



**DIGITIZATION OF MUSIC:
CURRENT CHALLENGES AND THE WAY FORWARD**

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Introduction

Today music is the most widespread cultural consumer product in the world, but how the digital transformation has influenced the music sector in the last decades, and how will it transform in the future under this irreversible revolution? When digitization is helping the music field and the actors involved, and when, instead, does it harm it? The digital technologies will shift our cultural experience to a virtual space abandoning the concert halls, or will they be useful to support music distribution?

The present research project aims to answer this question through an in-depth understanding of the main characteristic of digital transformation and how this process is affecting the music industry.

The process of the Digital Revolution, which has clearly been accelerated by the pandemic, represents the most important revolution after industrialization. This unprecedented technological acceleration has generated opportunities and challenges that are profoundly changing our cultural experience. Indeed, if, on the one hand, digitization enlarges our creative and productive tools, putting the basis for wider participation, on the other hand, it profoundly changes the essence of the performance and the relation with the public. In this context, it is very important to analyse how digitization, also given the pandemic period, has helped the artistic performance sector and how instead it could impoverish or damage the performance world. Indeed, one of the most important concepts in the digital debate is *Digital Humanism* that highlights the necessity to put people's needs at the centre of technological developments and make them the benchmark and rule for the digitization process so that humanistic and social values can be implemented by the development of technologies.

The research project aims to give a complete analysis of the digitization of the music sector, both from a theoretical and practical point of view, taking into consideration the impact of the music industry in the economy, the digital public policies framework, the response from musical institutions, the importance of audio and media services, the use of social networks, and the approach to digital performance by musicians and the audience. Indeed, in order to frame the concept, in the first chapter will be presented a general overview of the digital process. Indeed, it is essential to take into consideration both the opportunities that digitization is bringing to the cultural

sector, as widening the access to cultural services and stimulating new business models and, on the other side, the obstacles and the challenges that it is bringing to our society, as the over-information and the necessity to provide adequate infrastructures and skills. In the second chapter, this research will, firstly, outline the main developments and changes that the music industry has undergone due to the proliferation of new computer technology and the advent of new revolutionary business models. Indeed, this evolution has brought both important opportunities for the dissemination of niche music products and several challenges for the protection of the interests of the actors involved. Indeed, to have a complete overview of the music industry and to develop the necessary safeguards for its sustainable development is fundamental, as it will be illustrated in the second part of the chapter, to understand its economic impact within the global economy and the legislative framework in which it develops. The third chapter, instead, will be presented the analysis of three significant case studies. The three projects chosen are significant and diversified examples that contribute to a complete overview of the application of new technologies to the music industry. They make, indeed, a significant contribution to improving the services the music industry offers to artists and to the audience. The three projects, however, raise crucial ethical and philosophical questions about the worth of art, the relationship between machine and artist, and the essential public-artist interaction that is generally created in live performance. The three case studies will be explained in their operating principle and examined in a sustainable viewpoint for all parties concerned. Respectively the case studies covered are the various applications of Artificial Intelligence (AI) to the music industry and production, the Digital Concert Hall (DCH) platform of the Berliner Philharmonic Orchestra, and the use of social media by the creative world, with a special focus on the pianist Igor Levit. All three cases are different variations of how technologies are being used in the music sector, inaugurating new interactions between public-artist-technology and new economic models.

Indeed, digitization is not a possibility, but it is an irreversible reality of our days that brings unimaginable opportunities and challenges. It is important to have a complete picture of the digitization of the music sector to understand what are the strengths and weaknesses and how these can be filled by shared efforts involving public institutions, local actors, and private partners.

Literature Review

The process of digitization is profoundly changing our cultural experience, not only regarding new technology application, production, and dissemination but also in terms of participation, creation, learning, and partaking in a knowledge society. However, the researches about the digitization of culture and the music industry represent a new and relatively unexplored field of study. In fact, since the digitization process started around twenty years ago, it is still difficult to understand its long-term effects on society and the various areas in which it has been applied.

Although many of the innovations introduced support musical production, there are also negative implications that need to be considered, especially at the legislative and economic levels. Indeed, to understand the main issues related to digitization, the first chapter is dedicated to framing the main characteristics of this phenomenon. Given the importance of the process, several important studies have been conducted by the most important international institutions, such as the United Nations, the World Bank, and the European Commission. The reports used highlight the major challenges of digitization and the response that these institutions are ready to put in place to promote sustainable and long-term development.

