UNIVERSITY OF LJUBLJANA
SCHOOL OF ECONOMICS AND BUSINESS

MASTER'S THESIS

THE FUTURE OF WORK IN EU: CLOSING THE DIGITAL SKILLS GAP

Brussels, May 2022 NIKA NOVAK

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LIST OF ABBREVIATIONS

sl. – Slovene

A4AI – (sl. Zveza za dostopen internet) Alliance for affordable Internet

AI – (sl. Umetna intelligenca) Artificial Intelligence

CEDEFOP – (sl. Evropski center za razvoj poklicnega usposabljanja) European Center for the Development of Vocational training

COVID-19 – (sl. Koronavirusna bolezen 2019) Coronavirus disease 2019

DESI – (sl. Indeks digitalnega gospodarstva in družbe) The digital economy and society index

EU – (sl. Evropska unija); European Union

GDP – (sl. Bruto domači proizvod) Gross domestic product

GDPR – (sl. Splošna uredba o varstvu podatkov) General Data protection regulation

HRM – (sl. Upravljanje s človeškimi viri) Human resource management

I-DESI – (sl. Mednarodni indeks digitalnega gospodarstva in družbe) International Digital Economy and Society Index

ICT – (sl. Informacijsko-komunikacijska tehnologija) Information and Communication technology

IoT – (sl. Internet stvari) Internet of things

ITU – (sl. Mednarodna telekomunikacijska zveza) International telecommunications union

OECD – (sl. Organizacija za gospodarsko sodelovanje in razvoj) Organization for Economic Co-operation and Development

SME – (sl. Mala in srednje velika podjetja) Small and medium-sized enterprises

UNESCO – (sl. Organizacija združenih narodov za izobraževane, znanost in kulturo) The United Nations Educational, Scientific and Cultural Organization

WEF – (sl. Svetovni ekonomski forum) World Economic Forum

INTRODUCTION

The process of digitalization is about adaptation to constantly changing environment through technological advancement. However, digital transformation is not only about technology. Digital transformation refers to a broad spectrum of present and future socio-economic changes and new realties. The combination of societal shifts, ecosystem/industry disruptions and the everchanging consumer behaviors and expectations additionally spurred by the recent global pandemic of the coronavirus disease (COVID-19) led to the necessity for a faster deployment of digital transformation (i-SCOOP, 2022a).

In its essence digital transformation relates to integration of digital technologies, processes and competencies, with the aim of simplification of established ways of working and achievement of higher efficiency, innovation, competitiveness, sustainability and overall economic growth of companies (Bednarčíková & Repiská, 2021). While the term digital transformation is predominantly used in a business context, it is necessary to recognize that this umbrella term has wider implications that affect organizations, industries, and society from cultural, organizational, and operational point of view (i-SCOOP, 2022a).

In the midst of a global pandemic, this topic has gained even more relevance and companies as well as individuals are focusing on digital skills today more than ever. The pandemic has confirmed the importance of digitalization in the world and many businesses have been forced to digitally transform in order to create their business and enterprise activities (Bednarčíková & Repiská, 2021). While the need for more investment in digital technologies to be able to capture the value of high-impact technologies is undeniable, we sometimes fail to consider the need for transition on the level of development of digital skills, education and training of labor force (European Commission DG Communications Networks, Content & Technology, 2020).

The process of digital transformation cannot be addressed with one-layered, straightforward approach. New technologies can create new opportunities, but this is only one driver of socio-economic change. Special caution needs to be given to several external barriers that relate to recognition of how digital transformation can benefit all of society. This includes addressing the shortage of skills and qualified labor force, lack of sufficient infrastructure, appropriate regulation and privacy issue and limited access to funding that particularly small and medium-sized businesses (SMEs) face (Ebert & Duarte, 2018).

Addressing the digital skills gap also raises the importance of digital inclusiveness, which means all individuals and communities are entitled and should have the access to the same technology such as internet connection, access to digital training etc. According to Development Co-operation Report, issued by the Organization for Economic Co-operation and Development **(**OECD), the most immediate challenge for countries that pursue digital transformation is related to mobilization of sufficient finance to be able to address the most basic gaps in coverage and usage. While private capital remains the main source of funding

for digital transformation, the public sector can contribute by actively using both direct and indirect measures. Namely, these measures primarily relate to work of International organizations (such as the European Union) that have the means and ability to further scale funding for a range of priority areas, leveraging the organizations' convening power at global and country levels, and maximize coordinated action to achieve impact at scale (OECD, 2021).

With the exponential developments and advancements in technology, we are continuously facing new and unexplored frontiers that further enlarge the gap between recommendations of scholars and what is actually implemented by decision-makers. It is on the latter to acknowledge that the data-driven process of change is not a transformative process in the long-term future, but a present opportunity that presents both risks and challenges that are addressed in the continuation of this thesis (Hinterhuber & Nilles, 2021). The theoretical part of the thesis firstly focuses on definition of the digital skills and delving further into what impact has the digital transformation had on different sectors across Europe. Following, the focus of the theoretical part is on identifying the key critical points to close the digital skills gap and adapt to the new way of working, by taking into account also the impact of the recent global pandemic.

The goal of the theoretical part of this master's thesis will be to analyze and determine the level of existing digital development in Europe, progress and obstacles in development of skills that match the new ways of working, impact on disruption of classic workplace and attitude towards digital transformation. The practical goals of the study are to further investigate the digital skills gap in Europe, to determine whether the young employees are willing to reskill and upskill and to determine their attitude towards digital transformation and automation. Key focus will be on the key areas where progress towards reduction of the digital skills gap is most prominent, future implication of digital transformation on labor force and incentives that relevant stakeholders (i.e., companies, governments, NGOs, transnational organizations etc.) can implement to ensure a smoother transformation towards a digitalized society.

The purpose of the thesis is to shed light on the digital skills gap and to identify key areas to work on in order to close the gap. Having a better understanding of the issue can help in appropriate measures being taken which can have a positive impact not only on the organizations but also their employees, and consequently, in a broader sense, on the economy and the society as a whole.

The described research, based on relevant secondary data, serves as a foundation for understanding of the research problem and as a support for the empirical part of the thesis. The empirical part consists of research in the form of a survey, which was conducted among young European workers between the ages of 24 and 38, of different European nationalities. The research questions are composed as follows:

- Research question 1: What is young workers' general attitude towards digital transformation? Does it differ based on their level of digital skills and education level?
- Research question 2: Are employees willing to reskill and upskill?
- Research question 3: Do employees believe that automation is leading to job loss?
- Research question 4: Do young employees believe that advanced digital skills (ICT skills) lead to higher employability?

The collected data was used to test existing theoretical opinions about the digital transformation of our society and to measure trends identified in the theoretical part of the thesis. Quantitative research was used to analyze the primary data from the survey. The results were interpreted in conclusion of this thesis, and the obtained findings summarized in a form of a clear recommendation for further research on the given topic.

The master's thesis is structured as follows. The theoretical part consists of four main chapters. The first chapter defines digital transformation and outlines the impact it has had on our society, across the European labor market. We then discuss the ethical, societal and legal challenges of the digital transformation. In Chapter two, we summarize the effects of the digital transformation on the modern workplace, taking into account the automation and how it will impact the jobs of Europeans. We then outline the effects of the recent COVID-19 pandemic and study the employee as well as the corporate perspective of the changes it has brought. In the following chapter, we define the digital skills and point out the factors which influence the level of digital skills of an individual. The difference between upskilling and reskilling is defined and we suggest several guidelines on how employers should incentivize upskilling in reskilling in their companies. Next, we present and discuss the inclusion in digital economy, gender equality and diversity in the context of digital skills. Finally, the effects of the COVID-19 pandemic on the general level of digital skills are disclosed in chapter three. In the fourth chapter, several EU-level initiatives are presented, alongside with several company-level and individual country-level initiatives, which are highlighted as best practices. In the fifth chapter we present the empirical research we have carried out and in the last chapter we present the results of the research. In the discussion we provide answers to the research questions and interpret the findings of the research. Finally, we highlight the theoretical and practical contributions and limitations of the research and make recommendations for further research.

1 DIGITAL TRANSFORMATION OF OUR SOCIETY

Digital transformation is by no means a recent phenomenon. However, due to continuous advancement and changes that have broader implications on the society as a whole, it remains a vivid topic of discussion for both scholars as well as decision-makers. In order to

understand the impact digital transformation has on the socio-economic environment and especially the future of work, we firstly need to understand the basic concepts of the topic.

As already indicated, digital transformation is not only about technology. At its core, the term "digitization" indeed refers to the process of transformation from analog to digital form, which is connected to the still on-going technical process. On the other hand, the term "digitalization" refers not only to an operational and economic dimension but to the social one as well. In the business context "digitalization" implies the transformation of business operation with digital technologies and information, while it may also be defined it broader context and signify restructuring of many domains of social life around digital communication and media infrastructure. Digitization and digitalization are thus certainly a part of digital transformation, but not the only ones. "Digital transformation" stands for a sum of all the necessary digitalization processes geared towards the strategic change of an organization. This includes a profound transformation of business and organizational activities, processes, competencies and models. Simply put, information is digitized, processes and roles that combine the business operations are digitalized, while the businesses as a whole and their strategy are digitally transformed (Kopp, Gröblinger & Adams, 2019).

Digital transformation represents a journey towards ubiquitous optimization, that affects both social and economic perspectives. While the journey of digital transformation relates to achievement of multiple interdependent intermediary goals, Table 1 below summarizes the key areas of socio-economic changes.

Digital technologies and the ways we use them have already had an effect on our personal lives, work and society as a whole. As the purpose of this thesis is to define how the digital transformation affected the way of work, following section is dedicated to key areas of how digital technologies have changed the ways of doing business and will continue to do so in the future.

Table 1: Digital Transformation Goals

Perspective	**Objective**
Social	Fostering progress towards more innovative and collaborative culture in business and social environment.
	Adapt the education system to support development of skills needed for digital work and society.
	Support the creation of digital communication infrastructure and ensure its quality and accessibility to wider population.
	Address the issue of digital data protection and transparency.
Economic	Promote innovation and implementation of new business models.
	Increase income generation, productivity and value addition in economy.
	Work on improvements of regulatory framework and technical standards.

Source: Ebert & Duarte (2018).

1.1 The impact of digital transformation on European labor market

In terms of business and implications for the labor market, digital transformation revolves around rethinking current approaches to common issues in the light of new technology. At this point of technological evolution, when digital transformation is occurring across all industries and job functions it is not so much about enterprises choosing to transform but more about deciding how to transform (Olmstead, 2022). To get a better understanding of the implications of digital transformation, Table 2 below represents real-world examples of it broken down by industry.

Table 2: Examples of Digital Transformation by Industry

Industry	**Digital Transformation Example**	**Key objectives / benefits**
Healthcare	Virtual visits, patient portals, data aggregation, internationally shared real-time data	- Easier and more equal access to healthcare through transformation to a digital public health system; - Internationally shared real-time data to boost large-scale medical studies at a European level; - Introduction of shared technical, legal and technological framework to unlock the full potential of public digital health.
Agriculture	Online trading platforms, online health picture of livestock by help of sensors, increased quality control	- Reduction of human errors, increase in labor productivity, competitiveness and wages of workers through implementation of information systems - Higher quality and better traceability of products; - Reduce the gap in agricultural productivity between more and less developed countries through global data flows, improve living conditions in rural areas.
Manufacturing	Advanced tools for increased productivity, collection of maintenance data and decrease of downtime and cost	- Usage of advanced tools such as AI to improve productivity and quality control; - Real-time monitoring of maintenance data to minimize downtime and decrease costs; - Substitution of human labor with technology for dangerous tasks.
Education	Online classes, access to online sources of information	- Using data-analytics to track student performance and identify their needs; - Enable better access to relevant and updated content; - Address the problem of closing the digital skills gap, mainly affecting young people based on their socioeconomic background and inadequate level of digital literacy of professors.

(table continues)

Table 2: Examples of Digital Transformation by Industry (continued)

Hospitality/ tourism	Online check-ins, amenity booking tools	- Taking advantage of innovative sales and marketing approaches (cloud-based booking systems, sharing the travel experience on various digital platforms) and improve guest acquisition and services; - Improving offer based on a wide range of information on the consumer habits and behavior collected in CRM client databases.
Retail	Loyalty cards, e-commerce stores	- Rapid access to information for customers and increased transparency about products and prices; - Self-service and self-checkout systems; - Personalized marketing approaches supported by collection of consumer data, behavior and past activities. Collection of consumer data and understanding the buyer's preferences are two key benefits of digitalization of this industry.

Source: Li Han Wong et al., 2022; Zaripova, Tyurina, Rocheva & Chupaev, 2020; Albukhitan, 2020; SovTech, 2020; Frolova, Rogach, Tyurikov & Razov, 2021; Starkov, 2022; Zsarnoczky, 2018; i-SCOOP, 2022b; BigCommerce, 2021.

It is evident that digitalization is transforming business landscapes and consequently redefining the world of work, boundaries of product consumption and distribution. New digital technologies such as data analytics, artificial intelligence (AI), 3D printing, cloud computing, Internet of things (IoT) and robotization are all transforming the existing jobs, by demanding new skills to carry out new tasks. Thus, it is highly likely that the current work force will have to be retrained or replaced by workers that possess the needed skills. While digital transformation presents unique opportunities in all types of industries, several challenges and threats arose as a consequence, as new ways of employment pose new challenges to both employers and employees (de Groen, Lenaerts, Bosc & Paquier, 2017).

While the overall consequences on the labor markets are still highly uncertain and it is evident that the content of jobs is likely to change with creation of new tasks, it is also a common belief that rather than eliminating certain jobs altogether digitalization will only augment the human component. Thus, automation will mostly affect specific tasks within jobs, rather than cause entire jobs to disappear – at least in the short term. Servoz (2019) also explains that we do have an impact on the outcome of automation with the policies and decisions we will take in the next years. While specific tasks are likely to be monumentally changed, also numerous new jobs will be created, some even in sectors that will only start to exist in the future. Based on available evidence, technological advancements have historically created more jobs than destroyed and at the same time improved the quality of jobs and services. Job quality improvement specifically relates to jobs for which the probability of automation is most likely, which is between 14 % and 47 % of all jobs. While the impact of digitalization and automation on existing jobs is inevitable, the outcome of its

effects on the labor market will depend on the ratio between job automation/destruction and job creation. It seems that the displacement effect is particularly strong for low- and medium-skilled workers, whose jobs are more susceptible to getting automatized (Servoz, 2019). On the other hand, it is evident that digital skills will be in high demand in the labor markets of the future, as will entrepreneurial skills and creativity (de Groen, Lenaerts, Bosc & Paquier, 2017).

The effects of digital transformation are especially evident in traditional businesses and industries, specifically in changes of existing organizational and management structures, such as higher flexibility and fragmentation of work, changing work monitoring methods, recruitment strategies, and skill and training needs (de Groen, Lenaerts, Bosc & Paquier, 2017). The most common questions and challenges that digital transformation raises are addressed in the continuation of this thesis.

1.2 Challenges of digital transformation

While digital transformation is enabled through technology, the most important part of successful transformation relates to finding synergies between technological and human decision making. As technology is giving more and more power to act, this means that companies are facing making choices they did not have to make earlier and the importance of addressing the implication of new technological boundaries on ethical, societal and legal topics is only growing (Nishant, 2020). While great benefits can be achieved through new technologies, they can also threaten privacy, erode security and fuel inequality. How to manage these developments is still a subject of much discussion and the responsibility and choice how to harness and manage new technologies lies with everybody from governments to businesses and individuals (United Nations, 2020).

1.2.1 Ethical perspective

From the perspective of digital transformation ethical implications relate to the human element of addressing the topic of technological impact. While we often focus on the benefits of digital transformation for the organizations, the increased usage of digital platforms, applications and solutions can raise a certain ethical predicament (Yardley, 2018).

In the context of organizations, the practice of ethics mostly translates into values and reputation of a company. The underlying challenge of differentiating efficiency with morality is still work in progress for most organizations. Based on a series of global studies conducted by Deloitte, focused on some of the key questions concerning the ethical usage of digital technologies, a relationship was identified between the level of company's tech savviness and their focus on different ethical questions related to the use of these technologies. They concluded that the majority of companies that are still in the early stages of their digital transformation journey tend to dedicate less focus to ethical implications of

technology use. On the contrary, companies that are digitally more advanced seem to be more committed to exploring and understanding the ethical challenges brought by the technologies they use (Bannister, Buckley & Sniderman, 2020).

Alongside further digital transformation, questions surrounding technology and ethics will only grow in importance, especially in terms of security, equality and common good. While for many organizations, digital business transformation is necessary for long-term survival in a competitive market, more attention towards broader implication to the society will be needed to build a better future (Nishant, 2020).

1.2.2 Societal perspective

As with all past technological revolutions, the current wave of digitalization has changed the face of labor force, leading to wider societal changes. Digital transformation has brought new organization types (e.g., social media agencies), new roles (e.g., content creators, cybersecurity agents) and even completely new sectors of the economy (e.g., data science). On the one side, World Economic forum (WEF) estimates that digitalization could create up to 6 million jobs between 2016 and 2025 in the logistics and electricity industries alone (WEF, 2015). On the other side, reports by groups such as McKinsey suggest that 800 million people could lose their jobs to automation by 2030 (United Nations, 2020).

While the predicaments about future and implication of digitalization on work and society are not conclusive, a common agreement is that managing these new trends will require changes in approach to education and ensuring that people can re-skill and up-skill through their lifetimes (United Nations, 2020). As it is stressed in WEF (2015) governments and policy makers are equally expected to put actions in place in order to avoid future increase in inequality. While more developed countries are successfully managing the transition, some less developed, less innovative European countries will struggle to reach the same competitive advantage. In conclusion, it is apparent that organizations and governments will face different challenges, but the core focus should remain on increasing trust, reskilling workers, implementing actions to diminish inequalities between countries and workers (Zaripova, Tyurina, Rocheva & Chupaev, 2020).

