Note: The data pertains to the overall statistics for all digital profiles except for Digital Marketing

Salaries in European cities for consolidated technologies

Zurich stands out as the city with the highest salary range, offering between €97,100 and €169,700. Among the consolidated specialties that tend to be better paid in the cities studied, Cloud (AWS) professionals receive the highest average pay at €64,378, closely followed by those in Big Data and Business Intelligence, earning €63,687 and €63,630 respectively. On the other end of the spectrum, the least well-remunerated specialties include Digital Marketing at €40,979, App Developers at €50,774, and Cybersecurity at €55,656.

In the DigiAdvance project cities—Barcelona, Aveiro, and Dublin—the analysis of salaries for digital professionals across various technologies reveals a notable range. Dublin emerges as the top payer among the DigiAdvance cities, offering the highest salaries in almost all categories examined. The highest salary is observed in the field of Cloud (AWS) at €79,400, while the lowest is for Digital Marketing at €48,300. Barcelona presents a diverse scale of remuneration, with Cybersecurity professionals earning the highest in the city at €56,000. The lowest salary in Barcelona is for Digital Marketing professionals at €32,500. Aveiro shows more modest figures, typical of a smaller or emerging tech market. The maximum salary here is €40,200 for professionals in Cloud (AWS), and the minimum is notably lower at €21,700 for Digital Marketing professionals.



Figure 12. Digital professional salaries by city consolidated technologies

2022

	Web Developers	App Developers	UX/UI	CRM + ERP Consultant	Agile/Scrum	Cloud (AWS)
Zurich	€159,300	€109,000 €	€135,700	€158,100	€149,200	€159,500
Copenhaguen	€95,700	€65,500	€81,500	€94,900	€89,600	€95,900
London	€76,000	€84,700	€84,000	€83,900	€84,400	€74,300
Berlin	€77,000	€69,600	€68,300	€67,800	€76,600	€73,600
Stockholm	€83,000	€59,200	€70,700	€82,500	€77,800	€83,100
Ámsterdam	€66,000	€75,300	€58,100	€71,800	€81,000	€77,400
Dublin	€79,200	€56,400	€67,500	€78,700	€74,300	€79,400
Paris	€68,800	€56,900	€59,600	€67,300	€73,200	€69,100
Helsinki	€75,200	€53,600	€62,600	€74,700	€70,600	€75,400
Munich	€70,700	€50,400	€58,700	€64,200	€66,300	€70,800
Milan	€61,810	€48,320	€60,160	€59,280	€66,160	€70,800
Oslo	€49,000	€47,400	€84,600	€75,500	€50,000	€47,100
Rome	€63,705	€45,477	€50,964	€71,889	€59,799	€63,891
Viena	€61,500	€43,900	€51,100	€61,000	€57,600	€61,600
Barcelona	€44,000	€42,300	€41,700	€43,200	€43,800	€49,500
Madrid	€39,000	€39,500	€42,100	€38,300	€37,900	€48,200
Tallinn	€43,100	€30,700	€35,800	€42,800	€40,400	€43,200
Prague	€34,300	€32,100	€32,800	€40,600	€37,200	€41,800
Zagreb	€36,500	€26,000	€30,300	€36,200	€34,200	€36,600
Bucharest	€18,300	€ 24,700	€17,900	€30,800	€16,400	€24,000
AVERAGE	€61.596	€50.774	€55.966	€63.107	€61.559	€64.378



Figure 13. Digital professional salaries by city consolidated technologies

2022

	Cybersecurity	Business Intelligence	Big Data	ΑΡΙ	Digital Marketing
Zurich	€130,300	€155,300	€169,700	€158,800	€97,100
Copenhaguen	€78,300	€93,300	€101,900	€95,400	€61,500
London	€66,300	€85,800	€89,900	€70,300	€45,700
Berlin	€69,500	€81,200	€83,100	€74,800	€38,600
Stockholm	€58,800	€80,900	€75,300	€82,800	€53,900
Ámsterdam	€80,900	€70,000	€82,400	€73,800	€44,900
Dublin	€56,200	€77,300	€71,900	€79,100	€48,300
Paris	€81,800	€68,700	€66,500	€54,800	€53,000
Helsinki	€53,400	€73,400	€68,300	€75,100	€45,900
Munich	€50,200	€68,900	€64,200	€66,700	€43,100
Milan	€50,080	€68,880	€64,160	€70,480	€43,040
Oslo	€81,100	€47,400	€80,200	€49,000	€60,400
Rome	€45,198	€62,217	€57,846	€63,519	€38,874
Viena	€43,600	€60,000	€55,800	€61,400	€28,300
Barcelona	€56,000	€50,800	€44,800	€53,800	€32,500
Madrid	€57,100	€48,100	€41,200	€46,900	€31,800
Tallinn	€36,300	€42,000	€39,100	€42,900	€41,800
Prague	€31,400	€45,700	€31,600	€24,500	€18,600
Zagreb	€30,700	€35,600	€33,200	€36,400	€22,200
Bucharest	€24,500	€21,500	€37,600	€21,400	€15,200
AVERAGE	€55.656	€63.630	€63.687	€61.252	€40.979



Salaries in European cities for emerging technologies

Zurich stands out as the city offering the highest salaries to specialized workers in emerging technologies, with salary ranges spanning from €126,700 to €192,200. Among these specialties, Computer Vision emerges as the highest-paying field, boasting an average salary of €75,499 across the European cities studied. This is closely followed by Blockchain, which has an average salary of €63,541, highlighting the premium placed on these cutting-edge skills in the tech industry.

