

Louvain School of Management

How do European-level players - European Commission, European employer associations and European trade unions - cope with digitalisation of work?

Author(s): Pierre Bastin & Melvin De Vos
Supervisor: Evelyne Léonard
Academic year 2021-2022
Dissertation for the master of Master [120] in Management, professional
Focus
Daytime schedule

Abstract :

The digitalization of work is a topic that is becoming more and more important in our discussions today. However, few people really realize the extent to which it can affect our future. This scientific research aims to better understand the opportunities and challenges of digitalization for employees and employers and the role to be played by European actors.

In order to provide a structured answer, this work is based on the following question: "How do European-level players - European Commission, European employer associations and European trade unions - cope with digitalisation of work? To answer this research question, we consulted numerous scientific articles published by our three European institutions. These have led us to identify four key dimensions concerning the digitization of work: employment, inequalities in private companies, artificial intelligence and gender equality.

These dimensions give a better visibility on the challenges, positive and negative, of digitalization on the world of work and also allow us to better understand the impact and scope of digitalization. The conclusion of this work is that digitalization represents a major challenge for the world of work and for our European actors. It is therefore important that they accompany workers in this digital transition in order to reduce job losses and inequalities that will only increase if no measures are taken today and in the future.

UNIVERSITÉ CATHOLIQUE DE LOUVAIN
Louvain School of Management

Place des Doyens, 1 bte L2.01.01, 1348 Louvain-la-Neuve
Boulevard Emile Devreux 6, 6000 Charleroi, Belgique
Chaussée de Binche 151, 7000 Mons, Belgique
www.uclouvain.be/lsm

Foreword

The completion of this thesis was made possible thanks to the help of several people to whom we would like to express our gratitude.

First of all, we would like to thank Mrs. Evelyne Léonard for all her support and for the time she devoted to providing us with the methodological tools necessary to conduct this research.

We would also like to thank our families and friends who supported and encouraged us morally and intellectually during this writing period.

We hope that this thesis will meet the expectations of our readers and that they will enjoy reading it as much as we enjoyed writing it.

0.	Introduction	- 1 -
1.	Definition of the digital transformation process and tools	- 3 -
1.1.	The process of digital transformation	- 3 -
1.1.1.	Digitisation	- 3 -
1.1.2.	Digitalisation	- 3 -
1.1.3.	Digital transformation	- 4 -
1.2.	Industry 4.0	- 4 -
1.2.1.	Digitalisation of the work environment	- 5 -
1.2.2.	VR/AR/IA	- 6 -
1.2.3.	3D printing	- 8 -
1.2.4.	Internet of things	- 10 -
1.2.5.	Automation	- 12 -
1.3.	Conclusion	- 13 -
2.	Technological impact on employment	- 14 -
2.1.	Introduction	- 14 -
2.2.	What is the impact and stake of the digital transformation on employment?	- 15 -
2.3.	Effects on employment	- 15 -
2.3.1.	The replacement effect	- 15 -
2.3.2.	The reinstatement effect	- 16 -
2.3.3.	The real income effect	- 17 -
2.4.	Industries under digital transformation	- 18 -
2.5.	Artificial Intelligence	- 19 -
2.6.	Robots in industries	- 20 -
2.7.	Education and skills needed concerning equality gender	- 22 -
2.7.1.	Self-confidence and attractiveness	- 23 -
2.7.2.	The digital potential for empowerment	- 25 -
2.8.	Conclusion	- 25 -

3. European Commission programmes	28 -
3.1. Introduction	28 -
3.2. The European Initiatives in the field of digitalisation	28 -
3.3. Strategic objectives	29 -
3.3.1. Fostering digital literacy	30 -
3.3.2. Promoting digitally friendly policy-making in the EU	31 -
3.3.3. Fostering a digital transformation driven by business	33 -
3.3.4. Ensuring a unified digital environment	36 -
3.3.5. Reskilling the population and young population	37 -
3.3.5.1. Job placement in key capacity area	37 -
3.3.5.2. Short term training courses in key capacity areas	38 -
3.4. Conclusion	39 -
4. European Trade Union and European Employer Organization Programmes	41 -
4.1. Introduction	41 -
4.2. Impact of digitalisation on social dialogue	42 -
4.2.1. Opportunities	43 -
4.2.2. Risks	44 -
4.3. Digitalisation, a word not yet widely considered	45 -
4.4. What does ETUC do for Gender Equality?	45 -
4.5. ETUC and new form of employment due to the digitalisation	47 -
4.6. Employer organizations in Europe	48 -
4.7. European social partners frameworks agreement on digitalization	49 -
4.7.1. Digital skills and securing employment	52 -
4.7.2. Modalities of connecting and disconnecting	53 -
4.7.3. Artificial intelligence (AI) and guaranteeing the human in control principle	53 -
4.7.4. Respect of human dignity and surveillance	55 -
4.8. Conclusion	55 -

5. Discussions.....	- 56 -
6. Methodology	- 59 -
6.1. The interview process	- 59 -
6.1.1. Presentation	- 59 -
6.1.2. Types of interviews	- 60 -
6.1.3. Advantages	- 60 -
6.1.4. Disadvantages.....	- 60 -
6.1.5. Selection of the interviewee and skills required.....	- 61 -
6.2. Collection of secondary data	- 62 -
6.2.1. Presentation	- 62 -
6.2.2. Types of collection of existing data	- 62 -
6.2.3. Advantages	- 63 -
6.2.4. Disadvantages.....	- 63 -
6.2.5. Skills required	- 63 -
7. Empirical result	- 64 -
7.1. European Commission.....	- 64 -
7.1.1. Identification of the relevant documents issued by the EC	- 64 -
7.1.2. Summary of contents of these documents.....	- 65 -
7.1.3. Analysis: what to these documents say about the dimensions of our analytical framework?.....	- 67 -
7.1.4. Intermediary conclusion	- 68 -
7.2. European Trade Union Confederation.....	- 69 -
7.2.1. Identification of the relevant documents issued by the ETUC.....	- 69 -
7.2.2. Summary of the content of these documents	- 70 -
7.2.3. Analysis: what to these documents say about the dimensions of our analytical framework?.....	- 73 -
7.2.4. Intermediary conclusion	- 73 -
7.3. European employer organizations: BusinessEurope	- 74 -

7.3.1.	Identification of the relevant documents issued by BusinessEurope	74 -
7.3.2.	Summary of the content of these documents	74 -
7.3.3.	Analysis: what to these documents say about the dimensions of our analytical framework?.....	80 -
7.3.4.	Intermediary conclusion	81 -
7.3.5.	Additional input.....	81 -
7.4.	Joint initiatives (ETUC & BusinessEurope).....	83 -
7.4.1.	Identification of the relevant documents issued by the Joint initiatives	83 -
7.4.2.	Summary of the content of these documents	83 -
7.4.3.	Analysis: what to these documents say about the dimensions of our analytical framework?.....	88 -
7.4.4.	Intermediary conclusion	88 -
7.5.	The back up Joint initiatives (ETUC & BusinessEurope).....	90 -
7.5.1.	Identification of the relevant documents issued by the back up	90 -
7.5.2.	Summary of the content of these documents	90 -
7.5.3.	Analysis: what to these documents say about the dimensions of our analytical framework?.....	91 -
7.5.4.	Intermediary conclusion	92 -
8.	Comparison of empirical results	94 -
8.1.	Employment and digital skills	94 -
8.2.	SMEs and inequalities	95 -
8.3.	Artificial intelligence	96 -
8.4.	Gender equality: Blindspot.....	98 -
9.	Recommendations	99 -
10.	General conclusion.....	102 -
11.	References	103 -

0. Introduction

The research and analysis of our thesis is based on one main question which is: «*How do European-level players - European Commission, European employer associations and European trade unions - cope with digitalisation of work?*». In order to answer this question, we will divide our thesis into two distinct parts.

The first part will be our theoretical basis. We will start with the first chapter by defining the three stages of digital transformation as well as Industry 4.0 and the new technological tools it brings with it. The second chapter will contain a summary of the research on the effects and challenges of digital transformation and will define our field of analysis. The digital transformation of work is a broad topic, so it is important for us to define a range of issues and effects that will serve as a pillar of analysis. Chapters 3 and 4 will focus on the role and initiatives of our different institutions, namely the European Commission for the 3rd and the European Trade Union Confederation and the European employer organisation for the 4th chapter.

Then, after presenting the theoretical part of our work, we will carry out an empirical part which will first of all take up the methodology that we will have followed in order to best answer our research question and then the empirical results of our various researches which will be the final answers to our research question. In concrete terms, this part will aim to highlight the different dimensions that we have defined beforehand and see how our three European actors manage to deal with them in the context of digitalisation.

Then we will make recommendations based on all the information we have gathered. And finally, we will close this work with a general conclusion.

Theoretical results (1)

1. Definition of the digital transformation process and tools

1.1. The process of digital transformation

1.1.1. Digitisation

“Digitisation can be described as transforming physical entities into digital objects”. (Rijswijk & al., 2020)

Digitisation occurs when an analogue process is transformed digitally without changing the nature of the process. Before the advent of digitisation, all business documents and data were of an analogue nature. Information was difficult for companies to collect, transfer or analyse. With the widespread use of computers, companies got into the habit of converting all their analogue information into digital information. Once the information is digitised, it becomes unlimitedly accessible, editable from anywhere, traceable and transparent to all, but also easier to plan and automate.

In addition, during the 1960s and 1970s, computer use became widespread, and a lot of manual tasks were replaced by automation. Thus, a single or a small number of digital technologies used at the corporate level are frequently associated with digitization (Rijswijk & al., 2020). And digitisation is referred as industry 3.0 for authors such as Schwab (2017).

However, the digitisation of the data has been designed so that the transfer and management of the data remains similar to the analogue data process. But digitisation can often be a source of uncertainty for companies and raise questions such as the costs, the resources needed or how the industry might be affected. Digitalisation has a major impact on management. That is why it must therefore be taken into account in its entirety and understood in order to be adapted as well as possible to existing processes.

1.1.2. Digitalisation

The rise of the internet in the 1980s and 1990s, and the increased connectivity it brought, allowed for greater coordination and integration between activities. While this process of automation and increasing connectivity is still ongoing, the next wave of digital technology has

emerged (Porter & Heppelmann, 2014) which can be again referred as the fourth industrial revolution according to Schwab (2017).

Digitalisation is the use of digital data to work more efficiently. The use of digital technologies aims to provide new opportunities to produce value by changing the business model. This is known as the process of transition to a digital enterprise. With digitalisation going mainstream, people have started to invent new ideas to develop digital data to make it faster to use but also in a more efficient way while reducing costs.

1.1.3. Digital transformation

Digital transformation is a fundamental change that involves creating or altering the way a business process or culture operates in order to achieve desired organisational goals to create value for customers. The adoption of cutting-edge, high-impact technologies by enterprises and the effects these technologies have on society are referred to as the "digital transformation" of the EU. Digital platforms, the Internet of Things (IoT), wearable technology, and artificial intelligence (AI) are few examples of new technologies that disrupt important sectors (García, 2021).

Digital transformation is changing the way companies got use to work. They have had to adapt or even change their processes to make them compatible with digitalisation. But the important thing is that the company understands what the right mix of optimisation and transformation is. Once this is defined, it will be easier for the company to achieve its organisational goals. Digital transformation is about re-inventing a business to take advantage of the digital age.

1.2. Industry 4.0

Having presented what digital transformation means in its globality, the next part will deal with Industry 4.0, also described as digitalisation earlier in this thesis.

Water and steam power were utilised in the First Industrial Revolution to automate production. Electricity was employed by the Second to facilitate mass production. The Third automated production using electronics and information technologies. The Third Industrial Transformation, the digital revolution that has been taking place since the middle of the previous century, is now giving way to a Fourth Industrial Revolution. The distinction between the physical,

digital, and biological domains is becoming increasingly muddled as a result of a convergence of technology (David, 2016).

There is no precedent in the past for the speed of modern advances. The Fourth Industrial Revolution is developing exponentially rather than linearly when compared to earlier ones. More significantly, it is upending virtually every industry in every nation. Additionally, the magnitude and depth of these changes portend a complete overhaul of the management, governance, and production systems (David, 2016).

With unprecedented processing, storage, and knowledge access capabilities brought about by billions of people being connected via mobile devices, the possibilities are virtually limitless. And new technological developments in areas like artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3d printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing will multiply these opportunities (David, 2016)

1.2.1. Digitalisation of the work environment

Various terms have been used to characterize the present wave of technological progress, including the second machine age, the fourth industrial revolution, and Industry 4.0. It is separate from the so-called third industrial revolution, which gave rise to information and communication technologies (ICT) such as computerisation and the internet. The present technology wave has been made feasible by the exponential growth in computer power and data storage, as well as the declining cost of software and hardware. Data or digital information has become a strategic asset. Many firms and organizations now capture and store data as a primary function (Eurofound, 2021, October).

AI is important to the technology's capacity to extend and intensify the digital automation process. The most important characteristic of digital automation is that it minimizes human involvement in production while extending the role of machines via the use of networks and data. In other words, it enables a transition to less labor-intensive, more automated procedures.

Throughout history, technology advancement has been utilized to replace people - in whole or in part - in the execution of specific activities. Initially, industrial automation was restricted to manual jobs; for instance, the proliferation of machines in manufacturing displaced millions of

manual labor. Capitalist economies have evolved deindustrialization processes due in part to the greater usage of automated manufacturing methods (Eurofound, 2021, October).

Currently, advancements in computer technology offer the foundation for the automation of ordinary intellectual work, threatening the bulk of occupations in modern capitalist countries, which are in the service sector. Human operations requiring adaptability and learning may now be automated or supplemented by digital automation driven by artificial intelligence. In some circumstances, "intelligent" robots have the capacity to imitate and surpass human intellect. In this instance, new digital technologies promise to minimize the amount of labor necessary for manufacturing and to enable the removal of positions previously believed to be immune to automation. These technologies also promise to alter how work is performed (Eurofound, 2021, October).

There are several essential phrases associated with the concept of digital automation. Here are a few things we shall examine in further detail: VR/AR/IA, 3D printing and the Internet of Things.

1.2.2. VR/AR/IA

Virtual reality (VR), augmented reality (AR), and artificial intelligence (AI) are the technologies of the future that will alter how people live and how businesses work today. Today, businesses utilize a variety of software solutions to improve their operations and increase their profitability. They are continuously modernizing its technological stack in order to adapt swiftly to shifting business trends and rising client demand. AI, VR, and AR are next-generation technologies that have a significant influence on businesses, and organizations are maximizing their efficiency in a number of ways. They've enabled them target customers without aggressive marketing efforts and increase revenues overall (PaleBlue Newsroom, 2021).

There are several additional ways in which AI, VR, and AR are altering the workplace, and it would be fascinating to examine their contribution to accelerated growth.

Applications of virtual reality, augmented reality and artificial intelligence on the work environment:

- Employee onboarding: the HR department strives to acquire and retain the finest employees for as long as possible. In certain circumstances, though, employees quit the company after weeks or months of joining. This is due to the fact that they do not feel at ease in the work environment or have a different outlook on their vocation. Virtual reality can aid in overcoming induction issues and improving staff retention. Before joining an organization, VR may be used to enlighten workers about the sort of work they will be performing, providing them with more understanding about their tasks. They can experience corporate locations, numerous business activities, and even a meeting in a conference room that they would not have otherwise. This aids the process of assimilation. In addition to augmented reality and virtual reality, the HR department may leverage AI-powered recruiting tools to automatically exclude unsuitable candidates and improve the hiring process. There are several AI uses in the recruiting process, including the use of virtual HR bots to help candidates during the hiring process, on-demand text interviews, and automated interview scheduling, among others (PaleBlue Newsroom, 2021).
- Staff training: employee training is highly time- and cost-intensive, and if the training sessions are insufficiently comprehensive, it might add to the business's expenses. VR and AR technologies can enhance the interactivity and effectiveness of this endeavor. According to a poll, employees feel more secure following VR training and demonstrate a 40% improvement compared to classroom instruction. It allows staff to collect more data in a shorter amount of time. It can enable them to take a virtual tour of corporate premises or industrial facilities and demonstrate how the organization as a whole functions and what their position is. Some businesses expose employees to physical damage without sufficient training; VR and AR can greatly minimize these risks by teaching staff in a virtual environment (PaleBlue Newsroom, 2021).
- Facilitating remote work: The combination of holographic pictures with AR and VR settings has enabled businesses to virtually move personnel from distant places into conference spaces. As the trend toward remote work rises, augmented reality and virtual reality can further improve the experience. Workers may utilize this technology to visually describe each element of the product to international clients. Imagine substituting VR glasses for cameras and head-phones in a video meeting. Numerous well-known corporations have already adopted this new practice. Facebook just declared that it will permanently embrace remote work and will employ VR and AR technology to do it (PaleBlue Newsroom, 2021).

➤ Increase productivity: Similar to augmented reality and virtual reality, artificial intelligence has a significant influence on corporate change. Offices utilize them to automate the workflow of corporate procedures and simplify the overall operation. It eliminates human mistake and decreases the administrative effort. Most contemporary task management software systems utilize artificial intelligence to track and prioritize staff work. They increase worker productivity and increase their accountability for their job. Software of the highest caliber monitors workflows and gives intelligent suggestions for further enhancing company operations (PaleBlue Newsroom, 2021).

➤ Data analytics: In the digital era, data is everything, and if employees can analyze that data, their everyday activities may be significantly enhanced. AI provides employees with a deeper understanding of their performance in respect to marketing efforts, client connections, project expenses, etc. It decreases the likelihood of making a poor choice and enhances the company's bottom line (PaleBlue Newsroom, 2021).

Enhance customer service: Many businesses use AI-based chatbots to enhance customer service. These chatbots facilitate more robust human-computer interaction and alleviate pressure on support desks. Intelligent and responsive to client inquiries, chatbots based on AI are intelligent. Technophiles are attempting to create chatbots with "human" behavior. AR can play a significant part in creating a chatbot with human-like appearance, speech, and behavior. By merging augmented reality with AI-powered chatbots, businesses may enhance the customer experience; they can utilize face recognition and voice pattern analysis to customise the dialogue and engage the client (PaleBlue Newsroom, 2021).

The numerous uses of VR, AR, and AI in the workplace have already made great strides, but their potential is still thought to be enormous. One can only imagine about the effects of these technologies on the future of work.

1.2.3. 3D printing

From printing novelty items to printing hearing aids to printing spaceship engines, 3D printing technology is quickly becoming an integral component of the future of manufacturing. Three-dimensional printing has existed since the 1980s.

Depending on the sector, 3D printing may be used for many reasons, although the technology has not yet reached full operational maturity.

In the manufacturing industry, 3D printing is a supplement to existing production techniques, not a replacement. Quick prototyping in the automotive and aerospace industries, which enables rapid iteration and testing throughout product development, is one of the most prevalent use cases. In design and architecture, 3D printing is also utilized for prototype, allowing experts to rapidly test concepts and variations (Eurofound, 2021, October).

Complex, high-performance objects may also be manufactured with 3D printing. These difficult-to-manufacture components are in high demand in the automotive, aerospace, and medical industries. However, large-scale implementation of this technology has been limited, even in these industries, due to complicated functional and performance requirements, high part prices, and stringent regulatory compliance requirements. In the next 5 to 10 years, 3D printing is anticipated to become increasingly prevalent in the manufacturing of machinery and equipment, as well as in their maintenance and repair, due to the fact that individual components may be manufactured more quickly and easily (Eurofound, 2021, October).

In the healthcare industry, 3D printing is utilized to create one-of-a-kind, highly personalized medical items and gadgets that take into account human requirements. Some hospitals are already utilizing 3D printing to produce physical replicas of patients' organs in order to better prepare their personnel for complex procedures (Eurofound, 2021, October).

Additionally, 3D printing has played a significant part in the response to the COVID-19 pandemic by facilitating the quick and local fabrication of items and equipment. The fabrication of 3D-printed replacement breathing valves, visors, and pads, to mention a few, has quickened. Within the next 5 to 10 years, 3D printing might be utilized in the medical field (Eurofound, 2021, October).

Construction is another industry where 3D printing is not currently widespread but has the potential to be very disruptive. The industry has realized in recent decades that there is much to be gained by better planning prior to the start of a project. The construction industry might undergo a transformation if 3D printing is combined with BIM technologies, which include the development of digital models. Additionally, innovation in construction materials is increasing the sector's embrace of 3D printing (Eurofound, 2021, October).

3D printing is also being investigated in a number of other areas, ranging from the printing of food items to the design and manufacture of a variety of consumer products, such as clothing, fashion and lifestyle products (such as furniture, jewelry, and accessories), as well as home gadgets and decorations. In the near future, these apps may become more prevalent, as they are mostly pushed by startups (Eurofound, 2021, October).

As 3D printing creates items from 3D model data, designs may be readily altered and customized to meet unique requirements, but traditional manufacturing processes are unable to manufacture personalized goods. Numerous items, such as medical and dental gadgets and implants, are currently mass-customizable. Although experts concur that 3D printing will be utilized in an increasing number of manufacturing industries in the future, the technology is not competitive enough for mass production and is better suited for the manufacture of items with a high added value (Eurofound, 2021, October).

1.2.4. Internet of things

IoT enables sensor-equipped digital devices to connect through the internet and record, transmit, and process massive quantities of data in real time. Among the three digital technologies (VR/3D printing/IoT), IoT is the most prevalent across a range of industries, and the number of commercial applications is projected to increase over the next 5 to 10 years, according to the results of a Delphi poll. Existing IoT studies indicate a wide variety of present and prospective IoT uses (Gil et al, 2016).

Monitoring production processes and equipment status, shop floor and supply chain management, and inventory management and control are becoming increasingly widespread in industrial manufacturing. The Internet of Things also enables the optimisation of networked and automated manufacturing operations, reducing the need for human decision-making and creating "smart factories" defined by a highly digitised and linked production environment. Internet of Things sensors may link all industrial process components, enabling supply chain integration. The use of IoT in industrial production will rise over the next 5 to 10 years, expanding beyond the control of equipment and plants to the management of plant networks, according to consulted experts (business ecosystem level) (Eurofound, 2021, October).

Smart meter monitoring of power, gas, and water production and consumption is the most prominent IoT use case in the utility sector. According to IDC (2019), in terms of revenue and expenditure, the utilities business is one of the major IoT markets. In addition, Global Industry Insights (2017) projects that by 2024, the utilities IoT industry would generate \$15 billion (€12.5 billion) in revenue (Eurofound, 2021, October).