1.2.3 Legal perspective

From legal perspective, digital transformation was already a top priority even before the COVID-19 pandemic hit. One of the biggest risks is that companies find themselves exposed to different forms of cyber risk. Managing digital administration, digital procedures and customer sensitive data increases the chances of cyberattacks. Legally compliant digital solutions and platforms are thus essential for companies who manage and store their customers' data. From legal perspective, digital regulations should give the right directive

to a secure legal framework and should constantly be updated to reflect the latest form of technology (Euronovate Group, 2021).

According to a research conducted by Business Europe in 2017, back then less than a third of the surveyed companies actively involved their legal department in the digital transformation and their strategical planning (Business Europe & Noerr, 2017). The key liabilities around implementation of digital technologies are access to data, data ownership and cloud-based solutions, to diminish risks involving data violation, intellectual property rights, confidentiality, risk management, regulatory issues like General Data protection regulation (GDPR) (Kemp & Moynihan, 2020).

To sum up, with digital transformation management of knowledge has gained a new meaning. While historically most often technologies have helped us advance, if not managed properly digital technologies can become enablers of disruption in every aspect of life (Babu & Paul, 2020).

2 THE FUTURE OF WORK

As the technology is moving from digital to cognitive, companies, business models, products and processes are changing with exponential speed. Technological shifts in a shape of AI, human-computer interaction and automation that are commonly known under the name Industry 4.0 are creating new demands for organizations, especially in the field of Human Resource Management (HRM) (Rometty, 2017).

The aim of the following chapter is to focus on which jobs and skills will most likely be the ones to be affected by the changes, with emphasis on predicted job creation and emerging skills they incorporate. As today, it is possible to incorporate some kind of thinking into every application, product and system machines and algorithms are likely to replace human work especially in routine and well-established areas. However, it is also predicted that humans work will still be irreplaceable in certain new and previously non-existent fields (Arntz, Gregory & Zierahn, 2016).

The already existing trends brought by the start of digital transformation process, were further accelerated by the COVID-19 pandemic. Before COVID-19, the largest disruptions to work involved new technologies and growing trade links. However, the pandemic outbreak pushed companies and consumers to rapidly adopt new behaviors that are likely to have lasting impact especially on the labor demand, mix of occupations and workforce skills required in new diverse economic and labor market models (Lund et al., 2021).

In addition to digital skills, transversal skills are becoming more and more important as well. The United Nations Educational, Scientific and Cultural Organization (UNESCO) defines transversal skills as skills which can be used across multiple sectors and positions. These types of skills are more generic and are considered transferable since they are not domain

specific (for example listening and empathy). Soft skills (for example team work) have a very similar definition, with the distinction that these skills are sometimes not transferable since the individual has learned them in a particular context (UNESCO, 2013).

2.1 Renewing the organization of work

The fourth industrial revolution has already made a profound impact on the way we work even before the COVID-19 outbreak. According to Bhatia (2020), the three main revolutionary trends brought by the fourth industrial revolution and further accelerated by the effects of the pandemic are (Bhatia, 2020):

- normalizing the flexible workforce;
- use of technology;
- the lack of skills.

In terms of normalization of the flexible workforce, with COVID-19, employees endured a major shift from working on an employer's premises to working remotely. The pandemic accelerated the arrival of the future of work and inevitably worsened the inequalities across labor markets. Workers all around the world had to adapt to the new normal rapidly, causing them to face new challenges such as lack of proper equipment and mental health challenges. Furthermore, the employees for which remote work is not an option, have been temporarily or permanently displaced (WEF, 2020c).

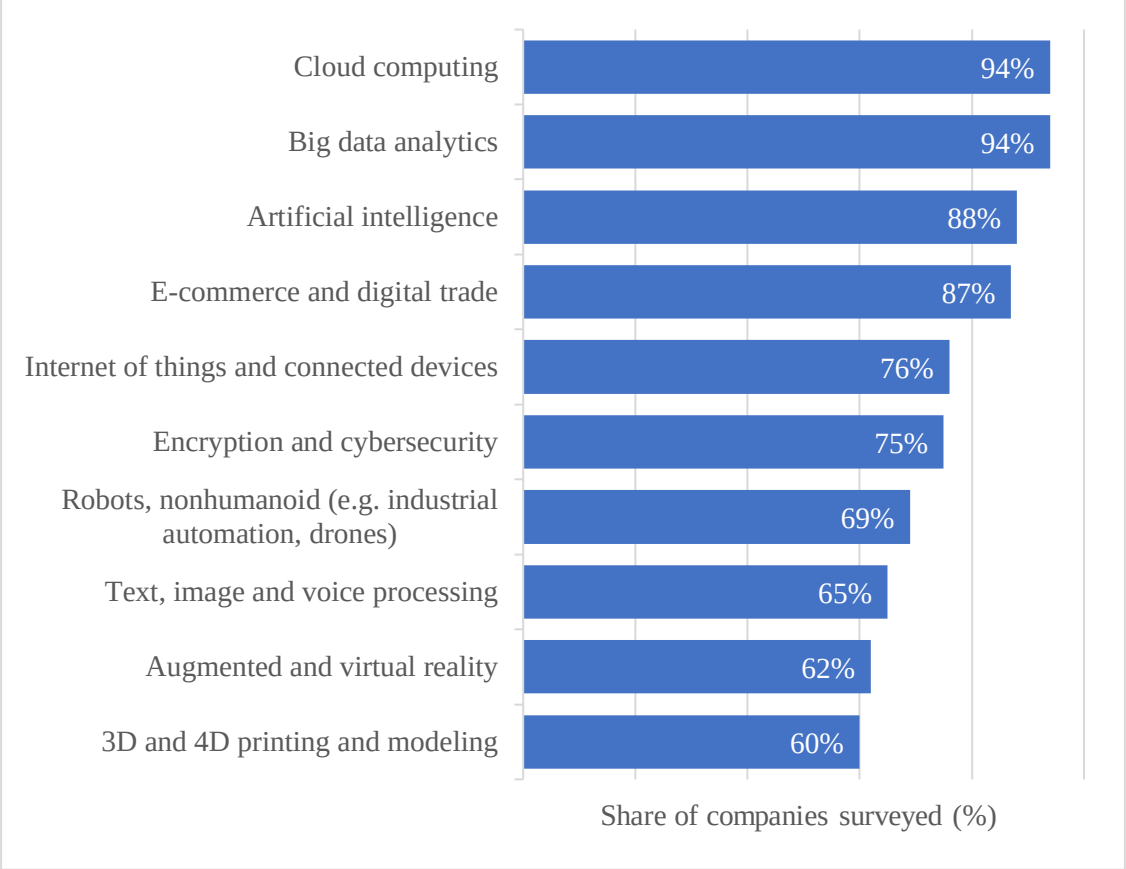
Even though digital technologies have been around for many years now, organizations are still struggling to escape the fear of negative consequences brought by implementing artificial intelligence solutions that can cause massive jobs disruptions. Use of new technologies raises the concern for the social implications such as privacy and security breaches and risk of inequality, which is why there is a clear need to educate the employers and employees on digital understanding and data literacy. As AI tools are now part of our daily working routine, is must also be considered as a trusted tool, which can only be achieved by working on full technical transparency (Servoz, 2019).

To remain competitive, companies need to restructure and adapt to the new reality partially or completely. According to the research done by WEF (2020), surveying the companies on the likelihood of adopt the selection of technologies presented in Figure 1, the technologies that are the most likely to be adopted by the majority of surveyed companies by 2025 are cloud computing, big data and e-commerce.

The demand for increased digital skills is directly linked to the fast acceleration in adoption of new technologies. Already today, companies are increasingly finding difficulties to recruit talent for a specific position, due to lack of candidates possessing the adequate skills. Since learning and reskilling requires a lot of time, many employers are filling this talent gap by recruiting highly skilled contingent workers, who can be onboarded in a much shorter time.

Nevertheless, the main problem persists - new technologies are constantly emerging, yet the majority of the workforce has not been trained to adequately interact with them (Bhatia, 2020).

Figure 1: Technologies likely to be adopted by 2025 (by % of companies surveyed)



Source: WEF (2020c).

2.2 Job disruption vs. Job creation

Digitalization requires a pro-active approach which includes a constant anticipation of the next change and a capability of the workforce to adapt its skills in order to meet the demands of the new market. Policymakers should not only rely on the new opportunities brought by digital transformation but also put in place an action plan to protect the low-skilled routine workers, who will certainly be impacted. New job opportunities are driven by the demand for new occupational profiles as well as demand for innovative technology-based products and services due to decreased prices, new markets or new customer groups (Mandl, 2021).

As already highlighted, the digital transformation impacts the employees by creating job disruption and automation of tasks. Further, it has been shown that the level of employees' digital skills influences their wage. The European Centre for the Development of Vocational Training (Cedefop) revealed that while employees in jobs using advanced information and

communications technology (ICT) skills earn on average 3.7 % more hourly wage compared to the employees with only basic ICT skills. Moreover, workers who do not require any ICT skills for their job, earn about 8 % lower hourly wage (Mandl, 2021).

In a recent survey, WEF (2020) suggests that on average 15 % of a company´s workforce is risking some sort of disruption up to 2025 and 6 % of the workers are expected to be fully displaced. Furthermore, the employers are aware of that fact that they will need reskill and upskill their employees since they estimate that by 2025, 44 % of the skills needed to perform a role will change.

Estimates predict a higher demand for certain occupational profiles in the market shaped by the new technologies. These include (Mandl, 2021):

- employees with proven management skills as well as soft skills;
- newly created profiled such as data security analysists, industrial data scientists;
- engineering profiles and quality control workers;
- workers with a wide set of skills (for example managers with advanced data analytics skills and/or statistical capabilities).

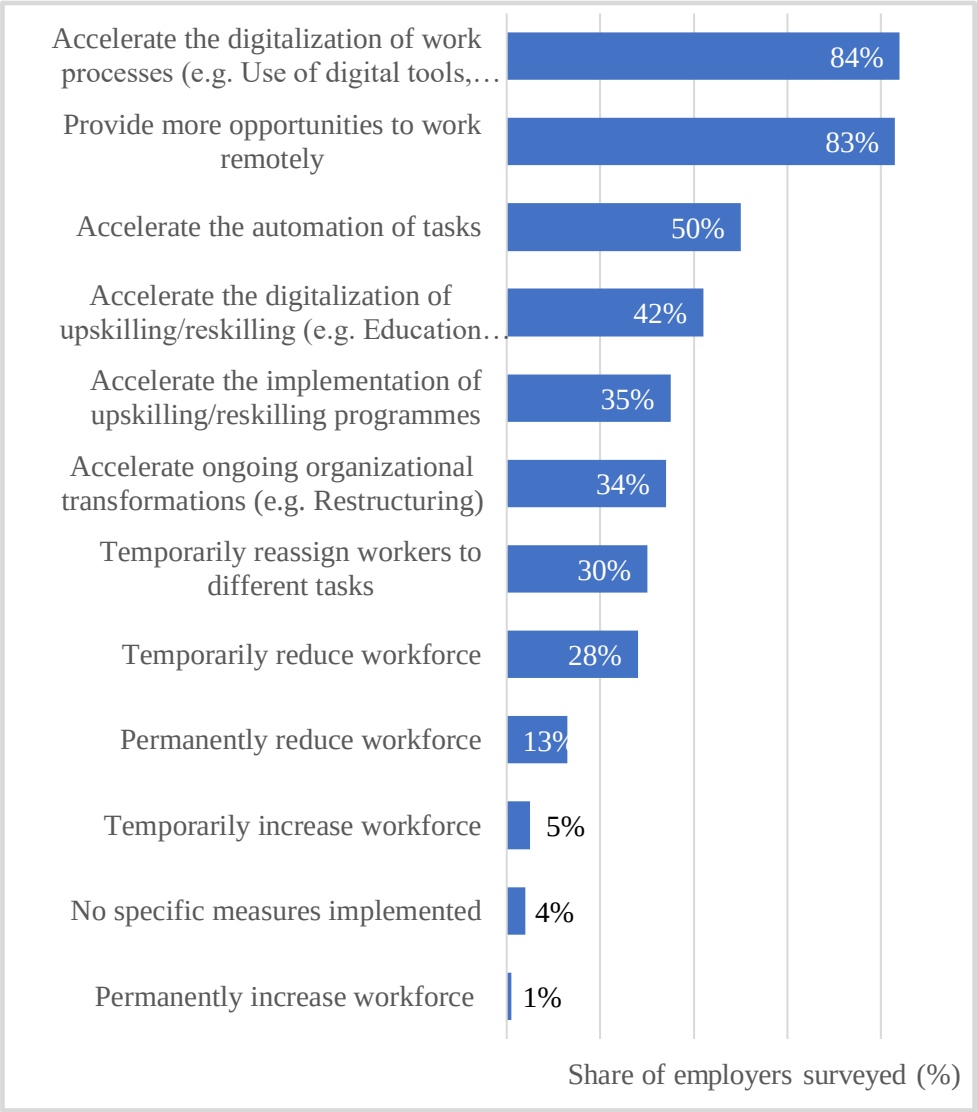
On the other hand, low-skilled employees performing rather routine work (e.g., blue-collar production work) will face job losses due to their tasks being at a higher risk of automation. The sectors predicted to be impacted the most by automation are manufacturing, automotive industry, online retailing and banking (Mandl, 2021).

2.2.1 The impact of the pandemic on the future of work

At the start of 2020, companies were forced to put their familiar practices to the sidelines and jump into the relatively unknown world of online work. WEF (2020c) found that the most common response of companies to the COVID-19 pandemic was to digitalize their processes and become more flexible on remote work. Furthermore, companies were also accelerating the automation of work tasks and were rapidly implementing upskilling and reskilling programs. Only 4% of the surveyed companies did not implement any specific action.

Remote work has brought forward some new opportunities such as better flexibility, but it has also revealed some key challenges such as employer trust issues, increased uncertainty amongst workers and overall struggle with communication and clear strategy of the post pandemic work model.

Figure 2: Planned business adaptation in response to COVID-19



Source: WEF (2020c).

2.2.1.1 The employee perspective

While in certain industries such as the information technology or the insurance industry remote work had been common for many years, many employees had limited or no prior experience with remote work before the pandemic. Nonetheless, the presence of remote work over the course of the pandemic shaped today's jobseekers' demands. Studies show that flexible hybrid work models, which include remote work, are important to many of them, while some may even consider rejecting job offers if full-time work on an employer's premises is required. LinkedIn Economic graph team indicated that in addition to existing patterns of remote working, job seekers are actually demanding either remote or hybrid work arrangements. In the same way, the employers are increasingly advertising remote based jobs. Many companies which never envisioned the possibility of remote work for their

employees, have now found themselves in the “new normal”. We can thus conclude that there has been a major shift in the perception of remote work (WEF, 2020c).

On the other hand, the COVID-19 pandemic negatively affected those, who were already in a disadvantageous position. Workers living in neighborhoods with poor infrastructure, without good employment prospects and with lower income were most likely to be negatively affected by the pandemic. People who had already been living on the brink of poverty risked social and economic exclusion the most. Further, the pandemic also intensified the pre-existing gender inequalities. According to the WEF (2020), women were at a higher risk of unemployment than men. On average, young women with lower income were also more likely to be impacted by the displacement. On industry level, the disruption was particularly felt in arts, accommodation and food services, entertainment and recreation. Those sectors are also the top starting sectors for young workers looking for their first employment. Forced to look for opportunities in other sectors, young workers prepared themselves for a transition to new jobs by reskilling and upskilling (WEF, 2020c).

2.2.1.2 The corporate perspective

As business leaders had to rapidly adapt to the shift to remote work, the trust between an employee and the employer was put to the test. The start of the global pandemic showed that leaders were doubtful of the productivity results of switching to a remote or hybrid work model. Nearly 80 % of managers were expecting negative consequences of remote work on the productivity of their employees. In addition, more than 20 % believed that remote work would bear strong negative consequences while only 15 % of the leaders expected a positive impact on productivity or no impact whatsoever (WEF, 2020c).

Remote management also requires a different skillset than “in person” people management. The fact that certain employees struggled to successfully adapt to the new normal and therefore underperformed has caused concern on management level. This mistrust can quickly turn into micromanagement, which further demotivates the employees. A study by Harvard Business Review (2020) suggests that managers are having issues with their roles and would like to receive more training and support and almost half of the 215 surveyed supervisors and managers of the study have conveyed low self-confidence in the capability to manage their employees remotely. Furthermore, almost 40 % of surveyed leaders agreed that remote workers perform worse than employees physically present at the office (Parker, Knight & Keller, 2020).

It is suggested that leaders should try to create a more personal and consistent relationship with their subordinates. Transparency, open communication and regular discussions about the work, challenges and goals can create a safe space for the employee to share their concerns. Most importantly, leaders should keep in mind that each person requires a personalized approach and building trust may take longer with some employees than with others (Bhatia, 2020).

In the post pandemic era, we can say with certainty that the hybrid working model is proven to be a great compromise combining remote work with office work. As a result of the pandemic, workers have been feeling increasingly more anxious, stressed and burned out. This seems to be directly correlated with lack of communication coming from the employers. Employees expect clearer guidelines, company-wide policies and more flexibility (Alexander, De Smet, Langstaff & Ravid, 2021).

Leaders should focus on employee well-being as well as building a sense of community and trust with their employees. This can be achieved by encouraging clear communication, which can boost employee well-being, productivity and improve their sense of inclusiveness. Employees who feel included in the communication are almost five times more likely to express increased productivity. On the other hand, lack of communication about the post-pandemic vision is causing employees concern and stress (Alexander, De Smet, Langstaff & Ravid, 2021).

3 DIGITAL SKILLS

The relevance of digital skills is undeniable. In the past 20 years, we have witnessed a digital revolution, which has had an impact on virtually all aspects of our personal and professional lives. The relevance of digital skills increased even further during the COVID-19 pandemic, when many had to shift to remote work, thus switching to a digital environment at home (Carretero Gomez, 2021).

As it is certain that digitalization will keep fostering new jobs and creating new markets, the demand for digital skills is directly affected. While the need for people with specific and advanced digital skills is rapidly increasing, the workers with different and less advanced set of skills will be less sought after or will even find themselves at risk of losing their jobs. According to Cedefop, more than 70 % of European employees require basic ICT skills to execute their daily tasks and about 30 % of them are likely to fall in the digital skills gap (Mandl, 2021).