Focusing on the DigiAdvance project cities, Dublin offers competitive salaries across the board, with the highest observed in Computer Vision at €95,700. Its salaries in other emerging technologies like Artificial Intelligence and Blockchain are also robust at €76,500 and €76,900, respectively. Barcelona has relatively lower salaries in these emerging fields, with the highest payment in Artificial Intelligence at €51,600. The lowest in this city is for Computer Vision, at only €43,000. Aveiro presents the most modest salary figures, the highest salary in Aveiro is for Artificial Intelligence at €33,800, with the lowest being for 3D Printing at €25,600.

Figure 14. Digital professional salaries by city emerging technologies



	Artificial Intelligence	юТ	3D Printing	Blockchain	Computer Vision
Zurich	€140,400	€149,300	€126,700	€131,400	€192,200
Copenhaguen	€80,800	€89,700	€76,100	€82,800	€115,500
London	€75,100	€95,400	€91,300	€116,300	€116,300
Berlin	€76,000	€61,700	€73,800	€108,100	€108,200
Stockholm	€70,000	€71,700	€66,000	€67,500	€100,200
Ámsterdam	€80,000	€63,800	€85,600	€97,800	€62,000
Dublin	€76,500	€68,400	€63,000	€76,900	€95,700
Paris	€72,100	€51,700	€76,600	€105,100	€93,600
Helsinki	€53,600	€65,000	€59,800	€57,800	€90,900
Munich	€47,900	€61,000	€56,200	€59,100	€85,300
Milan	€51,040	€60,960	€56,160	€54,400	€85,280
Oslo	€52,000	€58,000	€44,800	€63,800	€64,100
Rome	€46,686	€55,056	€50,685	€55,335	€77,004
Viena	€54,200	€53,100	€48,900	€53,900	€74,300
Barcelona	€51,600	€44,900	€49,900	€44,800	€43,000
Madrid	€44,000	€42,300	€53,900	€41,700	€37,000
Tallinn	€42,100	€37,200	€34,300	€38,800	€52,000
Prague	€41,600	€33,100	€43,300	€43,600	€35,600
Zagreb	€38,500	€31,500	€29,000	€33,700	€44,000
Bucharest	€23,200	€23,700	€21,300	€30,500	€24,900
AVERAGE	58.688 €	57.727 €	56.411 €	63.541€	75.499 €



Salaries in European cities normalized by cost of living and rent

When adjusting salaries for the cost of living and rent, London emerges as the leader with the highest normalized average salary at €76,790, followed by Zurich at €71,441, and Berlin at €69,301. Across the European cities studied, the normalized average salary is €50,991 per year. On the lower end of the spectrum, cities like Oslo, Lisbon, and Cork report lower normalized average salaries of €36,415, €36,489, and €37,434 respectively, reflecting the variability in economic conditions across different locations.

All DigiAdvance project cities have normalized salaries below the European average of \pounds 50,991. Among them, Dublin ranks the highest with a normalized salary of \pounds 49,314, closely aligning with the European average. Barcelona follows with a slightly lower normalized salary of \pounds 46,940, while Aveiro has a normalized salary of \pounds 43,816, the lowest among the DigiAdvance cities.



Figure 15. Digital professional salaries by city emerging technologies

2022





Normalized salary by cost of living and rent for consolidated technologies

Cloud (AWS) is the consolidated specialty with the highest average salary (\pounds 54,420) among the European cities studied, taking into account salary normalization based on the cost of living and rent. It is followed by Business Intelligence (\pounds 53,698) and Big Data (\pounds 53,133).

London and Zurich are the cities that offer the highest salary ranges among all the analyzed job offers in consolidated technologies.

Regarding the DigiAdvance project cities, Dublin's highest normalized salary is observed in Cloud (AWS) at \pounds 53,370, with its lowest in Digital Marketing at \pounds 32,465. Barcelona peaks at \pounds 56,000 for Cybersecurity, but dips to \pounds 32,500 for Digital Marketing. Aveiro presents the highest normalized salary in Cloud (AWS) at \pounds 58,276, contrasting sharply with its lowest in Digital Marketing at \pounds 31,457.