Agriculture is another field where IoT technologies are gaining popularity. They are used to monitor the quality of agricultural output, provide product traceability and quality control, and organize distribution. According to experts questioned, IoT technology will enable "smart farming" and "precise farming" over the next five to ten years (Eurofound, 2021, October).

IoT also offers several transport and storage application scenarios. In this area, IoT is most typically applied to fleet or asset monitoring and optimization, as well as predictive maintenance. As part of smart city projects, IoT solutions for optimizing urban public transportation are being examined. The Internet of Things technology captures massive amounts of data in real time from all connected trams and buses. This data is used to monitor the various health parameters of the vehicles and equipment, identify potential issues, and initiate preventative maintenance activities (Eurofound, 2021, October).

According to consulted experts, the transport sector is one in which the Internet of Things holds great promise for the future, as it enables the management of connected multimodal transport and the assessment of infrastructure capacity for more efficient management of freight flows within large-scale networked systems, such as for trains or cargo ships.

In the workplace, IoT may be used to track employee actions and behaviors as a means of improving efficiency, potentially enabling for intrusive monitoring and surveillance of employee performance, such as monitoring the duration of breaks and travel outside of work (Eurofound, 2020).

While the Internet of Things offers benefits, it also introduces a number of key disadvantages. Listed below are some downsides of the Internet of Things:

- Security issues: IoT systems are networked and interact over networks, which raises security concerns. Thus, despite security precautions, the system gives minimal control and can lead to a variety of network assaults.
- Privacy concerns: The IoT system offers sensitive personal data in every detail without the user's consent.
- Increased unemployment: Unskilled and even skilled people are at a significant danger of losing their jobs, resulting in increased unemployment. Intelligent surveillance cameras, robotics, ironing systems, washing machines, and other devices have replaced the humans who formerly performed these tasks.
- System complexity: The design, development, upkeep, and activation of the broad IoT system technology is highly difficult.
- Extreme likelihood of system-wide corruption: It is conceivable that every linked device will be corrupted if a system error occurs.
- Lack of international standardisation: As there is no universal standard for IoT interoperability, it is difficult for devices from various manufacturers to connect with one another.
- High dependence on the internet: They cannot function properly without the internet due to their strong dependency on it.
- Decreased mental and physical activity: Excessive use of the internet and technology makes individuals uneducated, as they rely on smart gadgets rather than performing physical labor, causing them to become sluggish and sedentary (Prasanna, 2022).

Obviously, all of this is still rather distant. Some of our current infrastructure would require replacement. However, we can anticipate that IoT will have an impact on the majority of businesses, particularly the health sector, which will witness advancements in diagnoses, treatments, and predictive health monitoring.

1.2.5. Automation

Automation is one of the 'vectors of change' identified as part of the broader notion of 'digitalisation' in Eurofound's conceptual framework. It is the replacement of

human input, in full or in part, by machine or software input. Advanced robotics, both for services and for manufacturing, is grouped with autonomous vehicles under the automation vector, since the ultimate aim of their application is to substitute machine input for human input. (Eurofound, 2021, December)

For a very long time, manufacturing has utilised robots. However, advances in technology have made it possible to use a new breed of robots called advanced robots, which can carry out tasks beyond simple, repetitive motions. Robotics has becoming more prevalent in the services industries as a result of this trait (Eurofound, 2021, December).

In corporate logistics and automobile manufacturing, the usage of advanced robots is a prevalent practise that is quickly developing (Eurofound, 2021, December).

Digitalization is utilised in conjunction with advanced robotics, such as remotely controlled or operated robots. Artificial intelligence and robotics are frequently used in tandem to address labour shortages, such as in smaller robots that cooperate with people (Eurofound, 2021, December).

1.3. Conclusion

We have therefore seen that digital transformation is a process of 3 distinct stages which includes digitisation, digitalisation and digital transformation. The digital transformation refers to the fourth industrial revolution.

That is why we thought it was relevant to analyse the fundamental tools of this revolution. The most interesting tools were the use of artificial intelligence and all the opportunities it can offer, the IoT which allows objects and machines to communicate with each other and finally the automation induced by the use of robots. This is obviously only a small sample of the different tools that exist in today's industries.

2. Technological impact on employment

2.1. Introduction

In 2022, we are in the fourth industrial revolution on the threshold of the fifth. For almost 300 years, employment has undergone many changes. Employment has been shaped by many adjustments and technological improvements over the years.

Compared to a hundred years ago, work has really changed in many ways, especially in terms of working conditions, which many years ago were very atrocious. Another factor that has changed dramatically is the demand for skills which has soared in recent years. Today, companies require their employees to have more and more skills in order to perform their tasks better and faster.

As we said above, employment has been shaped over the last few centuries, but today we may be facing one of the fastest and most significant changes the world of work has ever experienced. The advent of digital transformation is a big step towards automation and innovation for development.

In this chapter, we will see that this fourth and fifth industrial revolution raises questions about the future of work. While some reports express concerns about the future of employment, others are more confident and serene about the opportunities that lie ahead. We will therefore try to summarise main publications expressing the impact and consequences of the mass digital transformation.

The digital transformation raises the question of creation and destruction of jobs. Many articles have already been written on the subject but the results tend to vary. We will therefore try to provide a clear and precise answer on the subject and understand what kind of effects and consequences the digital transformation can have on employment.

Another point we will explore is gender equality. Digital technologies have changed many aspects of our lives. Their potential is enormous and is capable of significantly improving the social and economic performance of our society in many ways. However, it is apparent that there is literally a digital divide between men and women caused by multiple facets. These

include the lack of education and technological knowledge, the unattractiveness of the digital profession for women and the lack of self-confidence, the potential of digital technology for women's empowerment and cybersecurity. We will so analyse and explain these different points in order to better understand how this gender gap could be reduced.

We will also group together the recommendations made by the authors concerning the measures to be taken in order to manage this digital transition. We will then compare these data with the initiatives and plans introduced by European institutions and actors in chapter 3 & 4.

2.2. What is the impact and stake of the digital transformation on employment?

According to McKinsey (2017) quoted by Gasparri & Tassinari (2020) the effects of digitization on replacing jobs could be significant, especially for low-skilled individuals in low-paying industries and according to Degryse (2016) also quoted by Gasparri & Tassinari that it is also the case for countries with underdeveloped e-skills and digital infrastructure. These developments have sparked a discussion regarding the effects of digitisation on long-standing unions and their function in the management of work relations.

But the fact is that the analysis is based on countries that are less developed in terms of digital skills and is not sufficient to capture the full effect on employment. That is why we put our most interest on the report of Hötte & al. (2022). This paper reviews more than 100 papers on the different impacts of digital transformation on employment. The authors synthesised the response items and categorised them according to their frequency of occurrence.

2.3. Effects on employment

In the literature review Technology and Jobs, Hötte & al. (2022) indicate that there are two direct and one indirect effects on employment in the context of digital transformation.

2.3.1. The replacement effect

The first direct effect is the *replacement effect* and has the most direct technological impact on employment. This result happens when a company adopts a new technology that enables it to use less labour to produce the same amount of output. They rely on the general notion that technology is the ability to change a certain set of inputs into outputs. When the amount and/or quality of inputs or outputs vary, technological change occurs (Hötter & al., 2022, p. 6).

This replacement effect therefore creates productivity growth. And according to L. Soete (2018) in the book *Work in the digital age*, understanding any discussion of the effects of new technology on employment requires consideration of productivity growth. Because if a society wants to offer better standards of living in the long term, its overall productivity must increase. Other types of technical development may result in an increase in productivity. For example, while maintaining the same amount of input needs, technological advancement may potentially enhance output. But also to produce the same amount of output with less input and also to bring new and better products to the market without changing the required inputs (Hötte & al., 2022, p. 6).

2.3.2. *The reinstatement effect*

The reintegration is the second direct effect concerning technological change. It can occur if the adoption of a new technology leads to the creation of new jobs directly related to the new technology. The *reinstatement effect* is usually associated with an increase in output. For example, if the technology enables the emergence of new sectors of economic activity, this may create new jobs. For example, an input-saving technology can create new jobs within the same company for the operation and maintenance of the technology. Or a company may also start supplying goods to new customers if input-saving technological changes make the products more affordable, or if technological changes affect the quality of the products, thus widening their range of applications (Hötte & al., 2022, p. 7).

The main evidence of the reintegration effect is the increase in labour demand. This implies a decrease in unemployment and an increase in the number of employees and hours worked (Hötte & al., 2022, p. 8).

Note that reintegration effects need not be evenly distributed across the different types of work and can co-exist with substitution effects. To support the existence of this effect, it was sufficient to observe an increase in at least one group. Also considering changes in the relative demand for labour as suggestive evidence of a re-integration effect, as they may be caused by an increased demand for certain types of work. The net impact of technology on employment, whether positive or negative, depends on the balance between labour replacement and reintegration (Hötte & al., 2022, p. 8).

2.3.3. *The real income effect*

We will now see that the digital transformation also affects work through an indirect channel that operates mainly on the demand side. Productivity improvements allow firms to produce a given value of output at lower costs, which would translate into lower consumer prices if the savings in input costs were passed on to consumers. Furthermore, we can anticipate wage increases if technological advancement raises the marginal product of particular types of labour. This decrease in price and increase in salary contributes to the increase in real income. (Hötte & al., 2022, p. 8).

It is relevant to note that technological change is always associated with productivity improvements, otherwise it would be irrational to adopt a new technology for companies or sectors. (Hötte & al., 2022, p. 8). But it should also be borne in mind that even if the so-called technological advances are real, there is no guarantee that companies will opt for automation; this will depend on the costs of substituting machines for labour and the evolution of wages in response (Petropoulos, 2018, p. 125). And businesses will also be more likely to use robotization if it offers a more affordable alternative to current manufacturing procedures. For example, In 2017, thanks to 3D printing, the German company Adidas was able to set up two "fast factories" for the production of its shoes: one in Ansbach, Germany, and the other in Atlanta, USA, cutting more than 1,000 jobs abroad in the process (World Bank, 2019, pp. 20 - 21).

While the innovating firm would often have incurred substantial costs in the R&D phase of any new innovation, and must absorb the risks of launching the new product or process, competitors are often quick to acquire and exploit the knowledge behind the innovation, which economists explain by the non-rivalrous nature of knowledge. As a result, Schumpeterian competition involves the continuous emergence of new innovating firms which undermine the initial extraordinary innovation rents yielded by innovative firms. History is full of examples of innovating 'boom and bust' firms, which illustrates the process of creative destruction, as described by Schumpeter. (Soete, 2018, p. 36)

This translates into a fear of companies to innovate and invest knowing the costs they incur. We can see these examples as obstacles to the digital transformation of companies. And this could benefit the biggest companies to increase their market share in a less and less equal economy. This then risks creating a new form of digital monopoly capitalism.

But on the other hand, private investments in new technologies in Europe are also lagging behind compared to the rest of the world. One notable argument is that the slowdown in private capital investment is directly related to the macroeconomic policies adopted in most European countries following the financial crisis of low-wage competition. This alone provides little incentive for most companies to invest in productivity-enhancing capital. From this point of view, the lack of productivity growth necessitates the faster adoption and implementation of more robotics and artificial intelligence, despite the growing labour shortages of post-retirement baby boomers in many European countries (Soete, 2018, pp. 40 – 41).

2.4. Industries under digital transformation

In this part of the analysis, we will try to calculate the share of sectors and industries that are likely to be automated in the near future. We find this relevant because if we are able to predict the share of job losses in current sectors, we will be able to better manage the digital transition.

According to Arntz et al. (2016) automation and digitalisation are unlikely to destroy large numbers of jobs. However, low qualified workers are likely to bear the brunt of the adjustment costs as the automatability of their jobs is higher compared to highly qualified workers. Therefore, the likely challenge for the future lies in coping with rising inequality and ensuring sufficient (re-)training especially for low qualified workers.

The development and implementation of automation is more prevalent in sectors where the skill requirements are lower because machines are less efficient in tasks that require more complexity. It is therefore the medium and low-skilled labour force that is most affected. The first reason is that their jobs are more easily replicated by robots and therefore more vulnerable to a digital transformation. The second reason is that their jobs are less complementary to technologies (World Bank, 2019, p. 29).

But there will also be a decline in the demand for middle skilled jobs that generally require everyday physical and cognitive skills. The authors call this process the "polarisation of jobs". In France, Germany, Italy, Spain, Sweden and the UK the number of high-skilled jobs such as managers, engineers and health professionals is increasing, while the number of low-skilled jobs such as clerks and machine operators is decreasing. On the other hand, the number of low-skilled service jobs (such as shop assistants) that are atypical and difficult to replace by automation is increasing (Petropoulos, 2018, p. 120). This would mean that in a way the labour market regulates itself.

In the future, however, a new wave of automation and advanced machine learning techniques is on the horizon, and intelligent machines will increasingly be able to perform highly skilled and perhaps unconventional tasks. As we move from the efficiency of e-commerce to the massive use of artificial intelligence systems in industrial production, there is concern that even the workforce with high level skills will be displaced (Petropoulos, 2018, p. 121).

2.5. Artificial Intelligence

"The advent of a jobless economy raises concern because tasks traditionally performed by humans are being—or are at risk of being—taken over by robots, especially those enabled with artificial intelligence." (World Bank, 2019, p. 20)

There will be dramatic changes in the labour market and the technological shift is likely to lead to an increase in extreme inequality. Societies moving towards the large-scale use of AI are likely to experience enormous social pressure and even disruption (Petropoulos, 2018, pp. 163-164).

Concerning the AI technology we must remember that the age of artificial intelligence has only just begun and that the penetration of robots in our economy and industrial production is expected to increase dramatically due to the rapid and continuing progress of technology.

The fact that it is difficult to predict the exact impact of AI makes it difficult to formulate a policy response. But a response at the social level is certainly necessary. Therefore, there is a need to initiate an open consultation of all stakeholders to determine our attitude towards the age of artificial intelligence (Petropoulos, 2018, pp. 128-130).

This is a three-step process:

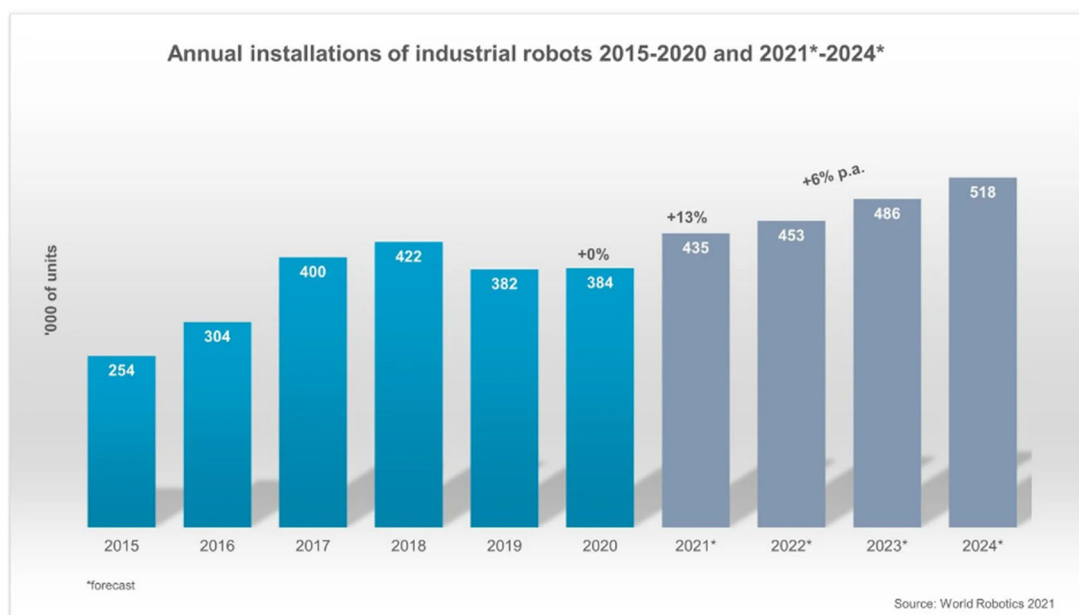
1. Make sure the general public, and in particular legislators, lawmakers, and corporate leaders, are aware of AI and its potential impact on contemporary economies. This step is crucial for the rest of the process. Without a good and thorough understanding of the whole subject, the future creation of a framework would be ineffective.

2. Establish a set of guidelines for the control of automated machines and AI systems. These must go much further than Asimov's well-known three robotics laws.

3. Create and implement the policies that will enable us to take advantage of the possibilities presented by modern technology. Education and training programmes need to be carefully rethought to provide workers with the appropriate skills to interact and work effectively with machines, and to develop the relevant digital skills for example. In doing so, the human workforce will be prepared to interact more effectively with innovations and ultimately increase productivity. Improved tools for employment reallocation and search assistance could also be helpful and ease displacement effect (Petropoulos, 2018, pp. 129 -130).

2.6. Robots in industries

Today robots are one the main cause of replacement of workforce. The number of new robots in the world has clearly increased in recent years and is likely to follow this trend in the coming years (World Bank, 2019, p. 20). On the graph we can clearly see that the trend is upwards since 2015 with a slight decrease in 2019 and 2020 probably due to the covid-19 pandemic but the expansion of robots in companies seems to follow a nice growth. This can be explained by the democratisation of industrial robots.



© World Robotics

(IFR, 2021)

A large proportion of employees see their jobs threatened by the advent of new technologies, including robots and especially those with artificial intelligence. However, the employment rate is still relatively high with the advent of robots and the ensuing automation.

But for example, robotisation has not particularly influenced employment overall in Germany, although there has been a decline in the recruitment of young people. For this reason, countries with an ageing population and those with a young population expecting a large number of new entrants to the labour market will react differently to automation (World Bank, 2019, p. 20).

In the report of “the risk of automation for jobs in OECD countries” it is said that the proportion of jobs whose job content will be changed by automation is higher than the proportion of jobs at high risk of automation. Skills upgrading is therefore also essential for workers whose jobs are not directly threatened by technological change. In addition, some displaced workers may not be able to make the transition to new jobs after losing their jobs. They need to be able to rely on social support systems (Arntz et al., 2016). The ability of individuals to use technological advances to benefit their jobs requires the development of specific digital skills through well-designed policies. This highlights the importance of using the right tools to ensure that workers are fully prepared to harness the disruptive power of digital technology (Petroopoulos, 2018, p. 120).

However, it is still very difficult to put a figure on the total proportion in which robots replace workers. It is true that automation linked to the implementation of robots equipped with artificial intelligence is substituting part of the workforce, but on the other hand it is increasing the demand for labour. This is due to the direct creation of jobs in these sectors as a result of technological advances as these facilitate the creation of new efficient value chains. This is made possible by technologies that create greater proximity to markets (World Bank, 2019, pp. 20 – 21).

Their negative results suggest that the replacement effect dominates the reinstatement effect of industrial mining robots. Moreover, the positive spillovers are very limited. The impact of robots on employment is most pronounced in manufacturing, particularly in the industries most exposed to robots, daily manual work, blue collar workers, assembly and related occupations, and workers without a university degree (Petropoulos, 2018, p. 128). This represents a large share of the total labour force in Europe.

2.7. Education and skills needed concerning equality gender

In terms of education, it can be seen that men and women are differently equipped with the skills needed for the digital age. Subjects such as science, technology, engineering and mathematics represent the most significant gender segregation. Indeed, the percentage of women with a degree in one of these fields has decreased in the European Union, from 23% to 22%. Furthermore, the percentage of women with a degree in ICT and engineering in the EU is 17% compared to 83% for men. According to the EIGE, this figure has decreased in 20 Member States between 2004 and 2015. Finally, the proportion of women working in STEM fields is only 14%, which shows the division that exists in the digital labour market (EIGE, 2018).

According to some ICT specialists, it is complicated for a woman to join a sector where the predominance is clearly male because they would find it difficult to be under the supervision of a woman and would therefore be less inclined to integrate women into their team. As a result, women would naturally want to specialise in an ICT field where there are more women. The number of women already present would therefore be an important factor. In addition, girls and women are often confronted with various gender stereotypes. These can have a direct impact on their ability to develop their digital literacy skills and to work in the digital sector. STEM

subjects are unfortunately not sufficiently considered as women's subjects. Indeed, a girl is more likely to be found in a sector such as teaching or the medical sector.

However, for those who decide to continue in STEM subjects, they will be confronted with male colleagues and teachers who will underestimate their competence because of their gender. Subsequently, they would find this discrimination and stereotyping in recruitment and in their future work. This is why it is observed that in the long term, many more women than men leave this sector (CCGD, 2018).

Strengthening certain skills such as self-organisation, management and communication as well as advanced digital skills could play an important role in reducing the gender pay gap and would enable women to reduce the existing gap in the ICT field. In addition, society and government could further encourage the enrolment of women in STEM studies and facilitate access to STEM-related apprenticeships.

EIGE research shows that closing the gender gap in STEM education would lead to economic growth, with an increase in employment (up to 1.2 million by 2050) and an increase in gross domestic product (GDP) in the long term (up to '820 billion by 2050). The new STEM jobs are expected to be the source of a significant amount of well-paid work, improving the EU's competitiveness and gradually reducing the gender pay gap. (EIGE, 2018, p. 2)

2.7.1. Self-confidence and attractiveness

With regard to the attractiveness of the digital profession and self-confidence, it can be seen that these two aspects can be closely linked. Indeed, if a young girl has a low degree of self-confidence regarding the digital technology sector, she will have little attraction for it. According to the European Institute for Gender Equality, only four EU countries (Bulgaria, Estonia, Malta and Romania) have observed young people being attracted to a career in the ICT sector.

But even in these, the attraction remains relatively low, ranging from 1 to 3 percent. If we look at the other EU countries, almost no girls are paying attention (EIGE, 2018).

However, if we now look at the attraction of males to teenagers of the same age, we can see that 3 to 15% of them would be interested in a career in the digital technology sector. As explained above, this shows that there is a gap in the choice of students for their studies.

If we now look more specifically at self-confidence, according to the EIGE report, men and women have roughly the same skills needed at a young age to handle digital technologies in their everyday lives. Where there is a disparity is in the confidence that girls and boys have in each other. Indeed, according to the statistics gathered by the report, 73% of boys easily use digital tools that are less familiar to them, compared to 63% of girls. Some countries like Latvia, Austria and Finland show a significantly higher confidence gap (EIGE, 2018).