In the time of digital transformation, we focus mainly on digital skills. However, other sets of skills also play an important role since their demand is determined by similar factors. For example, occupational skills (e.g., driving skills) are likely to be less in demand in the future if self-driving cars become the norm. The same is applicable for transversal skills (e.g., creativity and social skills). In conclusion, digital transformation and digitization affect all types of skills and drive the demand for these skills through the latest market trends (Mandl, 2021).

3.1 Definition of digital skills

UNESCO defines digital skills as “a range of abilities to use digital devices, communication applications, and networks to access and manage information. They enable people to create

and share digital content, communicate and collaborate, and solve problems for effective and creative self-fulfillment in life, learning, work, and social activities at large". In order for an individual to flourish, digital skills should be complimented by other skills such as literacy and numeracy skills, strategic thinking, problem-solving skills and collaborative skills (UNESCO, 2018).

International Telecommunications Union (ITU) (2018) categorizes digital skills to basic, intermediate and advanced. However, it is important to emphasize that other authors and institutions group the levels of digital maturity/proficiency differently. The different levels of digital skills are described in the Table 3.

Table 3: Levels of digital skills

Basic	Performing basic tasks such as using a keyboard, navigating a website, using touch screen devices, writing emails, using online search engines.
Intermediate	Include intermediate skills which depends on the persons occupation and personal goals. These skills can be graphic design skills, data processing and analytics skills or digital marketing skills. As technology keeps evolving, it is important to mention that this category is not a static one.
Advanced	Advances digital skills are commonly linked to ICT specialists. Amongst others, these skills include AI, big data, software development, data science and cybersecurity.

Source: *ITU, 2018a.*

As mentioned above, digital skills are in constant development. Consequently, the digital skills frameworks need to be updated on a regular basis in order to keep up with the technological advances since the frameworks provide an important insight to these changes and capture the range of skills. Frameworks enable policymakers to ensure that their programmes remain relevant. An example of a digital framework is the European Digital Competence Framework 2.0, created by the European Commission. The 5 competency areas are listed in Table 4 (ITU, 2018).

Table 4: Areas and competences of the European Digital Competence Framework 2.0 (DigComp 2.0)

Competency areas	**Competences**
Information and data literacy	- Browsing, searching and filtering data, information and digital content; - evaluating data, information and digital content; - managing data, information and digital content.
Communication and collaboration	- Interacting through digital technologies; - sharing through digital technologies; - engaging in citizenship through digital technologies; - collaborating through digital technologies; - netiquette; - managing digital identity.
Digital content creation	- Developing digital content; - integrating and re-elaborating digital content; - copyright and licenses; - programming.
Safety	- Protection devices; - protecting personal data and privacy; - protecting health and well-being; - protecting the environment.
Problem solving	- Solving technical problems; - identifying needs and technological responses; - creatively using digital technologies; - identifying digital competence gaps.

Source: ITU (2018b).

In order to discuss the level of digital competency, we must first evaluate it. Digital competency or digital skills level can be evaluated by using different methods (Carretero Gomez, 2021):

- Observation or computer-based performance test (the participant performs a set of tasks and is then assessed by either a human being or a computer);
- Knowledge-based assessment (the participant's knowledge is evaluated through a set of realistic questions/problems to see how the participant would choose to react in this specific situation);
- Self-assessment (the individual is given a set of questions and by exanimating the answers they can determine the level of their skills and the performance level on specific digital tasks).

Some organizations demand a digital skills certification from their employees, which is often linked to a promotion or is demanded as entry-level skill to obtain the desired position. It is

also a great incentive for existing employees to be made aware of their current skill level, which could potentially reveal the need for upskilling or reskilling (Carretero Gomez, 2021).

3.2 Factors influencing the level of digital skills

While, according to our knowledge, not much research has been done on what specifically determines the level of digital skills in young adults, the accessibility to internet and digital technologies growing up, the parenting style, the age and the education level seem to play a part.

Acquiring basic digital skills depends on the country of upbringing. Eurostat's research in 2021, showed that the highest number of people with at least basic digital skills come from the Netherlands, Finland and Ireland. On the contrary, the lowest number of people with at least basic digital skills come from Romania, Bulgaria and Poland. Overall, the research showed that just more than half of the Europeans aged between 16 and 74 have at least basic digital skills (Eurostat, 2022).

It seems that differences also persist depending on the education background and between different age groups. Based on the research conducted by Eurostat (2019), only 14 % of people with none or low formal education have above-basic digital skills, which are defined as the ability to use social networks, installing different software or applications, advanced usage of different functions of spreadsheets to analyze data, using services such as online banking etc. Further, 27 % of individuals having acquired medium formal education and 55 % of those with higher formal education possess above-basic digital skills. A similar trend can be observed with different age groups. Only 16 % of people between 55 and 64 have above-basic digital skills, whilst 57 % of Europeans between the age of 16 and 24 have acquired above-basic digital skills. In the middle age group, people between 25 and 54, Eurostat confirmed that 36 % of these individuals have acquire above-basic digital skills (Braun, März, Mertens & Nisser, 2020).

When it comes to digital proficiency, the differences between men and women are still pronounced. The gender differences are the biggest for individuals between 55 and 74 years, so the older generations. In 2019, Eurostat confirmed that the difference in this age groups is 7 % (16 % of men in that age group have above-basic digital skills and only 9 % of women). The difference for younger age groups, individuals between 16 and 24 years old, is significantly smaller – only 2 %. This might be due to the fact that these individuals are still studying and have not finished their education. The difference between individuals between 25 and 54 years old was 5 %, with the male population again achieving a higher percentage (Braun, März, Mertens & Nisser, 2020).

3.3 Reskilling vs. upskilling

The next logical step after identifying a gap in digital skills is to conceptualize a clear strategy on how to bridge it. Substantial investments in upskilling would undoubtfully boost the economy and prosperity of Europeans. Iberdrola (2022) defines upskilling as teaching new skills to employees, which will optimize the performance at their current job position. On the other hand, reskilling refers to training the workers to adapt completely to new skills which are to be relevant for a different position.

Looking from a global perspective, WEF (2021) reveals that upskilling the workforce could lead to 38 % of additional Gross domestic product (GDP). The underskilled countries, suffering the biggest inequality levels, would benefit the most from upskilling of the workforce, as technology-based jobs are generally paid better than low-cost labor. Additionally, a global improvement in digital skills with the goal of matching the markets demands would boost the global economy by 3 % on average. Due to the gap in digital skills, employers are reluctant about introducing new technologies to increase the company's productivity (WEF, 2021).

The survey conducted in 2018 showed that 54 % of all employees will require upskilling or reskilling by 2022. Amongst those, 10 % of them have reskilling needs, for which it is estimated it would take more than a year to bridge the gap. The training for 35 % of people in need of reskilling is expected to take up to 6 months (WEF, 2018).

On the positive side, the PwC survey from 2021 reveals that 77 % of workers are willing to learn new skills and 75 % of them are of the opinion that the training of new skills is a personal responsibility. Furthermore, 46 % of workers with post-graduate degrees agree on the fact that their employers give them opportunities to improve their digital skills. On the other hand, only 28 % workers with lower qualifications share the same opinion (PwC, 2021).

As industries are replaced by new emerging markets, many employees are at risk to be left behind. WEF (2020c) estimates that by 2030, we need to reskill more than 1 billion people globally. Enabling the workforce to thrive in the jobs of the future does not only entail upskilling but taking into account the sociodemographic changes. This means that the transformation needs to be executed at a multi-stakeholder level: businesses, governments, the education sector and individuals must all participate in order to achieve this goal (WEF, 2020a).

In 2020, WEF launched the Reskilling revolution, a multi-stakeholder effort to ensure better skills and consequently better job opportunities for one billion people. The Reskilling revolution aims to drive and inspire reskilling change through funding and demonstrating new models and templates for action on a global scale (WEF, 2020a). The reskilling revolution will consider these three approaches (WEF, 2020a):

- "Connecting action and thought leaders to promote visibility, recognition, support and cohesion for best-in-class efforts driving systems change;
- inspiring the next generation of bold business leadership commitment on the human capital investment agenda;
- co-creating, deploying and scaling innovative pilots for action at national, industry, organizational and school levels".

Now is the time that companies have to invest in upskilling their employees. Companies will need to focus on both hard skills (e.g., learning to use a new software) and soft skills (e.g., socio-emotional capabilities) when training their employees (Iberdrola, 2022).

Not only are we facing a talent gap issue, where recruiters are struggling to find highly skilled candidates but companies are also struggling with retaining their employees. Therefore, companies must realise that upskilling their employees is a long-term investment and not a short-term solution. Employees nowadays want to feel that their work is meaningful and want to understand their career advancment possibilities. Hence employees will appreciate the initiative of their employer to encourage upskilling and therefore contribute to their professional growth. Organisations exploring different possibilities of upskilling their employees should focus on empowerment, engagement of the employee and planning (e.g., providing a specific roadmap) (Vroman & Tiffany, 2022).

3.4 Inclusion in the digital economy

The concept of digital inclusion is an effort of the European Union to ensure that everyone can benefit from and contribute in the digital world. While the digital revolution has offered a lot of new opportunities, it is clear that not everyone can access them equally (European Commission, 2022d). When addressing the digital divide in the EU, we are referring to specific demographic groups, which are more likely to be excluded. Amongst these are older people, people with lower income, unemployed people, people with disabilities, people living in rural areas, homeless people etc. (NHS, 2021).

The levels of digital skills depend on many factors, one of the most important being the infrastructure, meaning the access to internet and the availability of computers. The Alliance for Affordable Internet (A4AI), a technology sector alliance, working towards decreasing the price of broadband by transforming policy and frameworks, has presented their latest findings during the 2021 ITU Regional Forum on meaningful connectivity. 36 % of the population living in Central and Eastern Europe remains unconnected, while this number is significantly lower in Western Europe – 19 %. Investigating the gender digital divide, it seems that Western Europe has managed to decrease the gap, while the Central and Eastern countries still have a long road ahead. On a global scale, it is estimated that an investment of 428 billion US dollars is needed in order to ensure everyone will be connected to the

internet by 2030. To bridge the digital divide in Europe, an investment of 34 billion US dollars is needed. Not only do we need to invest in the broadband infrastructure, but there is also a significant need to support affordable devices, making data and data services more affordable and invest in digital skills programmes (Sarpong, 2021).

Based on The digital economy and society index (DESI) human capital dimension analysis from 2019, the OECD concludes that the differences between genders weren't pronounced, digital skills level is directly affected age and the individual's level of education. A direct parallel can be drawn between lack of basic digital skills and low education. The digital skills proficiency seems to deteriorate after the age of 30, according to the Eurostat (European court of auditors, 2021).

Furthermore, there is a trend of lower digital skills amongst the unemployed. This became even more pronounced when the COVID-19 pandemic started in 2020 as many Europeans lost their jobs or were forced to stay at home for a longer period of time without work. We must ensure inclusion of the unemployed in the digital economy to prevent further deterioration of skills and to secure their chances of efficiently re-entering the labor market (European court of auditors, 2021).

In 2021, PwC conducted a global survey interviewing more than 32 thousand workers from 19 different countries. This included workers, managers, business owners, non-employed people and students. Most of the surveyed were optimistic about the future of work and confident that they can meet the demand of automation by upskilling. However, the survey also outlined some of the concerns. The fact that 50 % of the surveyed claimed they have faced discrimination at the workplace, which made them miss out on career opportunities, shows that inequality at the workplace is still very present (PwC, 2021).

3.5 Diversity and gender equality in digital education and workplace

Companies which already had strong diversity at the workplace emerged out of the COVID-19 crisis even stronger. A combination of different cultures and different perspectives is bound to strengthen the overall performance of the company, differentiating them from the competition. However, we still observe some negative trends, which became even more pronounced during the pandemic since some companies claim that they simply cannot afford to focus on diversity and inclusion during these times. These companies risk long-term consequences such as reinforcing the existing inequalities and impeding the inclusion of all employees. The 2020 McKinsey & Company report reveals the best practices of companies achieving high levels of inclusion and diversity. A systematic approach consists of ensuring that diverse talent is represented throughout all levels of roles. Upper management and executives should be placed at the heart of the inclusion and diversity efforts. Furthermore, companies should be transparent about career advancements, using analytics tools to expose the criteria and promoting fairness. Organizations should implement a zero-tolerance policy

for any discriminatory behavior. Lastly, employees should feel supported in expressing their culture and building a community at the workplace (Hunt, Prince, Dixon-Fyle & Dolan, 2020).

The 2021 PwC survey also revealed that 13 % of the surveyed workers report missing out on work opportunities due to their ethnicity and 14 % have endured discrimination based on their gender. Amongst those reporting gender discrimination were predominately women. The COVID-19 pandemic made the gender inequalities more pronounced with more women than men leaving the job market during that period (PwC, 2021).

Investigating the gender gap in employment, the situation has gradually improved for decades now, meaning that more and more women are employed in Europe. Slovenia, Denmark and Portugal were already above European average, while Greece had one of the lowest female participation in the labor market. Though the improvement has been significant, the gap has not yet been closed. The employment rate for men is still higher than women employment rate in all European countries. Based on the 2015 data, women generally dominate in the clerical support workers occupational group. They also represent the majority of service and sales workers. On the other hand, we observe that the male-dominated occupation groups were for example craft and related trade workers and plant and machine operators. In conclusion, we observe gender gaps in several different aspects – women are more likely to be excluded from future career advancements than men, women are more likely to be paid less than men for a similar position. That being said, we observe improvements throughout years, therefore we can claim that we are moving in the right direction (Eurofound, 2020).

While women represent 65 % of the European workforce, they only represent 17 % of the ICT workforce (Sarpong, 2021). Furthermore, women earn on average 18.9 % less than men in the ICT sector (European Parliament, 2018).

However, the problem begins before women enter the labor market - diversity and gender equality take root in the education system. This issue can be attributed to certain gender stereotypes, as there is a general misconception that men are more gifted for science related subjects. Consequently, teachers may take a different approach to presenting science related subject to the female students. The stereotypes are often further enforced by parents. We also observe a lack of female role models excelling at their career in the ICT industry (Davaki, 2018).

In the recent years, numerous programs, courses, trainings and initiatives have been designed to empower specifically those women who want a career in ICT, which shows the issue is being acknowledged and efforts to resolve it are being made. Examples of such initiatives include (Women4IT, 2022; WeHubs, 2022; SheCodes, 2022):

- Women4IT is project designed for women to obtain more digital skills. The project is planned to be implemented in 7 European countries: Greece, Ireland, Latvia, Lithuania,

Malta, Romania and Spain. The project is also supported by two expert partners: DIGITALEUROPE and The European Center for Women and Technology. The project aims to assist one thousand women to successfully enter the digital job market;
- WeHubs is the first European community empowering, promoting and supporting women entrepreneurs active in the digital sphere;
- SheCodes is a free coding class for women with the aim to help to bridge the gender gap in the tech industry. Up until May 2022, almost 79 thousand students have enrolled into the class from 191 different countries.

3.6 Impacts of the global pandemic on digital skills

The COVID-19 pandemic sped up the digitalization and automation which spurred changes that affected all working groups as well as educational institutions. As the whole world had to quickly change their working habits the educational sector faced struggles of its own. Teachers, parents and students with a relatively low level of digital skills have struggled to adapt to the new normal. The inequalities in access to digital devices, internet connection have contributed to the issue. Studies show that 18 % of surveyed teachers reported they would need more training in ICT and that 20-30 % of parents, whose children attend primary or secondary school, have low confidence or no confidence in teaching their child how to navigate the internet in a safe and responsible way (Carretero Gomez, 2021).

Due to schools being closed, the governments had to rapidly implement online learning platforms and other digital tools. Students coming from disadvantaged backgrounds, were the most impacted by these changes as they did not have access to digital tools and devices at home. Even though it might still be too early to effectively evaluate all the economic and social consequences of the school closure on students, we see a negative and a positive trend. Some students thrived in the new digital environment, while some were falling behind. Those falling behind must be identified and strong actions need to be taken in order to help them get back on track. With the right use of digital technologies, it is certain that these technologies can help children make up for lost skills. The teachers, however, need to be provided with the appropriate digital tools and skills in order to be able to transfer this digital knowledge to the students. A key differentiator will be the EU's decision and motivation to invest in education and to equip school with the appropriate digital tools. While it seems that the pandemic has provoked an even bigger educational gap, it is also responsible for speeding up the digital education, bringing digital technologies closer to children and exposing the existing gaps in digital literacy (Guallar Artal, Humburg & Koseleci Blanchy, 2021).

Looking at the other side of the spectrum, the pandemic has undeniably initiated several workforce trends: in a global survey conducted by PwC (2021) across 19 countries, 60 % of respondents reported they believed they were at risk of losing their job due to automation, while 39 % of them were of the opinion that their job would not be relevant within 5 years.

On a more positive note, almost half of them claimed that the level of their digital skills had improved during the pandemic. They were also mostly open to receive new training and to further develop their skills and showed confidence in being able to adapt to the new technologies.

European Center for the Development of Vocational training (2021) investigated the rising demand of ICT and non-ICT related skills during the pandemic. For some sectors such as retail and service, where the remote work option is not straightforward, digital skills were the driver leading to the transformation of existing business models. The public and private sectors also moved a step forward towards a more digitized sector, enabling workers with little to no digital skills prior to the pandemic with new digital tools and technologies. In tourism, one of the most affected sectors, companies are more open to adopting new technologies enabling them for example to check-in a guest online and providing more services remotely. Digitalization of the retail sector drastically increased the e-commerce activities. The skills demand for this sector changed since now they require more workers to deal with online orders and manage logistics and operations (Cedefop, 2021).