The different challenges that digitalization is bringing to our society have been deeply studied by a plethora of anthropologists, philosophers, and social scientists. One of the most eminent contemporary voices in the field is the South Korean philosopher Byung-Chul Han who deeply analysed the main disruptive effect of digitalization in several books. In particular, in the book “In the Swarm: digital prospects,” he highlights how digital communication and social media have taken over our lives, disintegrating the feeling of a real human community and the public space.

In the second chapter, the major challenges that digitalization poses to the creative industry and, in particular, to the music sector are explored. On the one hand, the analysis of the impact of the cultural and creative industries (CCIs) on the European economy and market has been based principally on two sources: a report conducted in 2014 by the leading global firm in auditing and consultancy, Ernest&Young, and the 2020’s report by International Federation of the Photographic Industry (IFPI), an organization that represents the interests of the recording industry worldwide. Both reports strongly highlight the importance of the CCIs as a fundamental component in

promoting across-sector innovation, developing social cohesion, and advantaging the broader economy. On the other hand, the legislative aspect of culture within the digital project of the European Union (EU) has been framed according to the different policy papers, reports, and strategy papers issued by the European Commission in the last 20 years. Among those, the most relevant for the present situation are the digital cultural policy framework for the period 2021-2027 “Creative Europe Programme” and “The New Renaissance”, a Report of the “Comité des Sages” Reflection group on bringing Europe’s Cultural Heritage online.

In the third chapter, three case studies are presented that can provide a concrete and detailed overview of the effects and future development of digitalization in the music area. First, are described the innovative application of AI to the music sector. The analysis of AI in the music industry is based on several different research studies and articles, such as the one conducted by E. Mazza, CEO of the Italian Music Industry Federation in 2020, and the one conducted by B. Marr in 2019 for the newspaper "Forbes". The second part presents the digital platform of the Berliner Philharmonic Orchestra, known as Digital Concert Hall that since 2009 is a key innovator in streaming concerts. The analysis of the DCH is principally based on the information provided by the Berliner Philharmonic’s website, on the research article conducted in 2013 by A. Uhl, A. Schmid, and R. Zimmermann, and on the research paper published in 2018 by A. G. Diaz Rodriguez. Finally, in the last part of the third chapter, the influence of social media on the CCI is described. The survey is based principally on two research papers, the one prepared by D. Poole’s for the Canadian Public Arts Funders, where an overview of the principal dynamics developed by the application of social media to the art industry is provided, and the one by M. Margiotta, from the Strategic Communication Department of Elon University. Finally, it is presented the case of the classical pianist Igor Levit, who has used social media as a winning tool not only to share his art but also to overcome the dark period, from the artistic and human point of view, of the pandemic crisis. The description of his experience is based on numerous interviews of the artist and on my personal observation of the case.

It is important to underline that given the novelty of the phenomena, there is a lack of exhaustive research and data analysis on the subject. Furthermore, it is essential to consider that given the rapid evolution of the digital transformation in the music

industry, many studies may be out of date or have significant gaps in information. Indeed, for this reason, the research project is mainly based on documents published from 2010 to nowadays, even though older ones can still have their relevance if the historical context of their publication is duly taken into consideration. During my research, I have often faced a lack of complete information and documentation, so I have frequently relied on primary sources such as direct observation, interviews, and personal experience. With this thesis, given the novelty of the research project presented, I tried to fill this gap of information, giving a complete and coherent view of the digitalization of the music industry.

Research Methodology

This research project aims to give a global overview, which is still missing, in the field of digitization of music, with particular attention to classical music, taking into account the different relations between the various actors involved in the process. The main objective of the thesis is to understand and describe how the digital transformation is profoundly changing the music industry, introducing new opportunities and challenges. Several meaningful cause-and-effect relationships should not be ignored to frame the topic and understand the future development of the music industry. Indeed, digitizing the music sector has produced different results, with its philosophical, political, cultural, and business implications. On the one hand, digitalization creates the possibilities for a more inclusive world because it lays the foundations, removing numerous obstacles, for wider participation; on the other hand, the absence of a coordinated political and economic effort to address the many digital challenges can only widen economic and social disparities.

The research has been conducted mainly on the basis of qualitative data, as to frame the topic was fundamental to understand its historical background. Indeed, the thesis is built on a discursive method that makes extensive use of both secondary and primary materials, such as historical studies, books, political papers, research papers, reports, and archival documents, as well as surveys, observations, and personal experiences.

The first chapter's purpose is to provide a relevant background of the digital revolution through the support of several studies, books, and reports. The second chapter analyses the EU's economic and legislative framework in a digital culture based on the analysis of the economic measurement of the CCIs and the EU policy papers. Finally, the third part is focused on three very different case studies that contribute to creating an objective picture of the possibilities and challenges that the classical music sector has to face with the advent of the digital revolution. The case studies were selected according to the principle of variety and relevance for the music sector.