Finally, there are also other aspects that influence the attractiveness and participation of women in digital technology:

1. Cost is one of the main barriers to basic access and use of ICT. Especially for those with relatively low incomes. Indeed, while the number of women owning a smartphone is increasing, access to the internet at a decent price remains a major challenge due to the quality of infrastructure and network coverage.

2. Access to quality hardware is a second criterion that can influence women's attractiveness to digital devices. This access will depend very much on whether you are in a developing country or in an already developed and industrialised country. In general, women use digital technologies at home while men access them at work, which means that the equipment is replaced more often and is therefore more efficient.

3. The use of mobile and internet services is a third criterion that impacts on women's participation. There is a gap that is growing as technologies become more complex and expensive. This leads to women's less frequent use. "Less access to digital resources means for many women entrepreneurs a lack of access to useful information, such as changes in legislation or the state of markets, and therefore a loss of competitiveness and new opportunities to develop their business (CCGD, 2018).

2.7.2. The digital potential for empowerment

It is also important to note the potential benefits of digital technologies. One of these is the potential of digital technology to empower women. Indeed, the empowerment that women can present through gaining access to ICTs can simplify the learning opportunities to have the skills required to enter the labour market and more particularly different sectors that require cross-skilling such as the health sector for example.

In addition, digital technologies can present opportunities and be a particularly useful lever for women's economic empowerment.

A second interesting aspect through the adoption of ICTs by women is that it could improve financial inclusion and thus bring about other aspects of gender equality. In other words, if women had a better grasp of ICTs, it could increase their presence in the economic market "by supporting their economic activities and financial autonomy, increasing their presence in the labour market, presenting them with new professional opportunities and promoting the efficiency of women-owned businesses and enterprises (CCGD, 2018).

A third aspect that can be taken into account is that ICTs can take the form of an empowerment tool that allows women to leave solitude, exchange knowledge and experience a community environment via professional platforms in order to stay informed about what is happening. ICT can also have a management role for women to save time on their daily tasks.

Finally, a last aspect that can be noted is the speed of access to information and the new modes of communication such as social networks, which now make it possible to increase and give greater visibility to women's words. We are also seeing new movements and activist approaches that women can create and promote while remaining in the greatest confidentiality (CCGD, 2018).

2.8. Conclusion

To conclude this paper, we will resume the most important stakes that we have identified in our analysis of the digitalisation of work in Europe.

First, in the paper written by Hötte & al (2022) we are told that there are three effects concerning the digital transformation of employment. When introducing new technologies such as robots or analytical tools into a company, a replacement effect can be observed. This means that tasks usually performed by employees no longer require human labour. This replacement effect is especially visible for low- and medium-skilled workers whose work is easily codifiable.

The second effect mentioned by Hötte & al (2022) is the displacement effect. It can occur if the adoption of a new technology leads to the creation of new jobs directly related to the new technology and is therefore directly related to the displacement effect. Therefore the net impact of technology on employment, whether positive or negative, depends on the balance between labour replacement and reintegration. But this replacement effect is also creating a shortage of skilled workers. Digital transformation requires more knowledge from employees in terms of skills, so this leads to a labour shortage of advanced digital skilled workers in key sectors and industries.

The last and third effect is the real income effect that operates on the demand side. If productivity increases, we can expect an increase in demand for better quality products for example. One might therefore expect higher wages for workers, but as Petropoulos says in the book *Work in the digital age* (2018), there is no guarantee that companies will opt for automation, this will depend on the costs of substituting machines for labour and the evolution of wages in response.

Another issue related to this effect is the lack of investment by SMEs. Investment in technology is costly but also subject to risk. As stated by Soete (2018), Innovative companies absorb all the risks associated with the adoption of new technologies, whereas competitors will tend to acquire and exploit new technologies once the risk has been assessed. SMEs are therefore afraid to invest a lot of money without being sure of recovering their investments.

As mentioned above, the digital transformation of companies implies a restructuration of low and medium skilled employees in Europe. It is therefore important to reskill the population of workers at risk in order to compensate for the shortage of advanced digital skilled employment. Moreover, with the arrival of new and even more powerful technologies such as AI, we could imagine that even jobs requiring advanced digital skills would be threatened. It is therefore important to tackle the problem at source and reform educational programmes to promote technology to young people.

Concerning the AI, we are only certain about the fact that the implementation of this technology will change our world. But it is still difficult to anticipate what will exactly happen with this technology. Moreover it is important to establish regular policy framework concerning the limitations of a such technology effect. Petropoulos (2018) gives us a 3-step process in order to frame the AI. The first is that policy makers must be aware of the AI and its potential impact on contemporary economies. The second is establishing a set of guidelines for the control of automated machines and AI systems. Finally, the third step is to create and implement these policies.

To better anticipate the effects of digital transformation, it is important to know the rate of employment that will be replaced by robotisation in the coming years. Moreover, robotisation is one of the main causes of labour force replacement. But again, this forecast is complex and not necessarily reliable in the long term. However, we can see that the impact of robots on employment is most pronounced in manufacturing, particularly in the industries most exposed to robots, daily manual work, blue collar workers, assembly and related occupations, and workers without a university degree.

With regard to gender equality, we can see that several aspects still represent barriers but also opportunities.

If we look at education and skills needs, we can see that men and women are educated differently in digital skills. STEM subjects are the most gender segregated. Strengthening self-organisation, management, communication and advanced digital skills could minimise the gender wage gap and help women bridge the ICT gap. Society and government could do more to encourage women to study STEM and promote STEM learning.

With regard to the attractiveness of digital professions and self-confidence, it was seen that the two aspects could be closely linked in that if a young girl had little self-confidence about digital, she would have little attraction to it.

In addition, it was also noted that there were statistics that showed that despite similar digital skills at a young age, a disparity evolved as she grew older. Other aspects such as cost, access to quality hardware and the use of mobile services can also have a significant impact on attractiveness.

Finally, with regard to the potential of digital technology for women's empowerment, it was seen that it could bring many opportunities such as easier access to ICTs which would result in improved learning for women, better financial inclusion, a tool to bring women out of loneliness or better access to information and a new mode of communication such as social networking.

Our research therefore leads us to 6 major issues concerning the effects of digital transformation on employment. We have the 2 main effects (Reinstatement & Replacement) that will be important to pay attention to in relation to the overall employment rate in Europe. Then we have seen that these effects lead to a shortage of highly qualified labour. This implies a mass re-skilling of the population to counter this problem. After that we saw the difficulties that SMEs may have in taking the step towards digital transformation. This is due to the risks and costs involved in such a move. We also talked about AI and the difficulty of regulating it. And finally, our last point focused on the existing inequalities between men and women in the field of new technologies.

3. European Commission programmes

3.1. Introduction

Now that we know the future impacts of digital transformation on employment, we will look more closely at the problems encountered in Chapter 2. An in-depth analysis of the initiatives and measures put in place by the European Commission.

But first of all, let us see what is the European Commission and what does it aim for the European population. It is one of the most potent international governments in the world. The Commission holds a pivotal position in the European Union with significant executive and enforcement powers, a crucial role in the management of the Union's finances and expenditures, and the exclusive authority to submit proposals in the majority of areas of EU legislation (Kassim & al, 2013, p. 1).

3.2. The European Initiatives in the field of digitalisation

The Commission applies a set of broad principles based on common European values, based on policy statements and recommendations, including the European Digital Rights and

Principles. These guiding principles go beyond those set out in the European Commission's Digital Agenda 2018, which are more operational and IT-focused (European Commission, 2022a, June, pp. 7 - 9).

A key step in the Commission's digital transformation is to focus on needs across the organisation and to build strong and reliable internal partnerships between services. This eliminates duplication, optimises resources and creates synergies within the organisation (European Commission, 2022a, June, pp. 7 - 9).

The second step is for the European Commission to maintain close relations with other EU institutions, groups and institutions, Member States, international organisations, universities, social partners and the private sector in order to share resources and keep up with the latest technological developments (European Commission, 2022a, June, pp. 7 - 9).

European digital sovereignty requires digital infrastructure, products and services aligned with European values and requirements to protect Europe's security, assets and strategic interests. Applying this principle in the current context means choosing technical solutions that have a positive impact on the European Commission's ability to continue its work in a cost-effective, sustainable, independent and secure manner (European Commission, 2022a, June, pp. 7 - 9).

To foster the digital transition, the European Commission will put in place digital policy instruments. As well as putting digital interactions at the forefront. In doing so, the Commission aims to provide a seamless, user-centred experience through digital solutions that respond quickly to the needs of businesses (European Commission, 2022a, June, pp. 7 - 9).

3.3. Strategic objectives

The Commission will work toward four strategic goals that respond to the institution's present needs in order to advance its digital transformation process. These institutional requirements have been determined through discussions in the Information Technology and Cybersecurity Committee and consultations within the Commission. They should make it possible for the institution to get ready for new difficulties (European Commission, 2022a, June, pp. 7 - 9).

3.3.1. Fostering digital literacy

The promotion of digital literacy is this section's main goal. Any process of digital transformation requires a critical mass of digital skills. The European Commission's staff must be willing to try out new tools and technologies, adopt unconventional working methods, and use digital technologies in their daily work. The Commission has already put in place extensive programmes for cyber security awareness training (European Commission, 2022a, June, pp 7 - 9).

Beyond acquiring e-skills, European Commission employees need assistance in determining how digitisation can increase their autonomy, flexibility, and productivity as well as the impact of their work. The management of change, public awareness campaigns, and a cooperative strategy between the IT community and the Commission as a whole are all part of this lengthy process (European Commission, 2022a, June, pp 7 - 9).

A modern, digital workforce will be created through lifelong learning, professional development, and retraining connected to flexible structures. To do this, job-specific digital skills training modules are required, as are routine staff digital skill assessments. It will make it possible for employees who are not IT experts to use digital technologies to enhance the effectiveness and quality of their daily work (European Commission, 2022a, June, pp 7 - 9).

The creation of an institutional brand, the support of a community-based approach, and a greater understanding of the opportunities presented by digital transformation are additional requirements for the development of a digital workforce (European Commission, 2022a, June, pp. 7 - 9).

A medium-term plan will identify digital job profiles, provide targeted career guidance to pertinent staff, and promote organisational change in order to accomplish these goals. This will make it easier for the Commission to find, hire, and keep talent with digital expertise in a variety of digital transformation fields, including infrastructure, AI, and IT security (European Commission, 2022a, June, pp. 7 - 9).

However, the Commission needs room to innovate and experiment if digital culture is to spread. Staff members can test new technologies, develop inclusive IT solutions in novel ways, put a strong emphasis on user experience and accessibility, make use of data, information, and

knowledge, and collaborate to overcome common challenges thanks to the Commission's ICT innovation framework, which leverages the Innovation Lab and takes into account the innovative practises of EU Member States (European Commission, 2022a, June, pp. 7 - 9).

« The digital Commission will empower staff to think digital first, be people-centred, collaborative, innovative and agile, and support digital transformation. » (European Commission, 2022a, June, p. 20)

The following actions will help achieve this goal:

- Enhancing the Innovation Lab and establishing a framework for digital innovation within the Commission;
- Establishing a community for digital transformation and developing the idea of the Digital Leaders Circle;
- Specific career counselling and rewards to encourage organisational change and digital literacy;
- The creation of learning modules based on functional profiles, as well as a medium-term planning exercise and inventory of required digital profiles. (European Commission, 2022a, June, p. 20).

3.3.2. *Promoting digitally friendly policy-making in the EU*

Digitalisation helps the Commission to respond quickly, appropriately and accurately to the societal needs of the Union. Digital is a central element of EU policies. According to a recent report, *"of the 284 legislative initiatives presented between March 2020 and June 2021, 47% referred to digital and 67% to data in their roadmap or at the initial impact assessment stage"* (European Commission, 2022a, June, pp. 9 – 10).

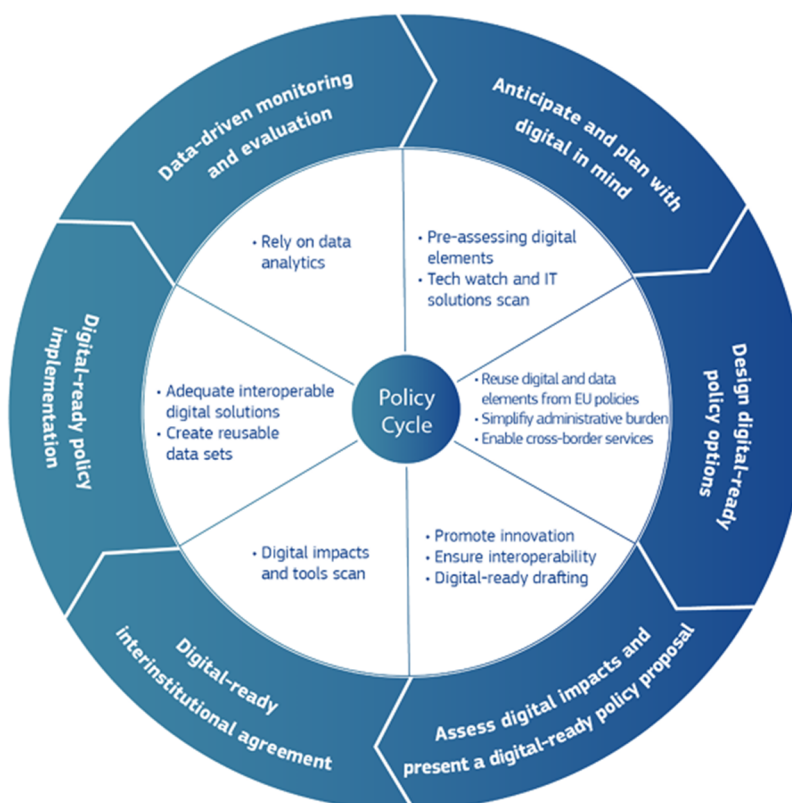


Figure 5: Policy cycle – digital-ready policymaking

Tool 28, (European Commission, 2022a, June, p. 10).

Guidelines for creating digitally responsive policies and information on "digital controls" are provided for policymakers in Tool 28 of the Better Regulation Toolbox. The goal is to assist in the early detection of digital dimensions by policy makers. This could facilitate the reuse of current standards and solutions, increase resource efficiency, lessen administrative burdens, open the door to the use of data analysis, and promote the adoption of cutting-edge technologies. However, for this strategy to be effective, early guidance is required, such as on system architecture or cyber security. Wherever possible, the bodies in charge of digital transformation and implementation in the Member States should also be consulted for their expertise (European Commission, 2022a, June, p. 11).

In order to effectively incorporate the digital dimension into policymaking, it's crucial to:

- Utilising appropriate technical skills while working in interdisciplinary teams to balance conflicting views, priorities, and perspectives;

- To consider the factors that contribute to digital-friendly policymaking, including the user-centered approach, the potential for automation, alignment with digital policies, the shifting digital landscape, innovative and digital technologies, the "one size fits all" principle, data management concerns, data reuse, and digital-friendly drafting, among others;
- Evaluate the effects of digital literacy using input from stakeholders and answers to a number of digital literacy-related questions (European commission, 2022a, June, pp. 11 - 12).

A Digital Responsive Policy Advice mechanism will be set up to direct the lead department in charge of a new policy initiative through required digital checks in order to support this strategy in practise (European Commission, 2022a, June, p. 12).

The development of new interoperable European digital services that improve cross-border co-operation and trust will be aided by the Union's digitally friendly policymaking (European Commission, 2022a, June, p. 12).

“The digital Commission will integrate digital dimensions across the EU policy cycle.” (European Commission, 2022a, June, p. 20).

The following actions will help achieve this goal:

- The creation of an inter-service advisory mechanism for the development of digitally friendly policy;
- The creation of guidelines for policymaking that is digitally friendly to aid in the execution of Tool 28 of the Better Regulation Programme (European Commission, 2022a, June, p. 20).

3.3.3. Fostering a digital transformation driven by business

With the help of technology, business processes are being rethought and redefined in order to increase performance and resource efficiency (European Commission, 2022a, June, p. 12).

Analysing current mapping, streamlining, optimising and automating business processes will, whenever possible, foster synergies, boost transparency, make it easier to reuse and adapt IT

solutions to meet changing requirements, and ultimately increase the effectiveness and predictability of business operations (European Commission, 2022a, June, p. 12).

Commission departments will outline their path toward digital transformation by adding a roadmap to their already existing annual IT business plans. This roadmap will be based on a thorough analysis of the department's portfolio of digital systems and services, as well as its business requirements and technical considerations. The digital transformation roadmap will also outline specific steps for business transformation and digital literacy (European Commission, 2022a, June, p. 12).

Innovative technologies like distributed ledger (blockchain) technologies, artificial intelligence (AI), high-end data analysis, and language technologies can be used to great advantage. These advantages include the gathering, analysis, and sharing of information that is quicker and more accurate as well as the automation of more processes. Based on proofs of concept and pilot projects, the Commission's AI Action Plan will pave the way for institutional AI solutions that are guided by the ideas behind the proposed artificial intelligence legislation (European Commission, 2022a, June, p. 12).

According to the Commission AI Action plan: *“The global leadership of Europe in adopting the latest technologies, seizing the benefits and promoting the development of human-centric, sustainable, secure, inclusive and trustworthy artificial intelligence (AI) depends on the ability of the European Union (EU) to accelerate, act and align AI policy priorities and investments. This is the key message and a vision of this 2021 review of the Coordinated Plan.”* (European Commission, 2021a, April, p. 2)

This 2021 Coordinate Plan proposes a detailed list of coordinated actions for the European Commission and Member States on how to establish EU global leadership on reliable AI. The key actions that have been put forth reflect the belief that for the European Commission, Member States, and private actors to succeed, they must:

- Accelerate investments in AI technologies to support a robust economic and social recovery made possible by the adoption of new digital solutions;
- Act on AI strategies and programmes by putting them into practise fully and promptly to make sure that the EU benefits fully from first-mover advantages;

➤ Align AI policy to address global challenges and eliminate fragmentation (European Commission, 2021a, April, p 2).

And this review of the Coordinated Plan puts forth four important sets of recommendations for the European Union and Member States in order to accelerate, act, and align to take advantage of opportunities presented by AI technologies and to facilitate the European approach to AI, which is human-centric, trustworthy, secure, sustainable, and inclusive AI in full respect of our core European values (European Commission, 2021a, April, p. 3).

The first activity will aim to create favourable conditions for the development and adoption of AI in the EU by acquiring, pooling and sharing information on policies while exploiting the potential of data. The second will aim to make the EU a place where excellence thrives, from the lab to the market, through stakeholder collaboration, building and mobilising research capacities, or supporting the funding and scaling of innovative AI ideas and solutions. The third initiative will ensure that AI is a force for good in society by developing a policy framework and promoting the EU's global vision for sustainable and trusted AI. And finally, the last one will be there to develop strategic leadership in high impact sectors by maintaining Europe's leadership in the field of AI-Robotics strategy or by supporting artificial intelligence in agriculture (European Commission, 2021a, April, p. 4).

Accordingly, the 2021 review of the Coordinated Plan outlines an outlook with specific proposals and recommendations for further action, identifying areas where the partnership between the EU and Member States is particularly effective in making Europe a hub for the development and use of cutting-edge, human-centric AI. The review also provides an overview of actions taken since the adoption of the 2018 Coordinated Plan. The 2021 review suggests 14 interconnected, joint action areas for cooperation between the European Commission and the Member States in order to advance the aforementioned goals (European Commission, 2021a, April, p. 5).

“The digital Commission will harness the benefits of data and innovative technologies to redesign its business and administrative processes, thereby improving efficiency and supporting integrated EU policies.” (European Commission, 2022a, June, p. 20)

The following actions will help achieve this goal:

- Putting the action plan for artificial intelligence into practise;
- Roadmaps for digital transformation for each department;
- Establishing a digital transformation award to recognise and promote departmental flagship digital transformation initiatives (European Commission, 2022a, June, p. 20).

3.3.4. *Ensuring a unified digital environment*

The Commission requires a secure, reliable, and effective digital environment. Today's environment of IT systems, digital solutions, and datasets is extremely complex. Developing a digital environment that is future-proof requires strengthened corporate architecture practises. When offering guidance or evaluating and approving investments as part of the IT governance, for example, an effective Corporate Architecture ensures consistency between strategic goals and operational guidance. This necessitates complete dedication to the dual pillar approach when deciding on new digital solutions. The dual pillar approach for digital solutions focuses on reusing current solutions, including corporate building blocks, before taking ready-made market solutions into consideration. The final option is custom development (European Commission, 2022a, June, p. 13).

On the basis of the following, this journey will advance steadily:

- Use of open source software will increase. This will streamline sharing outcomes across departments and with other European public administrations, as well as reusing solutions;
- A group of cross-department modernization and innovation pilot projects, backed by the Digital Solutions Modernisation Plan (DSMP) community and fed by departmental digital transformation roadmaps, to encourage collaboration, consolidate methods, processes, and resources, and encourage the reuse of it solutions;
- Early end-user participation in the design of its systems to guarantee a positive user-experience (European Commission, 2022a, June, p. 14).

“The Digital Commission will have a stronger focus on corporate information systems, ensuring seamless data exchange in a secure cloud environment.” (European Commission, 2022a, June, p. 20)

The following actions will help achieve this goal:

- Using the dual pillar strategy in all decisions;
- Starting a community of practise for corporate architecture;
- Encouraging departmental cooperation through the DSMP community;
- Putting into practise a new integrated IT service delivery model;
- The expansion of the opensource approach (European Commission, 2022a, June, p. 20).

3.3.5. *Reskilling the population and young population*

Regarding the Digital Europe Work programmes, many activities will emerge to improve some of the weaknesses or problems caused by the digital transformation. What interests us most here is related to the development of the skills of the European population, but also to what is being done to reintegrate workers who are no longer sufficiently qualified.

The report, “*Commission Implementing Decision on the financing of the Digital Europe Programme and the adoption of the multiannual work programme for 2021 - 2022.*”, provides us some ideas for activities to reskill actual workers and workers of tomorrow.

3.3.5.1. Job placement in key capacity area

The aim is to help young people acquire the advanced digital skills needed to deploy a specific technology and engage a diverse audience in digital careers through work experience in a skills centre or company. This is not only an opportunity for trainees to gain valuable work experience, but also an opportunity to refine and apply the advanced digital skills they have acquired during their studies. This action is in line with the objectives of the Digital Education Action Plan 2021-2027 and, more specifically, with the strategic focus on strengthening digital skills and competences for digital transformation by stimulating advanced digital skills in young people (European Commission, 2021b, November, p. 109).