It is certain that the pandemic has changed the way we work today. The mental shift concerning remote work is affecting both employers as well as employees as we enter the so called post-pandemic era. In general, more companies adopted a digital transformation strategy, some by choice while others were forced by the circumstances of the COVID-19 pandemic to rapidly implement new digital technologies. The pandemic accelerated the adoption of digital technologies by several years. Leaders digitized both internal operations as well as their supply chain and customer interactions. Fostering and investing in a digital transformation strategy is no longer a choice for companies wanting to stay ahead of the curve. The shifts and changes adopted during the pandemic on both corporate and educational level are long term (McKinsey & Company, 2020).

Another recent economic and societal phenomenon which is likely a consequence of the pandemic, is the so-called great resignation. The great resignation is a wave of employees resigning from their positions after the COVID-19 pandemic. According to the WEF (2021), the resignation rates are the highest among employees who are in the middle of their career path. Employees who were not affected by the uncertainty brought by the pandemic and who kept their jobs, have reflected upon their needs, goals and career opportunities. One of the deciding factors is also the fact that some companies now demand their employees to come back to the office, while some allow hybrid work models or even complete remote work. Overall, it remains to be seen what will be the effects of the great resignation in the long term and how companies will tackle the pending problematic (Chugh, 2021).

4 INITIATIVES TO BRIDGE THE DIGITAL SKILLS GAP

The European Commission (2022c) is determined to tackle the issues of digital skills gap as well as the low representation of women in tech related positions and studies. The target set in its Digital Skills agenda and the digital education action plan is to achieve that 70 % of adults have basic digital skills by 2025.

DIGITALEUROPE (2020) strongly recommends that the European Commission prioritizes digital skills across all programmes within the European Social Fund+ and the European Regional Development Fund for 2021–2027 as fostering basic, intermediate and advanced digital skills is crucial for the professional as well as personal lives of Europeans. Focusing on a digital strategy today should be the default approach (Pinto & Vincenzo, 2020).

Furtermore, DIGITALEUROPE (2018) points out the key EU funds and programmes, for which they believe represent the most substantial funding opportunities in 2021-2027. Those are: The European Social Fund+, the European Regional Development Fund, the Digital Europe Programme and the Erasmus Programme (DIGITALEUROPE, 2018).

In 2020, the International Digital Economy and Society Index (I-DESI) conducted a study on how Europe compares to the other world economies in terms of digitization. The five analysed dimensions included: connectivity, digital skills, use of Internet, digital technology and digital public services. The results showed that while Europe is ahead of its global competition on digital skills, the European countries still have a lot of catching up to do in terms of digitization of public services. This means that the results of the highest-ranking European countries are comparable with other global leaders. The leading European country was Finland, while the United States ranked highest among non-EU countries (Tech4i2, 2020).

The skills gap, especially in ICT skills, has been recognized for many years now. In Table 5 are summarized some of the ongoing actions of the European Union on digital skills (European court of auditors, 2021).

In the following chapter, specific EU initiatives as well as individual country and company initiatives for digitalization and digital skills will be presented in a more detailed way, providing some deeper insight into the current situation and outlining the goals for the future years.

Table 5: – Ongoing EU actions and their skills areas, skills levels and age

EU Action	Skills area	Skill levels	Age group
Digital Agenda for Europe (2010)	Seven priority areas, including digital skills and education.	All types of levels	Age groups 16-74
Digital Competence Framework for Citizens (2013)	Digital skills	Al skills levels	All age groups
Digital Single Market Strategy (2015)	Digital skills and expertise specifically mentioned but covering also other areas	All types of levels, but basic skills specifically mentioned	All age groups
Digitizing European Industry (2016)	Focus on digitalization	All types of levels	All age groups
Upskilling Pathways (2016)	All skill areas	Basic level	Adults
Digital Skills and Job Coalition (2016)	Digital skills	All skills levels	Young people and adults
Council Recommendation on key competences for lifelong learning (2018)	Eight competences including digital competence	Focus on basic skills	All age groups

Source: ECA (2021).

4.1 EU Initiatives

4.1.1 Digital Agenda for Europe

The digital agenda for Europe was first implemented in 2010. The 10-year strategy identified the ICT skills as being the key in reaching Europe's digital transformation goal. Enabling all European with access to digital goods and services was one of the key focuses of the first strategy. This meant supporting consumers and business owners by developing an advanced system of user rights, protecting both consumers and businesses. A major milestone was reached with the end of roaming charges throughout Europe in 2017. The legislation on privacy and data protection ensured better protection to consumers and a safer digital space. Furthermore, internet connectivity was massively improved by investing in broadband

development. The importance of digital skills, usage of AI and digitalization of public services were highlighted and promoted throughout the agenda (Ratcliff, Martinello, Ciucci, Sofsky & Kaiser, 2022).

The second Digital Agenda for Europe (2020-2030) focuses on the significant changes the digital age has introduced and the benefits of digital services and markets across Europe. The development of a safe online digital space is still one of the priorities, enabling the consumers to build trust in digital technologies. One of the 4 key objectives to be reached by 2030 is that at least 80 % of adults should possess basic digital skills. Furthermore, Europe should have employed 20 million ICT specialists by 2030. On a business level, 90 % of SMEs should reach at least basic digital usage. Every European household should have internet connectivity and 5G should be available throughout all populated areas in Europe. Lastly, all public services such as medical records should be accessible online (Ratcliff, Martinello, Ciucci, Sofsky & Kaiser, 2022).

4.1.2 Digital Single Market

The digital single market strategy was established in 2015. In the forefront were again the ICT technologies, which are becoming the pillar of modern economic systems. The digital era is bringing many new opportunities for growth and innovation. To profit from those opportunities, actions and policy changes needs to be taken on European level. The Digital Single market is focused on 3 main pillars (European Commission, 2015):

- "Better access for consumers and businesses to online goods and services across Europe – this requires the rapid removal of key differences between the online and offline worlds to break down barriers to cross-border online activity.
- Creating the right conditions for digital networks and services to flourish – this requires high-speed, secure and trustworthy infrastructures and content services, supported by the right regulatory conditions for innovation, investment, fair competition and a level playing field.
- Maximising the growth potential of our European Digital Economy – this requires investment in ICT infrastructures and technologies such as Cloud computing and Big Data, and research and innovation to boost industrial competitiveness as well as better public services, inclusiveness and skills."

Under the Juncker commission, many digital barriers across Europe fell as consumers started to feel the impact of the Digital Single market initiative. With the emphasis on digital freedom, consumers are for example able to stream their online subscription even when travelling to other European countries. Since 2018, consumers are no longer geo-blocked when wanting to purchase services and good from other European countries. When using online platforms, the focus is on transparency, ensuring fair usage for everyone. Online traders selling their services via booking platforms and marketplaces will benefit from these

new regulations as it will be much easier to resolve arguments and complaints online (European Commission, 2019).

4.1.3 The EU 2030 High Tech Skills Vision

Revolutionizing the way we work with skills and train the digital skills is the main objective of this initiative along with consolidating the competitiveness of the European economy against other global leaders. The strategy is composed of 9 blocks of policy recommendations, intended as a guidance for all stakeholders on their quest to implement their own skills strategy on a regional, national or EU level. Any future digital skills strategy should therefore be realistic, feasible, responsive, inclusive and ethical. By 2030, an individual should possess all 3 types of skills: sector-specific skills, tech and digital skills and transversal skills (PwC, 2019).

4.1.4 Digital Services Act

The European Commission fosters the Digital services act, which allows for a safer digital space. Human rights, freedom, transparency and equality are the foundation for the Digital services act. New regulations apply to all online digital services, which connect users to digital goods and services or content (European Commission, 2022a).

The European Commission outlined three main objectives to be fulfilled by the digital services act (Euronovate Group, 2021):

- ” To increase consumers’ protection and related fundamental digital rights;
- To promote transparency and a clear accountability framework for online platforms;
- To foster innovation, growth and competitiveness within the European Single Market.”

In April 2022, the EU member countries and the European Parliament reached an agreement on better protection of internet users and higher accountability of online platforms distributing harmful or illegal content. Building a transparent and safe online space is only possible if platforms are held accountable for irresponsible and illegal actions and are reprimanded for breaking the fundamental rights of European citizens (European Commission, 2022a).

4.1.5 The European Skills Agenda

The 5-year plan of this initiative is to supply individuals as well as business with better skills in order to ultimately strengthen sustainable competitiveness, secure social fairness and form better resilience to crisis such as the COVID-19 pandemic. Millions of Europeans lost their jobs, or they were forced to think about a different career path. The significant impact the pandemic has had the European workforce, has left the EU in need of acquiring new skills

or improving their existing ones. The European Skills Agenda is directly linked to other European initiatives such as the European digital strategy and Recovery plan for Europe. Concretely speaking, the agenda encompasses 12 actions, composed of 4 main areas and has a set of objectives to reach by 2025. One of the objectives is to increase the share of adults aged between 16 and 74 having at least basic digital skills. By 2025, the percentage should be 70 %, while in 2019 only 56 % of adults possessed basic digital skills (European Commission, 2022f).

4.1.6 Digital Education Action plan

The Digital Education action plan (2021-2027) is a European Commission initiative designed to encourage as well as support the appropriate development of the education systems to fit the digital age. A 2018 study showed that in EU only about 40 % of teachers feels comfortable with using digital technologies in the classroom. Therefore, all EU member countries should adopt an approach which includes a long-term vision of how to provide an inclusive and accessible digital education system. The initiative has also taken into account the recent risks and opportunities brought by the global pandemic, a phenomenon which has drastically accelerated the use of digital technologies in education. It is important to strengthen the cooperation of all stakeholders and sectors on EU level in order to work toward a refined digital education system. Lastly, the benefits and opportunities of using digital technologies in education must be brought forward for stakeholders to realize the potential it would have on quality of teaching. The two main objectives are the following: working towards the development of an efficient digital education ecosystem and improving the digital skills level and digital literacy (European Commission, 2022e).

DIGITALEUROPE (2020) applauded the decision of the European Commission to invest in digital education. The organization outlined 4 key areas to focus on. Firstly, it needs to be ensured that the digital network infrastructure is available and accessible to everyone. Secondly, more funding needs to be secured from public as well as private institutions, since private institutions could take on the role to actively promote ICT skills. A key to an efficient digital education is partnerships – whether this refers to companies which themselves provide digital technologies and solutions or other organization such as NGOs. Lastly, students should be learning digital skills such as basic programming as part of their curricula while educators must be provided with the right training and guidance on this path (Pinto, Renda & Hellebrand, 2020).

4.1.7 Digital skills and jobs coalition

By integrating a multi-stakeholder strategy, the Digital skill and job coalition tackles the digital gap. It is part of the Digital Single market strategy and was formed by the European Commission. The initiative is accessible to any organization since anyone can register to

contribute and become a member of the Coalition. Different types of actions are organized as for example training the unemployed, helping with the organization of online courses which help bring digital skills closer to teachers and children are offered free coding classes. The goal of the coalition is to provide training, internships, traineeships to 1 million young unemployed Europeans, raising awareness of the importance of digital skills, empowering educators and students with the digital knowledge and tools to modernize the education system. Lastly, the Coalition aims to focus on supporting SMEs in the reskilling and upskilling of the workers (European Commission, 2022b).

The coalition is further promoted through the European Digital Skills awards, which is attributed to the best initiative of an EU member country to bridge the digital skills gap. There are five categories considered and the commission selects 5 finalists projects for each one of them. One winner per category is then selected. The categories are the following (European Commission, 2018):

- "Digital skills for all;
- Digital skills for the labor force;
- Digital skills for ICT professionals;
- Digital skills in education;
- Digital skills for girls and women".

4.1.8 The European Digital skills and jobs platform

The European Digital Skills and Jobs Platform has been created as one of the European initiatives to inform, educate and train Europeans on digital skills of all levels. The initiative was launched under the Connecting Europe Facility Programme and is contributing to the Digital Europe Programme. The platform offers an individual a community, where one can come to educate themselves on all topics related to digital skills, acquire advice and help of an expert, explore their career opportunities, follow the latest news and developments on digital skills in Europe and access to the data and figures on digital skills. The Digital skills and jobs community unites citizens, organizations and public institutions across Europe with the same goal – making sure to unlock the potential of digital transformation and working towards a resilient and competitive European labor market (Spudyte, 2021).

4.2 Individual country initiatives

4.2.1 Skillnet Ireland

Skillnet Ireland is a national agency, in charge of promoting and enabling workforce training in companies. With the ultimate goal to increase Ireland's competitiveness, the program supports and funds the development of sector-specific corporate networks. This for example includes the ICT sector, agriculture, pharmaceutical sector and financial services. In this

way, the program can self-sustain long after the involvement of Skillnet Ireland is finished since it counts on the participation of the industry members. The statistics show that most of the onboarded companies are SMEs. Since its inception in 1999, the program has had major impact. Up until 2019, the agency has paved the way for more than 70 000 Irish companies and over 400 networks improved the quality and scope of their skills training thanks to the program. In addition, over 300 000 workers were able to upskill to adapt to the new requirements of their workplace. The OECD exposed the program as a best practice case of workforce training, combining governmental guidance and funds together with the collaboration of its members (PwC, 2019).

4.2.2 Luxembourg digital skills bridge

The initiative was launched in 2018 by The Ministry of Labour, Employment and the Social and Solidarity Economy with the objective to support the workers who might have to consider a different career direction because of the impact the digital transformation has had on their sector. After an initial strategic analysis of the workforce, companies and their employees are guided through the upskilling agenda. This is done by a careful evaluation of the current skill level among employees and a digital skills gap is later identified. Afterwards, the employees are trained on different sets of skills – technical, transversal or digital skills. With the help of advisors, who make sure that the upskilled employees successfully integrate new skills, employees are more likely to use the new acquired skills in a different position but within the same company. Furthermore, Luxembourg employees and companies who participated in the initiative have seen a 90 % increase internal mobility. The initiative impacted 10 companies and combined 330 employees in Luxembourg (PwC, 2019).

4.2.3 The Slovenian digital coalition

Established in 2016, the Slovenian digital coalition (sl. Digitalna Slovenija) aims to support and develop the digital transformation framework. The coalition builds on multi-stakeholder efforts, coming from both public and private sectors, to tackle and coordinate the digital transformation of Slovenia in accordance to the strategic framework adopted in 2016 called “Digital Slovenia 2020”. With the key goal of accelerating the adoption of digital technologies throughout all sectors nationwide, other goals include: enhancing the importance of ICT skills learning and promoting life-long learning, increasing the use of public online services, improving the level of digital skills and digital inclusion in society and creating synergies between different sectors by encouraging collaboration. Lastly, the coalition aims to improve the employability of Slovenian citizens (Digitalna Slovenija, 2019).

4.2.4 Portugal – building a national skills strategy

Supported by OECD, the Portuguese National skills strategy was created after a careful analysis of the current status of the education system, while identifying the digital skills gaps. The strategy is designed to promote digital skills in relation to provide better employability and ultimately contributing to the socio-economic development of the country. In 2014, when the project first started, the stakeholders gathered to evaluate and analyse the current situation. This led to the identification of 12 key challenges which can be summarised in 4 bigger groups: investing in developing relevant skills, providing the right conditions for a thriving digital skills ecosystem, increasing the opportunities for long-term employability and promoting reskilling among employees. Overall, the skills strategy positively impacted the number of people who leave education prematurely, the unemployment rate and the number of young people applying for higher education (PwC, 2019).

4.3 Company initiatives

4.3.1 Microsoft

In 2020, Microsoft has launched an initiative in order to help 25 million people across the globe to acquire the digital skills needed to survive and thrive in the pandemic economy. The initiative helps job seekers and enables them with the right skills to secure them a position in the job market. It also helps the workers to reskill and upskill with the idea of creating a learning system to empower everyone in lifetime learning. Furthermore, Microsoft developed an add-on to the Microsoft Teams app, which helps employers to upskill and reskill the workers. Microsoft is sourcing the best training material from LinkedIn learning and Microsoft Learn, in combination with other third-party training materials. The main three activities of the initiative cover: identification of in-demand jobs and the skills related to these jobs, access to more learning content and free of cost job seeking tools and certifications (Smith, 2020).

4.3.2 Amazon Web Services

Amazon Web Services launched its initiative in 2020, when the company committed to invest hundreds of millions of dollars to provide people with free training in cloud computer skills. The set goal was to provide the free training to 29 million people by 2025 across more than 200 countries. Furthermore, Amazon has also developed education programs for children for subjects like science, technology, mathematics and engineering. The program of Amazon is putting forward the unemployed and underemployed, deploying their AWS re/start free reskilling program in 38 countries by end of 2021. The goal of this program is

to enable individuals with little to no technological knowledge to enter the cloud computing job market, after the 12-week free training is finished (Amazon Web Services, 2021).

4.3.3 DELL EMC

Dell shows commitment to ensure digital access for everyone. The pandemic has accelerated the digital divide which led to further inequalities in access to digital technologies. By partnering up with educational institutions, governments and other private organizations, Dell wants to enable access to digital tools and resources to everyone. The EMC Academic Alliance Programme was launched back in 2006 and has since reaped great results. Through collaboration with schools and universities across the globe, Dell is ultimately helping students to prepare for a career in IT. The program offers education on all technology related fields such as cloud computing and big data analytics (Dell EMC External Research & Academic Alliance, 2022).

4.3.4 Google

For years Google has been actively involved in helping European improve their digital skills, increasing employability of the workers and helping small businesses with digital transformation. In 2016, Google promised to train two million Europeans in digital skills. Then in 2018, Google pledged to help one million Europeans to find a job or help them to grow their business by 2020 (Brittin, 2018). The results speak volumes; over 18 million people across multiple continents have participated in Grow with Google training since 2015. Consequently, Google helped more than 4 million people to secure a new job and has helped them to grow their career and/or business (Brittin, 2021).

4.3.5 Cisco

Since 1997, the Cisco Networking Academy is helping businesses and individuals across the globe with technical training, career mentorship and guidance and education services. The ICT-skill and career building program is present in all 28 EU member countries and has thus far had more than 2 million Europeans go through the program. Globally, the program certified more than 400 000 students and has therefore prepared them for a successful entry to the IT labor market. The Academy is collaborating with education institutions and local communities who deliver and present the program in person, while online content for training is also available. The participation is free of charge and Cisco hopes to bring benefits of the digital transformation to 1 billion people worldwide by 2025 (PwC, 2019).