Figure 16. Average standardised salaries for cost of living and rent (consolidated technologies)

2022

	Web Developers	App Developers	UX/UI	CRM + ERP Consultant	Agile/Scrum	Cloud (AWS)
Zurich	€76,726	€52,499	€65,359	€76,148	€71,862	€76,822
Berlin	€68,454	€61,875	€60,719	€60,275	€68,098	€65,431
London	€67,651	€75,395	€74,772	€74,683	€75,128	€66,138
Copenhagen	€64,255	€43,978	€54,721	€63,718	€60,159	€64,389
Stockholm	€61,705	€44,011	€52,561	€61,333	€57,839	€61,779
Helsinki	€60,972	€43,459	€50,756	€60,567	€57,243	€61,134
Tallinn	€57,726	€41,118	€47,949	€57,324	€54,110	€57,860
Vienna	€55,996	€39,971	€46,527	€55,541	€52,445	€56,088
Rome	€54,822	€39,136	€43,858	€61,865	€51,461	€54,982
Munich	€53,769	€38,331	€44,643	€48,826	€50,423	€53,845
Dublin	€53,235	€37,910	€45,371	€52,899	€49,942	€53,370
Zagreb	€50,719	€36,128	€42,103	€50,302	€47,523	€50,858
Milan	€49,275	€38,521	€47,959	€47,258	€52,743	€56,442
Paris	€48,329	€39,970	€41,866	€47,275	€51,420	€48,540
Aveiro	€47,258	€46,099	€36,096	€43,779	€46,824	€58,276
Amsterdam	€44,000	€42,300	€41,700	€43,200	€43,800	€49,500
Barcelona	€44,000	€42,300	€41,.700	€43,200	€43,800	€49,500
Prague	€43,153	€40,385	€41,266	€51,079	€46,801	€52,588
Lisbon	€41,758	€39,865	€29,175	€34,965	€38,974	4€9,552
Madrid	€40,844	€41,368	€44,091	€40,111	€39,692	€50,480
Cork	€34,817	€30,671	€32,861	€36,304	€48,588	€39,747
Bucharest	€31,458	€42,459	€30,770	€52,945	€28,192	€41,256
Oslo	€29,938	€28,961	€51,689	€46,129	€30,549	€28,777
AVERAGE	€51,424	€43,337	€46,400	€52,889	€51,310	€54,420



Figure 17. Average standardised salaries for cost of living and rent (consolidated technologies)

	Cybersecurity	Business Intelligence	Big Data	ΑΡΙ	Marketing digital
Zurich	€62,758	€74,800	€81,735	€76,485	€46,768
Berlin	€61,786	€72,188	€73,877	€66,498	€34,316
London	€59,016	€76,374	€80,024	€62,577	€40,679
Copenhagen	€52,572	€62,644	€68,418	€64,054	€41,292
Stockholm	€43,714	€60,143	€55,980	€61,556	€40,071
Helsinki	€43,297	€59,513	€55,378	€60,891	€37,216
Tallinn	€48,619	€56,253	€52,369	€57,458	€55,985
Vienna	€39,698	€54,631	€50,807	€55,905	€25,767
Rome	€38,896	€53,541	€49,780	€54,662	€33,453
Munich	€38,179	€52,400	€48,826	€50,727	€32,779
Dublin	€37,775	€51,958	€48,328	€53,168	€32,465
Zagreb	€42,659	€49,468	€46,133	€50,580	€30,848
Milan	€39,924	€54,911	€51,148	€56,187	€34,311
Paris	€57,461	€48,259	€46,713	€38,495	€37,230
Aveiro	39.865 €	51.172 €	42.475 €	43.199 €	31.457 €
Amsterdam	€56,239	€48,662	€57,282	€51,304	€31,213
Barcelona	€56,000	€50,800	€44,800	€53,800	€32,500
Prague	€39,504	€57,495	€39,756	€30,823	€23,401
Lisbon	€31,513	€40,978	€38,194	€34,631	€25,166
Madrid	€59,800	€50,375	€43,148	€49,118	€33,304
Cork	€33,331	€42,563	€33,253	€35,991	€26,211
Bucharest	€42,116	€36,959	€64,634	€36,787	€26,129
Oslo	€49,551	€28,961	€49,001	€29,938	€36,904
AVERAGE	€46,708	€53,698	€53,133	€51,080	€34,325



Normalized salary by cost of living and rent for emerging technologies

The specialty of Computer Vision tends to be the highest paid, with an average salary among the European cities studied of $\pounds 62,573$, taking into account the cost of living and rent. It is followed by Blockchain, with $\pounds 53,561$, and Artificial Intelligence, with $\pounds 49,821$.

Focusing on the DigiAdvance project cities, Dublin offers a balanced range of salaries, with the highest being €64,326 in Computer Vision and the lowest at €42,346 in 3D Printing. Barcelona, on the other hand, presents its highest normalized salary in Artificial Intelligence at €51,600, while the lowest is in Computer Vision at €43,000. Aveiro has the most modest salary figures among these cities, with the highest in Artificial Intelligence at €48,998 and the lowest in 3D Printing at €37,111.