The topic will enable people to gain training and work experience in skills centres and companies, and to be trained on the job. The action builds on the success of the pilot project "Training

for Digital Opportunities", which is continuing under the Erasmus+, Digital Education Action Plan, and will focus on highly specialised skills, in particular supercomputing in the first two years. This action will help bridge the gap between education and the labour market, giving EU citizens the opportunity to work in a unique environment, with access to the latest technological developments and valuable expertise. The aim is to enable people to deploy technology in the economy or to continue working in an ecosystem of excellence (European Commission, 2021b, November, p. 109).

3.3.5.2. Short term training courses in key capacity areas

The purpose of this measure is to give the current workforce access to training that reflects the latest developments in key competency areas, such as high-performance computing, cybersecurity, artificial intelligence and other emerging technologies. (European Commission, 2021b, November, p. 110 - 111).

"These technologies evolve at such a fast pace that requires a constant update of the digital skills, also of the people already in employment." (European Commission, 2021b, November, p. 110 - 111)

This investment will increase the number of men and women able to design, develop and deploy digital solutions in business and all sectors. The project aims to expand the training and re-skilling of the existing workforce, with a particular focus on meeting the needs of SMEs.

The chosen project will develop the content of these courses based on the requirements of businesses, particularly SMEs, for certain technologies and will offer the necessary level of flexibility for the employees to participate. Training exercises may be conducted on-site at the SME, remotely, or at the facilities of universities or other training providers (European Commission, 2021b, November, p. 110 - 111).

The measure will specifically promote the creation and delivery of short-term training programmes in cutting-edge technology for both those in the workforce and job seekers. Aspects like green application and the environmental impact of these technologies must receive special consideration (European Commission, 2021b, November, p. 110 - 111).

The provision of the Crash Courses mentioned in the SME-strategy as well as specific trainings to improve digital skills in important professions managing sensitive data, like managers and professionals in the health and care industries, would also be covered by funding (European Commission, 2021b, November, p. 110 - 111).

Consortia of educational and training providers will get funding for their collaboration with pertinent stakeholders who have experience in the relevant digital field. In order to spread information about these courses and, when practical, deliver them locally, European Digital Innovation Hubs will play a special role. Adequate quality assurance and monitoring procedures shall be used, along with initiatives that promote learning from one another and the sharing of best practises (European Commission, 2021b, November, p. 110 - 111).

Between market demands and what is available in terms of advanced digital technology-related skills in the EU, a sizable and structural gap exists. According to the European Investment Bank (EIB), the biggest barrier to new business investment is a lack of qualified personnel. Additionally, it is challenging for 53% of businesses to find ICT expertise. Only 65% of the existing workforce has "above basic" computer abilities, according to a study on digital literacy. This discourages the adoption of cutting-edge digital technologies. In order to meet the needs of both workers and job seekers who need to upskill, the initiative intends to increase the training offer (European Commission, 2021b, November, p. 110 - 111).

3.4. Conclusion

In this chapter we have analysed the last major actions undertaken by the European Commission to foster the digital transformation of work. We mainly focused this chapter on the report issued from the European Commission on the digital strategy to adopt toward digital transformation effects.

A key step in the Commission's digital transformation is to focus on needs across the organisation and to build strong and reliable internal partnerships between services. This eliminates duplication, optimises resources and creates synergies within the organisation.

To foster the digital transition, the European Commission will put in place digital policy instruments. As well as putting digital interactions at the forefront. In doing so, the Commission aims

to provide a seamless, user-centred experience through digital solutions that respond quickly to the needs of individuals and businesses.

The Commission will work toward four strategic goals that respond to the institution's present needs in order to advance its digital transformation process. They should make it possible for the institution to get ready for new difficulties.

Fostering digital literacy, promoting digitally friendly policy-making, fostering a digital transformation driven by business and ensuring a unified digital environment. These are four goals defined by the European Commission as the Digital Employment Transition Plan.

This first goal to foster digital literacy can be summarised in five distinct objectives. It consists of strengthening the innovation lab and establishing a framework for digital innovation within the Commission, creating a community for digital transformation and developing the idea of the Digital Leaders' Circle, providing specific career guidance and rewards to encourage organisational change and digital literacy, creating learning modules based on functional profiles, as well as a medium-term planning exercise and an inventory of required digital profiles, and finally strengthening collective staff training on cyber security.

The second action aims at promoting digital-friendly policy-making in the EU and can be taken up in actions such as the creation of an inter-service advisory mechanism for digital-friendly policymaking or the creation of guidelines for digital-friendly policymaking to facilitate the implementation of Tool 28 of the Better Regulation Programme.

The next goal is to foster a business-led digital transformation. The main actions to achieve these results can be defined by putting the Artificial Intelligence Action Plan into practice, defining digital transformation roadmaps for each department and creating a digital transformation award to recognise and promote the leading digital transformation initiatives of departments.

The fourth and final one is to ensure a unified digital environment. This can be achieved by implementing actions such as using the two-pillar strategy in all decisions, launching a community of practice for enterprise architecture, encouraging departmental cooperation through

the DSMP community, implementing a new integrated IT delivery model and expanding the Open Source approach.

Finally, we also analysed a report expressing the importance of reskilling the labour force in the European Union. As we saw in Chapter 2, the replacement effect of digital transformation is pushing workers to be increasingly skilled. In addition, most companies have experienced difficulties in finding skilled digital workers.

And in the *Multiannual Work Programme for 2021 – 2022*, we find interesting ideas of activities to reskill the European labour force. The first will help young people to acquire the advanced digital skills needed but also offer the opportunity to refine and apply the advanced digital skills they have acquired during their studies. The second one is to give the current workforce access to training that reflects the latest developments in key competency areas, such as high-performance computing, cybersecurity, artificial intelligence, and other emerging technologies.

The next step is to determine whether these actions developed by the European Commission will be sufficiently relevant and effective.

4. European Trade Union and European Employer Organization Programmes

4.1. Introduction

In this fourth chapter, we will look at two actors that play an important role in the digitalization: the European Trade Union Confederation and the European employer organisation.

Digitalisation is increasingly present in our economy, our societies and in the world of work. This brings new changes, new forms of work organisation and creates new opportunities as well as new risks. This is where trade unions and employers organization comes in, supporting and accompanying workers and employers in their new working conditions and future employment prospects.

In this first part of the chapter, we will first analyse the impact of digitalization on social dialogue with the opportunities and the risks. Secondly, we will see how digitalisation is

interpreted and understood by trade unions then we will look at the actions trade unions are taking to address gender inequality. Thirdly we will talk about the new forms of employment created by digitalization with the opportunities and the risks. Fourthly we will introduce employer organization and finally we will conclude with the European social partners frameworks agreement on digitalization.

4.2. Impact of digitalisation on social dialogue

Discussions, talks, negotiations, and cooperative activities between organizations representing the two sides of industry (employers and employees) are referred to as social dialogue by the European Commission. Social dialogue is a key component of democratic democracy, as well as of the process of economic and social modernization, and it is the defining characteristic of collective industrial relations in Europe.

The International Labour Organization (ILO) defines social dialogue as any kind of discussion, negotiation, or information exchange on topics of mutual concern including economic and social policy between or among representatives of governments, employers, and employees. It can take the form of a two-way conversation between labor and management (or employer organizations and trade unions), or it can take the form of a three-way conversation with the government as an official participant. It can be sectoral or interprofessional, and it can happen at the national, regional, corporate, or workplace levels (Social dialogue, 2011).

The process of negotiating the terms and circumstances of employees' employment as well as the rights and obligations of trade unions is known as collective bargaining. It is a rule-making procedure that results in collaborative regulation.

The TFEU and European labor law both contain a number of rules aimed at enhancing social dialogue and the social partners' roles at the European, national, sectoral, local, and corporate levels. The “European social partners framework agreement on digitalization” (BusinessEurope, ETUC, CEEP, and SMEunited) in 2020 serves as an illustration of the value of social engagement for tackling the effects of technological transformation. The agreement acknowledges that digitalization calls for particular strategies, customized to each party's unique set of circumstances. Since the benefits are not inherent, we must modify our social protection, education, and labor markets to ensure that both workers and companies win from the change. (BusinessEurope et al., 2020)

The delivery of skills required by employees and businesses, work organization and conditions, work-life balance, and the accessibility of technology, including infrastructure, across economic sectors and geographies are just a few of the areas that must be prioritized in order to prepare for change (Eurofound, 2021b, December).

4.2.1. Opportunities

In terms of opportunities, the first is how technological progress affects how work is organized, how people are employed, how they develop their abilities, and how they are treated at work. To a greater or lesser extent, this has a positive societal influence.

Second, the social partners build a cooperative strategy that includes an anticipatory and non-deterministic view of technology development and its effects on employment and working circumstances. Additionally, working conditions are enhanced through sector- and company-level collective bargaining. Moreover, collaboration, consultation, and collective bargaining in the workplace about the use of digital technology may assist to guarantee that the advantages and advancements, beyond the effects on labor conditions, are also shared with the workforce.

Finally, new strategies for worker representation and social interaction at work are being developed by trade unions (Eurofound, 2021b, December).

Along with the autonomous cross-industry framework agreement on digitalization that the EU social partners signed in 2020, the social partners have recently signed a number of other declarations and joint statements and put other instruments in place that outline ways to assist businesses and employees in adapting to technological change (Eurofound, 2021b, December).

The effects of digitalization offer a chance to reconsider firm and sector-level skill strategies. The chance to discuss labor market institutions and rules is provided by digitalization as well. « The European Telecommunications Network Operators' Association (ETNO) and UNI Europa in the EU telecommunications sector (December 2020), Ceemet and IndustriALL in the metal, engineering, and technology sectors (November 2020), and the Association of Mutual Insurers and Insurance Cooperatives in Europe (AMICE), Insurance Europe, and UNI Europa in the insurance sector (February 2019) have all signed various cooperation agreements in this regard » (Eurofound, 2021b, December).

The breadth and perspective of human resources and labor relations at the corporate level are likewise expanded by digitalization processes, according to management and employee representatives. They provide fresh topics for debate and might rekindle interpersonal communication. Overall, the degree and character of each technology's deployment, as well as the industry or economic activity under consideration, determine how the digitalization of society will affect collective labor relations. The management of digital transformation relies heavily on social dialogue, which calls on powerful social partners to come to agreements to ensure that technology progress benefits both companies and employees (Eurofound, 2021b, December).

4.2.2. Risks

The social conversation agenda, which is more centered on conventional topics and goals, and collective bargaining, which lags behind digitalization because it often takes time to respond to structural changes, are the current risk factors.

Additionally, there is the need for labor brought on by the digital transition, which favors more qualified profiles with lower levels of unionization. And finally, the early stages of the digital transition do not include workers' representatives enough (Eurofound, 2021b, December).

When digitalization has an influence on employment rates or job profiles within industries, social discussion is hampered. Collective labor relations are influenced by potential job losses or adjustments to production and work organization, necessitating trade unions and worker representatives to adjust to the shifting workforce and workplace.

In the end, this requires answers that could deviate from conventional strategies. The difficulty is amplified when one realizes that the effects of digitization are occurring within a larger framework of change, which includes heightened rivalry in some industries, such as the automobile, banking, and telecommunications sectors. The organization of the workforce, working conditions, and skill requirements must alter significantly as a result of these changes in production and service delivery, which also affect collective labor relations (Eurofound, 2021b, December).

As a result of these structural threats, it is possible that social discourse and collective bargaining may be unable to find consensus on how to manage the repercussions of digital revolution and pass appropriate regulations. For instance, when it comes to collective bargaining, employers and trade unions often focus on issues like salary setting and working hours without giving

sufficient consideration to the impact that technological progress would have on these areas of negotiation. Commonly, collective agreements include broad, overarching declarations about how technology integration into industrial processes would be handled. This is because, historically, it has been assumed that issues related to the deployment of digitalization (e.g., the introduction of new equipment, machines, and processes related to work and organization) in production should not be subject to negotiations unless they have major implication for technical adaptation (requalification), work organization, or both. Moreover, technological change and innovation could be introduced gradually through a series of smaller incremental projects, which may coincide with a lack of training and vision on the part of employees' representatives concerning the medium- and long-term implications for labour conditions and shifts in workers' responsibilities (Eurofound, 2021b, December).

4.3. Digitalisation, a word not yet widely considered

According to the ETUC survey, only one third of trade union representatives think that the term digitalisation is just a word for the advancement of new technologies and the changes they bring about.

However, this view is not shared by all and differs from country to country. For example, Eastern and Western countries are more likely to think of digitisation as more than just a word than Northern and Southern countries such as Germany, Austria and Belgium.

Nevertheless, there is general agreement that digital transformation remains a factor in accelerating the globalisation of policies as well as in streamlining and automating processes that significantly increase productivity and efficiency (ETUC, 2018, September).

4.4. What does ETUC do for Gender Equality?

The ETUC is determined to participate in the rebalancing of the equality between men and women. It should be noted that more than 50% of the European population are women and that around 45% are trade union members. The ETUC works to ensure that women's rights and gender equality are represented in the labour market and more generally in society.

In order to highlight and promote their main actions to address gender inequality, the ETUC has created an action programme called the "Vienna Action Programme (2019-2023)". This aims to monitor and verify "that digitalisation and new forms of work are gender-sensitive and do not disadvantage women workers; to achieve equal pay and economic independence for

women; fully implement the Work-Life Balance Directive; end gender-based violence and harassment; empower vulnerable women, including elderly, migrant and refugee women and people with disabilities; and mainstream gender equality in all EU policy areas. (Gender equality, s.d.)

Since the outbreak of the COVID-19 pandemic, many consequences have been observed in terms of increasing inequalities towards women. As a result, the ETUC is insisting that the different programmes remedy these inequalities and grant more rights and better working conditions to women.

Every year, a study is carried out on 8 March to see if there is still a stability between the different genders within the trade union institutions. Again, it can be seen that the European Trade Union Confederation is focusing on the lack of gender balance in the various top boards of SMEs by advancing the directives. In order to address this problem, it has also created what it calls a "gender equality toolkit" with EU workers. In addition, the ETUC takes part in "the EU Advisory Committee on Equal Opportunities, the Expert Forum of the European Institute for Gender Equality and the European Women's Lobby. (Gender equality, s.d.)

Finally, the ETUC also intervenes by calling for the implementation of new European guidelines and instructions on gender pay clarity, which will eliminate the pay secrecy that exists today. The following guidelines have been drawn up by the European Trade Union Confederation:

- Firstly, so that employers can talk freely about their salaries, there will be a ban on salary secrecy clauses in contracts.
- Secondly, each job will be required to give all possible information in order to establish a wage equivalent to the work done.
- Furthermore, the ETUC demands that trade unions be helped to negotiate workers' - wages in order to improve existing inequalities.
- Finally, the ETUC demands clarity on the total wage package with all related benefits and threatens employers with heavy sanctions for those who do not comply with all the new rules (Gender pay gap, 2020).

4.5. *ETUC and new form of employment due to the digitalisation*

There has been a lot of press around digitization recently. The optimistic group, on the one hand, is largely speculative. Many people believe that digitalization will improve their lives in many ways, including creating a more efficient and sustainable economy by reducing waste and increasing the efficiency of underutilized assets (such as cars and apartments), providing greater access to information and greater transparency (over 3.5 billion people now have internet access), facilitating a more balanced and fulfilling personal and professional existence, and introducing a new era of collaboration and sharing. But also shorter working hours and self-employment are important opportunities arising from digitalisation (ETUC, 2016, June).

For the pessimists, the future holds a new machine age with a global pool of workers competing with each other for a racialized distribution of wealth, a polarization of jobs (increase in low and high skilled workers, decrease in average workers), growing wealth inequalities, and a racialized distribution of work.

The European Trade Union Confederation (ETUC) is committed to neither an overly optimistic nor a sceptical vision, but rather to a balanced analysis of the prospects and hazards. As labor organizations, we have an obligation to raise public awareness about some disturbing developments and critical problems impacting the workplace of the future. The greatest difficulty lies in facilitating a safe and fruitful shift toward a more fair digital future for all people. The precautionary principle must be applied to digitalization to keep it from creating an even more unequal distribution of wealth and further polarizing society into a select few winners and many losers (ETUC, 2016, June).

The ETUC regrets that the problem of job losses does not play a role in the Commission's study - is it 'technical unemployment' (Keynes), 'creative destruction' (Schumpeter) or a new trend commencing with the fourth industrial revolution? Job losses have been a consistent result of productivity gains throughout history, but new employment opportunities have always emerged after a short adjustment time. A recent OECD study suggests that on average 9 percent of employment are at high risk of becoming automated. The main problem in the realm of employment is to design an inclusive transition to fair and excellent work (ETUC, 2016, June).

The European Trade Union Confederation (ETUC) supports the use of new technologies that benefit citizens, employees (particularly women and older workers), and businesses that adhere to national and European (labor) law.

Trade unions face a challenge in shaping the transition to fair and high-quality digital labor as the digital economy opens up new opportunities for automation, robotization, and outsourcing across industries and services. To mold the digital revolution, it will take time. Trade union involvement is both a huge challenge and an opportunity.

Employment, skills and competence upgrading, outsourcing of activities, working time rules, health and safety issues, work-life balance, and data protection are the primary areas where trade unions take action.

Trade union involvement in digitization seems like a fragmented landscape and is mostly tied to existing initiatives in the Member States (to list the most major projects: Luxembourg, France, Sweden, Germany) (ETUC, 2016, June).

We can therefore see that there are still many differences of opinion between the different people in EU countries, which will only make it more difficult for them to trust and participate in this ongoing digital transition (ETUC, 2018, September).

4.6. Employer organizations in Europe

Employers' organizations are institutions created to coordinate and advance the common goals that employers have with regards to the labor market. In contrast to an employer's individual interests, the scope and content of such collective interests are not predetermined or obvious; rather, they depend on how they are interpreted. As a result, there are significant differences between countries in the organization's structure, membership, and duties. Large businesses in particular have the capacity to intentionally choose which labor market interests they desire to pursue on an individual basis and which interests they prefer to have represented by employers' organizations. The United States serve as an illustration of a particularly individualistic approach because there are very few employer organizations there that serve to further employer

interests. In contrast, employers' organizations often play a considerably bigger role in European cultures (Employers organisation's in Europe, 2004).

The employers' organisation, Business Europe, is involved in a number of actions to integrate digitalisation into the world of work as well as possible. We will see in more detail in the empirical part what it is actually doing, but we can already get a good overview in the next chapter on the framework agreement that the European social partners have concluded on digitalization.

4.7. European social partners frameworks agreement on digitalization

The economy's digital transformation is a complex issue with wide-ranging effects on labor markets, the workplace, and society at large. Due to varying social and economic conditions, labor markets, industrial relations systems, and current initiatives, practices, and collective agreements, EU member states approach it in a number of ways.

Employers, employees, and jobseekers all stand to gain significantly from the digital revolution in terms of new employment prospects, enhanced productivity, better working conditions, novel work-organization techniques, and higher-quality services and goods. Overall, it can result in increased employment and job retention with the correct measures.

Since many functions will change and some may disappear, there are risks and obstacles associated with the shift for both employees and businesses. This necessitates anticipating change and providing people and businesses with the skills they need to thrive in the digital era. *“Others include the structure and circumstances of the workplace, the balance between work and life, and the accessibility of technology, including infrastructure, across the economy and regions”*. In order for SMEs to adopt digitalization in a way that is catered to their particular circumstances, certain measures are also required (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

Since the benefits are not inherent, we must modify our social protection, education, and labor markets to ensure that both workers and companies win from the change.

The EU and national governments have a crucial role to play in ensuring that the framework conditions allow and support employers and workers to seize the

opportunities and leave them room to find appropriate solutions to deal with the challenges, keeping in mind that they are the ones who know the situation on the ground and what steps are required to benefit businesses and workers best (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

Additionally, in order to take advantage of the potential and overcome the problems in a partnership approach, while respecting the various responsibilities of those involved, it is necessary for employers, employees, and their representatives to share a commitment.

The European cross-sectoral social partners have committed to working together under this framework agreement to maximize the advantages and address the problems of the workplace's digital transformation (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

The primary goal of this framework agreement is to promote knowledge of the opportunities and problems in the workplace brought on by the digital revolution among companies, employees, and their representatives. Secondly, to encourage, direct, and assist employers, employees, and their representatives in developing measures and actions aimed at seizing these opportunities and overcoming the challenges, while taking into account already-existing initiatives, practices, and collective agreements, provide an action-oriented framework. Thirdly, promote a collaborative mindset among companies, employees, and their representatives in order to support/assist workers and boost productivity, encourage the development of a human-oriented approach to integrating digital technology into the workplace.

To achieve these objectives, the social partners must outline a joint dynamic circular process that can be customized to different national, sectoral, and/or company situations, industrial relations systems, jobs, and various digital technologies/tools. This process must take into consideration various roles and responsibilities of the various actors.

Additionally, it emphasizes particular strategies, actions, and measurements that employers, employees, and their representatives may apply in response to their unique requirements and circumstances to address issues like skills, work organization, and labour conditions (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

The European cross-sectoral social partners have reached an autonomous agreement that is applicable to the entire EU/EEA.

It applies to all employees and employers in both the public and commercial sectors, as well as in all economic activities, including those using online platforms, in which a formal employment connection exists, as determined on a national level.

In this accord, they use the term "enterprises" to refer to both commercial and public sector organizations. The rights of trade union representatives are to be recognized in line with national law and practice when the term "workers representatives" is used in this agreement (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

Employers and employees' representatives are involved in a partnership process where the overall objective is to obtain a consensual transition by successfully integrating digital technologies at work, reaping the benefits, preventing and minimizing the risks for both employers and employees, and ensuring the best possible result for both. Numerous subjects are involved or need to be considered. The recommended wide interdisciplinary approach includes all pertinent workplace components. The majority of these issues are connected and shouldn't be handled separately (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

While some characteristics are the same for all businesses regardless of size, there is a need to customize the approach to the size of the firm and to cope with various conditions or circumstances. Success depends on a common commitment by employers, employees, and their representatives to a determined and cooperatively managed process. A viable method for implementing the agreement while respecting the roles and duties of many players, including workers' representatives, is a mutually agreed-upon dynamic circular process (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

Digital tools and technologies have an influence on a number of areas, many of which are connected. These topics are the following:

“Work content – skills, working conditions (employment terms and conditions, work-life balance), working conditions (work environment, health and safety), work relations and work organization” (European social partners framework agreement on digitalization, 2020).