5 RESEARCH

5.1 Goal and purpose of the research

The purpose of this study is to underline the importance of closing the digital skills gap in Europe as theoretical research suggests there is a significant lack of employees possessing the right digital skills. Furthermore, is it essential to implicate all relevant stakeholders, as this cannot be resolved without the effort of European institutions, organizations, companies as well as individuals. Even though, the EU is undertaking many actions to bridge the digital skills gap, a deeper investigation of the phenomenon among young European workers could help individuals as well as companies to become more aware of the importance of digital skills today and in the future.

The practical goals of the study are to further investigate the digital skills gap in Europe, to determine whether the young employees are willing to reskill and upskill and to determine their attitude towards digital transformation and automation. The research objectives will be achieved by collecting data that will be used to answer the following research questions:

- Research question 1: What is young workers' general attitude towards digital transformation? Does it differ based on their level of digital skills and education level?
- Research question 2: Are employees willing to reskill and upskill?
- Research question 3: Do employees believe that automation is leading to job loss?
- Research question 4: Do young employees believe that advanced digital skills (ICT skills) lead to higher employability?

5.2 Research method

5.2.1 Survey structure

A quantitative survey was carried out using a questionnaire (Appendix 2) via the online survey tool "1KA". The survey starts with a brief introduction and explanation of the purpose of the research topic. The content part of the questionnaire consists of five major parts. The first part focuses on the general attitude of the respondent towards digital transformation. The second part is about the willingness of your European workers to upskill and reskill and whose responsibility it is to grant upskilling/reskilling opportunities to employees. The third part of the survey focuses on young workers' attitude and opinion about automation in correlation to job loss. The fourth part of the questionnaire explores the correlation between advanced digital skills and employability. The last part consists of demographic questions to ascertain the respondents' gender, age, nationality, highest formal education attained, in which industry they work, and questions to determine how familiar they are with specific European initiatives for digital skills and digitalization. Respondents expressed their

agreement with the statements on a 5-point Likert scale (1 - Strongly disagree; 2 - Disagree; 3 - Neither agree nor disagree; 4 - Agree; 5 - Strongly agree).

5.2.2 Survey rollout

The online questionnaire was published on the "1KA" website and the link to the online questionnaire was directly sent to Slovenian and international friends/acquaintances/colleagues with the goal to reach respondents from different European countries. A link to the questionnaire was also posted on social networks such as Facebook and LinkedIn to ensure a bigger reach. Lastly, the questionnaire was published on the online platform “Survey Swap” where one can reach respondents by answering other published surveys and gaining credits. The credits then help the individual to obtain more respondents. Each respondent had to fulfill certain conditions in order to participate in the survey – the respondent needed to be employed in one of the European countries and be between the age of 24 and 38. The survey was active between June 6, 2022 and July 2, 2022. On average, respondents took just under 7 minutes to complete the questionnaire.

5.2.3 Processing of the data

The data were processed using IBM SPSS version 23.0. For the data obtained from the questionnaire, descriptive statistics were first calculated, presenting means (M) and standard deviations (SD). Spearman's rank correlation coefficient was computed in order to identify the correlations between the researched occurrences. Independent sample t-test and one-way analysis of variance (ANOVA) were then utilized to compare means of level of digital skills, attitude towards digital transformation and willingness to reskill and upskill between two or more sample groups respectively, factors used being level of digital skills gender and age group. Lastly, a linear regression was used to analyze the relationship between the dependent variable "willingness to reskills and upskill" and the independent variable "attitude towards digital transformation".

5.3 Sample presentation

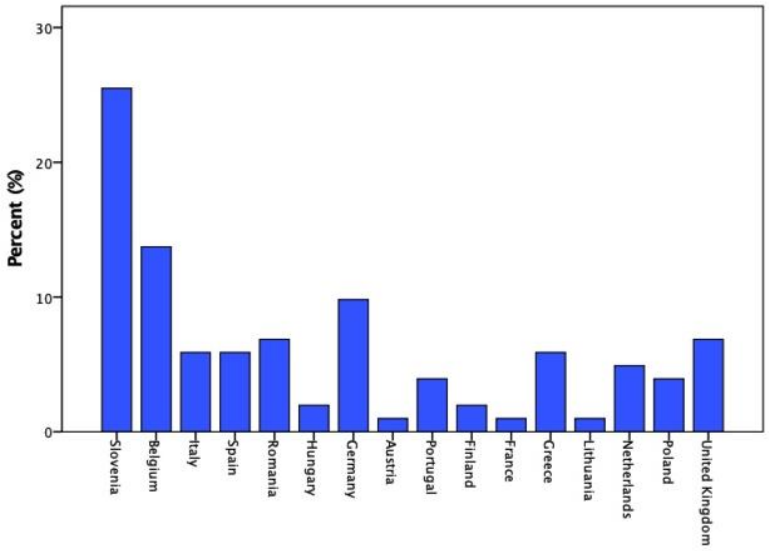
113 respondents participated in the survey. From the sample obtained, 8 responses were excluded since they did not fill out the questionnaire completely, 1 response was excluded because the participant is not currently employed and 1 response was excluded because the respondent did not fulfill the age limit for the research, resulting in a total of 102 valid responses.More women (56.9 %) than men (43.1 %) participated in the survey. The minimum age of the respondents was 24 and the maximum age was 38. The average age of the respondent was 29.36 (SD = 2.964). For the purpose of result interpretation, the age of the respondents was divided into three groups:

- age between 24 and 29 (59.6 %);

- age between 30 and 34 (32.4 %);
- age between 35 and 38 (7.8 %).

Most of the respondents were highly educated, meaning that they have obtained a post-graduate or master's degree (58.8 %) or an under-graduate or bachelor's degree (27.5 %). Less than 10 % of the respondents did not pursue higher education and have finished high school (7.8 %). Lastly, a small percentage of the respondents completed a doctorate/PhD (5.9 %). Overall, respondents from 16 different European countries participated in the survey, including United Kingdom. Most of the participants came from Slovenia (25.5 %), Belgium (13.7 %) and Germany (9.8 %). The Figure 3 shows the different nationalities of the respondents.

Figure 3: Respondent's nationality



Source: Own work.

As presented in Table 6, most of the participants worked in the IT/communications sector (27.5 %) and hospitality/food industry/tourism sector (8.8 %). Almost 15 % of the respondents worked in a sector which was not listed, and these answers mainly related to marketing and consulting services.

Table 6: Sector/industry

	Frequency (N)	Percent (%)
IT/Communications	28	27.5
Administrative	5	4.9
Health/Social welfare	3	2.9
Education	6	5.9
Transport/logistics	2	2.0
Hospitality/food/tourism	9	8.8

(table continues)

Table 6: Sector/industry (continued)

Finance/Insurance	9	8.8
Manufacturing	6	5.9
Energy supply	3	2.9
Public administration	2	2.0
Science/technology	10	9.8
Wholesale/retail	4	3.9
Other	15	14.7

Source: own work.

The participants were also asked with which European Initiatives related to digital skills they are familiar with. The results showed that 67.4 % of the respondents were not familiar with any of the 6 initiatives listed. Significant differences between respondents' familiarity with different initiatives were observed: only 5.3 % of the respondents were familiar with the Digital skills and job coalition, while 17.9 % of them were familiar with the Digital agenda for Europe.

Table 7: Familiarity with EU Digital skills initiatives

	Frequency (N)	Percentage (%)
Digital Agenda for Europe	17	17.9
Digital Education Action Plan 2021-2027	6	6.3
Digital skills and jobs platform	10	10.5
The European Skills Agenda	8	8.4
The digital skills and job coalition	5	5.3
EU Code week	11	11.6
None of the above	64	67.4

Source: own work.

5.4 Interpretation of results

5.4.1 Descriptive statistics

The results of respondents' degree of agreement with the statements related to their attitude to digital transformation are shown in Table 8. On average, they agreed with these statements (M = 4.32, SD = 0.40). The respondents, on average, agreed that they see digital transformation as a positive phenomenon (M = 3.96, SD = 0.75), that specific digital skills

(such as data analytics, digital marketing, programming, social media) lead to higher employability (M = 4.35, SD = 0.69), that companies who wish to stay ahead of the competition must constantly adapt to the new digital transformation trends (M = 4.42, SD = 0.62) and that it is beneficial for companies to have a digital transformation strategy (M = 4.33, SD = 0.66). Further, they on average agreed that having access to their own medical records online is an advantage (M = 4.28, SD = 0.78) and that they feel that the customer experience has improved due to digitalization (M = 4.39, SD = 0.73). The respondents on average expressed strong agreement with the statement that due to digitalization they have easier and better access to information (M = 4.55, SD = 0.51).

Table 8: Attitude towards digital transformation

	1	2	3	4	5	**N**	**M**	**SD**
	Percentage (%)							
I see digital transformation as a positive phenomenon.	1.0	2.9	15.7	59.8	20.6	102	3.96	0.75
I believe that specific digital skills (such as data analytics, digital marketing, programming, social media) lead to higher employability.	0.0	1.0	9.8	42.2	47.1	102	4.35	0.69
I believe that companies who wish to stay ahead of the competition must constantly adapt to the new digital transformation trends.	0.0	0.0	6.9	44.1	49.0	102	4.42	0.62
I believe that it is beneficial for companies to have a digital transformation strategy.	0.0	1.0	7.8	48.0	43.1	102	4.33	0.66
Due to digitalization, I feel I have easier and better access to information.	0.0	0.0	1.0	43.1	55.9	102	4.55	0.51
Having access to my medical records online is an advantage in my opinion.	1.0	1.0	11.8	41.2	45.1	102	4.28	0.78
As a consumer, I feel that the customer experience has improved due to digitalization (online shopping, self-checkout etc).	0.0	1.0	11.8	34.3	52.9	102	4.39	0.73
					Total	102	4.32	0.40

Source: own work.

The second part of the survey focused on the willingness of young employees to upskill and reskill. The results of respondents' degree of agreement with the statements related to their willingness to upskills and reskill are shown in Table 9. On average, they agreed with these statements (M = 3.91, SD = 0.48). The respondents, on average, agreed that there is a general shortage of specific digital skills (M = 3.70, SD = 0.79) and they have also agreed on average that the required skills for their jobs will change over the next 5 to 10 years (M = 3.85, SD = 0.92). The respondents agreed that they would be willing to open to reskilling/upskilling training and that they are prepared to invest their free time and money for the training (M = 3.67, SD = 0.89) and that they often take initiative and learn new skills in their free time (M = 3.46, SD = 1.04). The respondents were willing to expand my skills set to fit the demands of another position within the same company (M = 4.19, SD = 0.68). They agreed with the statement that they would be willing to learn more advanced ICT skills (M = 4.01, SD = 1.0). On the other hand, the respondents expressed very strong agreement with the statement that they would participate in upskill/reskill training if it were organized and paid by their employer (M = 4.52, SD = 0.68).

Table 9: Willingness to upskill and reskill

	1	2	3	4	5	**N**	**M**	**SD**
	Percentage (%)							
I believe that there is a general shortage of specific digital skills.	0.0	6.9	30.4	49.0	13.7	102	3.70	0.79
I believe that the required skills for my job will change over the next 5 to 10 years.	1.0	9.8	15.7	50.0	23.5	102	3.85	0.92
I would participate in upskilling training if it was organized and paid by my employer.	0.0	1.0	7.8	29.4	61.8	102	4.52	0.68
I would be open to upskilling/reskilling training and I am prepared to invest my free time and money for the training.	0.0	8.8	35.3	36.3	19.6	102	3.67	0.89
I often take the initiative and learn new skills in my free time.	2.0	18.6	27.5	35.3	16.7	102	3.46	1.04
I would be willing to expand my skills set to fit the demands of another position within the same company.	0.0	2.0	9.8	55.9	32.4	102	4.19	0.68
I would be willing to learn more advanced ICT skills.	1.0	9.8	13.7	38.2	37.3	102	4.01	1.00
					Total	102	3.91	0.48

Source: own work.

The third part of the survey was related to automation and the general attitude that the employees have towards it. The results of respondents' degree of agreement with the statements related to their attitude to automation are shown in Table 10. On average, they agreed with these statements. The respondents, on average, agreed that digitalization is leading to more job opportunities than job losses (M = 3.45, SD = 0.97) and that some of their daily tasks will be automized in the next few years (M = 3.82, SD = 1.06). Further, they also agreed that their job is not threatened by digital transformation/automation (M = 3.49, SD = 1.15) and that automation will make their job easier (M = 4.04, SD = 0.84). There was strong agreement with the statement that some skills like creative thinking and strategic decision making cannot be automized or replaced (M = 4.30, SD = 0.86). Lastly, the statement that only workers with advanced digital skills will benefit from increased job opportunities was only true to some extent (M = 3.33, SD = 0.94), according to the respondent's answers.

Table 10: Attitude towards automation

	1	2	3	4	5	**N**	**M**	**SD**
	Percentage (%)							
In my opinion, digitalization is leading to more job opportunities than job losses.	2.0	13.7	36.3	33.3	14.7	102	3.45	0.97
I believe that some of my daily tasks be automized in the next few years.	3.9	7.8	19.6	39.2	29.4	102	3.82	1.06
I believe my job is not threatened by digital transformation/automation.	6.9	13.7	21.6	39.2	18.6	102	3.49	1.15
I believe automation will make my job easier (for example automation of repetitive tasks).	1.0	4.9	12.7	52.0	29.4	102	4.04	0.84
Some skills like creative thinking and strategic decision making cannot be automized or replaced.	0.0	4.9	11.8	31.4	52.0	102	4.30	0.86
Only workers with advanced digital skills will benefit from increased job opportunities.	2.0	17.6	35.3	35.3	9.8	102	3.33	0.94

Source: own work.

When observing the results of the respondent's task nature, we see that the fact that their daily tasks are highly repetitive was true to some extent (M = 2.90, SD = 1.20). Respondents did not agree that their daily tasks require manual/physical work (M = 1.82, SD = 1.21). On the contrary, respondents agreed that their daily tasks require problem-solving skills (M = 4.20, SD = 0.70), strategic decision making (M = 3.96, SD = 0.93), creative thinking (M = 3.88, SD = 0.98) and data analysis (M = 3.56, SD = 1.19).

Table 11: Task nature

	1	2	3	4	5	**N**	**M**	**SD**
	Percentage (%)							
My daily tasks are highly repetitive	13.7	28.4	19.6	30.4	7.8	102	2.90	1.20
My daily tasks require manual/physical work (e.g. working in a factory, in construction, in hospitality).	57.8	21.6	6.9	7.8	5.9	102	1.82	1.21
My daily tasks require problem-solving skills.	0.0	2.0	10.8	52.9	34.3	102	4.20	0.70
My daily tasks require strategic decision making.	2.0	4.9	18.6	44.1	30.4	102	3.96	0.93
My daily tasks require creative thinking.	2.0	7.8	19.6	41.2	29.4	102	3.88	0.98
My daily tasks require data-analysis.	6.9	13.7	20.6	34.3	24.5	102	3.56	1.19

Source: own work.

The table 12 below shows the data obtained when respondents were asked to which extent, they believe that certain digital skills lead to higher employability, which presented the last part of the survey.

Table 12: Skills and employability

	1	2	3	4	5	**N**	**M**	**SD**
	Percentage (%)							
Navigating a website, using search engines	5.9	15.7	14.7	35.3	28.4	102	3.65	1.21
Writing and sending out emails	5.9	15.7	22.5	26.5	29.4	102	3.58	1.23
Completing an online transaction such as an online purchase	7.8	25.5	24.5	28.5	13.7	102	3.15	1.18
Data entry	6.9	10.8	22.5	42.2	17.6	102	3.53	1.14
Using digital communication tools such as Slack, Zoom, Microsoft teams	2.0	7.8	24.5	31.4	34.3	102	3.88	1.03
Social media marketing	0.0	7.8	12.7	51.0	28.4	102	4.00	0.85
Digital marketing	1.0	2.9	9.8	54.9	31.4	102	4.13	0.77
Web design	1.0	3.9	9.8	47.1	38.2	102	4.18	0.83
Data analytics	0.0	1.0	4.9	34.3	59.8	102	4.53	0.64
Artificial intelligence (AI)	1.0	3.9	11.8	27.5	55.9	102	4.33	0.90
Web development	0.0	2.0	10.8	29.4	57.8	102	4.43	0.76
Programming	1.0	1.0	8.8	23.5	65.7	102	4.52	0.78
App development	1.0	2.9	7.8	28.4	59.8	102	4.43	0.83

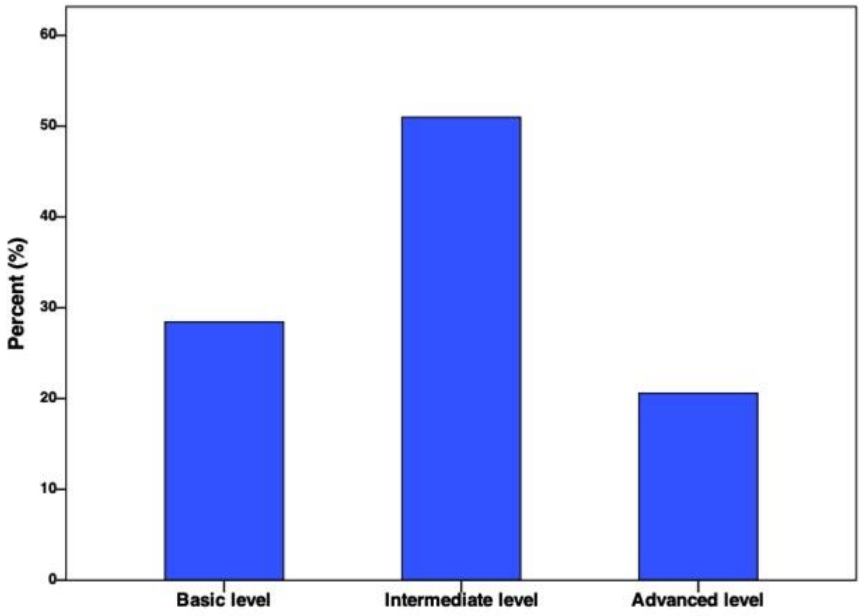
Source: own work.