Figure 18. Average standardised salaries for cost of living and rent (emerging technologies)

2022

	Artificial Intelligence	ЮТ	3D Printing	Blockchain	Computer Vision
Zurich	€67,623	€71,910	€61,024	€63,288	€92,572
Berlin	€67,565	€54,852	€65,609	€96,102	€96,191
London	€66,850	€84,920	€81,270	€103,523	€103,523
Tallinn	€56,387	€49,824	€45,940	€51,967	€69,646
Amsterdam	€55,614	€44,352	€59,507	€67,988	€43,101
Copenhagen	€54,251	€60,227	€51,095	€55,594	€77,549
Zagreb	€53,498	€43,771	€40,297	€46,828	€61,140
Prague	€52,337	€41,643	€54,476	€54,853	€44,788
Stockholm	€52,040	€53,304	€49,066	€50,182	€74,492
Barcelona	€51,600	€44,900	€49,900	€44,800	€43,000
Dublin	€51,420	€45,976	€42,346	€51,689	€64,326
Paris	€50,647	€36,317	€53,808	€73,828	€65,750
Vienna	€49,350	€48,348	€44,524	€49,077	€67,651
Aveiro	€48,998	€44,649	€37,111	€38,271	€45,519
Cork	€48,901	€37,086	€29,575	€32,627	€56,412
Madrid	€46,081	€44,300	€56,449	€43,672	€38,750
Helsinki	€43,459	€52,702	€48,486	€46,864	€73,702
Milan	€40,689	€48,597	€44,771	€43,368	€67,985
Lisbon	€40,310	€35,633	€29,731	€33,406	€39,976
Rome	€40,176	€47,379	€43,617	€47,619	€66,266
Bucharest	€39,881	€40,740	€36,615	€52,430	€42,803
Munich	€36,429	€46,392	€42,742	€44,947	€64,873
Oslo	€31,771	€35,437	€27,372	€38,981	€39,164
AVERAGE	€ 49,821	€ 48,403	€ 47,623	€ 53,561	€ 62,573



Remote job opportunities in major European cities

Helsinki stands out as the city with the highest percentage of remote job offerings at 38.98%, closely followed by Tallinn at 38.17%, and Munich at 28.79%. In contrast, the cities offering the least remote work opportunities include Oslo with only 1.93%, Copenhagen at 4.60%, and Rome at 4.62%.

In the context of remote job opportunities within the DigiAdvance project cities—Dublin, Barcelona, and Aveiro—each city presents varying levels of accessibility to remote work. Dublin features a somewhat higher percentage of remote job opportunities at 11.64%, just below the average for European cities, which stands at 12.48%. Barcelona is close behind with 11.24% of its job opportunities listed as remote, suggesting a fairly open stance towards telecommuting. Aveiro, however, offers the least remote work flexibility among the three, with only 5.83% of job opportunities being remote, significantly below the European average.



Figure 19. Remote job offers by city

2022

Source: TalentUp.io for DigiAdvance



In Helsinki, jobs for App Developers (96.32%) and Computer Vision (95.73%) are almost entirely remote.

Internet of Things is the specialty that, on average, provides the most opportunities for remote work among the cities studied, with an average of 31.16% of job offers.

In the DigiAdvance project cities, Barcelona exhibits a strong propensity for remote work in IoT and 3D Printing, with 41.84% and 40.91% of job postings respectively allowing remote work, contrasting with lower opportunities in Business Intelligence and Big Data at 9.71% and 13.06%. Dublin, meanwhile, demonstrates notable strength in Artificial Intelligence, where 59.47% of the jobs are remote, though it presents fewer remote options in fields like CRM + ERP Consultants and Digital Marketing at only 5.27% and 6.61%. Aveiro offers more modest remote work opportunities across the board, with its highest percentages in Business Intelligence at 18.18%, yet minimal remote roles in 3D Printing and Digital Marketing at 1.85% and 1.54%.