The following concerns also should be explored and considered as part of the process in connection to the themes mentioned earlier.:

“Digital skills and securing employment, modalities of connecting and disconnecting, Artificial intelligence (AI) and guaranteeing the human in control principle, respect of human dignity and surveillance” (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

It is also possible to employ or introduce digital technology or techniques to advance such subjects (“e.g. by better work organisation, communication, more learning possibilities, improved work relations, better work-life- balance, gender equality”) (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

4.7.1. Digital skills and securing employment

The major goal is to equip our existing and future workforce, businesses, and organizations with the necessary skills via continuous learning, so they can take advantage of the possibilities and overcome the problems of the workplace's digital transformation.

“Social partners share an interest in facilitating access to high-quality, efficient training and skills development while respecting the diversity and flexibility of training programmes, which vary depending on various industrial relations practices” (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

This is because of the challenges and opportunities that digitalization presents. This calls on companies to make a positive commitment to using digital technology, aiming to boost creativity and productivity, for the long-term viability of businesses, as well as for the workforce's employment security and improved working conditions. If businesses want to stay competitive in the current marketplace, personnel must be committed to fostering the development and success of the company as well as understanding the possible role of digital technology (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

To analyze and define training requirements related to digitalization for the business or sector and its personnel, social dialogue organizations made up of employer and worker representatives must be supported. These might be both hard and soft skills that are outlined in a common skills training methodology.

In order to guarantee that the impact on employment is properly foreseen and managed in digital transformation initiatives supporting employment retention and creation, social partners should

take the right steps. Digital technology must be implemented in the framework of industrial relations systems with prompt consultation of the workers and their representatives in order to foster trust in the system. Avoiding employment losses and generating new possibilities, especially by looking into work redesign, are goals of digital transformation initiatives. *“With regard to working conditions, innovation, productivity and the sharing of productivity gains, business continuity, and employability, strategies should be put in place to guarantee that both the company and the workers profit from the adoption of digital technology”* (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

4.7.2. Modalities of connecting and disconnecting

Employers and employees should adjust work organization as needed to reflect the continual changes in the workplace brought on by the usage of digital work tools. Collective bargaining at the relevant levels in the Member States can promote the achievement of clarity about the acceptable expectations that can be placed on workers while utilizing such devices.

Employers and employees may both benefit from the presence and/or introduction of digital devices and tools in the workplace since it opens up a wide range of new options and possibilities for flexible work organization. The separation of work and personal time during and after working hours may become riskier and more difficult as a result.

The responsibility to protect employees' health and safety at work extends to every area of their employment. The emphasis should be on preventive to avoid potential detrimental impacts on the health and safety of employees as well as the operation of the business. This refers to a culture where the idea of prevention is given the top priority and where employers and employees actively contribute to guaranteeing a safe and healthy workplace through a framework of defined rights, obligations, and duties (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

4.7.3. Artificial intelligence (AI) and guaranteeing the human in control principle

The future of employment will be significantly impacted by artificial intelligence (AI). The majority of businesses in Europe are still in the early phases of implementing new AI-based opportunities to streamline company operations or develop fresh revenue streams. It is crucial to investigate possibilities of utilizing AI or machine learning systems at this stage in order to achieve economic success and favorable working circumstances.

While AI systems and solutions have the precious power to enhance workplace productivity, employee satisfaction, and a better division of labor between humans, among enterprise departments, and between robots and humans, it is also crucial to ensure that these systems and solutions do not undermine but rather strengthen human intervention and capabilities at work (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

The Social Partners' Autonomous Agreement outlines certain guidelines and guiding principles for when and how AI will be applied in the workplace.

In the workplace, the ability of people to maintain control over machines and artificial intelligence should indeed be ensured. This should support the deployment of robots and AI applications while adhering to safety and security regulations.

The following three criteria must be met for a system to be considered trustworthy:

- It must be legal, fair, transparent, safe, and secure, adhering to all legislation and regulations but also fundamental rights and non-discrimination rules.
- It must adhere to agreed-upon ethical standards, guaranteeing compliance with EU Fundamental/human rights, equality, and many other ethical standards.
- It needs to be reliable and sustainable from a technological and social standpoint, as even well-intended AI systems have the potential to hurt people unintentionally.

Social partners at the company level and at other adequate levels should proactively evaluate the potential of digital technology and AI to maximize the performance of the company and the well-being of the workforce, such as better task distribution, enhanced competence development and labor aptitudes, and a decrease in exposure to hazardous working conditions. It is important to recognise and resolve any possible conflicts between respecting individual autonomy, preventing damage, being fair, and having decision-making processes that are comprehensible (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

4.7.4. Respect of human dignity and surveillance

Data processing, digital technology, and AI surveillance systems provide the opportunity to secure the working environment, guarantee safe and healthy working conditions, and increase business productivity. However, they also increase the chance of undermining human dignity, especially in circumstances of intimate surveillance. This can result in worsening working conditions and worker health (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

The danger of invasive surveillance and abuse of personal data is minimized through data minimization, openness, and explicit restrictions on the handling of personal data.

Regarding the processing of employees' personal data in the context of employment, GDPR stipulates standards that must be adhered to (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

The social partners in this accord are reminded of article 88 of the GDPR, which discusses the possibility of establishing more detailed restrictions for the processing of workers' private information in the form of employment relationships through collective bargaining agreements (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

4.8. Conclusion

To conclude this chapter, we can firstly see that social dialogue is an essential component of democracy, as well as of the process of economic and social modernisation, and that it is the defining feature of collective industrial relations in Europe. Moreover, it can take the form of a two-way conversation between workers and management (or employers' organisations and trade unions), or a three-way conversation with the government as an official participant.

Furthermore, it can be seen that digitalisation has a real impact on social dialogue and that it brings opportunities and risks and it should be noted that the decision to deploy digitalisation is not a neutral one, as social dialogue at all levels identifies institutionalised strategies for re-organising collective labour relations by anticipating and controlling the consequences of digitalisation on labour relations.

Secondly, that despite the undeniable presence of digitalisation in our everyday lives, both private and professional, many people still feel completely lost and unprepared for this transition.

This lack of understanding can also differ depending on the European country in which you are located.

As far as gender inequality between men and women is concerned, it can be noted that there are still far too many imbalances in terms of salaries and rights and that Covid-19 has only accentuated these. However, trade unions are taking many initiatives to rebalance the different aspects that are missing today. The Vienna Action Programme is an example.

Then, in relation to the new forms of employment caused by digitalisation, we can see that it is still very controversial. Opinions diverge between positive and negative, creation and destruction, opportunities and risks or short term and long term. What is certain is that the ETUC is taking many steps to accompany and help private companies in this digital transition. It systematically examines whether there are better ways to ensure fair and quality digital work. For this, it can count on the business representation bodies that are the direct intermediary between the trade unions and the SMEs and, more precisely, the workers.

In the penultimate part of this chapter, we have seen that the role of employers' organisations can be very different depending on the geographical location with a greater importance in Europe compared to the United States.

Finally, it can be seen that employer and employee representatives are involved in a partnership process whose overall objective is to achieve a consensual transition by successfully integrating digital technologies into the workplace, reaping the benefits, preventing and minimising the risks for employers and employees, and ensuring the best possible outcome for both. To ensure that the impact on employment is properly anticipated and managed in digital transformation initiatives supporting job retention and creation, the social partners should take the right steps. Employers and employees need to adapt the organisation of work as necessary to reflect the ongoing changes to the workplace brought about by the use of digital work tools.

5. Discussions

How do European-level players - European Commission, European employer associations and European trade unions - cope with digitalisation of work?

In order to conclude this theoretical part, we would like to make an overall assessment of the information gathered and then draw up a list of hypotheses which we will try to answer in the last analytical part of this thesis.

First of all, in chapter 1, we defined what digital transformation is and the different steps to achieve it. We also saw the new technologies that digital transformation brings with it.

Chapter 2 discusses the issues related to the implementation of these new technologies and the various impacts they may have on employment. We have identified 4 significant impacts such as

- The displacement of jobs which leads to a need to reskill workers with medium and low digital skills
- Challenges related to the use of artificial intelligence and the establishment of policies to regulate it
- The lack of investment by private companies and the difficulty for SMEs to invest in the digital transition
- The existing inequalities and barriers between men and women in terms of digital skills

The European Commission is at the heart of the analysis in our third chapter. We analyse three reports focusing on the successful development of technologies within European industries. The first one is the most recent one and defines 5 steps to address the current needs of the institution to advance its digital transformation process. After that we saw the report on the framework of artificial intelligence and the creation of effective and fair laws. And finally the report on the need to reskill the European labour force.

Chapter 4 examined the actions undertaken by the European Trade Union Confederation and the European employer organisation. It covers topics such as the importance and risks of social dialogue and the process of economic and social modernisation. And we also learnt that many people are lost and unprepared for the digital changes that are taking place.

Empirical results (2)

6. Methodology

In this first chapter of our practical part, we present the methodology. The methodological part aims to justify why we chose one method rather than another by presenting the method of information collection but also by explaining the selection of our respondents, the way we constructed our questionnaires as well as the main advantages and weaknesses/limitations of this method.

In this thesis we used two types of methods: the interview method and the secondary data collection method.

6.1. *The interview process*

6.1.1. *Presentation*

The utilization of basic human contact and communication processes distinguishes interviewing methods in all of its forms. When used properly, these procedures enable the researcher to glean extremely detailed and nuanced knowledge and insights from the interviews. The researcher and his interlocutors have direct touch throughout the interview procedures, and there is little to no researcher direction.

As a result, in theory, a genuine exchange occurs in which the researcher's interlocutor expresses his or her perceptions of an event or situation, his or her interpretations, or their experiences, while the researcher, through his or her open-ended questions and reactions, facilitates this expression, prevents it from veering off the research's goals, and enables the interlocutor to reach a maximum degree of sincerity and depth.

The researcher's theoretical mind must be continually on guard if the interview is first and foremost a way of acquiring information in the broadest sense. This is necessary so that the researcher's interventions introduce analysis that is as fertile as possible.

While keeping parallel developments that could qualify or correct them in mind, the researcher will focus the conversation more on his working hypotheses than the exploratory interview did. The interview's content will also be the focus of a systematic content analysis, which aims to evaluate the working hypotheses. This is the key distinction (Van Campenhoudt & Quivy, 2011).

6.1.2. *Types of interviews*

As far as the types of interviews are concerned, there are two very well known types of interview: the "semi-directive" or "semi-directed" interview and the "focused" interview. Here we decided to go for the first one for different reasons:

- The first reason is that we did not yet have all the information we wanted, so we had a limited number of guiding questions that were often quite open-ended.
- The second reason was that we wanted to leave time for the interviewee to go further than what was asked of him or her in order to gather additional information that might be relevant.
- Finally, the third and last reason was that we wanted to have direct contact with the speaker so that it would be dynamic and we could learn and ask for more things or bounce back on certain subjects, which would not have been possible with a questionnaire survey for example.

6.1.3. *Advantages*

The interview method allowed us to identify several advantages:

- The depth of the information collected opened up new areas of research that we would not have thought of.
- The flexibility of the interview allows us to ask additional questions or to redirect these questions to more relevant purposes.
- The human contact and direct interaction between the interviewer and the interviewee make the exchange more dynamic and lively.

6.1.4. *Disadvantages*

The interview method also allowed us to identify several disadvantages:

- During an interview one can also, due to stress or other reasons known to the "direct", forget to mention or talk about certain points that could have been an added value

- The interview can also influence the discussion and take the interlocutors away from the basic subject.
- Time is also a disadvantage in our eyes because it puts pressure on the interview when we know, in our case, that we only had 30 minutes to ask our questions and get constructive and useful answers for our empirical part
- The relevance of the answers can also be a disadvantage. Indeed, the interviewee would perhaps answer more precisely if he/she were alone in front of his/her computer.

6.1.5. Selection of the interviewee and skills required

The choice of our speaker was made thanks to a recommendation during a discussion related to our thesis. We were informed of his very good knowledge of IT and his experience of more than 30 years in IT, first at Delhaize and then at VOO. We thought it would be interesting to contact him so that he could answer our questions and explain to us the changes and digital transformations that he had observed throughout his years.

As for the skills required for this type of method, they are not very specific.

Before the interview :

- It is necessary to have a theoretical and/or practical knowledge of the subject concerned.
- Knowing how to prepare open-ended questions, semi-directive in our case.

During the interview :

- Having basic experience of communication and individual interaction.
- Having a curious character in order to dig deeper and go further into the subject is a plus.

6.2. *Collection of secondary data*

6.2.1. Presentation

Macro-social statistics are frequently needed by researchers, but they can only be gathered by strong government agencies like national statistical institutes. Such organizations operate primarily to supply academics and policymakers with a plethora of trustworthy data that they are unable to get on their own. However, there is a wealth of information waiting for scholars in libraries, archives, and data banks in all their forms. Therefore, it is unnecessary to invest a lot of effort in gathering information that is already available elsewhere, even if the way the data is presented may need some modification.

Even though it has numerous benefits, gathering current data might present a number of issues that must be properly resolved. Because of this, gathering existing data is regarded as a legitimate research strategy in this instance (Van Campenhoudt & Quivy, 2011).

6.2.2. Types of collection of existing data

The types of data collection that exist are numerous and depend on where the sources come from and what is considered as information. Indeed, from the point of view of the source, we can find videos, handwritten documents, and many other types of documents. In order to simplify things, we will say that there is a type of collection known as "statistical data" and a type of "collection of documents in literary form emanating from institutions and public and private bodies (laws, statutes and regulations, minutes, publications, etc.) or from individuals (stories, memoirs, correspondence, etc.)" (Van Campenhoudt & Quivy, 2011).

Here we will use both types of methods:

- The statistical part will allow us to justify the job losses and creations as well as the different data related to gender equality.
- The literary part will be more useful through different audiovisual, official and electronic documents for our three European actors.

6.2.3. *Advantages*

- There is a great saving of time and energy. There is no need to schedule an appointment, prepare questions and go. The information can be accessed directly from a computer or library.
- If the research is well done, the source is 100% reliable and reusable.
- There is a wealth of information available online which allows access to a wealth of information that no other method can match.
- There is the possibility to compare information to be sure of its veracity.

6.2.4. *Disadvantages*

- Access to information may be limited and not usable
- The reliability of some documents may be questioned because of the date the information was collected. Extra care is therefore needed when using this method
- As the data was collected by other researchers, the article may not answer the question correctly.
- The consultation time may be long if the question you are asking is one that is still being debated by other researchers.

6.2.5. *Skills required*

For statistical data collection: training in descriptive statistics and, preferably, in epistemology. Indeed, one should not be misled by numerical data which, like all other data, are not real facts but 'constructed facts', i.e. abstractions that are supposed to represent real facts. Although these data therefore make it possible to form a more or less correct image of reality, they only have value and meaning if we know how and why they have been constructed.

For the collection of documents in literary and audiovisual form: training in the criticism of documentary sources.

In both cases, training in documentary research (which is rarely taught specifically in universities and colleges) (Van Campenhoudt & Quivy, 2011).

7. Empirical result

We are now entering the empirical phase of our thesis. We will analyse new documents and compare them with our theoretical data collected earlier.

To do this, we will first identify the documents relating to each institution and summarise their content, which we will analyse. Finally, we will finish this empirical part by comparing the data of our three institutions and see if they are effective.

7.1. *European Commission*

7.1.1. *Identification of the relevant documents issued by the EC*

We will now analyse the position of the European Commission on the digital transformation of work and employment in Europe. To do this we went to the European Union's publication website to find out about the latest initiatives published by the European Commission. On the website "Publications Office of the European Union" we found a section called "Digital Strategy". It is essentially on these publications that we will base our empirical analysis concerning the European Commission.

What is immediately obvious is the number of reports written by the European Commission on artificial intelligence. Since the end of March this year, 16 publications of the European Commission have been published, and half (8) of these publications are about artificial intelligence. These include publications such as AI Watch (Tangi & al, 2022), AI watch and uptake in manufacturing (Nigris & al, 2022) and Artificial Intelligence & its potential impact (European Union Agency for Fundamental Rights, 2022).

While two publications address the subject of SMEs: SMEs and cybercrime (European Commission, 2022, May) and the single digital gateway guidance for local authorities (European Commission, 2022, March). And only one documents is about digital skills, Academic offer of advanced digital skills in 2020-21 (Righi & al, 2022).

In our research, we did not find any measures related to the risks of replacement and reinstatement of work. Indeed, we had deduced that digital transformation was destroying some jobs but also tended to create new ones. We can therefore say that this transition will not be obvious and

autonomous, which is why the European Commission should pay more attention to these effects in order to facilitate the transformation.

And finally concerning the gender gap, we saw in chapter 3 that gender equality in digital transition is not mentioned in European texts, if at all. There are currently no concrete projects underway to address gender gaps in digital transformation. The only two real plans to reduce the gender gap are expressed in the Digital Education Action Plan, but the former does not address the problem in the short term and has other objectives. The second plan concerns the overall European gender equality strategy, which does not include any direct measures to reduce the gender gap in the context of the digital transformation.

7.1.2. Summary of contents of these documents

It is summarised in the Academic offer of advanced digital skills in 2020-21 (Righi & al, 2022) that the European Commission promotes digital skills as a crucial component to enhancing economic competitiveness and social justice as part of its strategy to promote digital transformation and succeed in the digital decade. In order to anticipate potential gaps or abundance in their offer, this report provides evidence regarding the availability of higher education offerings in artificial intelligence, high performance computing, cybersecurity, and data science for the academic year 2020–2021. It tracks the availability of master's programmes and analyse their features, such as the scope (broad and specialised), education fields in which digital skills are taught (for example, information and communication technologies; business, administration, and law), and the content areas covered by the programmes, using a keyword-based query methodology that captures the inclusion of advanced digital skills in the programmes' syllabus.

The EU has a greater selection of specialised master's programmes in artificial intelligence than the US. Even though information and communication technologies dominate the master's programme offerings in AI, sizable shares of these programmes are also found in engineering, manufacturing, and construction. The EU is the only region that has shown a positive trend in cybersecurity over the past year, involving both general and specialised master's degrees. Despite this, the EU's offer is still less favourable than those of the US and the UK (Righi & al, 2022).

The report *SMEs and Cybercrime* (European Commission, 2022, May) indicates that the 25 million small and medium-sized businesses in Europe are what keep the EU economy afloat. They contribute significantly to value addition across the board and employ about 100 million people. They also represent more than half of the European Union's GDP. SMEs support the digital transformation by acting as enablers. Data and information are essential to the digital transformation, which, regrettably, draws cybercrime more and more. The COVID-19 crisis showed how important the Internet and computers, in general, are for SMEs to maintain their business. In order to survive the pandemic and to continue in business, many SMEs had to take business continuity measures such as adopting cloud services, upgrading their internet services, improving their websites, and enabling staff to work remotely. For these reasons, the pandemic posed additional cybersecurity challenges. On behalf of the European Commission, Directorate-General for Migration and Home Affairs, Ipsos European Public Affairs conducted a survey exploring SMEs' experiences with cybercrime and their awareness about cybersecurity risk. SMEs' level of concern about cybercrime; their experiences with cybercrime over the past 12 months, including the types of cybercrime they encountered, the most serious incident experienced, and the effect this had on business; and SMEs' preferred channels for reporting cybercrime incidents are some of the major subjects covered by the survey (European Commission, 2022, May).

The document, *AI watch, AI uptake in manufacturing* (2022), aims to offer the European policymaking process evidence-based scientific support. The report acknowledges that AI can enable a range of manufacturing-related applications and have an impact on all production stages; in particular, AI plays a significant role in combining data from various processes, factory floors, or production sites to enable comprehensive optimizations. But access to data and the need for high-quality data are both very important. Furthermore, a key enabler for data sharing will be the standardisation of data formats and communication protocols. Another crucial requirement in manufacturing, at both the workforce and management levels, is the inclusion of human resources in the AI adoption process. The latest report demonstrates that although the adoption of AI in manufacturing has increased over the past ten years, it is still in its infancy (Nigris & al, 2022).

This analysis reveals a sharp rise in AI and manufacturing-related scientific publications since 2014, from about 5% to a peak in 2019 at about 25% of the year's publications. With about 20% of manufacturing publications delving into the application of AI, the EU27 occupies a

leadership position in terms of scientific output. (Nigris & al, 2022). Des chiffres intéressants qui rendent compte de l'intérêt de la Commission Européenne à en savoir plus sur cette technologie.

On the webpage Artificial intelligence and the world of work (Eurofound, 2021a, December) it is said that the European Commission is leading several initiatives to develop AI research and foster the adoption of trustworthy AI – that is, AI where human supervision is built into the decision-making system – in accordance with the High-Level Expert Group on Artificial Intelligence's Ethics guidelines for trustworthy AI, drawn up in 2019. In summary, AI should be lawful, ethical and robust (Eurofound, 2021a, December).

In 2017, women made up 54% of all tertiary students in the EU, but they are disproportionately underrepresented in the digital industries. Only 17% of jobs in the tech sector are held by women. Even though girls typically outperform boys on international skills tests like the Programme for International Student Assessment (PISA) and the International Computer and Information Literacy Study (ICILS), they have a tendency to stray away from STEM fields as they get older. Due to the fact that only one in three STEM graduates are women, this has an impact on their participation in higher education. Teachers, parents, and STEM professionals must engage, inspire, and motivate female students because more gender diversity in the workforce and greater inclusion of women in the digital economy can benefit Europe's competitiveness, growth, and innovation. For the digital industry to have a better gender balance, efforts to combat gender bias and stereotypes are also critical. There is a need to better understand why fewer women choose careers in the ICT sector. This will help us develop curricula and careers that are more appealing to girls and women. Such knowledge can only advance the teaching and research of digital technologies as well as the SME Strategy's goal of fostering female entrepreneurship (European Commission, 2020, September).

7.1.3. Analysis: what to these documents say about the dimensions of our analytical framework?

Relating to digital skills, we have seen that the European Commission believes that digital skills are at the core of developing a digital sphere. The Commission realises that Europe is lagging behind its competitors and that must do what is necessary to close the gap. This article spotted the importance to develop skills in accordance with new technologies. Unfortunately, we can see that despite everything that is being put in place, Europe is struggling to stand out from

its direct competitors such as the US and the UK. Moreover, nothing is really in place today to promote digital skills among the current workforce. This could lead to a labour shortage and a slowdown in digital economic activity.