The skills were listed from most basic ones to most advanced. We observe that, on average, the respondents agreed that all the skills listed lead to higher employability. However, we do notice that there is an increasing trend in the level of agreement which is considerably lower for basic skills as for example data entry (M = 3.53, SD = 1.14) and considerably higher for more advanced skills as for example data analytics (M = 4.53, SD = 0.64).

5.4.2 Comparisons between sample groups

The first question of the survey asked the participants to define their current level of digital skills. As shown in Figure 4, most of the participants reported possessing intermediate digital skills (51 %), almost a third (28.4 %) basic digital skills and a smaller percentage reported having advanced digital skills (20.6 %).

Figure 4: Levels of digital skills



Source: own work.

Correlations are presented in Table 13. The results show that the attitude towards digital transformation is positively correlated with the level of digital skills, r(100) = 0.212, p = .032; gender is correlated with the level of digital skills, r(100) = -0.231, p = .019; willingness to reskill and upskill is positively correlated with the level of digital skills, r(100) = 0.329, p = .001 and the attitude towards digital transformation is positively correlated to the willingness to reskills and upskill, r(100) = 0.265, p = .007.

Table 13: Results of the correlation matrix

Variable		Gender	Age	Highest level of education obtained	Level of digital skills	Attitude towards digital transformation	Willingness to reskills and upskill
Gender	r p N	-					
Age	r p N	-0.090 0.366 102	-				
Highest level of education obtained	r p N	-0.044 0.664 102	0.072 0.472 102	-			
Digital skills level	r p N	-0.231* 0.019 102	-0.123 0.218 460	0.022 0.825 102	-		
Attitude towards digital transformation	r p N	0.098 0.328 102	-0.316** 0.001 102	0.087 0.387 102	0.212* 0.032 102	-	
Willingness to reskills and upskill	r p N	-0.082 0.415 102	0.008 0.933 102	0.181 0.068 102	0.329** 0.001 102	0.265** 0.007 102	-

Source: own work.

One-way analysis of variance (ANOVA) was performed to compare the average attitude towards digital transformation between respondents based on their level of digital skills. As presented in Table 14, the results were marginally statistically significant, $F(2, 99) = 2.35$, $p = 0.079$.

Table 14: Results of ANOVA for comparison of attitude towards digital transformation and the level of digital skills

	Level of digital skills						
		Basic	Intermediate	Advanced	df1, df2	F	p
Attitude towards digital transformation	N	29	52	21	2, 99	2.35	0.079
	M	4.21	4.35	4.45			
	SD	0.39	0.42	0.35			

Source: own work.

As presented in Table 15, the results of the Games-Howell post-hoc showed that those with advanced digital skills had a statistically significantly better attitude towards digital transformation ($M = 4.45$, $SD = 0.35$) compared to those with basic digital skills ($M = 4.21$, $SD = 0.39$), $F(2,99) = 2.35$, $p = 0.07$.

Table 15: Results of Games-Howell post-hoc test for comparison of attitude towards digital transformation and level of digital skills

Level of digital skills		**Mean difference**	**p**
Basic	Intermediate	-0.14	0.30
	Advanced	-0.24	0.07

Source: own work.

Independent sample t-test was performed to compare the average digitals skills between respondents based on their gender. As presented in Table 16, men had, on average, a statistically significant higher level of digital skills (M = 2.11, SD = 0.78) than women (M = 1.78, SD = 0.59), t(100) = 2.286, p = .019.

Table 16: Results of the t-test for comparison of the mean level of digital skills between men and women

		Gender				
		Male	Female	t	df	p
	N	44	58			
Level of digital skills	M	2.11	1.78	2.286	100	0.019
	SD	0.78	0.59			

Source: own work.

Thirdly, a one-way analysis of variance (ANOVA) was performed to compare the willingness to reskill and upskill between respondents based on their level of digital skills. As presented in Table 17, the results were statistically significant, F(2,99) = 6.12, p = 0.003.

Table 17: Results of ANOVA for comparison of willingness to reskills and upskill and the level of digital skills

	Level of digital skills						
		Basic	Intermediate	Advanced	df1, df2	F	p
Willingness to reskill and upskill	N	29	52	21			
	M	3.70	3.93	4.16	2, 99	6.12	0.003
	SD	0.51	0.46	0.39			

Source: own work.

In Table 18 are presented the results of the post hoc analysis using the Games-Howell test. It revealed that those with advanced digital skills had a statistically significantly higher

willingness to reskill and upskill (M = 4.16, SD = 0.39) compared to those with basic digital skills (M = 3.70, SD = 0.51), F(2,99) = 6.12, p = 0.002.

Table 18: Results of Games-Howell post-hoc test for comparison of willingness to reskills and upskill and level of digital skills

Level of digital skills		**Mean difference**	**p**
Basic	Intermediate	-0.22	0.13
	Advanced	-0.46	0.002

Source: own work.

Further, in this regression model, we tested whether the independent variable 'attitude towards digital transformation' has a statistically significant effect on the dependent variable 'willingness to reskills and upskill'. Table 19 shows that the independent variable 'attitude towards digital transformation' has a statistically significant effect on the dependent variable 'willingness to reskills and upskill', F(1, 100) = 7.323, p = 0.000 (B = 0.312). The independent variable 'attitude towards digital transformation' explains 7 % of the variability in the dependent variable 'willingness to reskills and upskill' ($\mathbf{R^2}$ = 0.07). Therefore, the respondents with a more positive attitude towards digital transformation are, on average, more willing to upskill and reskill.

Table 19: Regression model – identifying the relationship between the dependent variable "willingness to reskills and upskill" and the independent variable "attitude towards digital transformation"

	R	**R^2**	**Std. Error of the Estimate**	**df**	**Unstandardized Coefficients**		**F**	**t**	**p**
	0.26	0.07	0.47	1, 100	**B**	**Std. Error**	7.323		
Constant					2.564	0.501		5.121	0.000
Attitude towards digital transformation					0.312	0.115		2.706	0.008

Source: own work.

A one-way analysis of variance (ANOVA) was performed to compare the average attitude towards digital transformation between respondents based on their age group. The results were, as presented in Table 20, marginally statistically significant, F(2,99) = 3.55, p = .070).

Table 20: Results of ANOVA for comparison of age and attitude towards digital transformation

	Age						
		24-29	30-34	35-38	df1, df2	F	p
Attitude towards digital transformation	N	61	33	8			
	M	4.41	4.19	4.25	2, 99	3.55	0,070
	SD	0.35	0.45	0.43			

Source: own work.

As presented in Table 21, the Games-Howell post-hoc test indicated that those in the 24-29 age group had a statistically significantly better attitude towards digital transformation (M = 4.41, SD = 0.35) compared to those in the 30-34 age group (M = 4.19, SD = 0.45), F(2,100) = 3.55, p = 0.047.

Table 21: Results of Games-Howell post-hoc test for comparison of age and attitude towards digital transformation

Age		**Mean difference**	**p**
24-29	30-34	0.22	0.047
	35-38	0.16	0.58

Source: own work.

Lastly, correlations between the task nature and two statements related to automation were calculated. Based on the results, which are presented in the correlation matrix in Table 22, we can observe that the individuals whose jobs require problem-solving skills are more likely to think that their job is not threatened by digital transformation, r(100) = 0.269, p = 0.006.

The same can be said for those individuals whose daily tasks require strategic decision making, r(100) = 0.262, p = 0.008 and for individuals whose daily tasks require creative thinking, r(100) = 0.248, p = 0.012. To summarize, the results of the research show that the respondents with more complex daily tasks are more likely to think that their job is not threatened by digital transformation/automation.

In Table 22, we can also observe that the respondents whose daily tasks require problem solving skills, r(100) = 0.203, p =0.041, strategic decision making, r(100) = 0.258, p = 0.009 and creative thinking, r(100) = 0.258, p = 0.009 are more likely to think that some skills like creative thinking and strategic decision making cannot be automized or replaced.

Table 22: Results of the correlation matrix for comparisons of automation and task nature

Variable		I believe my job is not threatened by dig. Transformation.	Some skills like creative thinking and (…) cannot be automized or replaced.	My daily tasks are highly repetitive	My daily tasks require manual/physical work.	My daily tasks require problem solving skills.	My daily tasks require strategic decision making.	My daily tasks require creative thinking.	My daily tasks require data analysis.
I believe my job is not threatened by digital transformation/automation.	r p N	-	0.245* 0.013 102	-0.186 0.061 102	0.089 0.372 102	0.269** 0.006 102	0.262** 0.008 102	0.248* 0.012 102	0.154 0.122 102
Some skills like creative thinking and strategic decision making cannot be automized or replaced.	r p N		-	0.001 0.990 102	0.100 0.319 102	0.203** 0.041 102	0.258** 0.009 102	0.258* 0.009 102	-0.052 0.603 102

Source: own work.

5.4.3 Discussions and research questions answers

Research question 1: What is young workers' attitude towards digital transformation? Does it differ based on their level of digital skills and education level?

The results of the research showed that young workers have a positive attitude towards digital transformation. This tells us that the respondents see great benefits in digital transformation and appreciate the changes it has brought such as better and easier access to online information, which was the statement with which the respondents, on average, agreed the most with.

It is interesting that the education background of an individual does not have an impact on the attitude of the worker towards digital transformation. Nevertheless, this kind of outcome could also be expected since there is little to no regular curriculum in schools which would include digitalization, informatics and technology. It would be interesting to see what kind of studies the respondents finished and how did that play into their attitude towards digital transformation today. A negative correlation was observed between the age and the attitude towards digital transformation. Respondents in the age group 24-29 have generally a better attitude towards digital transformation than the respondents in the age group 35-38. This might be explained by the fact that the younger respondents grew up in a more advanced

technological environment than the older respondents and have therefore been in touch with the digital world since a young age.

The level of digital skills of the respondents are in fact correlated with their attitude towards digital transformation. This means respondents with advanced digital skills have generally a more positive attitude towards digital transformation. It could be explained by the fact that the employees with advanced digital skills can appreciate the digital transformation more since they see and acknowledge its benefits.

It is important to mention that some differences between men and women in the level of digital skills still prevail. On average, more men have claimed to have advanced digital skills than women. This could also be explained because of the fact that women are in general less confident in their digital skills. Even though Eurostat's research revealed that while in some countries men outperform women in level of digital skills, there are also countries where women outperform men. Despite the differences in the level of digital skills between men and women are relatively small, women continue to hide behind the illusion that this is a male-dominated area (Braun, März, Mertens & Nisser, 2020).

Research question 2: Are employees willing to reskill and upskill?

Overall, the respondents are open to reskill and upskill. We found that young employees are very open to reskilling and upskilling in general, especially if it was organized and paid by employer. If employees were offered upskilling and reskilling training by the employer, it is likely that they would respond in a very positive way. On the contrary, respondents are less keen to invest their own time and money to reskill and upskill. It is possible that they feel overwhelmed in the sheer volume of online information. Even though, there are countless free online coding classes or similar, the employees simply are not motivated to take on additional learning after work. This may of course also depend on the nature of their current work and how physically and mentally demanding it is.

When investigating the correlation between the level of digital skills and the willingness to reskills and upskill we found that, on average, employees with advanced digital skills are more willing to reskill and upskill. It is possible that because the workers with more advanced digital skills are more aware of the benefits that these types of skills bring, they are more open and more willing to further upskill and reskill. On the other hand, workers with basic and intermediate digital skills are less open to that idea. This leads to a sort of a snowball effect since the more knowledge and skills the workers have, the more they are willing to reskill and upskill. The ones with lower digital skills are less likely to take the initiative and invest their own free time to upskilling. Therefore, it is recommended that companies incentivize these workers by offering and organizing upskilling/reskilling workshops/classes for the employees.

Furthermore, formal education does not play a role with the willingness to reskill and upskill. This is likely related to the fact that we are not directly educated and informed on those

topics. This means that digital literacy should definitely be more present in the standard curricula since each new generation will live in a more digitalized society and will need the appropriate knowledge and skills to integrate themselves into the job market once they finish their studies.

Most of the respondents (almost 70 %) were not familiar with any of the European digital skills initiatives. Even though, young workers have a general positive attitude towards digital transformation, not many people go a step further and ask themselves what that entails for their career/job and if they should invest more time trying to upskill and acquire new skills. The EU should invest in new initiatives to bring the awareness of the digital skills gap closer to the young workers by organizing competitions, offering scholarships and forming new collaborations with universities across Europe to unite in promoting these initiatives. Countries where the level of digital skills is the lowest, would need to be prioritized. Implementing new strategies to incentivize employees to upskill could also be organized on a company level.

Research question 3: Do employees believe that automation is leading to job loss?

Overall, we can say that employees are not greatly concerned with automation and the possibility of job loss to it. Their attitude towards automation in general is quite positive. The respondents agreed with the statement that automation is leading to more job opportunities than job losses and that automation will make their job easier by for example eliminating repetitive tasks.

Since we did not have that many respondents claiming that their daily tasks are highly repetitive, it is possible that our sample included more of the working population, whose jobs would indeed be harder to automate or replace, meaning that they work in sectors where there is a current talent gap and the employees are feeling fairly secure about their jobs. Almost a third of the respondents work in IT sector and 10 % of them work in technology/science.

The respondents whose daily tasks are more of a complex nature (data analytics, strategic decision making, creative thinking), believe that their job is not threatened by digital transformation and automation and they also strongly agreed with the statement that these kinds of skills cannot be automized or replaced. As expected, young workers with advanced digital skills and with more complex daily tasks feel more secure in their job. On the other hand, since we did not have many respondents who claimed that their job requires physical/manual work and highly repetitive tasks, we could not determine their attitude towards automation and if they feel secure in their current job.

Therefore, we observe that the results of the survey are consistent with the theory of Servoz (2019). Young European workers are confident in their job positions but at the same time do believe that automation will affect and replace some of their daily tasks. Workers with lower

digital skills are more susceptible to changes brought by automation (Servoz, 2019). Unfortunately, we could not make a parallel of this claim from the results of the research.

At this time, it is not possible to claim with certainty what will happen in the next few decades, but it seems that at least for now automation is not a direct threat to young European workers. Overall, the theoretical sources are not completely aligned on this topic. Some sources like McKinsey claim that up to 800 million people could lose their jobs to automation by 2030 (United Nations, 2020). On the other hand, on a far more optimistic note, WEF (2015) suggests that automation could create up to 6 million jobs between 2016 and 2025 in the logistics and electricity industries alone (WEF, 2015). In conclusion, the future of automation and its impact remains a guessing game but at the moment, the young Europeans workers are not seeing it as a big threat.

Research question 4: Do young employees believe that advanced digital skills (ICT skills) lead to higher employability?

The results of the questionnaire showed that young workers strongly believe that more advanced digital skills and ICT skills such as data analytics, web programming, app development, artificial intelligence, are more likely to lead to higher employability. However, there is still room for further research as the respondents are also confident that very basic digital skills like writing and sending out an email lead to higher employability. Since the respondents, on average, agreed that they would be willing to learn more advanced ICT skills such as programming, big data analytics, artificial intelligence, it would be interesting to further identify the respondents with basic digital skills and intermediate digital skills to see what would motivate them to start the upskilling process.

5.4.4 Theoretical and practical contributions

The research made various theoretical contributions, namely on the level of digital skills amongst young European workers, on their attitude towards digital transformation and their willingness to reskill and upskill in the future. The most important theoretical contribution of the study is the finding that there is a positive correlation between the level of digital skills and the attitude towards digital transformation and willingness to reskill and upskill. At the same time, it was confirmed that there is still a significant discrepancy in level of digital skills between men and women, as the theory already suggests. Davaki (2018) underlined the main issues which lead to the fact that women are generally less inclined to enroll to studying ICT-related topics. The idea that men are better in this field is somehow well settled in the female brain and affects the decision-making process. However, a lot of progress has been done in the recent years. Females nowadays can participate to numerous free courses, trainings and can be motivated by many female role models active with a successful career in ICT. Since is currently no theoretical literature exploring the found correlation between the level of digital skills and the attitude towards digital transformation, we could say that this research opens the door for further research on this topic.

On a practical note, the survey results showed that education does not play a role in individuals' attitude towards digital transformation nor the willingness to upskill and reskills.

- On a corporate level: Employers should firstly identify the level of digital skills of their employees. This can be either achieved by a self-assessment test or by demanding a digital skills certification from their employees (Carretero Gomez, 2021). Recruiters should focus less on the education background of the applicant but rather on the required level of digital skills. Applicants with more advanced digital skills are more likely to be more open to upskill and reskill if needed. On the other hand, the employees whose skills do not match the current requirements are likely to respond positively if being offered the opportunity to be trained and upskilled. The survey results showed that the majority of employees would be willing to upskill and reskill if this was paid and organized by the employer.
- On an institutional level: Since almost 70 % of the respondents did not know any of the European digital skills initiatives, there is definitely room for improvement in this area. Perhaps the digital skills initiatives and initiatives about digitalization in general could be presented in high schools, universities under the form of competitions, trainings for additional credits. Undoubtfully, more courses about digital literacy, ICT skills training, informatics should be included in the standard educational curriculum to enable the young population to acquire interest for those skills at an early age and at the same time to prevent an even bigger digital skills gap in the future. This would also help females to get to know these subjects early on and would therefore be able to make a more informed decision once choosing university studies.
- On an individual level: Depending on their current level of digital skills, individuals can invest their free time to attend different online courses and trainings such as a free online coding class. This would guarantee them higher employability on the job market. As the demands of the market keep changing, it is important that the skills of the individual stay relevant. Taking into account the results of the research, an employee with no educational background in advanced digital skills still has all the possibilities to upskill/reskill their skillset. It all depends on the level of motivation and the realization of the potential these new acquired skills could unlock.