Given the novelty of the research, the lack of information and reliable literature led me to adapt and change the project more than once. In fact, there were two major challenges arising from a lack of data: first, identifying current national regulatory

frameworks for cultural digitization, and second, locating case studies based on reliable and current data. Finally, the research is based on trustworthy and documented facts. It is the product of an in-depth analysis of the subject, intending to develop a forward-looking and grounded overview of the topic that could be valuable to a large audience.

1. Different Approaches Toward the Digitization of Culture

1.1. Main Aspects of the Digital Revolution

The digital revolution that has been accelerated by the pandemic is the main important revolution after industrialization. The main characteristic of the digital revolution is the increasing digitization of many aspects of human life. Indeed, in the last three decades, there has been rapid innovation and expansion of Information and Communication Technologies (ICTs) that are profoundly transforming our economies and societies, bringing important innovations and opportunities. Mobile telephony, the Internet, electronic information exchange, and digital transmission systems have contributed to the development and growth of the so-called *information society*. Given this context, it is not a coincidence that, for more than a decade, many European economic and cultural policies have been focusing on the development of digital literacy skills, the spread of the Internet, and the digitalization of cultural heritage, as principal objectives to reach and implement a full economic, social and cultural development of the society. Indeed, in an information-based society, information technology (IT) skills become crucial, since by opening up new channels for communication and learning, they have a positive impact in terms of strengthening social cohesion, personal development, intercultural dialogue, and active citizenship (European Parliament, 2014). Indeed, if on the one hand, the new technologies bring new opportunities, greater efficiency and can contribute to the achievement of the Sustainable Development Goals, enhancing the quality of life, healthcare, the education system, and the economic growth; on the other hand, the speed of current technological change entails new challenges to achieve a real beneficial impact on society (United Nation, 2020, p. 59).

One of the most important concepts, to implement digitization positively, is represented by *Digital Humanism*. Indeed, *Digital Humanism* highlights the necessity to put people's needs at the centre of technological developments and make them the benchmark and rule for the digitalization process so that humanistic and social values can be implemented by the development of technologies, information systems, and

business models. Indeed, the main question is not how human values can be defended against technological developments but how digital technologies can serve as a means to strengthen and disseminate social values and positive visions.

Digital innovation is not anymore just a possibility, but it is an irreversible reality of our days that has clearly been accelerated by the pandemic crisis. Indeed, during the pandemic, it became clear how fundamental technological innovation is because the digitization of communications and services has allowed many companies and citizens to continue operating and managing the emergency even at the most critical moments. Digital technologies, such as the Internet, mobile phones, and all other tools to collect, store, analyse, and share information digitally, have reshaped our lives by expanding the information base, reducing the costs of sharing, transmitting, and acquiring information, and bringing innovation that leads to greater connectivity between people, companies, and governments (World Bank, 2016). If developed on the basis of human values, digitization creates an important and profound sense of social connectedness and global community through the development of faster trade and social relations in and across nations. Indeed, if, on the one hand, digital technologies promote innovation in various sectors, on the other hand, they also strongly increase the inclusion of people who can access services that were previously out of reach. Some of the most interesting examples could be found in the commercial, educational, and public policy sectors. Indeed, the development of digital tools can have a positive effect on the education sector, because they could be important tools to reduce the imbalance of resources between poor and rich areas (Wei, 2019). Digital technologies in many rural schools in developing countries could be an important means of updating teachers and key support for learning, laying the foundations for effective and high-quality education for all students in the world. In these and other areas, digital technology presents interesting new opportunities as it promotes development through inclusion, efficiency, and innovation (World Bank, 2016, p. 9). Indeed, firstly, the most important chance given by digitization is the possibility to create a more inclusive world because it puts the basis, removing numerous obstacles, for broader participation that includes women, disadvantaged people, and people with disabilities. Secondly, digitalization promotes economic efficiency across firms, workers, and governments because it fosters many transactions and operations, making them quicker, cheaper, and more

convenient. Finally, digital technologies enable innovation through the stimulation of new business models based on more accessible and across-boarders relations between customers and producers.