Figure 20. Remote job offers by city and specialisation

2022

Source: TalentUp.io for DigiAdvance



50% to 60%

-	Web Developers	App Developers	UX/UI	CRM + ERP Consultant	Agile/Scrum	Cloud (AWS)	Cyber- security	Business Intelligence
Barcelona	18.75%	30.77%	35.00%	19.25%	20.43%	31.15%	17.64%	9.71%
London	45.45%	58.09%	50.28%	30.64%	53.22%	48.84%	65.67%	35.90%
Madrid	16.31%	34.87%	17.91%	15.04%	24.69%	24.40%	12.26%	8.84%
Paris	11.11%	10.87%	12.22%	5.09%	11.67%	14.09%	15.59%	5.30%
Amsterdam	76.28%	8.11%	52.28%	15.67%	38.73%	41.75%	34.68%	8.42%
Prague	66.48%	8.61%	6.86%	7.60%	19.95%	19.18%	14.80%	42.92%
Berlin	14.02%	39.45%	38.30%	17.26%	51.06%	38.24%	14.24%	25.34%
Bucharest	41.67%	26.06%	22.61%	14.19%	24.15%	24.35%	28.21%	19.05%
Stockholm	10.24%	14.16%	13.87%	13.56%	18.09%	22.92%	14.52%	7.83%
Munich	17.65%	31.43%	58.79%	14.22%	63.93%	54.97%	10.26%	35.84%
Zurich	35.20%	4.55%	47.59%	18.64%	19.65%	52.80%	20.75%	5.34%
Helsinki	53.13%	96.32%	88.67%	34.26%	76.18%	84.50%	69.20%	85.98%
Milan	8.91%	8.64%	22.01%	4.51%	7.14%	9.13%	3.06%	4.60%
Tallinn	20.00%	33.33%	23.40%	1.33%	24.49%	12.07%	20.00%	5.26%
Vienna	12.63%	56.99%	39.54%	6.20%	28.68%	30.31%	5.48%	8.14%
Oslo	33.70%	25.93%	6.75%	20.27%	9.38%	25.19%	11.76%	10.34%
Dublin	16.44%	32.95%	21.46%	5.27%	15.18%	20.78%	23.61%	32.63%
Zagreb	12.50%	8.46%	10.00%	11.11%	45.60%	44.90%	16.67%	13.45%
Copenhagen	5.06%	51.12%	12.18%	6.91%	14.62%	14.51%	31.18%	8.76%
Rome	9.60%	15.91%	11.02%	3.70%	9.46%	7.95%	7.89%	4.75%
Lisbon	11.95%	11.71%	12.00%	5.48%	10.41%	9.08%	5.15%	6.30%
Aveiro	11.76%	3.95%	14.83%	4.46%	10.00%	9.71%	6.56%	18.18%
Cork	2.21%	7.42%	3.98%	8.16%	15.38%	36.89%	16.81%	7.94%
AVERAGE	23.96%	26.94%	27.02%	12.30%	26.61%	29.47%	20.26%	17.86%



Figure 21. Remote job offers by city and specialisation

2022



-	Big Data	API	Artificial Intelligence	ЮТ	3D printing	Blockchain	Computer vision	Digital Marketing
Barcelona	13.06%	16.67%	28.68%	41.84%	40.91%	24.55%	30.56%	16.27%
London	41.75%	49.86%	41.79%	47.68%	72.27%	54.81%	26.85%	30.52%
Madrid	14.43%	34.00%	34.20%	19.51%	28.49%	6.52%	15.04%	18.44%
Paris	9.90%	18.59%	21.09%	20.52%	10.78%	4.50%	4.96%	11.78%
Amsterdam	56.04%	17.19%	51.19%	30.18%	6.94%	40.08%	14.89%	56.65%
Prague	2.19%	12.13%	13.56%	10.86%	5.94%	35.34%	0.74%	9.47%
Berlin	40.62%	38.58%	51.04%	40.20%	2.98%	39.83%	54.81%	45.45%
Bucharest	24.35%	17.49%	44.55%	22.08%	29.11%	43.11%	11.02%	19.55%
Stockholm	8.42%	16.28%	28.00%	18.72%	5.43%	13.50%	7.87%	6.08%
Munich	37.61%	65.16%	44.73%	59.89%	4.65%	39.69%	64.20%	22.12%
Zurich	8.91%	42.39%	8.59%	32.27%	22.48%	73.14%	8.68%	23.68%
Helsinki	83.03%	36.93%	75.95%	79.79%	50.00%	39.13%	95.73%	67.29%
Milan	2.82%	43.51%	9.50%	16.94%	9.84%	32.22%	6.61%	21.75%
Tallinn	3.75%	7.02%	14.21%	81.75%	29.90%	25.00%	26.79%	28.57%
Vienna	52.76%	52.54%	1.86%	58.41%	51.85%	1.88%	13.37%	8.06%
Oslo	21.12%	9.98%	38.89%	13.53%	63.64%	71.88%	26.32%	66.67%
Dublin	14.59%	26.98%	59.47%	43.24%	10.98%	46.72%	14.62%	6.61%
Zagreb	20.83%	2.98%	4.78%	8.33%	14.18%	9.92%	1.20%	0.91%
Copenhagen	7.38%	13.25%	7.69%	22.20%	12.50%	15.57%	2.36%	7.72%
Rome	6.13%	14.83%	11.01%	12.94%	3.85%	23.40%	15.28%	3.71%
Lisbon	11.50%	14.99%	7.54%	12.95%	4.64%	16.06%	8.35%	6.00%
Aveiro	10.64%	5.96%	6.98%	4.60%	1.85%	14.29%	9.72%	1.54%
Cork	18.52%	6.07%	11.11%	18.35%	2.32%	27.78%	13.33%	16.94%
AVERAGE	22.19%	24.49%	26.80%	31.16%	21.11%	30.39%	20.58%	21.56%



Presence of women in the ICT sector of European cities

The range of women in the technology sector among the European cities studied falls between 22.14% and 32.77%, with an average of 27.79%. Essentially, 3 out of every 10 professionals in the sector are women.

The city with the highest representation of women in the technology sector is Milan, with 32.77% of women on staff. It is followed by Aveiro (32.14%) and Madrid (30.19%).

Among the DigiAdvance project cities, Aveiro leads within them with 32.14% of its tech sector positions held by women, slightly above the average across European cities, which stands at 27.79%. Dublin follows closely with 29.47%, showing a solid commitment to gender diversity. Barcelona has a slightly lower proportion, with women making up 28.69% of its tech workforce, still slightly above the European average.