5.4.5 Limitations of the research

The conducted research has certain limitations. The biggest limitation of this research was the sample size. Since only 102 duly completed questionnaires were obtained, this prevented the findings of being extrapolated which in turn increased the general margin of error. Secondly, it is important to mention that the respondents chose the level of their digital skills based on self-assessment which means that due to possible bias in the respondents' answers, the results are not fully reliable and can only serve as an outline of the digital skills level of the respondents. Thirdly, only currently employed Europeans were the object of the research,

while young unemployed respondents who have just finished their studies or people are in the process of changing jobs were not included in the sample. Lastly, a considerable limitation of the research came from the fact that most of the respondents came from Slovenia.

5.4.6 Recommendations for future research

Recommendations for further research are based on the limitations of the survey we have conducted. A more comprehensive study could be conducted to investigate the correlation between the nationality of the individual and their level of digital skills. This would provide a deeper insight into the problematic and highlight the countries where the digital gap is the biggest. Even though Eurostat is regularly researching the level of digital skills among residents across EU member states, there is undoubtfully more to be done with the data obtained as for example granting the countries with lower digital skills and lower accessibility to internet a higher budget for digitalization.

Secondly, the results show that men have higher level of digital skills than women, which is not that surprising since the statistics show that women, on average, are less likely to pursue studies or a career in ICT. However, a deeper research of the occurrence would allow us to investigate the reasons for these choices in more detail. It would also be advisable to analyze if the self-assessment of their digital skills and ICT related knowledge has more to do with their overall confidence in their skills or does it in fact accurately reflect their knowledge.

Finally, since the results show that the education level of an individual had no impact on the researched occurrences, we recommend a more extensive research of the educational background of the respondents and the studies they completed to determine if the nature of their studies is correlated to the type of job they acquire later. Furthermore, it would be beneficial to determine if some universities prepared the students for the actual demands of the labor market and gave them the necessary tools to integrate seamlessly.

CONCLUSION

The combination of various technological, economic and societal shifts in recent years has led to a clear need for a faster digital transformation, further stimulated by the coronavirus pandemic (COVID-19). In the light of the pandemic, many companies have had to adapt their business processes and activities. As a consequence, the consumer behavior and needs have changed. This master thesis examines the evolution of digital transformation and addresses the issue of closing the digital skills gap in Europe.

Digital transformation is the integration of digital technologies, processes and competences, with the aim of simplifying established ways of working and achieving higher growth, efficiency, innovation, competitiveness and sustainable development of companies. Digital

transformation is not only about companies and their operations - its impact is changing entire industries, the work and performance of employees, the lives of individuals and the behavior of society at large.

Successful digital transformation requires significant investment in the digital technologies that drive digital transformation, including adequate training, development and upskilling of the workforce. In addition, there is a need to make significant investments in the digital infrastructure in Europe, to regulate legislation and to underline the importance of digital inclusion, ensuring that all individuals and communities have equal access to digital tools and internet connectivity.

This thesis consists of a theoretical and an empirical part. The goal of the theoretical part of the thesis is to analyze the level of digital development in Europe to date, its progress and impact on existing jobs, and the barriers to developing the skills needed for new ways of doing work. The empirical work aims to investigate the digital skills gap in Europe, to find out to what extent young employees are willing to upgrade their existing skills in the light of digital transformation or to reskill, and to provide an assessment of their general attitude towards digital transformation and automation. The purpose of the master thesis is to shed light on the digital skills gap and to identify key areas where work is needed in order to close this gap. A better understanding of the issues can help to take appropriate measures that can have a positive impact not only on organizations and their employees, but also, in a broader sense, on the economy and society as a whole.

In the theoretical part, we first define digital transformation and outline its impact on different sectors and the labor market in Europe, while also presenting the barriers to digital transformation - from an ethical, societal and regulatory perspective. Next, we present the characteristics and needs of the future labor market, first listing the existing jobs and skills that are likely to be most affected by the changes brought about by digital transformation, and then the new jobs and skills that will be created in the course of digital transformation. We then look in more detail at the digital changes that organizations have made as a result of the context of the COVID-19 pandemic, focusing on the introduction of teleworking and its impact on employees and organizations. We then provide a definition of digital skills, list the factors influencing the level of digital skills of employees, including those caused by the COVID-19 pandemic, and elaborate on the incidence of the need for upskilling and reskilling employees. We also highlight the importance of inclusion and gender equality issues in the context of digital transformation. In the last theoretical part, we list the most prominent initiatives of the European Union aimed at reducing the digital skills gap and present good practices in this area by individual Member States as well as by major international companies.

In the empirical part of the thesis, we present the findings of a quantitative survey conducted using an online questionnaire, which was answered by 102 individuals aged between 24 and

38 from 16 European countries. Based on the data collected, we answer the following research questions:

- Research question 1: What is young workers' general attitude towards digital transformation? Does it differ based on their level of digital skills and education level?
- Research question 2: Are employees willing to reskill and upskill?
- Research question 3: Do employees believe that automation is leading to job loss?
- Research question 4: Do young employees believe that advanced digital skills (ICT skills) lead to higher employability?

The results of the survey show that on average respondents have a rather positive attitude towards both digital transformation and upskilling/reskilling, which are positively correlated phenomena. Their attitudes towards these two constructs are predicted by their level of digital skills - the better their digital skills, the better, on average, their attitudes towards digital transformation and the more willing they are to upskill and reskill. We also find that younger individuals have a better attitude towards digital transformation, that men on average have better digital skills than women, and that level of formal education is not related to the attitude towards digital transformation, nor does it predict respondents' attitudes towards upskilling or reskilling. We also find that on average respondents also have a positive attitude towards automation and are not worried about the possibility that automation may lead to job losses. The results further show that respondents overwhelmingly believe that both simpler and more complex digital skills lead to higher employability. In the final section, we list recommendations for further research that we have formulated based on the limitations of the survey. These include, for example, conducting a more comprehensive survey comparing digital skills among employees in different European countries, which would give a better insight into which parts of Europe have a particularly pronounced digital skills gap. We also recommend, among other things, a more detailed analysis of the digital skills gap between men and women and the factors that cause it.

REFERENCE LIST

1. Albukhitan, S. (2020). Developing Digital Transformation Strategy for Manufacturing. *Procedia Computer Science*, *170*, pp. 664–671.
2. Alexander, A., De Smet, A., Langstaff, M. & Ravid, D. (2021, April 1). *What employees are saying about the future of remote work*. Retrieved April 2, 2022, from https://www.mckinsey.com/business-functions/people-and-organizational-performance/our-insights/what-employees-are-saying-about-the-future-of-remote-work
3. Amazon Web Services. (2021, November). *AWS Expands Access to Free Cloud Skills Training on its Mission to Educate 29 Million People by 2025*. Retrieved April 25, 2022, from https://press.aboutamazon.com/news-releases/news-release-details/aws-expands-access-free-cloud-skills-training-its-mission/
4. Arntz, M., Gregory, T. & Zierahn, U. (2016, May 14). *The Risk of Automation for Jobs in OECD Countries*. Paris: OECD Publishing.
5. Babu, G. & Paul, J. (2020). *Digital Transformation in Business and Society*. Cham, Switzerland: Springer Nature Switzerland AG.
6. Bannister, C., Buckley, N. & Sniderman, B. (2020, January). *Ethical Tech*. Retrieved April 5, 2022, from https://www2.deloitte.com/us/en/insights/topics/digital-transformation/make-ethical-technology-a-priority.html?fbclid=IwAR2wnu7WZ4qikVRWVYcAFl5q36WC5z20HEjOLUPwPrbHnf3y6SjMrKvdMQk
7. Bednarčíková, D. & Repiská, R. (2021). Digital Transformation in the Context of the European Union and the Use of Digital Technologies as a Tool for Business Sustainability. *SHB Web of Conferences: Current Problems of the Corporate Sector 2021*. Les Ulis: EDP Sciences.
8. Bhatia, S. (2020, February 20). *The Fourth Industrial Revolution Is Changing Work*. Retrieved January 22, 2022, from https://www.forbes.com/sites/forbesbusinessdevelopmentcouncil/2020/02/20/the-fourth-industrial-revolution-is-changing-work/?sh=7b176ee63a22
9. BigCommerce. (2021, May). *Digital Transformation and the Future of Ecommerce*. Retrieved June 2, 2022, from https://thegood.com/insights/digital-transformation-ecommerce/
10. Braun, A., März, A., Mertens, F. & Nisser, A. (2020). *Rethinking Education in the Digital Age*. Brussels: European Parliament.
11. Brittin, M. (2018, March). *Helping 1 million Europeans find a job or grow their business by 2020*. Retrieved March 3, 2022, from https://blog.google/outreach-initiatives/grow-with-google/helping-1-million-europeans-find-job-or-grow-their-business-2020/
12. Brittin, M. (2021, November). *Helping European small businesses grow and succeed*. Retrieved May 6, 2022, from https://blog.google/outreach-initiatives/small-business/helping-european-small-businesses-grow-and-succeed/

13. Business Europe & Noerr. (2017). *Legal Issues of Digitalisation in Europe*. Retrieved April 24, 2022, from https://www.businesseurope.eu/sites/buseur/files/media/reports_and_studies/2017-09-29_legal_issues_of_digitalisation_in_europe.pdf
14. Carretero Gómez, S. (2021). *Skills for Life: Digital Skills*. Inter-American Development Bank.
15. Chugh, A. (2021, November). *What is 'The Great Resignation'? An expert explains*. Retrieved April 29, 2022, from https://www.weforum.org/agenda/2021/11/what-is-the-great-resignation-and-what-can-we-learn-from-it/
16. Davaki, K. (2018). *The underlying causes of the digital gender gap and possible solutions for enhanced digital inclusion of women and girls*. Brussels: Policy Department for Citizen's Rights and Constitutional Affairs.
17. de Groen, W. P., Lenaerts, K., Bosc, R. & Paquier, F. (2017). *Impact of digitalisation on the on-demand economy on labour markets and the consequences for employment and industrial relation*. Brussels: European Economic and Social Committee.
18. Dell EMC External Research & Academic Alliance. (2022, May). *Introduction*. Retrieved May 2, 2022, from http://www.ictacademy.in/emc/
19. DIGITALEUROPE. (2018). *DIGITALEUROPE's Position on EU funding for digital skills in the next EU budget 2021-2027*. Brussels: DIGITALEUROPE.
20. Digitalna Slovenija. (2019, November). *Digitalna koalicija*. Retrieved April 22, 2022 from https://digitalna.si/digitalna-koalicija
21. Ebert, C. & Duarte, C. (2018). Digital Transformation. *IEEE Software*, *35*(4), pp. 16–21.
22. Eurofound. (2020). *Gender equality at work, European Working Conditions Survey 2015 series*. Luxembourg: Publications Office of the European Union.
23. Euronovate Group. (2021, January). *Digital Regulations: legal aspects of the digital era*. Retrieved February 15, 2022, from https://www.euronovategroup.com/digital-regulations-legal-aspects-of-the-digital-era/
24. European Centre for the Development of Vocational Training (Cedefop). (2021, February). Digital skills: challenges and opportunities during the pandemic. Retrieved May 2, 2022, from https://www.cedefop.europa.eu/en/news/digital-skills-challenges-and-opportunities-during-pandemic
25. European Commission DG Communications Networks, Content & Technology. (2020). *Shaping the digital transformation in Europe*. Luxembourg: Publication Office of the European Union.
26. European Commission. (2015). *Communication from the Commission to the European Parliament, the Council, the European economic and social committee and the committee of the regions*. Brussels: European Commission.
27. European Commission. (2018, November). *European Digital Skills Awards: meet 24 outstanding finalists*. Retrieved May 11, 2022, from https://digital-strategy.ec.europa.eu/en/news/european-digital-skills-awards-meet-24-outstanding-finalists

28. European Commission. (2019). *A Digital Single Market for the benefit of all Europeans*. Brussels: European Commission.
29. European Commission. (2022a, April). *Digital Services Act: Commission welcomes political agreement on rules ensuring a safe and accountable online environment*. Retrieved May 9, 2022, from https://ec.europa.eu/commission/presscorner/detail/en/ip_22_2545
30. European Commission. (2022b, February). *Digital skills and jobs coalition*. Retrieved May 2, 2022, from https://digital-strategy.ec.europa.eu/en/policies/digital-skills-coalition
31. European Commission. (2022c, February). *Digital skills and jobs*. Retrieved April 21, 2022, from https://digital-strategy.ec.europa.eu/en/policies/digital-skills-and-jobs
32. European Commission. (2022d, March). *Digital inclusion*. Retrieved May 18, 2022, from https://digital-strategy.ec.europa.eu/en/policies/digital-inclusion
33. European Commission. (2022e, May). *Digital Education Action Plan (2021-2027)*. Retrieved April 17, 2022, from https://education.ec.europa.eu/focus-topics/digital-education/about/digital-education-action-plan
34. European Commission. (2022f, May). *European Skills Agenda*. Retrieved June 14, 2022, from https://ec.europa.eu/social/main.jsp?catId=1223&langId=en
35. European court of auditors. (2021). *EU actions to address low digital skills*. Luxembourg: European court of auditors.
36. European Parliament. (2018, March). *More women in ICT: empowering women in the digital world*. Retrieved May 21, 2022, from https://www.europarl.europa.eu/news/en/headlines/society/20180301STO98927/more-women-in-ict-empowering-women-in-the-digital-world
37. Eurostat. (2022, March 30). *How many citizens had basic digital skills in 2021?*. Retrieved April 28, 2022, from https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20220330-1
38. Frolova, E. V., Rogach, O. V., Tyurikov, A. G. & Razov, P. V. (2021). Online Student Education in a Pandemic: New Challenges and Risks. *European Journal of Contemporary Education, 10*(1), pp. 43–52.
39. Guallar Artal, S., Humburg, M. & Koseleci Blanchy, N. (2021, December). *Education after the pandemic*. Retrieved March 22, 2022, from https://www.eib.org/en/essays/covid-19-digital-education
40. Hinterhuber, A. & Nilles, M. (2021). *Managing Digital Transformation*. London: Routledge.
41. Hunt, V., Prince, S., Dixon-Fyle, S. & Dolan, K. (2020, May 19). *Diversity wins. How inclusion matters*. Retrieved April 4, 2022, from https://www.mckinsey.com/featured-insights/diversity-and-inclusion/diversity-wins-how-inclusion-matters

42. i-SCOOP. (2022b, May). *Retail – transformation in the retail industry*. Retrieved June 4, 2022, from https://www.i-scoop.eu/digital-transformation/retail-transformation-retail-industry/
43. i-SCOOP. (2022a, May). *What is digital business transformation? The essential guide to DX*. Retrieved May 16, 2022, from https://www.i-scoop.eu/digital-transformation/
44. Iberdrola. (2022, May). *Reskilling and upskilling: work training in the digital transformation era.* Retrieved May 15, 2022, from https://www.iberdrola.com/talent/reskilling-upskilling
45. International Telecommunication Union (ITU). (2018). *The Digital Skills Toolkit*. Geneva: International Telecommunication Union.
46. Kemp, R. & Moynihan, D. (2020*). Legal Aspects of Digital Transformation*. Kemp IT Law.
47. Kopp, M., Gröblinger, O. & Adams, S. (2019). Five common assumptions that prevent digital transformation at higher education institutions. *INTED Proceesings*, pp. 1448-1457.
48. Li Han Wong, B., Maaß, L., Vodden, A., Van Kessel, R., Sorbello, S., Buttigieg, S. & Odone, A. (2022, March 3). *The dawn of digital public health in Europe: Implications for public health policy and practice*, *14*, pp. 1-7.
49. Lund, S., Madgavkar, A., Manyika, J., Smit, S., Ellingrud, K., Meaney, M. & Robinson, O. (2021, February 19). *The future of work after COVID-19*. Retrieved April 10, 2022, from https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19
50. Mandl, I. (2021, December 15). *Employment impact of digitalisation*. Retrieved May 2, 2022, from https://www.eurofound.europa.eu/data/digitalisation/research-digests/employment-impact-of-digitalisation
51. McKinsey & Company. (2020, October 5). *How COVID-19 has pushed companies over the technology tipping point—and transformed business forever*. Retrieved May 30, 2022, from https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/how-covid-19-has-pushed-companies-over-the-technology-tipping-point-and-transformed-business-forever
52. National Health Service (NHS). (2021, September). *Definition of digital inclusion.* Retrieved May 22, 2022, from https://digital.nhs.uk/about-nhs-digital/our-work/digital-inclusion/what-digital-inclusion-is
53. Nishant, K. (2020, May 7). *Social and Ethical Implications of Digital Transformation: AI in Synthetic Biology*. Retrieved May 22, 2022, from https://www.linkedin.com/pulse/social-ethical-implications-digital-transformation-ai-nishant/
54. Olmstead, L. (2021, December 2). *9 Critical Digital Transformation Challenges to Overcome (2022)*. Retrieved May 5, 2022 from https://whatfix.com/blog/digital-transformation-challenges/