Concerning the importance of SMEs, we can see that the European Commission really understands the importance of developing SMEs on a reliable basis. Indeed, SMEs represent more than half of the European GDP. It is therefore very important to encourage their development by providing them with a secure basis for development.

In the report AI watch, AI uptake in manufacturing (Nigris & al, 2022) authors tell us that the use of artificial intelligence in the manufacturing sector has two important aspects. The first is that this technology allows for a complete optimisation of activities. The second important aspect to note is that this technology is still in the early stages of development.

Furthermore, in its report Eurofound (2021) informs us that the European Commission is leading several initiatives to develop AI research and foster the adoption of trustworthy AI.

Despite the fact that several reports prove that the place of women in digital transformation is paramount, the European Commission does not seem to be very concerned about the issue of gender equality.

7.1.4. Intermediary conclusion

To conclude this section, we can say that the Commission has indeed put in place actions and initiatives in order to best frame this technology about which we still know very little.

Digital skills are important for the development and use of new technologies by employees. A lot will be done by the Commission to reform education and make it more accessible to digitalisation. But it can be said that this initiative to reskill the population is more focused on the young than on the old. This initiative would probably work in the long term, but in the short term there is no real initiative from the European Commission. And as we have already seen in the theoretical part, it is important to include the whole population in this transition in order not to create more inequalities but also to help people who are not able to develop their digital skills. None of these points are really expressed in the reports.

It is clear that SMEs have an important role to play in this digital transformation at European level. If Europe wants to be the world leader in terms of digitalisation, it will have to do everything possible to ensure that SMEs can prosper while continuing to stimulate competition in the market. But care should be taken to regulate this competition to avoid the emergence of inequalities in the market.

However, it is very important to note that the complexity and speed of artificial intelligence can cause problems such as reducing privacy. It is therefore difficult to give a clear answer to the question of AI, as the Commission is doing a lot to frame artificial intelligence as well as possible, but on the other hand it is uncertain about its future. The European Commission should therefore keep itself informed and collect as much data as possible on the evolution of artificial intelligence.

As mentioned above, one point that is not addressed in the European Commission's initiatives is the replacement and reinstatement effect. We really believe that more needs to be done to facilitate the transition of jobs to digital as much as possible. Employment defines a country's economy, and if it falls too much, the consequences for Europe could be significant.

In our view concerning the last point, equality gender, the European Commission has a more important role to play. Indeed, their action plan only takes into account youth with its Digital Education Plan, so it is a long-term objective. However, as already mentioned in our brief, there is currently a shortage of employees in key digital sectors. This is why we sincerely believe that the European Commission must play a more important role and provide both long-term and short-term solutions to this issue.

7.2. *European Trade Union Confederation*

7.2.1. *Identification of the relevant documents issued by the ETUC*

In this second part of the analysis, we will look at the position of the ETUCs in relation to the digitalization of work in Europe. To do this, we went to the ETUC website to gather our information through various articles and reports.

There are many articles published by the ETUC on digitalization, so we had to focus on those that we felt were most relevant to help us answer our research question.

The first two papers we identified focus on the employment and SME dimensions which are two dimensions that we consider crucial to the digital transition that is underway today. The first initiative of the ETUC is the project "ETUC resolution on digitalisation: "towards fair digital work"" which was adopted on 9 June 2016 by the Executive Committee.

The second initiative is the report from 2018 "Digitalization and workers' participation: what trade unions, company levels workers and online platform workers in Europe think".

A Third initiative taken by ETUC in June 2020 is the "Resolution on the European strategies on artificial intelligence and data". This document is about our third dimension, the artificial intelligence.

And finally, the last document that we have identified for ETUC is related to artificial intelligence but also to employment and work platforms in SMEs. The document is dated 10 September 2021 and entitled "ETUC response to the second stage consultation of the social partners under Article 154 TFEU on possible actions to address the challenges related to working conditions on platforms".

7.2.2. Summary of the content of these documents

The first document of the ETUC "ETUC resolution on digitalisation: "towards fair digital work"" aims at supporting employment in the current digital transition in order to limit job losses, to shape an inclusive transition to quality and fair digital work based on good working conditions, a safe and secure working environment and fair employment and many other aspects that we have observed as problematic. The European Trade Union Confederation (ETUC) supports implementing technological change in a way that benefits citizens, employees (especially women and older workers), and businesses that adhere to national and European (labor) law and regulations. To prevent the rise of a new digital precariousness, employees in the digital economy require proper safeguards. Information, consultation, and board-level participation, along with guaranteed minimum wages and social security, offer a significant barrier. Trade unions face a challenge in helping to shape the transition to fair and excellent digital work as the scope of opportunities for automation, robotization, and outsourcing grows across sectors and services. Step by step development is required if the digital revolution is to succeed. Trade union participation is both a significant problem and an exciting new possibility. Employment,

credentials and upskilling, outsourcing of activities, laws on working hours, health and safety problems, work-life balance, and data security are the most essential areas for union action (ETUC, 2016, June).

The second document is the report from 2018 called “Digitalization and workers' participation: what trade unions, company level workers and online platform workers in Europe think”. At the conclusion of this document, we can assert that ETUC at corporate level across Europe are fully aware that digitalization is an essential problem that will have a significant impact on how we work and live in the future. More than only new and sometimes disruptive technologies and processes of restructuring and change are seen by trade unions in Northern, Southern, Western and Eastern Europe as a major concern for the future of work, according to a survey of trade unions in these regions. ETUC's poll also found that trade unions in Europe are not averse to digitalization. New technology and digital business models have the potential to provide new business and job opportunities for trade unions throughout Europe, from western to eastern European countries. European trade unions, on the other hand, have expressed concerns about the dangers of digitalization, such as in terms of workplace conditions, monitoring of employees, work intensification, work-life balance and new sorts of pressure or job losses as a result of automation and computerization. For the survey, data was collected on trade unions in a wide range of nations that are taking action on the impact of digitization on the workforce, industries, and enterprises. That's not to say that digitalization's benefits, including increased autonomy, less repetitious and less difficult jobs or new career prospects, are a done deal; they must be actively fashioned, according to the results of the poll and the ETUC project. The problem of working hours is a good illustration of the necessity to co-shape equitable digital transformation in order to take advantage of possible possibilities and prevent risks: The information provided on information and consultation practices, collective agreements at various levels and experiences of good and bad practices makes it very clear that, according to trade unions, the impact of digitalization on working time could offer opportunities and added value to workers if framework conditions and accompanying rules are put in place at company level and beyond. Weakened worker involvement and degradation of collective bargaining at national and/or corporate levels are among the most significant concerns that digitalization poses, say nearly a third of poll participants, including unions and workers' representative organizations. In Central and Eastern Europe, the perception of this risk is more prevalent. There is a strong argument that trade unions need to learn new things. Over 95% of those polled felt that unions should be more

engaged in addressing and campaigning on digitalization and the future of work. The ETUC study reveals that trade unions must also adapt (ETUC, 2018, September).

The third initiative taken by ETUC in June 2020 is the “Resolution on the European strategies on artificial intelligence and data”. The implementation and utilization of AI are crucial concerns for the workplace and the general public. On the one hand, they present opportunities brought about by the unquestionable big breakthrough technologies in areas such as medical, space, mobility, and communication. Contrarily, there is an ever-increasing potential for violations of privacy, data protection, and other basic rights. ETUC believes that worker safety and technical progress are not mutually exclusive. The European Trade Union Confederation's guiding philosophy is a fair transition to digitalization and employment. The European Union (EU) must lead the way in humane technological advancement, but it should also ground its policies in the European social model and its core principles. The EU should take the lead in ensuring that new technologies respect workers' rights and improve their living and working conditions. Since employees are especially worried about AI technology, ETUC thinks that an EU framework on AI should address the workplace component in an ambitious and proactive manner. Considering a strong AI framework to develop quality jobs, invest in employees' AI literacy, encourage and increase safeguarding of workers' rights, workers' protection, and make sure that trade unions and workers' representatives take part in shaping AI at work is something the EC should be doing in light of the power imbalance between employers and workers. A comprehensive artificial intelligence framework would apply to all employees and employers across all industries and platforms (ETUC, 2020d, July).

Finally, the Fourth initiative is a document dated 10 September 2021 entitled "ETUC reply to the Second phase consultation of social partners under Article 154 TFEU on possible action addressing the challenges related to working conditions in platform work". This document shows the interest of trade unions in reworking the regulations concerning AIs so that they can provide a framework for the employment of workers. « *ETUC would like to recall its position on the Commission's proposal for a Regulation on Artificial Intelligence, which fails to address the specificity of AI uses in employment, including platform work. The European Commission should ensure that trade unions and workers' representatives participate actively in the building of AI at work, which is essential to achieve a robust AI framework that guarantees the protection of workers' rights, quality jobs, and investment in worker's AI literacy*” (ETUC, 2021b, September).

7.2.3. Analysis: what to these documents say about the dimensions of our analytical framework?

The first document takes up and analyses the employment dimension and the SME dimension, which are two dimensions that we consider crucial to the digital transition that is underway today.

The second paper focuses on the dimensions of work and the opportunities and risks that digitalisation brings. It also analyses the divergences that exist at the geographical level and what actions European trade unions could take.

The third paper from June 2020 focuses on the dimension of artificial intelligence, which is a major, if not the major, challenge we have identified for our European stakeholders. Strategies need to be rethought and readapted in order to help workers live with these technologies which are still largely unknown.

Finally, the last document that we have identified for ETUC is related to artificial intelligence but also to employment and work platforms in SMEs. These three issues that we have developed above represent major challenges for European trade unions and we can see that they are mobilising to work on them in order to best help workers.

7.2.4. Intermediary conclusion

To conclude this section on ETUC, we can conclude that European trade unions are aware of the challenges and opportunities that digitalization represents. They are mobilising through different reports, initiatives and position papers in order to better understand and prepare themselves for this digital transition and its major challenges. We can also see that following the four major dimensions we had identified: employment, SMEs and inequalities, artificial intelligence and gender equality, only three of the four dimensions were addressed by ETUC. Indeed, even if gender inequalities have been addressed by the European institutions for some time now, we can see that in terms of digitalisation, there is still little action. In the first article quoted here, "Toward a fair digitalisation", ETUC openly admits that the gender gap is a blind-spot and that it is really necessary to take initiatives to reduce these inequalities, which will only become more pronounced as time goes on.

7.3. *European employer organizations: BusinessEurope*

7.3.1. Identification of the relevant documents issued by BusinessEurope

In this third part of the analysis, we will look at the position of BusinessEurope in relation to the digitalization of work in Europe. To do this, we went to the BusinessEurope website to gather our information through various position and strategy paper.

There are not so many articles published by the BusinessEurope on digitalization, so we tried to focus on those that we felt were most relevant to help us answer our research question.

The first document “Legal issues of digitalization in Europe measures to effectively help companies advance their digital strategies” published in 2017 is about SME and the partnership between BusinessEurope and Noerr LLP to help companies to develop digital strategy.

The following three articles are directly concerned with the artificial intelligence dimension. Two deal with recommendations and advice for dealing with artificial intelligence technology (BusinessEurope, 2021b, October), (Business Europe, 2019b, July) and the last one addresses the potential future that BusinessEurope is considering (BusinessEurope, 2017b, December)

Then the fourth articles is a document that was written by BusinessEurope in 2021 showing the close link between the greening of the economy and digitalization.

And finally the last articles that we have chosen is the document "Our Digital Ambition: priorities for 2019-2024" has been drafted by Business Europe to call on decision-makers in the commission, parliament and council to take initiatives to move forward and evolve with the digital technology that is now increasingly present and closer to businesses.

7.3.2. Summary of the content of these documents

The first document that we decided to analyse is the “Legal issues of digitalization in Europe measures to effectively help companies advance their digital strategies” published in 2017.

Noerr LLP, in conjunction with BusinessEurope, performed an investigation into the legal hurdles that digital enterprises in all European Member States confront as they try to reap the benefits of digital technology. The investigation lasted from March through April of 2017. Establishing an efficient cross-border free movement of data is an example of an essential EU

priority, which includes the construction of a true Digital Single Market with the aim of developing a European Data Economy. Companies in Europe are following the trend of adopting digital innovations and transforming their operations to take use of data and analytics.

Thus, the goals of this research are as follows:

1. Analyzing the degree to which European businesses have progressed in their digitalization efforts
2. Contributing to the public discourse on the most pressing legal issues and technology trends affecting businesses in Europe today. Based on an examination of the responses to the survey, this paper offers recommendations to help European businesses deal with the legal issues they face today. The European law firm Noerr LLP and BusinessEurope partnered to study the legal hurdles that companies in Europe face while implementing digital transformation strategies. This research uses the responses of business professionals from around Europe to assess whether the current national and European regulatory framework adequately supports and encourages the use of new technology, apps, and business models of the digital economy (BusinessEurope, 2017a).

BusinessEurope has posted numerous position papers and strategy papers on artificial intelligence. Here are three that we thought were interesting to note in order to show BusinessEurope's investment in the issues we have identified above. Indeed, in these three documents we can find different actions and recommendations that employee organisations have thought of in order to face the advent of AI.

Here is the first document:

1. *“We welcome the Commission’s risk-based approach outlined in the AI Act and share the ambition to ensure that AI is safe, lawful and in line with EU fundamental rights.*
2. *We recommend carefully addressing all potentially unwanted consequences and administrative burden for industry which could discourage investment in the development of AI systems and hurt EU competitiveness in the long term.*

3. *The proposed definition of “AI systems” is too broad. We recommend using the definition proposed by the High-Level Expert Group on AI, focusing on AI systems that display intelligent behaviour and take actions with some degree of autonomy.*
4. *The proposed classification rules for high-risk AI should be refined to ensure consistency with sectoral legislation in Annex II. The AI should only regulate high-risk AI applications in areas where a clear regulatory gap has been demonstrated.*
5. *We agree that some AI use-cases in the areas listed in Annex III will require to undergo specific requirements, but we recommend adjusting the scope of application based on objective and clear criteria and to have a differentiation between applications of AI according to the actual risk they pose to fundamental rights and/or health and safety.*
6. *Responsibilities of different actors in the AI value chain must be reassessed and clarified to ensure obligations are allocated to the actors that can ensure compliance” (BusinessEurope, 2021b, October).*

Here we have the second document on artificial intelligence:

“The potential to derive the benefits AI technologies offer will rely on the ability for companies to: research, test, acquire a skilled workforce, exist in a vibrant data economy, have appropriate infrastructure to build upon and a beneficial framework to exist within.

- *A highly educated and entrepreneurial workforce is required to promote growth and use of AI in Europe.*
- *All levels of education and training, starting at an early age, should be strengthened to improve skills on cognitive, social and cultural levels of future workers to establish a new “data culture” and “awareness of AI”. It is important that there is close cooperation between companies and education at all levels.*
- *“The current workforce should be introduced to AI through re-skilling and upskilling on the job programmes organised through a cost sharing approach. The EU could sponsor and*

support these activities, while it should remain the sole task of the Social Partners to coordinate and ensure that demand and supply can be matched. There would nevertheless also be scope for mutual learning and the exchange of best practices at EU level.

- *As companies develop their workforces strategies, the key challenge they face is to design and introduce technological solutions in a way that improves production processes in terms of outputs, making use and making sense of AI in a way that supports employment. Achieving this across the economy will be critical to ensure that the digital transformation creates new opportunities, both in terms of employment creation and transformation of jobs/reallocation of tasks.*
- *General knowledge of citizens and workers must also increase since AI works best if users understand the process and as a result gain trust in it. Free-of-charge online “courses” should be created at national level. People also need the practical skills that will improve how to use AI more effectively (eg. critical decision making and systemic thinking).*
- *Businesses should also take the time to educate, train and assist the public sector on the benefits of AI and how it can improve public services.*
- *Objectives to be achieved at European level in the fields of Education and digital skills should be set by next European Commission” (BusinessEurope, 2019b, July).*

And finally, here is the third document:

Artificial intelligence (AI) has the potential to double annual economic growth rates of developed economies and increase labour productivity by 40% within 20 years. It can improve conditions for society on the whole by innovating sectors like manufacturing, healthcare, agriculture, education, infrastructure, public safety and financial services. But there is a need for a coherent European approach to invest in AI to maintain our scientific and commercial leadership. To seize the opportunities offered by AI, Europe needs to enable technological progress, encourage the uptake

of emerging technologies and address the potential challenges in a smart and future-proof way.

We can expect AI-based systems to reshape current employment and skills needs. Productivity improving technologies may make certain tasks obsolete, or change the nature of certain processes. However, AI will not replace humans, but assist and enhance their work. The emergence of AI will also create opportunities in many areas, resulting in an overall net increase in jobs for Europe if a favourable harmonised regulatory environment for businesses and appropriate educational and long-life learning strategies are implemented. Re-skilling Europe's workforce is essential to reap the benefits of this technological shift. Currently 40% of EU citizens possess digital skills whereas 90% of jobs will require them by 2025. (BusinessEurope, 2017b, December)

The document here is a document that was written by BusinessEurope in 2021 showing the close link between the greening of the economy and digitalization.

There are two important transitions currently influencing labour markets: digitalisation, additionally accelerated by the Covid-19 pandemic, and greening of the economy. These transitions are interlinked and mutually reinforcing: digitalisation contributes to more environmentally friendly production processes, service provision and lifestyles, while greening of the economy requires more advanced technologies and digital solutions to accompany structural changes.

Striving for a "green economy" resonates also with a profound societal demand. Significant numbers of citizens across the EU have opted for more environment-

centred policy choices. This trend has been confirmed by the recent elections in several EU Member States.

The employment and skills dimensions of a greening economy are common to all profound transformations. Such a transition creates the need to observe, anticipate, raise awareness, adapt the training offer, facilitate transitions, and act locally. But the ecological transition, maybe more than the technology-driven digital transition, takes on a systemic dimension, disrupting modes of production, consumption, travel and work organisation, and is subject, moreover, to a strong influence of regulations. (BusinessEurope, 2021a, October).

The document "Our Digital Ambition: priorities for 2019-2024" has been drafted by Business Europe to call on decision-makers in the commission, parliament and council to take initiatives to move forward and evolve with the digital technology that is now increasingly present and closer to businesses. In this report, we can find concrete examples of actions that should be taken according to BusinessEurope such as

Create opportunities to capitalise on the free market economy, support European competitiveness at a global level and enable every business to reach its potential in the digital era. Europe needs a coherent industrial strategy to link individual initiatives as their success relies on one another (e.g. blockchain, cybersecurity, artificial intelligence (AI), privacy, supercomputing, platforms, infrastructure). This means relevant policy maker services and competences working closer together at all stages of the legislative process so that clear actions are put forward to reach Europe's future digital ambitions or support people to reach their potential and succeed. To ensure citizens are equipped to thrive in a more digitalised

world. Digitalisation offers employees greater opportunities to fulfil safer and rewarding tasks. It also has the ability to improve efficiency and therefore offer a greater work life balance. Yet as automation proliferates at a greater pace than ever before, the skills required to take part in these new tasks will need continuous updating. All citizens, including those involved in the gig economy, should feel included and be able to benefit both from the opportunities and protection that digital transformation offers. New technologies like AI should augment human capital. Digital can help integrate the most vulnerable segments of society and ensure they are not left behind throughout this digital revolution.

A great investment in human capital is needed. This begins with basic digital education at early curricular levels. Basic and advanced science, technology, engineering, and mathematics (STEM) and investing in digital skills are also fundamental for the next industrial revolution to be a success (BusinessEurope, 2019a, April).

7.3.3. Analysis: what to these documents say about the dimensions of our analytical framework?

In the first document “Legal issues of digitalization in Europe measures to effectively help companies advance their digital strategies” we can see that the dimension that is aim here is the SMEs. This document aims to analyzing the degree to which European businesses have progressed in their digitalization efforts and offering recommendations to help European businesses deal with the legal issues they face today.

In the three next BusinessEurope documents, we can see that the dimension that is obviously dealt with is artificial intelligence but we also find the employment dimension as well as the

business dimension with the different recommendations for example. AI is a very important point to analyse for BusinessEurope. They are very supportive of the European Commission both in building the ecosystem and in building confidence in artificial intelligence in Europe. Because of the many challenges it brings and especially because it is a global technology, it is important that all member states and European institutions participate in this digital revolution so that no one gets hurt or lost along the way.

In the document “Greening the economy”, even if it deals mainly with the green economy, we can still find some points, some dimensions such as the creation of jobs thanks to digital technologies or the way in which the digital transition impacts on ecology and companies.

And finally, the last article "Our Digital Ambition: priorities for 2019-2024", which we have chosen as an empirical result, addresses three of our four dimensions, namely employment, artificial intelligence and SMEs. BusinessEurope shows its involvement by offering different recommendations to the institutions above it that would facilitate and help employees and employers to better understand the new technological tools.

7.3.4. Intermediary conclusion

To conclude this section on BusinessEurope, we can see that they are taking initiatives through various position papers and strategy papers. In terms of the four dimensions identified above, we can say that BusinessEurope seems to be focusing mainly on artificial intelligence technology. Indeed, this represents a major challenge and would generate new jobs as well as considerable changes within companies, which are also points of attention for BusinessEurope.

However, here again we can see that the fourth issue we identified, i.e. gender equality, is of little interest. Indeed, there are no documents dealing with the subject of gender inequalities in the face of digitalisation. We can therefore conclude that gender equality is also a blind spot here.

7.3.5. Additional input

This report was written in August 2021 following the European Commission's March 2021 report "2030 digital compass". This report is entitled "SMEunited position paper on the Commission's consultation on the "2030 Digital Compass"". SME united supports the idea of setting

digital targets and a system for monitoring progress towards the goals of the digital decade, provided that more emphasis is placed on the digital transformation of SMEs.

Any robust European pathway to digital transformation should take more carefully into account the specificities of a very diverse SME community, mainly composed of micro-enterprises, whose existence and resilience are crucial for a good quality of life in urban and rural areas. Among the parameters to be used to define specific digital targets and actions, specific indicators should be included and monitored on an ongoing basis to measure the impact of digital developments on economic operators, often micro-enterprises, operating in urban and rural areas. There is a need to ensure adequate training and re-skilling of human capital to take full advantage of the digital transformation, bearing in mind also that, because of their size, many enterprises will need accompanying measures to make full use of digital technologies (SME united, 2021, August).