Figure 22. Women in the sector by European cities (%) 2022



Presence of women by technology

The specialties with the highest representation of women in the sector are CRM & ERP Consultant (45.84%), Digital Marketing (44.21%), and Business Intelligence (36.58%).

In both CRM & ERP Consultant and Digital Marketing, almost 5 out of every 10 workers are women.

Figure 23. Percentage of women in the sector by technology (average across European cities analysed) 2022





Percentage of women by technology and European city

CRM & ERP Consultant, Digital Marketing, UX/UI Design, and Business Intelligence stand out for having a presence of over 40% women in most of the European cities studied.

In some cases, such as in Copenhagen, in the field of CRM & ERP Consultant, women make up as much as 70% of the workforce.

In DigiAdvance cities, Barcelona showcases a relatively balanced gender distribution across different roles, with notable representation in Digital Marketing at 45.71% and UX/UI at 42.78%. Dublin stands out for its high female presence in roles such as CRM + ERP Consultants at 60.00% and Business Intelligence at 47.62%. Aveiro demonstrates significant female participation in Digital Marketing at 41.18% and UX/UI at 34.55%.



Figure 24. Percentage of women in the sector by technology and European city

2022

Source: TalentUp.io for DigiAdvance

 70% or more
 50% to 60%

 60% to 70%
 40% to 50%

	Web Developers	App Developers	UX/UI	CRM + ERP Consultant	Agile/Scrum	Cloud (AWS)	Cyber- security	Business Intelligence
Barcelona	26.20%	30.65%	42.78%	37.89%	29.12%	28.79%	27.65%	35.61%
London	24.78%	30.59%	36.78%	59.03%	24.33%	14.01%	16.35%	39.24%
Madrid	31.11%	26.12%	35.04%	45.28%	27.61%	18.75%	27.27%	38.27%
Paris	24.45%	23.06%	41.18%	58.26%	20.95%	15.63%	27.27%	38.51%
Amsterdam	29.40%	25.00%	48.72%	54.35%	22.16%	19.05%	23.40%	49.21%
Prague	23.04%	32.50%	30.00%	40.00%	25.13%	17.80%	21.50%	45.45%
Berlin	26.78%	28.70%	38.64%	43.28%	22.80%	20.00%	26.70%	48.16%
Bucharest	16.35%	21.93%	15.38%	11.11%	17.38%	15.79%	18.84%	39.58%
Stockholm	18.96%	33.67%	48.84%	64.71%	20.77%	10.53%	23.10%	37.50%
Munich	25.71%	18.18%	33.93%	58.09%	23.94%	19.05%	16.67%	40.43%
Zurich	26.79%	30.23%	39.13%	51.90%	20.39%	7.89%	30.00%	27.27%
Helsinki	21.71%	41.00%	48.89%	50.00%	19.45%	28.95%	24.31%	29.67%
Milan	27.42%	19.75%	48.48%	48.41%	20.82%	31.82%	43.48%	27.82%
Tallinn	20.00%	33.33%	50.00%	46.80%	25.00%	16.90%	23.34%	25.83%
Vienna	19.05%	38.71%	25.00%	43.75%	23.17%	6.89%	40.00%	27.78%
Oslo	23.57%	32.26%	20.00%	40.74%	17.91%	11.11%	31.12%	46.15%
Dublin	34.09%	27.80%	23.53%	60.00%	24.56%	16.67%	22.56%	47.62%
Zagreb	26.67%	12.50%	29.12%	35.10%	23.68%	17.60%	20.06%	22.72%
Copenhagen	25.98%	16.79%	37.25%	70.69%	18.11%	11.76%	22.31%	26.37%
Rome	24.18%	8.65%	47.62%	47.73%	22.70%	13.64%	19.62%	45.59%
Lisbon	32.51%	19.47%	30.87%	28.57%	24.89%	16.50%	16.36%	38.90%
Aveiro	27.34%	19.82%	34.55%	29.77%	27.77%	18.75%	27.29%	29.09%
Cork	22.95%	14.29%	33.33%	28.90%	28.57%	16.67%	38.10%	34.48%