1.2. The Digitization of Culture

In order to talk about digital culture, we must, first of all, have in mind the concept of culture and that of technology. The classical concept of culture is based on two focal points: the close connection between philosophy and the life of the community in which he lives. On the other side, the term technology, which derives from the Greek word *τεχνολογία*, composed of *τέχνη* (techne), that means art, skill, and *λογία* (loghía), that means speech, explanation, indicates the sum of techniques, skills, methods, and processes used in the production of goods or services or in the achievement of objectives, such as scientific surveys. In particular, it was with the Enlightenment that culture began to imbue itself with that ideal of universality that still marks it today. Indeed, it is according to this view that the “Comitè des Sages”, a reflection group on bringing Europe’s cultural heritage online, declare that: «the cultural heritage of old continent nourished the education, the formation, the spirit of the generations which preceded us and we feel the responsibility to transmit this rich [...] heritage to future generations and to make sure it will be preserved, enriched and shared» (Comité des Sages, 2011, p. 5). Indeed, on the one hand, according to the principle of "intergenerational equity", it is necessary to preserve the cultural capital to allow future generations to enjoy the cultural heritage as those present. On the other hand, according to the principle of "intra-generational equity", it is necessary to guarantee free access, free use, and participation of the whole community in the cultural capital.

Digitalization, which literally means translating an analogic signal into digital form or converting a text, an image, or a series of data into digital format, has today become a key point of our era in terms of cultural heritage conservation and social inclusion (Comité des Sages, 2011, p. 35). Indeed nowadays, the preservation of

cultural heritage increasingly passes through the road of digitalization, and digital materials have become an integral part of our cultural and scientific heritage. Following the path of digitalization, culture gives great impetus to its diffusion to its accessibility, and the cultural institutions themselves are committed to adopting this new way of communicating with their audience. Thanks to the new information technologies, which provide the opportunity to make this common heritage most accessible to all, it is, therefore, possible to include, unite and promote, greatly reducing the problems related to unequal access to information and education. According to the “Comité des Sages”, the benefits of digitization are worth all the efforts of the investments. These benefits are in the first concerns greater accessibility and democratization of culture and, subsequently, related to the educational system. Another great benefit in the economic field lies in the development of new technologies and digital services, as the digitized material is itself bearer of innovation in the touristic and educational sector. According to this vision, many European cultural institutions have started to digitize their collections of books, newspapers, maps, sound and video material, manuscripts, photographs, and objects in museums, making them available online. Indeed, large parts of digital works are now in the public domain. The cultural sector has adopted a wide range of practices to allow the use of digital material in the public domain through public money (i.e. projects funded at the national, regional or local level) and the projects have produced excellent results as examples of digital preservation at both national and European level. According to “The New Reinassance” Report of the “Comité des Sages”, the concept of sustainability of cultural heritage must be closely linked to the high risk of obsolescence to which digital materials are subjected.

Indeed, digital objects are more at risk than they appear to be due to rapid technological change because they are functional until they become obsolete. For this reason, the issue of digital preservation of cultural heritage should not be ignored and becomes very important in the long-term view. Unfortunately, today, among the collections and the material digitized by cultural institutions that have digitization projects, only 22% developed long-term conservation plans. This means that investments in the cultural digitization sector may reveal completely unsuccessful results if not properly designed with a long-term vision. However, according to the European Commission, the resulting benefits of these projects, if correctly developed,

are not only linked to the democratization of culture and knowledge but are also of an economic nature, as digitized material is primarily the bearer of innovation (Comité des Sages, 2011).

1.3. The New Renaissances of Music Sector

The music industry has seen significant transformations as a result of digitalization. On the one hand, in terms of supply chain management, digitization eliminated raw materials, such as CDs and LPs, and shifted traditional distribution methods to the online channels, resulting in significant cost reductions. On the other hand, it increased the number of suppliers, songwriters, and artists by offering easy access to the market with digital audition programs.

Nowadays, when we speak about the music industry, it is necessary to have in mind that the traditional musical chain of publishing, recorded music, and live music has served its purpose, and a fourth production and sales line, called music-tech, has been introduced to these traditional businesses. Digitalization has profoundly revolutionized the productive system introducing great changes in the creative process and has also led to the development of new business opportunities, thanks to the development above all of the streaming market, which nowadays is dominated by large international players, as Youtube, Apple Music, Facebook Live, Twitch/Amazon, ByteDance/TikTok, Tencent and Spotify (Lupelli and Zò, 2020, p. 1).