Even if this document is not from BusinessEurope, it was interesting to add it to show that there are also initiatives from other employer organisations. It is clear here that European employer organisations have an impact and play a role in addressing the inequalities of SMEs caused by digitalisation. Inequality is perhaps a misnomer and should rather be called challenges. Challenges that will bring opportunities and risks for businesses. This is why it is important that the European institutions are present and accompany SMEs in this digital transition so that they can adopt the technologies and grow with them.

7.4. Joint initiatives (ETUC & BusinessEurope)

7.4.1. Identification of the relevant documents issued by the Joint initiatives

We have first here the European social dialogue, which is a very important point and which certainly concerns the ETUC and the Business Europe. Indeed, the social partners have created a programme called "European social dialogue Work programme 2019 - 2021". This is not the first work programme they have done, but it is of particular interest to us because of its link with digitalisation.

Following the 2019 work programme, the social partners (ETUC, BusinessEurope, smeunited and SGI Europe), have created a second programme called the European social dialogue Work programme 2022-2024.

As a conclusion to our research and the issues we have identified throughout this work on how European Commission, ETUC and BusinessEurope are coping with the digitalization of work, this third document brings together the key action points. (European social partners frameworks agreement on digitalisation (Business Europe and ETUC))

7.4.2. Summary of the content of these documents

The first European social dialogue work programme is defined by the social partners like this:

➤ *Social partners are particularly well-placed to accompany the process of transformation of the economy and design balanced measures and solutions that contribute to economic and social progress. In this context, the sixth autonomous work programme of the European social partners¹ supports the objectives of the 2016 quadri-partite statement on “A New Start for Social Dialogue²” to strengthen social dialogue at European and national levels; to foster the role and influence of national social partners in the European semester; and to step up capacity building*

support to national social partners, notably through the European Social Fund (BusinessEurope, 2019a, February).

The 2019-2021 work programme covers six priorities, one of which is of particular interest to us, digitalization.

- *In the world of work, digitalisation can be an opportunity and a challenge. The whole world, and particularly Europe, is currently facing a fundamental transformation in the world of work. Many aspects of the ongoing digitalisation process are not yet clear or understood. The European social partners will organise a joint fact-finding seminar where they will explore different experiences relating to issues, such as the acquisition of digital skills, work organisation, including possibilities and modalities of connecting and disconnecting, and working conditions. They will negotiate an autonomous framework agreement on digitalization (BusinessEurope, 2019a, February).*

We were also able to receive an audiovisual testimony from the Business Europe on the social dialogue of the 2019-2021 work programme:

- *The new European social dialogue working program represents a concrete joint contribution of social partners on key social and economic challenges to shape a more inclusive future for Europe. The program contributes to the implementation of their common commitment to allow social dialogue and it covers a balanced range of themes of common interest for workers and employers, such as digitalization, the performance of labor markets and social systems skills, psychosocial aspects and risks at work, capacity building and circular economy. It is designed by social partners and for social*

partners. It is a central tool for social partners to deliver on their responsibility to ensure a fairer Europe for workers and companies. The word of labor and the word of work is changing rapidly. digitalization is a word is a catch word we hear every day in all the media's and it is of course of interest of the social partners to manage the digitalization process in a fair way, that all the economy the business and the workers participate and profit from it. So it should create good jobs quality jobs. And of course, one thing is important that we distinguish between working life and the life apart from work the life after work and that is a reason why in the negotiation about digitalization, they would like to see the possibility that they have an overall and framework agreement about switching off and switching on and that is what they are aiming for is trade unions (BusinessEurope, 2019a, February).

The second European social dialogue work programme provides for negotiations on legally binding measures and includes a wide range of areas of cooperation:

- *The seventh work programme 2022-2024 of the European social partners aims to strengthen autonomous social dialogue at European and national levels. It comes at an important time, ahead of an EU initiative on social dialogue.*

Social dialogue at all levels is particularly relevant for fair, responsible and effective labour markets. Social partners are particularly well-placed to contribute to shape the process of the digital and green transitions and accompany the resilience and recovery from Covid-19. They play a key role to co-design with the European Commission and national governments balanced measures and solutions to create an enabling environment for enterprises and improved living and working conditions (BusinessEurope, 2022, June).

Here are some comments from ETUC and BusinessEurope:

Commenting on the Work Programme, ETUC General Secretary Luca Visentini said: *“Agreements between unions and employers are the foundation of a decent society. This agreement is ambitious in what it aims to achieve and deals with several of the biggest challenges facing workers and businesses today”* (BusinessEurope, 2022, June).

BusinessEurope Director General Markus J. Beyrer said: *“Social dialogue has a fundamental role to play in making our labour markets more productive, competitive and resilient. This work programme demonstrates a shared endeavour and commitment in times of rapid labour market change”* (BusinessEurope, 2022, June).

ETUC Deputy General Secretary Esther Lynch said: *“Agreeing to negotiate an EU Directive on Telework and the right to disconnect is good news for employers and workers alike. It shows that where there is a will, even the most difficult issues can be resolved by constructive negotiations”* (BusinessEurope, 2022, June).

Finally, the result of these social dialogues and agreements between the social partners has resulted in a European framework agreement addressing the biggest challenges related to digitalization. There are many opportunities and benefits for employers and employees. But of course, there are also challenges, so they will need to work together to ensure that it is mutually beneficial for workers and employers.

And having the right skills for the digital age will be crucial to maintaining the employability of workers and improving the resilience of businesses.

The digital transformation of the economy is a multifaceted issue with far-reaching implications for labour markets, the world of work and society in general. It is being addressed in different ways by EU Member States, due to the diversity of

social and economic situations, labour markets and industrial relations systems, as well as existing initiatives, practices and collective agreements.

The digital transformation has clear benefits for employers, workers and jobseekers in terms of new employment opportunities, increased productivity, improved working conditions and new ways of organising work. Overall, with the right strategies, it can lead to employment growth and retention.

Transition also brings challenges and risks for workers and companies, as some tasks will disappear and many others will change. It is therefore necessary to anticipate change and provide the necessary skills for workers and companies to succeed in the digital age. Other issues are the organisation and conditions of work, work-life balance and the accessibility of technologies, including infrastructure, across the economy and regions. Specific approaches are also needed to ensure that SMEs adopt digitalisation in a way that suits their particular situation.

As gains are not automatic, we need to adapt our labour markets, education and training, and social protection systems so that the transition is mutually beneficial for employers and workers. The EU and national governments have an important role to play in ensuring that the framework conditions allow and support employers and workers to seize the opportunities, while allowing them to find appropriate solutions to the challenges, knowing that they know best the situation on the ground and what needs to be done for the benefit of businesses and workers.

In addition, a joint commitment is needed from employers, workers and their representatives to make the most of the opportunities and address the challenges in a partnership approach, while respecting the different roles of those involved.

This framework agreement is the joint commitment of the European social partners to maximise the benefits and meet the challenges of digitalization in the world of work (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

7.4.3. Analysis: what to these documents say about the dimensions of our analytical framework?

In the European social dialogue Work programme 2019-2021, many topics are covered, including digitalisation, which is of particular interest to us. As far as our dimensions are concerned, we can see that digital skills as well as work organisation and employment are integral parts of this programme.

The European social dialogue Work programme 2022-2024 foresees negotiations on legally binding measures to regulate telework and establish the right to disconnect following, among other things, Covid, which has encouraged and accelerated online remote working. In this work programme, the dimensions of employment, the improvement of digital skills as well as SMEs to a larger extent are mainly addressed.

Concerning now the European social partners' framework agreement on digitalization, we can see that it includes the dimensions of employment but also artificial intelligence and SMEs. This agreement aims to highlight the major challenges that the digitalisation of work brings.

7.4.4. Intermediary conclusion

In conclusion, the “work programme 2019-2021” aims to support the 2016 quadripartite declaration which aimed to strengthen social dialogue at both European and national level and also to strengthen the influence and positioning of the social partners (BusinessEurope, 2019a, February).

The European Social Partners agreed a Joint Work Programme 2022-2024 on June 28, 2022, which calls for talks on binding laws establishing the right to disconnect and regulating

telework. The work plan calls for collaboration in a wide variety of sectors, including telework, the right to disconnect, the green transition, youth employment, work-related privacy and surveillance, and strengthening Europe's talent matching. The first time such an agreement would be put into effect in the form of a directive since 2010, this is a significant signal that the European social partners are dedicated to playing a significant role in determining how the labor market will work in the future (BusinessEurope, 2022, June).

The European social partners agreement from 2020 was obviously negotiated before the COVID crisis, but the crisis has shown how relevant this topic is and how important the leap that the European players have all made into digitalisation was. And it proves that the European social partners are capable of providing solutions to the crucial transformation challenges of our time. Digitalization will determine to a large extent whether the social partners will be successful in the future (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

7.5. The back up Joint initiatives (ETUC & BusinessEurope)

7.5.1. Identification of the relevant documents issued by the back up

A first Joint initiative that was taken on 30 November 2018 is the one taken by the European social partners in the banking sector like Uni-europa, EBF or ESBG. The report is entitled "Joint declaration on the impact of digitalization on employment".

A second joint initiative is a document was posted in November 2020 by ETNO and Uni-Europa on artificial intelligence in the telecommunication sector entitled "The Telecom Social Dialogue Committee Joint Declaration on Artificial Intelligence".

7.5.2. Summary of the content of these documents

The first document on the joint declaration on the impact of digitalisation on employment by the European social partners in the banking sector (EBF, European associations of co-operative banks, ESBG and Uni – Europa) observe that since all of the financial sector's services are immaterial and hence susceptible to digitization through information and communication technology, the consequences of digitalization on this industry are extremely severe (ICT). As a result, traditional banks are now up against more competition from new businesses who rely on digital platforms and ecosystems. Banks must further improve their competitiveness by using ICT to boost job productivity. For the banking industry to be profitable, for jobs to be available, and for work conditions to improve, this initiative must be successful (Uni Europa, ESBG, EBF, & European association of co-opertative banks, 2018, November).

Employee skill and working technique development is a requirement for success in this age of digitalization and automation. Since they raise the value of entirely digital services to customers, human talents should be developed and strengthened to concentrate on tasks that computers and robots cannot perform. The recognized competitive advantages in the financial business are expertise and trust. With the development of information followed by a growth in digital transactions, their importance will expand. For raw information to be useful and transformed into confidential information for the client, it needs to be pruned and analysed (Uni Europa, ESBG, EBF, & European association of co-opertative banks, 2018, November).

As digital technology reaches ever-higher levels of maturity, Social Partners understands that it should not only be a tool for boosting revenue but also a tool for productivity, enhancing customer service quality, work-life balance for employees, and improving the quality of life. Additionally, AI should emphasize training and competence growth, complement humans rather than replace them. It's critical to support tactics that let the Social Partners use and benefit from what contemporary technology has to offer. The secret to success in the future is employability in the workforce (Uni Europa, ESBG, EBF, & European association of co-operative banks, 2018, November).

The second documents “The Telecom Social Dialogue Committee Joint Declaration on Artificial Intelligence” from 2020 is about work and employment that have undergone a radical transformation thanks to technology and digital innovation. Despite the fact that they are not new per se, robotics, big data, and artificial intelligence (AI) technologies have received new speed, and together, they have quickly advanced and altered the way we operate. Future labour markets are predicted to be profoundly impacted by these technologies, especially if existing jobs and tasks change, vanish, or are replaced by new ones (ETNO & Uni-Europa, 2020, December).

The European social partners for the telecom industry, UNI Europa ICTS and ETNO, recognize the advantages that artificial intelligence (AI) holds for innovation, such as in the fields of communication, mobility, and medical. AI systems could replace labour-intensive or hazardous positions in the workplace, freeing up humans to concentrate on more important or innovative duties (ETNO & Uni-Europa, 2020, December).

7.5.3. Analysis: what to these documents say about the dimensions of our analytical framework?

In the first back up joint initiative that we analyse, we can see two of our dimensions: the employment and the artificial intelligence. Indeed, the document explain that digitalisation will replace the way of we work and create new form of work that will change the traditional understanding of employment. So the document say that is crucial to follow a holistic approach to forecasting the future of employment by assessing employment effect of foreseeable.

In the second back up joint initiative that we analyse, we can also see two of our dimensions: employment and artificial intelligence. With the new technologies comes both opportunities and challenges. “*With this Joint Declaration, the European social partners in the telecom sector wish to contribute to the general debate on AI and to provide guidance to the sector*

stakeholders regarding the opportunities and the risks that AI represents” (ETNO & Uni-Europa, 2020, December).

7.5.4. Intermediary conclusion

In conclusion of the first back up initiative, we can say that the adoption of digital systems and processes necessitates significant changes in how labor is organized. Finding working strategies that integrate experience with creativity, social interaction, and flexibility is one difficulty. There is a demand for new types of work, such as telework and flexible working hours. They serve both employers' and employees' interests. The traditional notions of employment, working hours, and locations may change due to new types of labor, which may also pose distinct health and safety risks. Nevertheless, there is a lot of room for improvement in terms of the standard of existing occupations. The administrative burden on staff members might be lessened by the use of digital tools and systems, which would help them in their work and provide them more time and resources to assist and advise consumers.

It is essential to use a comprehensive strategy when predicting the future of employment by analyzing the employment implications of anticipated, technology-induced developments in certain industries. In order to meet the potential and difficulties of digitalization in a constructive way and to produce value for all stakeholders, including shareholders, the sector, employees, consumers, and society at large, strategic policy-making is necessary (Uni Europa, ESBG, EBF, & European association of co-operative banks, 2018, November).

And finally, in conclusion of the second document we can say that without social interaction, we cannot create the most effective AI approach. In order to address complicated issues pertaining to employment, training, the nature of work, inequality, and social security systems, European trade unions and employer organizations have a crucial role to play as social partners. Both unions and employers must be listened to and worked with by decision-makers at the national and EU levels. Additionally, we must all acknowledge and draw on the knowledge of individuals who are directly impacted by or involved in the design and usage of AI systems. Social partners should actively participate in creating suitable norms and implementation strategies, creating and overseeing training, and establishing responsibility.

This Joint Declaration serves as our guide for the telecom industry's social partners as they implement a flexible framework for moral AI at all levels and across all nations (European,

national and local). In order to lay the groundwork for the use of AI to advance societal and economic goals, it outlines the essential principles that Trade Unions and telecom corporations have agreed upon (ETNO & Uni-Europa, 2020, December).

8. Comparison of empirical results

8.1. *Employment and digital skills*

The European Commission will do a lot of actions to reform education and make it more accessible. But it can be said that this initiative to reskill the population is more focused on the young than on the old. This initiative would probably work in the long term, but in the short term there is no real initiative from the European Commission.

ETUC is also interested in digital employment and skills through various action plans and initiatives. Indeed, ETUC aims to support and sustain employment in the face of this digital transition, which leads to job losses, changes in skills and the creation of new jobs that require new training and new skills. Moreover, ETUC is fully aware that digitalization will change the way we work today, so once again, it wants to accompany and help workers in this radical digital change.

BusinessEurope, like the other two European players, plays a role in this digital transition. Indeed, following the different articles we have been able to consult, we have been able to learn about the different initiatives and position papers on which BusinessEurope has positioned itself. Employment being at the heart of work, it is essential for European actors to support it and to ensure that it is adapted to the digital changes taking place.

One difference that can be identified between our actors is the scope of action. Indeed, while the European Commission has a more general role on employment, ETUC focuses on workers and BusinessEurope more on employers.

The European Commission, the European Trade Union Confederation and BusinessEurope have a global impact on the labor market and all have a crucial role to play in accompanying, assisting and supporting employers and workers so that the labour market remains stable and can evolve and grow together with digitalization and its new technological tools.

The different Joint initiatives taken by the European players are the proof that there are working together to face the different challenges that the digital transition brings with it.

For instance, in the European social partners framework agreement, one of the main point is about securing employment by foster employment transitions of workers in enterprises and provide the conditions for digital transformation of enterprises that leads to employment creation. Social partners should consider measures at the appropriate levels to ensure that the impact on employment is well anticipated and managed in digital transformation strategies supporting employment retention and creation (ETUC, BusinessEurope, CEEP, & SMEunited, 2020c, June).

In conclusion of our research on the impact of digitalization on employment, and especially the investment and time that our three European institutions devote to it, it can be said that it represents a key factor that is at the heart of their action plans and initiatives.

8.2. *SMEs and inequalities*

We can see that the European Commission really understands the importance of developing SMEs on a reliable basis. Indeed, SMEs represent more than half of the European GDP. It is therefore very important to encourage their development by providing them with a secure basis for development. However, an important factor to consider is that such initiatives will be very costly.

ETUC on the other hand has a less important and decisive role than its two European colleagues. Indeed, because of its role rather directed towards the employees, it seems normal that the private companies are not in the heart of its action plans. Nevertheless, even if ETUC does not have an initiative purely aimed at the inequalities of SMEs caused by the digital transition, we can still see through the documents we have analysed that it integrates and talks about this dimension. Moreover, being social partners of different recent reports like the European social partners framework agreement on digitalization or joint work programme, we can see that ETUC participates indirectly in the different action plans facing this dimension that we have identified.

BusinessEurope, as the European employers' organization, has an important role to play in supporting SMEs in the face of the inequalities caused and accentuated by the digital transition. We could notice through the different documents consulted that BusinessEurope took into account this dimension as in the document "Legal issues of digitalization in Europe measures to

effectively help companies advance their digital strategies". However, BusinessEurope being an actor among other European employer organizations, we could see that SME united was the most involved in this fight. Indeed, in the document "SMEunited position paper on the Commission's consultation on the "2030 Digital Compass"", it is clear that European employer organizations have an impact and play a role in addressing the inequalities of smes caused by digitalization. Inequality is perhaps a misnomer and should rather be called challenges. Challenges that will bring opportunities and risks for businesses. This is why it is important that the European institutions are present and accompany SMEs in this digital transition so that they can adopt the technologies and grow with them.

In conclusion of our research on private companies and the inequalities that can exist, we can now say that yes, our European institutions are working and collaborating to accompany private companies as best they can in the face of the advent of digitalization. As explained before, only the European trade unions play a lesser role in this area, which is quite normal as they are mainly focused on workers and not on employers or companies as could be the European employers' organizations with SME united for example or simply the European Commission which has more of a regulatory role.

In summary, the three European actors play a decisive role in supporting SMEs in the face of the digitalization of work.

8.3. *Artificial intelligence*

It is very important to note that the complexity and speed of artificial intelligence can be source of many problems. It is therefore difficult to give a clear answer to the question of AI, as the Commission is doing a lot to frame artificial intelligence as well as possible, but on the other hand it is uncertain about its future. Because this technology is still in its early stages and we don't know much about it. The European Commission should therefore keep itself informed and collect as much data as possible on the evolution of artificial intelligence.

The research we have done on artificial intelligence in relation to ETUC has led us to say that this dimension represents a major challenge. Artificial intelligence is a topic that has been addressed in many articles, such as the resolution on European strategies for artificial intelligence and data, which highlights the technological opportunities it brings, but also the risks regarding privacy and data protection. The main role here that ETUC wants to have is a role of regulating

AI in order to be able to better frame employment as we can see in the document dated September 10, 2021 entitled "ETUC response to the second phase of consultation of social partners under Article 154 TFEU on possible actions to address the challenges related to working conditions on platforms". ETUC would like to recall its position on the Commission's proposal for a regulation on artificial intelligence, which does not take into account the specificity of AI uses in employment, including platform work.

AI is a very important point to analyse for BusinessEurope. They are very supportive of the European Commission both in building the ecosystem and in building confidence in artificial intelligence in Europe. Because of the many challenges it brings and especially because it is a global technology, it is important that all member states and European institutions participate in this digital revolution so that no one gets hurt or lost along the way.

We could see that Business Europe had, just like ETUC, a role of recommendation for the European Commission. Indeed, BusinessEurope has written several official documents with the aim on the one hand to explain and support the growth of artificial intelligence and on the other hand to play a role of prevention by bringing the various issues and challenges that this dimension of artificial intelligence represents as in the position paper "Artificial Intelligence Recommendations" of 2019 which tells us that "The possibility of taking advantage of the benefits offered by AI technologies will depend on the ability of companies to : research, test, acquire a skilled workforce, exist in a dynamic data economy, have appropriate infrastructure to build on, and a beneficial framework in which to exist" (BusinessEurope, 2019b, July).

In conclusion of our research on artificial intelligence, we can see that it has and will have a considerable impact on society and on the world of work that we know today. AI is a fast-growing technological tool that requires a lot of knowledge and more than ever the support of the European institutions so that it can be properly integrated and managed by the actors of the working world. AI is an integral part of digitalization and we can see that our three actors are playing an important role through the implementation of action plans, initiatives and directives. The European social partners framework agreement on digitalization is an example of joint initiative taken by our three actors to support employees and employers in dealing with the opportunities and risks of artificial intelligence. Our research has also led us to see that the future of artificial intelligence can be quite unclear due to the speed of its evolution and the number of factors that it can and will encompass in the future. It is therefore important that the

three European institutions remain informed and collect as much data as possible in order to cope with the digitalisation of work.

8.4. *Gender equality: Blindspot*

In our view concerning the last point, equality gender, the European Commission has a more important role to play. Indeed, their action plan only takes into account youth with its Digital Education Plan, so it is a long-term objective. However, as already mentioned in our brief, there is currently a shortage of employees in key digital sectors. This is why we sincerely believe that the European Commission must play a more important role and provide both long-term and short-term solutions to this issue.

Concerning ETUC, even if gender inequalities have been addressed by the European institutions for some time now, we can see that in terms of digitalisation, there is still little action. In the first article quoted here, "Toward a fair digitalisation", ETUC openly admits that the gender equality is a gap and a blindspot and that it is really necessary to take initiatives to reduce these inequalities, which will only become more pronounced as time goes on.

Here again for BusinessEurope, we can see that the fourth issue we identified, gender equality, is of little interest. Indeed, there are no documents dealing with the subject of gender inequalities in the face of digitalization. We can therefore conclude that gender equality is also a blind spot here.

As far as gender equality is concerned, we can see that this dimension is not included in any of the joint initiatives and is not considered a challenge of digitalization.

In conclusion of our research, it appears that gender equality is the "blindspot" of our European institutions. Indeed, despite many different initiatives and action plans, we have come to realise that in terms of digitalization, our European actors did not focus on gender inequalities.