Figure 25. Percentage of women in the sector by technology and European city

2022

Source: TalentUp.io for DigiAdvance

70% or more	50% to (
60% to 70%	40% to \$

60% 50%

	Big Data	ΑΡΙ	Artificial Intelligence	ЮТ	3D printing	Blockchain	Computer vision	Digital Marketing
Barcelona	33.11%	30.57%	29.53%	28.29%	31.58%	25.10%	29.66%	45.71%
London	36.14%	27.88%	32.33%	26.60%	25.15%	28.33%	24.07%	29.27%
Madrid	35.97%	25.14%	36.33%	26.84%	21.62%	27.51%	16.24%	60.00%
Paris	27.88%	20.62%	33.19%	18.18%	23.62%	26.26%	22.67%	35.71%
Amsterdam	32.31%	19.10%	31.41%	22.43%	18.70%	27.19%	30.65%	33.33%
Prague	25.00%	33.33%	34.42%	37.63%	25.00%	35.48%	50.00%	33.33%
Berlin	35.67%	25.24%	34.03%	24.26%	22.22%	30.47%	23.92%	50.00%
Bucharest	25.71%	5.71%	28.37%	21.27%	28.43%	31.00%	35.71%	18.18%
Stockholm	20.21%	24.73%	35.98%	25.35%	26.32%	41.79%	18.34%	28.57%
Munich	29.69%	23.84%	22.53%	27.19%	26.23%	27.00%	20.45%	62.30%
Zurich	32.61%	29.27%	28.94%	24.39%	12.90%	25.43%	29.09%	40.00%
Helsinki	36.05%	49.49%	29.55%	22.44%	40.00%	27.27%	11.89%	62.50%
Milan	32.95%	31.82%	31.30%	19.20%	20.37%	31.88%	32.47%	66.67%
Tallinn	31.01%	29.09%	14.81%	28.38%	32.22%	33.33%	33.33%	38.20%
Vienna	34.48%	37.04%	31.01%	20.00%	20.83%	22.22%	26.67%	25.00%
Oslo	30.28%	29.41%	32.00%	28.70%	15.00%	15.56%	31.37%	64.90%
Dublin	28.07%	41.38%	33.10%	8.89%	28.21%	20.00%	11.54%	40.00%
Zagreb	32.97%	50.00%	11.54%	33.33%	31.84%	26.78%	23.00%	35.70%
Copenhagen	27.78%	25.31%	25.58%	21.14%	11.67%	38.75%	21.05%	50.00%
Rome	27.35%	10.92%	20.00%	18.44%	29.41%	14.75%	19.64%	55.55%
Lisbon	28,28%	35,77%	21,43%	23,44%	20,00%	21,74%	25,33%	52,64%
Aveiro	28,21%	8,93%	28,70%	23,33%	24,32%	33,81%	27,56%	41,18%
Cork	10,10%	33,33%	19,23%	28,57%	20,93%	22,65%	19,92%	48,09%



Top employers

The main employers in the principal cities of DigiAdvance countries are technology companies and consultancies.

Figure 26. Top employers by European city

2022

Barcelona	Madrid	Dublin	Lisboa	Aveiro	Cork
Amazon	Amazon	Harvey Nash	Microsoft Portugal	Bosch	Dell
(e-commerce)	(e-commerce)	(Consultancy)	(Technology)	(Technology)	(Technology)
Glovo	Ansys	IT Alliance Group	Accenture	Altice	Apple
(Food)	(Technology)	(Technology)	(Consultancy)	(Telecoms)	(Technology)
Flix Snip (Video On Demand)	Axa (Insurance)	Tandem Project Management (Consultancy)	NOS (Telecoms)	Critical Software (Technology)	VMWare (Technology)
Aggreko (Energy)	Bloomberg (Consultancy)	Jazz Pharmaceuticals (Pharmaceutical)	Sapo (Technology)	Mindera (Technology)	Johnson Controls (equipment for buildings)
Dynatrace	Xitaso	Apcoa	Noesis	Dellent Consulting	McAfee
(Technology)	(Consultancy)	(Parking)	(Consultancy)	(Consultancy)	(Technology)



Conclusions

Conclusions

The DigiAdvance project has provided a comprehensive and insightful analysis of the digital skills landscape within the SME sector across Europe. Through rigorous research and detailed needs analysis, the project has highlighted critical gaps and opportunities in digital skills, providing a robust foundation for future policy and training initiatives.

Key findings from the report emphasize a pronounced digital skills gap, particularly in sectors vital to national and regional economies. This gap threatens productivity and growth, underlining the urgent need for targeted interventions. SMEs with digitally skilled workforces exhibit enhanced operational efficiencies and innovation capabilities, making digital skills an essential driver of growth and competitiveness.

The bibliometric literature review on digital skills and SMEs reveals a rapidly growing field of research that underscores the critical importance of digital competencies for the competitiveness and sustainability of small and medium-sized enterprises. The analysis identifies key themes such as digital transformation, e-learning, and digital literacies, which have emerged as pivotal areas of focus. It highlights the collaborative efforts of researchers across the globe, indicating a widespread recognition of the transformative potential of digital skills in driving innovation and efficiency in SMEs. However, the review also points to significant gaps, particularly in the integration of digital skills within SME operations, calling for more targeted research and practical interventions. As digital technologies continue to evolve, ongoing investigation into these areas will be essential to equip SMEs with the necessary skills to navigate and thrive in the digital economy.

The report also reveals significant geographical disparities in job conditions and digital talent distribution across Europe. Cities like Zurich, London, and Dublin offer better salary prospects and employment opportunities in tech sectors, while remote working arrangements in cities like Helsinki and Munich provide new avenues for employment and work-life balance. Addressing these disparities through strategic policy and investment in digital training is crucial for fostering a balanced and inclusive digital economy.