The music-tech industry represents a real revolution that has made available on a global scale and very low cost the immediate availability of an unlimited amount of music, stimulating at the same time its consumption, to the extent that today music is the most widespread cultural consumer product in the world for hours of fruition. However, critical points are present: digitalization has profoundly transformed the production system, on the one hand, determined by an increasing need for music products, and on the other hand, by the resulting drop in the value of each individual production (Lupelli and Zò, 2020, p. 2). Indeed, the digitization of the musical chain is irreversible, and it is leading to some phenomena that cannot be ignored, such as the worldwide success of artists who turn to a very young audience, which has no

purchasing power but high digital capabilities. In addition, the new musical production is no longer just an instrument of fruition of the product but is based on a total change in the relationship between performer and consumer, as, on the one side, it is based on an increasingly direct relationship with the public, but on the other side, it results more difficult to manage all the new interests and activities. As a result, the music industry is being transformed into a digital key on all levels, necessitating faster production speeds, improved communication methods, and the prospect of an international component in musical initiatives (Lupelli and Zò, 2020, p. 5).

In this context, one of the most interesting sectors is represented by the live stream concerts, where it is necessary to develop concepts of experiences that go beyond the simple reduction of a live concert to a digital viewing experience, already possible through other means such as television. The current trend is to think about new virtual musical experiences, which may vary from intimate sessions for a few participants, perhaps enriched by gamification strategies, to the possibilities offered by immersive technologies (Lupelli and Zò, 2020, p. 7). Indeed, it is necessary to come up with new creativity, where the live stream is not treated as a mere digital transformation of what was physical but as a new frontier of expression and creativity in the music industry. This transformation could, on the one hand, allow nowadays to face the critical pandemic situation with a proactive attitude, and on the other hand, give the possibility for the future of the live events to adopt hybrid models that “augment” the experience both offline and online (Lupelli and Zò, 2020, p. 7).

In the process of the digital revolution, the traditional sector of the music industry has the historic opportunity to reinvent itself through new tools and join the new music-tech sector. According to a recent study conducted by Goldman Sachs, as reported by Lupelli and Zò, the music sector, while is reporting a negative performance of 25% for 2020, will experience a return in the near future, recouping the losses of the previous two years and doubling its value by 2030 (Lupelli and Zò, 2020, p. 9). The process will be lead first of all by the streaming services that, more than the other music realities, represent the real driving force of the sector.

It is very important to underline that the digital transformation in no way wants to lead to a loss of value of the current production models and usage; on the contrary, it introduces new experiences of music fruition, whether hybrid or digital. However, in

order to support the development of these new models on a solid and transparent basis, it is important to combine them with safeguards that protect first of all the interests of those who create and invest in cultural content (Lupelli and Zò, 2020, p. 9).

1.4. The “Swarm” of Digitization

If, on the one hand, we can speak about a “New Renaissance” of culture, and in this case of the music sector, for the great opportunities mentioned above, on the other hand, there are important challenges and problems that digitization brings, and that should not be ignored. Some of this weakness has been clearly and deeply analysed by the South Korean philosopher Byung-Chul Han in his book “In the Swarm: digital prospects”. Indeed, in his reflection on digitized life, he highlights how digital communication and social media have taken over our lives, disintegrating the feeling of a real human community and the public space. The question of distance is indeed its starting point. Not the geographical distance, but what one might call the cognitive or even moral type: the distance between the public and private sphere and between issues that are significant for all and for none. Indeed, in this digital society characterized by the over-information that leads to information fatigue, the *Homo digitalis* is not able anymore to distinguish between what is necessary and what is not. This over-information eliminates the capacity to absorb the correct information, condemning humanity to be a voracious devourer, which does not choose because there is no time to digest and absorb knowledge. Too much information became the new norm, and the effect is paradoxical and burdensome. According to Byung-Chul Han:

«more information does not necessarily lead to better decisions. Through the swelling mass of information, it is precisely our higher faculty of judgment that is now in a state of decline. [...] Simply having more information and communication does not shed light on the world. Nor does transparency mean clairvoyance. On its own, a mass of information generates no truth. It shed no light into the dark. The more information is set free, the more confusing and ghostly the world becomes. After a certain point, information ceases to be informative. It becomes deformative. Likewise, communication stops being communicative henceforth, it is only cumulative» (Byung-Chul, 2017, pp. 60-61).

All the inhabitants of the network, convinced of living with complete information, live in the illusion of freedom, but in reality, they are only the new preys of digital, where each is a controller of the other and, at the same time, a prisoner of the network: millions of people, of individuals, with the aim of virtually existing. According to Byung-Chul Han, we are a swarm, formed on the basis of homologation that makes us equal to others, at the same time lacking in originality and strength and therefore vulnerable, ready to disintegrate. In the swarm, you live in a hive, each in its own small virtual cell. Indeed, the digital aggravates man's isolation; it moves us further and further away from the other, giving us the illusion of approaching. The *Homo digitalis* has a virtual patrimony of web platforms at his disposal, with which to explore the whole world, but without bothering and moving away from his home. Through the screens, it is possible to interact with the whole world, behind the immobility of an armchair and a PC, but progressively the intention and the necessary ways to dialogue with others in the reality begin to disappear. Using the words of the philosopher again:

«the world of *Homo digitalis* evinces an entirely different topology. Spaces such as sports arenas and amphitheatres - that is, sites where masses meet – are foreign to this world. The digital inhabitants of the Net do not assemble. They lack the *interiority of assembly* that would bring forth a *we*» (Byung-Chul, 2017, p. 11).