9. Recommendations

Our recommendations follow from our empirical analysis. We have based our empirical research on our five major issues related to the transformation of work in Europe.

Our first recommendation concerns SMEs and inequalities. We have seen that much is being done both by the European Commission and BusinessEurope. However, it is easy to see that big companies are gaining more and more power every day at the expense of smaller companies. We therefore believe that the joint efforts of these two institutions will not be sufficient to allow SMEs to compete fairly in the market in terms of digital development. The European Commission should find new levers other than financial aid to reduce the balance of inequalities in the markets.

Our second is based on artificial intelligence. Once again, much is being done and implemented by our institutions. However, the use and development of this technology is still in its infancy. The European institutions should therefore keep a close eye on the uses that will be made of artificial intelligence and ensure that it is not used for the wrong purposes.

Finally, gender equality will be our third and last recommendation. This is probably one of the most underestimated issues by the institutions. More should be done to integrate women into the digital changes that are taking place as their vision can open up new avenues of exploration. It is really important to be able to evolve in a digital society where all the population has equal access to digital transformation, whether you are a man or a woman.

Based on our analysis, we propose the following recommendation for gender equality:

One of the secondary data collections of literary form that we consulted allows us to envisage different actions that policies could consider and that could result in an improvement of the positioning of women in today's society:

- The first initiative would be to invest in more equitable education programmes for all with equal access and which would address social and economic factors that show the existing inequality towards women and girls.

- The second initiative would be to integrate or transform education systems from the earliest age in order to get girls used to having basic digital skills that they can develop throughout their lives.
- Finally, a third initiative that could be taken by the European institutions would be to:

Focus education policies on digital literacy skills for girls and women and support their study of STEM subjects in inclusive and gender-neutral environments. Support early exposure to technology programmes to create opportunities for girls to experiment with technology at a young age. This can increase their confidence in digital technologies and ultimately in working in the digital sector. Or invest in training female teachers who can be a positive role model for girls and encourage them to continue their education in secondary school, and subsequently in STEM fields. (CCGD, 2018, p.7)

Our research via secondary data collection in literary form led us to believe that certain actions could be taken to reduce existing inequalities:

- The first action that the European institutions could take is to lower the cost barriers in order to favour and stimulate women's access to digital professions.
- The second action would be to ensure better availability of public spaces and that these are safe so that women and girls can have easy access to them and have the possibility of benefiting from the same type of material as men.
- Finally, a third action, which we believe is one of the most important for women's participation, would be to "Evaluate digital for development initiatives and programmes for their wider impacts in society, and particularly ensure that they reach women and girls who are most disadvantaged due to their geographical location, age, household income, level of education, ethnic or religious minority status, disability, etc." (CCGD, 2018)

In this third and final empirical analysis on gender equality, we gathered information through a secondary data collection in literary form. These concern the actions that European institutions could take in the face of the potential of digital technology for the empowerment of women and girls. We have selected 3 that we think are the most relevant:

- The first action would be the implementation of programmes that would allow women and girls to have access to ICT information and training. This would allow women to learn and evolve without any social pressures or stereotypes. It would also allow for a better dialogue between them.
- The second action could be to promote and enhance the image of women in STEM and digital technologies so that they can identify themselves in this sector and better integrate into it.
- The third action would be "Implement specific policies and programmes to ensure women's equitable access to innovative financial tools tailored to their needs" (CCGD, 2018).

10. General conclusion

We finally come to the last part of our work. We started our research by defining the terms we were going to use. We saw that digitalisation was part of a three-step process called digital transformation. We also saw the main digital tools used in our current industries such as artificial intelligence or robots.

We then looked at the issues that digital transformation brings with it. We identified several key issues such as the effects of displacement and replacement of work, the difficulties of investing in digital for SMEs and the creation of inequality with respect to large companies but also the gender gap that could exist.

Chapters 3 and 4 allowed us to conclude our first theoretical part by providing answers as to the objectives of each of the institutions. The European Commission has an important role to play in the digital transition. The report from June of this year gave us a clear picture of the objectives and priorities, such as the importance of reskilling the population and redesigning business through new technologies. We then looked at the European Trade Union Confederation and the European Employer Organisation. We saw that they play a certain regulatory role. We learned that digitalisation has an impact on social dialogue, which brings with it opportunities and risks. Inequalities between men and women were observed, as well as diverging opinions on the creation or destruction of work caused by digital transformation.

Once this theoretical part was completed, we continued our thesis with an empirical part. The latter enabled us to highlight the actions of institutions to deal with the digital transformation of work. The majority of the issues highlighted in Chapter 2 are at the heart of the institutions' interests and initiatives. However, if there is one issue that is underestimated by our institutions, it is gender equality. Indeed, our research has shown that initiatives to reduce the existing gaps between men and women in the digital sectors are weak or non-existent. Much remains to be done and much will be done in the coming years to facilitate the digital transformation. Therefore the presence of women on the same scale as men in the digitalisation process is crucial for European digital development.

11. References

- ❖ Arntz, M., Gregory T. & Zierahn U. (2016). The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis. *OECD Social, Employment and Migration Working Papers*, No. 189. Paris: OECD Publishing. Retrieved from <http://dx.doi.org/10.1787/5jlz9h56dvq7-en>
- ❖ Business Europe. (2019a, February). European work programme 2019 – 2021 social dialogue. https://www.businessseurope.eu/sites/buseur/files/media/reports_and_studies/v2_sd_work_programme_2019-2021.pdf
- ❖ Business Europe. (2019b, February). *Social dialogue : employers and workers across Europe* [Vidéo]. YouTube. Retrieved from <https://www.youtube.com/watch?v=Rfl2jzFM8kY&t=8s>
- ❖ Business Europe. (2020, June). *Social partners new agreement on digitalisation* [Vidéo]. YouTube. Retrieved from https://www.youtube.com/watch?v=d7bGQH5KxAM&feature=emb_title
- ❖ Business Europe. (2022, June). *European Social Dialogue Work programme 2022 - 2024*. Retrieved from https://www.businessseurope.eu/sites/buseur/files/media/reports_and_studies/2022-06-28_european_social_dialogue_programme_22-24_0.pdf
- ❖ BusinessEurope. (2017a). *Legal issues of digitalisation in europe measures to effectively help companies advance their digital strategies*. Retrieved from https://www.businessseurope.eu/sites/buseur/files/media/reports_and_studies/2017-09-29_legal_issues_of_digitalisation_in_europe.pdf
- ❖ BusinessEurope. (2017b, December). *Artificial Intelligence (AI)*. Retrieved from https://www.businessseurope.eu/sites/buseur/files/media/position_papers/internal_market/2017-12-15_artificial_intelligence.pdf
- ❖ BusinessEurope. (2019a, April). *Our Digital Ambition: priorities for 2019–2024*. Retrieved from https://www.businessseurope.eu/sites/buseur/files/media/position_papers/internal_market/2019-04-15_our_digital_ambition_-_priorities_for_2019-2024.pdf
- ❖ BusinessEurope. (2019b, July). *Artificial Intelligence Recommendations*. Retrieved from https://www.businessseurope.eu/sites/buseur/files/media/position_papers/internal_market/2019-07-31_ai_recommendations.pdf
- ❖ BusinessEurope. (2021a, October). *Greening the economy : Employment and skill aspects*. Retrieved from https://www.businessseurope.eu/sites/buseur/files/media/reports_and_studies/2021-10-15_employment_and_skills_aspects_of_greening_-_final.pdf
- ❖ BusinessEurope. (2021b, October). *The Artificial Intelligence Act (AI Act)*. Retrieved from https://www.businessseurope.eu/sites/buseur/files/media/position_papers/internal_market/2021-10-28-be_aia_position_paper_27102021.pdf
- ❖ CCGD. (2018). *Avis relatif à l'intégration de la dimension de l'égalité de genre dans la mise en œuvre de la politique stratégique relative au numérique au service du développement*. Retrieved from CCGD, https://www.argo-ccgd.be/sites/default/files/180228_avis_digitalisation_final.pdf

- ❖ Coster, S., & Ghailani, D. (2018, June). The impact of digitalisation on job quality in European public services the case of homecare and employment service workers. Retrieved from <https://eticasfoundation.org/wp-content/uploads/2019/03/FINAL-REPORT-EPSU-DIGITALISATION-OSE-June-2018.pdf>
- ❖ Davis, N. (2016, January). What is the fourth industrial revolution. *World Economic Forum*, (Vol. 19). Retrieved from <https://alejandroarbelaez.com/wp-content/uploads/2020/10/What-is-the-fourth-industrial-revolution-WEF.pdf>
- ❖ Deighton, B. (2014). *What does the future hold for 3D printing?* Retrieved from European Commission Web site: <https://ec.europa.eu/research-and-innovation/en/horizon-magazine/what-does-future-hold-3d-printing>
- ❖ EIGE. (2018). *Égalité de genre et numérisation dans l'Union européenne*. Retrieved from Publications Office <https://data.europa.eu/doi/10.2839/16195>
- ❖ EIGE. (2020, October). *Gender Equality Index 2020: Digitalisation and the future of work*. Retrieved from <https://eige.europa.eu/publications/gender-equality-index-2020-digitalisation-and-future-work>
- ❖ ETNO & Uni-Europa. (2020, December). *The Telecom Social Dialogue Committee Joint Declaration on Artificial Intelligence*. Retrieved from <https://etno.eu/news/8-news/691-the-telecom-social-dialogue-committee-joint-declaration-on-artificial-intelligence.html>
- ❖ ETUC. (2016, June). *ETUC resolution on digitalisation: "towards fair digital work"*. Retrieved from <https://www.etuc.org/en/document/etuc-resolution-digitalisation-towards-fair-digital-work>
- ❖ ETUC. (2018, September). Digitalisation and workers participation: what trade unions, company level workers and online platform workers in europe think. Retrieved from <https://www.etuc.org/sites/default/files/publication/file/2018-09/Voss%20Report%20EN2.pdf>
- ❖ ETUC. (2019, August). *Etuc action programme 2019-2023*. Retrieved from <https://www.etuc.org/sites/default/files/publication/file/2019-08/CES-14e%20Congrès-Action%20Programme-UK-02.pdf>
- ❖ ETUC. (2020a, January). *Gender Pay Gap - End the Secrecy*. Retrieved from <https://www.etuc.org/en/publication/gender-pay-gap-end-secrecy>
- ❖ ETUC. (2020b, March). *ETUC statement ahead of Commission proposal for an EU Industrial Strategy*. Retrieved from <http://www.etuc.org/en/document/etuc-statement-ahead-commission-proposal-eu-industrial-strategy>
- ❖ ETUC, BusinessEurope, CEEP, & SMEunited. (2020c, June). *European social partners framework agreement on digitalisation*. Retrieved from https://www.etuc.org/system/files/document/file2020-06/Final%2022%2006%2020_Agreement%20on%20Digitalisation%202020.pdf
- ❖ ETUC. (2020d, July). *Resolution on the European strategies on artificial intelligence and data*. Retrieved from <https://www.etuc.org/sites/default/files/document/file/2020-07/Adopted%20-%20ETUC%20resolution%20on%20the%20European%20strategies%20on%20artificial%20intelligence%20and%20data%20-%20EN.pdf>

- ❖ ETUC. (2021a, May). *Commission's proposal for a regulation on Artificial Intelligence fails to address the workplace dimension*. Retrieved from <https://www.etuc.org/en/document/commissions-proposal-regulation-artificial-intelligence-fails-address-workplace-dimension>
- ❖ ETUC. (2021b, September). *ETUC reply to the Second phase consultation of social partners under Article 154 TFEU on possible action addressing the challenges related to working conditions in platform work*. Retrieved from <https://www.etuc.org/en/document/etuc-reply-second-phase-consultation-social-partners-under-article-154-tfeu-possible>
- ❖ ETUC. (2022, June). *European Unions and Employers sign historic deal*. Retrieved from <https://www.etuc.org/en/pressrelease/european-unions-and-employers-sign-historic-deal>
- ❖ ETUC. (s. d.). *Digitalisation*. Retrieved from <https://www.etuc.org/en/issue/digitalisation>
- ❖ ETUC. (s. d.). *Gender equality*. Retrieved from <https://www.etuc.org/en/issue/gender-equality>
- ❖ Eurofound. (2004, April). *Employers' organisations in Europe*. Retrieved from <https://www.eurofound.europa.eu/publications/report/2004/employers-organisations-in-europe>
- ❖ Eurofound. (2020). *Employee monitoring and surveillance: The challenges of digitalization*. Luxembourg: Publications Office of the European Union. Retrieved from https://www.eurofound.europa.eu/sites/default/files/ef_publication/field_ef_document/ef20008en.pdf
- ❖ Eurofound. (2021a, December). *Automation, digitisation and platforms in the world of work*. Retrieved from <https://www.eurofound.europa.eu/data/digitalisation/research-digests/automation-digitisation-and-platforms-in-the-world-of-work#s-180>
- ❖ Eurofound. (2021b, December). *Impact of digitalisation on social dialogue and collective bargaining*. Retrieved from <https://www.eurofound.europa.eu/data/digitalisation/research-digests/impact-of-digitalisation-on-social-dialogue-and-collective-bargaining>
- ❖ Eurofound. (2021c, December). *Artificial intelligence and the world of work*. Retrieved July 14, 2022, from <https://www.eurofound.europa.eu/data/digitalisation/research-digests/artificial-intelligence-and-the-world-of-work>
- ❖ European Commission. (2020, March). *An SME Strategy for a sustainable and digital Europe*. European Commission. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0103&from=FR>
- ❖ European Commission. (2020, September). *Digital Education Action Plan 2021–2027. Education and training*. Retrieved from https://education.ec.europa.eu/sites/default/files/document-library-docs/deap-communication-sept2020_en.pdf
- ❖ European Commission. (2021a, April). *Fostering a European approach to Artificial Intelligence*. European Commission. Retrieved from <https://digital-strategy.ec.europa.eu/en/library/proposal-regulation-laying-down-harmonised-rules-artificial-intelligence>

- ❖ European Commission. (2021b, November). *Commission Implementing Decision on the financing of the Digital Europe Programme and the adoption of the multiannual work programme for 2021 - 2022*. European Commission. Retrieved from https://ec.europa.eu/newsroom/repository/document/2021-46/C_2021_7914_1_EN_annexe_acte_autonome_cp_part1_v3_x3qnsqH6g4B4JabSGBy9UatCRc8_81099.pdf
- ❖ European Commission. (2022, March). The single digital gateway guidance for local authorities. *Your Europe*. Luxembourg: Publications Office of the European Union. Retrieved from <https://data.europa.eu/doi/10.2873/876640>
- ❖ European Commission. (2022, May). SMEs and cybercrime: summary. *Flash Eurobarometer 496*. Luxembourg: Publications Office of the European Union. Retrieved from <https://data.europa.eu/doi/10.2837/89101>
- ❖ European Commission. (2022a, June). *European Commission digital strategy Next generation digital Commission*. European Commission. Retrieved from https://ec.europa.eu/info/sites/default/files/strategy/decision-making_process/documents/c_2022_4388_1_en_act.pdf
- ❖ European Union Agency for Fundamental Rights (EUAFR). (2022). Artificial intelligence & its potential impact. *Getting the future right*. Luxembourg: Publications Office of the European Union. Doi: 10.2811/443863
- ❖ European women's lobby. (2017). *Mapping the state of online violence against women and girls in Europe*. Retrieved from https://www.womenlobby.org/IMG/pdf/hernetherights_report_2017_for_web.pdf
- ❖ García, I. (2021, June). *Digital transformation in the EU*. The New Federalist. Retrieved from Digital Affairs Web site: <https://www.thenewfederalist.eu/digital-transformation-in-the-eu?lang=fr#:~:text=The%20EU's%20digital%20transformation%20refers,and%20their%20repercussion%20in%20society>
- ❖ Gasparri, S. & Tassinari, A. (2020). 'Smart' Industrial Relations in the Making? Insights from Analysis of Union Responses to Digitalization in Italy. *Relations industrielles/Industrial Relations*, 75(4), 796–817. Retrieved from <https://doi.org/10.7202/1074565ar>
- ❖ Gil, D., Ferrández, A., Mora-Mora, H. & Peral, J. (2016). 'Internet of things: A review of surveys based on context aware intelligent services'. *Sensors*, Vol. 16, No. 7, 1069. Retrieved from https://www.researchgate.net/publication/305217415_Internet_of_Things_A_Review_of_Surveys_Based_on_Context_Aware_Intelligent_Services#read
- ❖ Hötte, K., Somers, M., & Theodorakopoulos, A. (2022). Technology and jobs: A systematic literature review. *The Oxford Martin Working Paper Series on Technological and Economic Change*. Retrieved from <https://doi.org/10.48550/arXiv.2204.01296>
- ❖ International Labour Organization. (2011, November). *Social dialogue*. Retrieved from [https://www.ilo.org/ifpdial/areas-of-work/social-dialogue/lang--en/index.htm\)%20%20a](https://www.ilo.org/ifpdial/areas-of-work/social-dialogue/lang--en/index.htm)%20%20a)
- ❖ International Federation of Robotics (IFR). (2021). *World Robotics 2021 reports*. Retrieved from <https://ifr.org/ifr-press-releases/news/robot-sales-rise-again#:~:text=next%20years%20following,Europe,of%2075%2C560%20units%20in%202018>

- ❖ Kassim, H., Peterson, J., Bauer, M. W., Connolly, S., Dehousse, R., Hooghe, L., & Thompson, A. (2013). *The European Commission of the twenty-first century*. Oxford: Oxford University Press. Retrieved from https://books.google.com/books?hl=en&lr=&id=jYNoAgAAQBAJ&oi=fnd&pg=PP1&dq=european+commission&ots=jz8pHpTwZD&sig=wW_gjWH69nT6IQ3Jje2ZuNEqCL4
- ❖ Nigris, S., Haarbuerger, R., Hradec, J. (2022). AI watch, AI uptake in manufacturing. *Joint Research Centre*. Luxembourg: Publications Office of the European Union. Doi: 10.2760/267198
- ❖ OECD. (2018). *Bridging the digital gender divide*. Retrieved from <https://www.oecd.org/digital/bridging-the-digital-gender-divide.pdf>
- ❖ PaleBlue Newsroom. (2021, December). *The Impact of VR, AI And AR In The Workplace*. Retrieved from <https://pale.blue/2021/12/13/the-impact-of-vr-ai-and-ar-in-the-workplace/>
- ❖ Petropoulos, G. (2018). The changing face of work in the digital age: The impact of artificial intelligence on employment. In M. Neufeind, J. O'Reilly & F. Ranft (Eds.). *Work in the digital age: challenges of the fourth industrial revolution*. (pp.119 – 132). London: Rowan & Littlefield.
- ❖ Porter, M. & Heppelmann, J. (2014). How smart, connected products are transforming competition. *Harvard business review*, 92(11), 64-88. Retrieved from https://www.academia.edu/download/48737111/WP_hbr_how-smart-connected-products-are-transforming-competition_R1411C_EN.pdf
- ❖ Prasanna. (2022, January). *What is IoT ? Advantages and Disadvantages of Internet of Things (IoT)*. Retrieved from AplusTopper Web site: <https://www.aplustopper.com/advantages-and-disadvantages-of-iot/>
- ❖ Righi, R., López-Cobo, M., Samoilis, S., Cardona, M., Vàsque-Prada, B., De Prato, G. & Papazoglou, M. (2022). Academic offer of advanced digital skills in 2020-21: international comparison: focus on artificial intelligence, high performance computing, cybersecurity and data science. *Joint Research Centre*. Luxembourg: Publications Office of the European Union. Doi: 10.2760/466727
- ❖ Rijswijk, K., Bulten, W., Klerkx, L., den Dulk, L., Dessen, J. & Debruyne, L. (2020). Digital Transformation: Ongoing digitisation and digitalisation processes. *EU Horiz., Desira*. Netherland, Wageningen, Wageningen Univ. Res. Retrieved from https://desira2020.eu/wp-content/uploads/2020/05/DESIRA_article_rijswijk_digitisation.pdf
- ❖ Schwab, K. (2016). The fourth industrial revolution: what it means, how to respond. *World Economic Forum*. New York, Crown Business. Retrieved from <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/>
- ❖ SME united. (2019). *Best practices on assisting SMEs with the digital transformation*. Retrieved from <https://www.smeunited.eu/admin/storage/smeunited/smeunited-digital-brochure.pdf>
- ❖ SME united. (2021, August). *SMEunited position paper on the Commission's consultation on the "2030 Digital Compass"*. Retrieved from <https://www.smeunited.eu/admin/storage/smeunited/20210803-smeu-pp-2030-digital-compass.pdf>

- ❖ Soete, L. (2018). Destructive creation: Explaining the productivity paradox in the digital age. In M. Neufeind, J. O'Reilly & F. Ranft (Eds.). *Work in the digital age: challenges of the fourth industrial revolution*. (pp.29 – 46). London: Rowan & Littlefield.
- ❖ Tangi, L., Noordt, C., Combetto, M., Gattwinkel, D. & Pignatelli, F. (2022). AI Watch: European landscape on the use of artificial intelligence by the public sector. *Joint Research Centre*. Publications Office of the European Union. Doi: 10.2760/481674
- ❖ Uni Europa, ESBG, EBF, & European association of co-opertative banks. (2018, November). *Joint declaration on the impact of digitalisation on employment by the european social partners in the banking sector*. Retrieved from [https://www.abi.it/DOC_Lavoro/Relazioni-sindacali/Internazionale%20e%20comunitario/Joint%20Declaration%20On%20The%20Impact%20Of%20Digitalisation%20On%20Employment%20\(2\).pdf](https://www.abi.it/DOC_Lavoro/Relazioni-sindacali/Internazionale%20e%20comunitario/Joint%20Declaration%20On%20The%20Impact%20Of%20Digitalisation%20On%20Employment%20(2).pdf)
- ❖ Van Campenhoudt, L., & Quivy, R. (2011). *Manuel de recherche en sciences sociales* (pp. 170-181). Retrieved from <https://www.ugb.sn/cours/sarandiaye/Manuel-recherche-sciences-socials-Luc-Van-Compenhoudt-Raymon-Quivy-4-Edition.pdf>
- ❖ World Bank. (2019). World Development Report 2019: The Changing Nature of Work. Washington, DC: World Bank. doi:10.1596/978-1-4648-1328-3.