Gender disparities in the ICT sector persist, particularly in high-tech and leadership roles. Empowering women and underrepresented groups through targeted support and inclusive policies is essential for creating a diverse and innovative digital workforce. Public-private partnerships (PPPs) are highlighted as a cornerstone for tailoring educational programs to the nuanced needs of SMEs, ensuring training is relevant and accessible.

The quantitative analysis of the DigiAdvance project's questionnaire highlights the critical digital skills gaps within SMEs across various sectors and regions. This comprehensive data collection, encompassing both employees and employers, reveals a pronounced need for targeted digital skills training to bridge these gaps and enhance organizational performance.

Key findings from the quantitative analysis indicate that while employees generally acknowledge the importance of digital skills, there is a significant disparity between their perceptions and those of employers regarding the most critical skills needed. Transversal skills, such as analytical thinking, flexibility, and resilience, emerged as paramount, underscoring the necessity for holistic skill development that extends beyond technical competencies. The analysis further demonstrates that SMEs across



Portugal, Ireland, and Spain face unique challenges in funding and implementing effective training programs. While internal funding and government-supported initiatives are common, the variability in training duration and commitment levels highlights the need for more standardized and accessible training solutions.

Moreover, the survey responses underscore the strategic importance of continuous digital skills development in maintaining competitiveness and adaptability in a rapidly evolving digital landscape. Employers overwhelmingly recognize the need for ongoing training, although practical constraints such as time and resource allocation pose significant barriers. Overall, the quantitative analysis provides valuable insights into the current digital skills landscape within SMEs, offering a clear roadmap for future training initiatives. By addressing these identified gaps and leveraging the diverse strategies highlighted in the report, SMEs can better equip their workforce with the necessary skills to thrive in the digital age, thereby fostering growth and innovation within the sector.

The qualitative analysis of the semi-structured interviews provides a rich in-deep understanding of the digital skills landscape within SMEs across Portugal, Ireland, and Spain. Key insights reveal a unanimous recognition of the critical importance of digital skills development for maintaining competitiveness and adaptability in a rapidly evolving digital environment. Despite this shared commitment, organizations face several common challenges, including time and budget constraints, which hinder the effective implementation of training programs.

The interviews highlight a notable emphasis on transversal (soft) skills over technical (hard) skills, with attributes such as communication, teamwork, problem-solving, and adaptability being prioritized. This indicates a growing recognition of the importance of holistic employee development that balances technical expertise with interpersonal abilities. Additionally, the strategic focus on areas like cybersecurity, artificial intelligence, and data analytics underscores the need for specialized skills to drive future competitiveness and innovation.

Differences in approaches to measuring the return on investment (ROI) of training programs across the three countries suggest varying levels of maturity in assessing the impact of digital skills initiatives. This highlights the need for developing robust and relevant KPIs to ensure the effectiveness of these programs.

The comparative analysis of Portugal, Ireland, and Spain demonstrates a strong shared commitment to digital skills development, despite common challenges such as time and budget constraints. The diverse approaches to measuring training effectiveness and the strategic emphasis on different digital skills reflect the unique contexts and priorities of each country. To address identified skills gaps, organizations need to evolve their strategies, leverage both internal and external resources, and develop robust metrics to assess the impact of their training initiatives.

Overall, the qualitative analysis offers actionable insights and strategic recommendations for enhancing digital skills development within SMEs. By addressing the identified gaps and leveraging internal and external resources, organizations can better prepare their workforce for the demands of the digital future. This comprehensive understanding of the current state and future priorities of digital skills development will be instrumental in fostering a resilient and innovative digital economy across Europe.



As Europe advances towards digital transformation, prioritizing the cultivation of digital talent is imperative. This requires a strategic blend of policy intervention, educational innovation, and corporate responsibility. By doing so, Europe can ensure that its digital economy is not only robust and competitive but also inclusive and resilient, capable of harnessing the full potential of its SMEs.

The insights from the DigiAdvance project serve as a valuable resource for shaping future policies, educational initiatives, and business strategies that enable SMEs to thrive in the digital age. Continued research and investment in digital skills development will be critical for adapting to the ever-changing technological landscape and securing a prosperous future for Europe's digital economy.

Addressing the digital skills gap within the SME sector is paramount for fostering a resilient and innovative digital economy. Strategic recommendations for stakeholders include investing in comprehensive and continuous digital skills training tailored to the specific needs of SMEs. This involves enhancing collaboration between higher education institutions, industry leaders, and government bodies to create targeted educational programs and support initiatives that align with market demands. Emphasizing the development of transversal skills alongside technical competencies is crucial, as these skills are vital for adaptability and innovation. Additionally, leveraging public-private partnerships can facilitate the sharing of resources and best practices, ensuring that SMEs have access to the necessary tools and knowledge. Implementing robust metrics to assess the impact of training initiatives will help in refining strategies and ensuring their effectiveness. By adopting these strategic recommendations, stakeholders can significantly contribute to bridging the digital skills gap, thus empowering SMEs to thrive in the digital age and driving sustainable economic growth.



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