The Byung-Chul Han description seems almost a premonition of the current pandemic situation, or at least certainly, the pandemic has accelerated processes that had already begun.

1.5. Race between Technology and Digital Skills

The rapid growth of digital technology has largely reshaped our lives as well as almost all social and economic sectors, and culture is no exception. Despite this significant and irreversible process that presents a huge potential to facilitate and democratize access to culture and other resources, certain technical conditions are necessary to take advantage of these possibilities. These conditions not only include working Internet infrastructure, computers, tablets, and smartphones, but also the skills and knowledge needed to use them. However, the majority of the world's people remain largely untouched by the digital revolution. Indeed, nearly 6 billion people do not have access to high-speed Internet, 2 billion people do not own mobile phones, and the world's offline population is largely concentrated in developing countries (World Bank, 2016).

The disparity between those who have access to digital technologies and services and those excluded is called the *digital divide*. Indeed, due to the disparity of access to digital services, the process of the digital revolution has further marginalized some population groups and geographical areas, making the gap between rich and poor larger than it was previously present. The *digital divide* is principally caused by four characteristics: the lack of digital infrastructures and services, the lack of affordable network services and devices, the lack of digital skills, and the lack of coordinated efforts to foster social and economic equality (Shenglin *et al.*, 2017, pp. 2-3). The main barriers and challenges that strongly cause a *digital divide* in societies are the lack of access to digital infrastructures and affordable digital devices. This disparity is visible when comparing access to the Internet between different social groups and different countries. About 20% of the population in developing countries has access to the Internet, while in developed countries, the percentage rises to 85% (United Nations, 2020, p. 71). Moreover, the prices of fixed-broadband Internet as well as of the mobile phones and computer devices are, concerning to per capita income, much higher in developing countries than in developed countries.

The absence of digital infrastructures and affordable devices and network services deny access, to a large part of the world population, to the real “benefits” of technological innovations. These lacks are pointing out the importance of implementing

policies that provide adequate infrastructure and services both in developing countries and in the poorest areas of developed countries to avoid further and wider disparities.

However, to bridge the *digital divide* and achieve the “full benefits” of digital technologies, avoiding increasing inequalities, ensure physical access to Internet services is not sufficient. Indeed, the essential lesson of this challenge is that, without adequate educational and digital skills, the potential of digital technology cannot be fully achieved (Shenglin *et al.*, 2017, p. 2). It is fundamental that the technological revolution goes hand in hand with the development of digital skills, that must strongly include socially disadvantaged people, people of all ages, and people with disabilities, who are in a particularly difficult situation, since ICT equipment is often not designed for their specific difficulties (European Parliament, 2020, p. 1).

Indeed, Unesco’s 1948 Universal Declaration of Human Rights recognized as fundamental human rights the free participation in cultural life. Consequently, the signatory states are required to ensure to conditions for this participation, bringing down barriers, which prevent its application, respecting the freedom for creative activities and expressions, and taking the necessary measures for the conservation, development, and dissemination of science and culture (European Parliament, 2020, p. 2). It is widely accepted that digital technology is key to democratic access to cultural goods and services, as it has the potential to make culture more accessible for inhabitants of remote, rural, or peninsular areas lacking of cultural infrastructure and activities, as well as people with disabilities and the elderly.

Indeed, the European Union recognizes the importance to tackle the *digital divide* considering cultural access the second most important aspect of psychological well-being (European Commission, 2020, p. 10), and plays a supporting role through its policies by encouraging Member States, regions, and local authorities to invest in actions that promote free and widespread access to digital culture. In fact, to tackle the marginalization and inequality caused by the *digital divide*, it is fundamental to develop policies that support and improve digital skills, especially for disadvantaged people in developed and developing countries.