55. Organization for Economic Co-operation and Development (OECD). (2021). *Development Co-operation Report 2021: Shaping a Just Digital Transformation*. Paris: OECD Publishing. Retrieved April 5, 2022 from https://doi.org/10.1787/ce08832f-en
56. Parker K., S., Knight, C. & Keller, A. (2020, July 30). *Remote Managers Are Having Trust Issues*. Retrieved April 17, 2022, from https://hbr.org/2020/07/remote-managers-are-having-trust-issues
57. Pinto, R. & Vincenzo, R. (2020). *European social and regional funds must prioritise digital skills investments*. Brussels: DIGITALEUROPE.
58. Pinto, R., Renda, V. & Hellebrand, T. (2020). *The new Digital Education Action Plan should boost digital's role as enabler of innovative and flexible learning*. Brussels: DIGITALEUROPE.
59. PwC. (2019). *Skills for Smart Industrial Specialisation and Digital Transformation*. Brussels: European Commission.
60. PwC. (2021, February). *Hopes and fears 2021*. Retrieved March 2, 2022, from https://www.pwc.com/gx/en/issues/upskilling/hopes-and-fears.html
61. Ratcliff, C., Martinello, B., Ciucci, M., Sofsky, F. & Kaiser, K. P. (2022, January). *Digital Agenda for Europe*. Retrieved April 16, 2022, from https://www.europarl.europa.eu/factsheets/en/sheet/64/digital-agenda-for-europe
62. Rometty, G. (2017). Danes digitalno, jutri kognitivno. *Global, 17*(5), p. 8.
63. Sarpong, E. (2021). *The Digital divide in Europe. Towards meaningful connectivity*. ITU Regional Forum on Meaningful Connectivity.
64. Servoz, M. (2019). *AI, the future of work? Work of the future!: on how artificial intelligence, robotics and automation are transforming jobs and the economy in Europe*. Brussels: Publications office of the European Union.
65. SheCodes. (2022, May). *Hands-on Coding Workshops for Women.* Retrieved May 23, 2022, from https://www.shecodes.io/
66. Smith, B. (2020, June). *Microsoft launches initiative to help 25 million people worldwide acquire the digital skills needed in a COVID-19 economy*. Retrieved June 23, 2022, from https://blogs.microsoft.com/blog/2020/06/30/microsoft-launches-initiative-to-help-25-million-people-worldwide-acquire-the-digital-skills-needed-in-a-covid-19-economy/
67. SovTech. (2020, June). *6 Benefits of Digital transformation in education*. Retrieved April 25, 2022, from https://www.sovtech.co.za/6-benefits-of-digital-transformation-in-education/
68. Spudyte, I. (2021, May). *Digital Skills & Jobs Platform – the new home of digital skills in Europe*. Retrieved May 24, 2022, from https://www.digitalsme.eu/digital-skills-jobs-platform-the-new-home-of-digital-skills-in-europe/
69. Starkov, M. (2022, April). *Hospitality Digital Technology: Challenges, Priorities and Buzzwords*. Retrieved April 18, 2022, from https://hoteltechnologynews.com/2019/03/hospitality-digital-technology-challenges-priorities-and-buzzwords/

70. Tech4i2. (2020). *International Digital Economy and Society Index*. Brussels: European Commission.
71. UNESCO International Bureau of Education. (2013). *IBE Glossary of Curriculum Terminology.* Geneva: UNESCO IBE.
72. United Nations Educational, Scientific and Cultural Organization (UNESCO). (2018, March). *Digital skills critical for jobs and social inclusion*. Retrieved February 2, 2022, from https://en.unesco.org/news/digital-skills-critical-jobs-and-social-inclusion
73. United Nations. (2020). *The impact of digital technologies*. New York: UN.
74. Vroman, S. R. & Tiffany, D. (2022, January). *How to Build a Successful Upskilling Program*. Retrieved May 8, 2022, from https://hbr.org/2022/01/how-to-build-a-successful-upskilling-program?registration=success
75. WeHubs. (2022, May). *Summary*. Retrieved May 8, 2022, from http://wehubs.eu/summary/
76. Women4IT. (2022, May). *Our Mission*. Retrieved May 8, 2022, from https://women4it.eu/about-us/
77. World Economic Forum (WEF). (2015). *Understanding the impact of digitalization on society*. Retrieved May 8, 2022, from https://reports.weforum.org/digital-transformation/understanding-the-impact-of-digitalization-on-society/
78. World Economic Forum (WEF). (2018). *The Future of Jobs Report 2018*. Retrieved May 8, 2022, from https://www.weforum.org/reports/the-future-of-jobs-report-2018/
79. World Economic Forum (WEF). (2020a, January). *We need a global reskilling revolution – here's why*. Retrieved May 16, 2022, from https://www.weforum.org/agenda/2020/01/reskilling-revolution-jobs-future-skills/
80. World Economic Forum (WEF). (2020b). *Reskilling Revolution Platform*. Retrieved May 8, 2022, from https://www.weforum.org/projects/reskilling-revolution-platform
81. World Economic Forum (WEF). (2020c). The Future of Jobs Report 2020. Geneva: World Economic Forum. Retrieved March 23, 2022, from https://www.weforum.org/reports/the-future-of-jobs-report-2020/
82. World Economic Forum (WEF). (2021). *Upskilling for Shared Prosperity*. Geneva: World Economic Forum.
83. Yardley, D. (2018, April). *The top five ethical | moral principles for digital transformation*. Retrieved April 6, 2022, from https://www.consultancy.uk/news/16602/the-top-five-ethical-moral-principles-for-digital-transformation
84. Zaripova, R., Tyurina, M., Rocheva, O. & Chupaev, A. (2020, March 30). *Major Trends in the Digital Transformation of Agriculture. Proceedings of the "New Silk Road: Business Cooperation and Prospective of Economic Development" (NSRBCPED 2019).*

85. Zsarnoczky, M. (2018). *The Digital Future of the Tourism & Hospitality Industry*. Retrieved March 22, 2022, from https://www.bu.edu/bhr/files/2018/06/The-Digital-Future-of-the-Tourism-and-Hospitality-Industry.pdf

APPENDICES

Appendix 1: Povzetek (Summary in Slovene language)

Zaradi prepleta različnih tehnoloških, gospodarskih in družbenih premikov se v zadnjih letih zaznava očitna potreba po hitrejši digitalni preobrazbi, ki jo je dodatno vzpodbudila pandemija koronavirusne bolezni (COVID-19). V luči pandemskih razmer so bila namreč številna podjetja primorana prilagoditi svoje poslovne procese in dejavnosti, spremenili pa so se tudi vedenje in potrebe potrošnikov. Pričujoče magistrsko delo obravnava razvoj digitalne preobrazbe in naslavlja problematiko odpravljanja vrzeli v digitalnih veščinah v Evropi.

Digitalna preobrazba predstavlja integracijo digitalnih tehnologij, procesov in kompetenc, s ciljem poenostavitve ustaljenih načinov dela in doseganja višje rasti, učinkovitosti, inovativnosti, konkurenčnosti in trajnostnega razvoja podjetij. Digitalna preobrazba pa ne zadeva zgolj podjetij in njihovega delovanja – njen vpliv spreminja celotne panoge, delo in delovanje zaposlenih, življenja posameznikov ter obnašanje družbe nasploh.

Za uspešno izvedbo procesa digitalne preobrazbe so potrebne velike naložbe v digitalne tehnologije, ki predstavljajo gonilno silo digitalne preobrazbe, pri čemer je nujno zagotoviti tudi ustrezno usposabljanje, razvoj in nadgrajevanje digitalnih veščin delovne sile oziroma usmerjati njeno prekvalificiranje. Poleg tega je treba nadgrajevati infrastrukturo, urediti zakonodajo s tega področja, vključno z vprašanjem zasebnosti, nasloviti problematiko omejenega dostopa do financiranja, s katerim se soočajo zlasti mala in srednje velika podjetja ter poudariti pomen digitalne vključenosti, s katero se zagotavlja vsem posameznikom in skupnostim enak dostop do digitalnih orodij in internetne povezave.

Magistrsko delo sestavljata teoretični in empirični del. Cilj teoretičnega dela magistrskega dela je analizirati raven dosedanjega digitalnega razvoja v Evropi, njegov napredek in vpliv na obstoječa delovna mesta ter ovire za razvoj veščin, potrebnih pri novih načinih opravljanja dela. Cilji empiričnega dela pa so raziskati vrzel v digitalnih veščinah v Evropi, ugotoviti, do katere mere so mladi zaposleni pripravljeni nadgraditi svoje obstoječe veščine v luči digitalne preobrazbe oziroma se prekvalificirati ter podati oceno njihovega odnosa do digitalne preobrazbe in avtomatizacije. Namen magistrskega dela je osvetliti problematiko vrzeli v digitalnih veščinah in identificirati ključna področja, na katerih je treba delati, da bi se lahko ta vrzel zapolnila. Z boljšim razumevanjem problematike se lahko lažje sprejme ustrezne ukrepe, ki lahko pozitivno vplivajo ne le na organizacije in njihove zaposlene, ampak posledično, v širšem smislu, tudi na gospodarstvo in družbo kot celoto.

V teoretičnem delu najprej opredelimo digitalno preobrazbo ter predstavimo njen vpliv na različne sektorje ter trg dela v Evropi, pri čemer predstavimo še ovire digitalne preobrazbe – z etičnega, družbenega in zakonodajnega vidika. V nadaljevanju

predstavimo lastnosti in potrebe trga dela prihodnosti, pri čemer najprej naštejemo obstoječa delovna mesta in veščine, ki bodo najverjetneje najbolj prizadeti zaradi sprememb, ki jih prinaša digitalna preobrazba, nato pa tista, nova, ki bodo ustvarjena tekom digitalne preobrazbe in veščine, ki jih bodo le-ta zahtevala. Potem podrobneje predstavimo digitalne spremembe, ki so jih uvedle organizacije zaradi okoliščin pandemije COVID-19, pri čemer v ospredje postavimo uvedbo dela na daljavo, njegov vpliv na zaposlene in organizacije. V nadaljevanju podamo opredelitev digitalnih veščin, naštejemo dejavnike, ki vplivajo na raven digitalnih spretnosti zaposlenih, vključno s tistimi, ki so jih povzročile razmere pandemije COVID-19, ter natančneje predstavimo pojavnost potreb po nadgrajevanju digitalnih veščin in prekvalificiranju zaposlenih. Osvetlimo še pomen vključenosti in problematiko enakosti med spoloma v kontekstu digitalne preobrazbe. V zadnjem delu teoretičnega dela pa naštejemo vidnejše iniciative Evropske unije, katerih cilj je zmanjšanje vrzeli v digitalnih veščinah, in predstavimo dobre prakse določenih posameznih držav članic pa tudi večjih mednarodnih podjetij na tem področju.

V empiričnem delu magistrskega dela predstavimo ugotovitve kvantitativne raziskave, ki smo jo izvedli s pomočjo spletnega anketnega vprašalnika, na katerega sta odgovorila 102 posameznika med 24 in 38 letom starosti iz 16 evropskih držav. Na podlagi zbranih podatkov odgovorimo na naslednja raziskovalna vprašanja:

- 1. Raziskovalno vprašanje: Kakšen je splošen odnos mladih zaposlenih do digitalne preobrazbe? Ali nanj vplivata njihova raven digitalnih veščin in stopnja izobrazbe?
- 2. Raziskovalno vprašanje: Ali so se zaposleni pripravljeni nadgraditi svoje digitalne veščine oziroma se prekvalificirati?
- 3. Raziskovalno vprašanje: Ali zaposleni menijo, da avtomatizacija vodi v izgubo zaposlitve?
- 4. Raziskovalno vprašanje: Ali mladi zaposleni menijo, da napredne digitalne veščine (veščine IKT) večajo zaposljivost?

Rezultati raziskave pokažejo, da imajo vprašani v povprečju precej pozitiven odnos tako do digitalne preobrazbe kot tudi do nadgrajevanja veščin oziroma prekvalifikacije, ki sta pozitivno povezana pojava. Njihov odnos do teh dveh konstruktov napoveduje raven njihovih digitalnih veščin – boljše kot so njihove digitalne veščine, boljši je tudi, v povprečju, njihov odnos do digitalne preobrazbe in bolj so pripravljeni nadgraditi svoje obstoječe digitalne veščine oziroma se prekvalificirati. Ugotovimo tudi, da imajo mlajši posamezniki boljši odnos do digitalne preobrazbe, da imajo moški v povprečju boljše digitalne veščine kot ženske in da stopnja formalne izobrazbe ni povezana z odnosom do digitalne preobrazbe, ne napoveduje pa tudi odnosa vprašanih do nadgrajevanja veščin oziroma prekvalificiranja. Ugotovimo še, da imajo sodelujoči v povprečju pozitiven odnos tudi do avtomatizacije in da niso zaskrbljeni zaradi možnosti, da lahko avtomatizacija povzroči izgubo zaposlitve. Rezultati še pokažejo, da vprašani večinoma

menijo, da tako preprostejše kot tudi kompleksnejše digitalne veščine izboljšujejo zaposljivost.

V zadnjem delu naštejemo priporočila za nadaljnje raziskovanje, ki smo jih izoblikovali na podlagi omejitev raziskave. Ti vključujejo na primer izvedbo obsežnejše raziskave o primerjavi digitalnih veščin med zaposlenimi v različnih evropskih državah, kar bi omogočilo boljši vpogled v to, v katerih delih Evrope je vrzel v digitalnih veščinah posebej izrazita. Med drugim priporočimo tudi natančnejšo analizo pojava diskrepance v ravni digitalnih veščin med moškimi in ženskami in analizo dejavnikov, ki jo povzročajo.

Appendix 2: Survey Questionnaire

The future of work in EU: Closing the digital skills gap

My name is Nika Novak and as part of my master's thesis at the Faculty of Economics (University of Ljubljana), I will be exploring the attitude of young European workers towards digital transformation, determining whether the level of digital skills is influenced by specific factors and investigating the willingness of millennials to reskills and upskill.

The questionnaire consists of statements and questions. At the end, you will find general demographic questions. The survey is anonymous. Your answers to the questions and statements stored in the database do not therefore store any information that could identify you. It will take you 10 minutes to complete the questionnaire. Your participation is essential for this research, so I thank you in advance for your time!

PART 1 – Digital transformation

1. How would you rate your current level of digital skills?
   - **Basic level** – using a keyboard to operate a device, using online programmes, creating documents, sending out emails, basic online transactions;
   - **Intermediate level** – skills mainly related to your profession such as creating online content, digital graphic design, digital marketing skills;
   - **Advanced level** – ICT related skills such as computer programming, big data, artificial intelligence, internet of things, cybersecurity, data science.

2. The statements below refer to the general attitude you have towards digital transformation - in what way you believe it has transformed our professional and personal lives. Please rate your level of agreement with each statement.

Statement	I strongly disagree	I disagree	Neither agree nor disagree	I agree	I strongly agree
I see digital transformation as a positive phenomenon.					
I believe that specific digital skills (such as data analytics, digital					

marketing, programming, social media) lead to higher employability.					
I believe that companies who wish to stay ahead of the competition must constantly adapt to the new digital transformation trends.					
I believe that it is beneficial for companies to have a digital transformation strategy.					
Due to digitalisation, I feel I have easier and better access to information.					
Having access to my medical records online is an advantage in my opinion.					
As a consumer, I feel that the customer experience has					

improved due to digitalization (online shopping, self-checkout etc).					

PART 2 – Upskilling and Reskilling

3. The following statements refer to upskilling (learning new skills to better fit the demands of the current position) and reskilling (learning new skills to fit the demands of a new position). Please rate your level of agreement with each statement.

Statement	I strongly disagree	I disagree	I neither agree nor disagree	I agree	I strongly agree
I believe that there is a general shortage of specific digital skills.					
I believe that the required skills for my job will change over the next 5 to 10 years.					
I would participate in upskilling training if it was organized and paid by my employer.					
I would be open to upskilling/reskilling training and I am prepared to invest my free time and money for the training.					
I often take the initiative and learn					

new skills in my free time (by reading, attending online courses, trainings).					
If needed I would be willing to expand my skill set to fit the demands of another position within the same company.					
I would be willing to learn more advanced ICT skills (for example programming, big data analytics, AI etc.)					

PART 3 – Automation, job loss and job opportunities

4. The statements below relate to automation and the impact the digital transformation has had and will have on the European labor market. Please rate your level of agreement with each statement.

Statement	I strongly disagree	I disagree	I neither agree nor disagree	I agree	I strongly agree
In my opinion, digitalization is leading to more job opportunities than job losses.					
I believe that some of my daily tasks will be automized in the next few years.					
I believe my job is not threatened by digital transformation/automation.					

I believe automation will make my job easier (for example automation of repetitive tasks).					
Some skills like creative thinking and strategic decision making cannot be automized or replaced.					
Only workers with advanced digital skills will benefit from increased job opportunities.					

5. The statements below relate to automation and the type of tasks you perform at your job on a daily basis. Please rate your level of agreement with each statement.

Statement	I strongly disagree	I disagree	I neither agree nor disagree	I agree	I strongly agree
My daily tasks are highly repetitive.					
My daily tasks require manual/physical work (e.g. working in a factory, in construction, in hospitality).					
My daily tasks require problem-solving skills.					
My daily tasks require strategic decision making.					

My daily tasks require creative thinking.					
My daily tasks require data-analysis.					

PART 4 – Skills level and employability

6. The statements below relate to different types of digital skills. The theory shows that specific digital skills lead to higher employability. To which extent do you agree that the digital skills listed below are likely to lead to higher employability?

Statement	I strongly disagree	I disagree	I neither agree nor disagree	I agree	I strongly agree
Navigating a website, using search engines					
Writing and sending out emails					
Completing an online transaction such as an online purchase					
Data entry					
Using digital communication tools such as Slack, Zoom, Microsoft teams					
Social media marketing					
Digital Marketing					
Web Design					

Data analytics					
Artificial intelligence (AI)					
Web development					
Programming					
App development					

PART 5 – General questions

7. Your gender?
   - Male
   - Female

8. Your age: _____

9. Where do you come from (drop down list)?

   - Belgium
   - Slovenia
   - Germany
   - Italy
   - Romania
   - Ireland
   - Croatia
   - Bulgaria
   - Portugal
   - Hungary
   - France
   - Finland
   - Sweden
   - Denmark
   - Spain
   - Austria
   - Poland
   - Lithuania
   - Latvia
   - Greece

- Slovakia
- Czech Republic
- Cyprus
- Estonia
- Malta
- Luxembourg
- Netherlands
- United Kingdom

10. Are you currently employed?
    - Yes
    - No

11. In which sector/industry do you work?
    - IT/Communication
    - Administrative
    - Agriculture
    - Health/Social welfare
    - Education
    - Construction
    - Transport/logistics
    - Hospitality/Food industry/Tourism
    - Finance/insurance
    - Manufacturing
    - Energy supply
    - Entertainment
    - Public administration
    - Science/technology
    - Wholesale/retail
    - Other: _____

12. What is your highest level of education obtained?
    - Elementary school
    - High school
    - Under-graduate or bachelor's degree
    - Post-graduate or master's degree
    - Doctorate/PhD

13. With which European initiatives are you familiar with? (checkbox)

- Digital Agenda for Europe
- Digital Education Action Plan 2021-2027
- Digital Skills and Jobs Platform
- The European Skills Agenda
- The digital skills and job coalition
- EU Code week
- None of the above

Thank you for your participation!