Improving digital skills would mean that people from all over the world could take full advantage of digital opportunities by developing the knowledge and skills needed to achieve an inclusive digital economy (Shenglin *et al.*, 2017). Given this

context, it is clear how global interconnectedness introduced new vulnerabilities and challenges that should not be ignored to prevent the rise of inequalities. For this reason, in order to ensure equal, inclusive, and fair access to digital infrastructures and their benefits, shared efforts at global and national levels are needed. Indeed, if on the one hand, digitization may play an important role in the development of a more inclusive society, on the other hand, in the absence of coordinated efforts, the risk that digital technologies could only widen the economic and social disparities remains very high.

1.6. Which Way Forward?

Digital technologies have developed rapidly in much of the world, but not universally. In many instances, digital technologies have boosted growth, expanded opportunities, and improved service delivery; however, they have also brought significant challenges that should not be ignored in order to prevent the spread of inequality (World Bank, 2016, p. 2). It is important to stress that digital technologies themselves are neutral, which means they do not have the power to bring about any change. Indeed, important investments and common policies are needed at the global and local levels to deliver universal digital benefits and avoid any further marginalization. On the contrary, maintaining the *status quo*, while technology progressively pervades every sector, can critically widen disparities (Shenglin *et al.*, 2017, p. 1).

To bridge the technology gap and support an inclusive digital economy, global and shared policies that invest simultaneously in three areas are needed. First, in the market regulation, so that businesses can use the Internet to compete and innovate. Secondly, in educational and digital skills so that people can seize the full opportunities of the digital world. Finally, in accountable institutions, so that governments can effectively respond to people's needs and demands (World Bank, 2016, p. 4). In the cultural field, it appears very important to develop and promote access to culture via digital means, not only to attract a new audience and to foster digitization as an important tool for the future of the cultural fruition but also to guarantee more democratic access, by facilitating the access to disadvantage people. In this context, one

of the actions aimed at achieving social cohesion and well-being is understanding the digital audience, in particular as regards data collection, as data represent the key to understanding the public's demands and thus guiding people's access to the information they like or would like.

Technologies represent a big opportunity for human development; however, it is fundamental to shift the focus, both in resources allocation and policy agenda, from “digital technology development” to “digital skills’ development”, putting at the centre of our interests and efforts the development and improvement of human life (Shenglin *et al.*, 2017, p. 8). Indeed, digital technologies can be the promoter of economic and social inclusion but only through a common and global effort that ensures everyone accesses digital infrastructures and the benefits of digitization.

2. Main Issues of Digital Cultural Policies and Music Market

2.1. The Development of Music Industry Under the Digital Transformation

Technological innovation has had an important influence on business models in all industrial sectors. However, the music industry is certainly one of the sectors that have undergone the greatest transformations in the last twenty years. Indeed, it has faced significant and complex changes due to the proliferation of new computer technology and the advent of new revolutionary business models. The clearest and most recognizable example of the music business transformation is the continuous appearance of new devices or supports at the expense of those already existing: with vinyl in the 1970s, followed by cassette tapes in the 1980s, replaced by CDs in the 1990s. However, it is at the end of the 20th century, with the major digital transformation, that the music industry experienced the greatest transformations that led to the development of new business models. Indeed, digitalization radically changed the relationship between artists, record companies, retail music stores, and consumers, contributing to significant variations in music consumption, with a devastating impact on markets and the sales of major record labels.

In particular, the period 1995-2000 is considered the turning point of the industry. Indeed, in 1995 spread a new format: the mp3, that enabled users to compress music files from CDs into a format that could be easily transferred through the Internet. Thanks to this new technology, Shawn Fanning, in 1999, created Napster, the first peer-to-peer file-sharing network that was allowing users to download and share music without compensating recognized rights holders. In 2001, less than two years after its introduction, the software boasted more than 60 million registered users. The Record Industry Association of America accused the company of enabling and encouraging copyright infringement, with the consequent shut down of the company in July of 2002. However, the “die had been cast”, and a slew of other increasingly sophisticated services quickly followed, such as eMule, WinMX, and BitTorrent, forever altering the music industry. Indeed, if the power and influence of the pre-Internet music market were largely based on the ability to control physical distribution, the Internet revolution

makes the distribution of physical music increasingly irrelevant, with the consequent decline in music sales.

The Napster revolution dictated the search for an innovative business model that uses legally important innovations related to ICTs. Despite the efforts of the major record labels, the first company able to create a successful online service for legal sale and distribution of music was Apple, which until then had not been part of the music industry, in 2003, with the platform iTunes Music Store. Indeed, Apple, after signing licensing deals with all five major labels, launched a pay-per-download music service that allows users to purchase music at 99 cents per song or \$9,99 per album (Margiotta, 2012, p. 7). The success of the iTunes Music Store was global: in December 2003, just eight months after the official opening, Apple recorded 20 million songs sold. In February 2010, Music Store sold 10 billion songs, making the company the largest distributor of music worldwide (Uli, 2015, p. 10). Indeed, accessibility is a crucial reason for the iTunes Store's success: consumers may purchase music from their computer 24 hours a day, seven days a week, 365 days a year (Margiotta, 2012, p. 7).

A further evolution forward in online music distribution is represented by the music streaming platforms like Spotify and Deezer. Founded in 2006, Spotify is a music streaming service where instead of buying individual songs, it allows customers to have access to a vast music catalogue. The Spotify model works mainly through two versions, a free version paid by ads, where basic music services are provided with added advertising and limited control, and a premium version, offered via paid subscription, with additional features, like offline listening and creating playlists. Unlike physical or download sales, when artists are paid a predetermined fee per song or album sold, Spotify pays right holders, often record labels, around 70% of its overall earnings, who then pay artists according to individual agreements. It is important to note that streaming platforms, such as Spotify, thanks to the use of AI, have developed a service in which the customization of the product to the customer is central. Indeed, as explained in the third chapter, Spotify's Discover Weekly option, thanks to an algorithm, analyses the users' music preferences and proposes a collection of songs that the user never heard before. In general, it is possible to observe in the music industry, based on streaming platforms' rapid innovation, a shift toward targeted suggestions and a more tailored music offer for users.

Given this context and the speed of change, it is difficult to know the future of the music industry. However, thanks to streaming services, the business in the music industry has totally changed, as the enjoyment of music has passed from a traditional concept of “ownership”, to a concept of “content use”. In general, it is possible to observe two important tendencies: firstly, the ever-diminishing value for recorded music that hurt music industry giants in terms of sales, opening the door for smaller record labels and emerging artists, and secondly, the battle between streaming services to offer ever lower subscription prices, leading to an ever-increasing decrease in illegal offers, although piracy continues to be the main culprit for the economic losses suffered by musicians and the music industry.

However, despite these positive effects, it is impossible to ignore the lack of tools and safeguards to ensure fair earnings to the artists involved through streaming platforms. Indeed, as we have seen, streaming services such as Apple Music and Spotify make money from subscription fees and advertising. In order to guarantee accessible streaming prices, they make deals with music labels, usually paying the musician less than a penny per stream. Indeed, platforms keep 30% of the revenue, the record labels get 55%, while the artists take the 15%. Moreover, each streaming service has a different pay-out, where, according to 2018 data, 1 million streams on Youtube apply \$690, 1 million Streams on Spotify \$4,370, and 1 million streams on Apple Music \$7,350 (Mcintosh, 2019). This unequal position is one of the main reasons why many artists look for additional ways to make money, such as pushing ticket sales, retailing their image on social media, and appearing on TV and in movies. Indeed, unfortunately, due to how the industry is structured, it does not always benefit the artists' interests, at least not in the early phases of their careers.

Given this situation, to support the development of new sustainable and fair business models, it is important to combine them with strong legal and economic safeguards that protect the interests of those who create and invest in music content. Indeed, innovative business models, wise investments, cross-sector collaboration, such as public-private, cultural-business, creative-technological, and policies tailored to the demands of stakeholders, can aid in the dynamic and forward-looking transition to the digital era (Comité des Sages, 2011, p. 51). For this reason, to have a complete view of the music industry, the following paragraphs will outline a framework both of the

impact of cultural and creative industries on the European economy and of the digital cultural policies of the EU that foster the digitalization of our cultural heritage.

2.2. The Impact of Cultural and Creative Industry in the EU Economy

Creative and cultural industries are an inexhaustible source of growth and employment for local, regional and national communities. Furthermore, CCIs have an impact that extends far beyond leisure, entertainment, jobs, or economic progress, as they provide important social cement, contribute to a sense of belonging to a society, and, in short, assist in the formation of a European identity. Each CCI is distinct, and its success hinges on a thorough grasp of its requirements and operations. Indeed, developing a more supportive environment and suitable legislative and economic tools is critical to fully utilizing the potential of any CCI.

It is important to emphasize the creative economy's resilience, as according to the 2014 Ernest&Young report, job creation in CCIs grew on average by 3.5% a year from 2000 to 2007 and continued to grow at 0.7% per year between 2008 and 2012, despite the number of jobs in the rest of the economy fell 0.7% (Ernest&Young, 2014, p. 16). Partially thanks to this resilience, CCIs are increasingly seen as an important component of local economic growth, as they function as a catalyst and as an innovation engine at the crossroads of art, business, and technology, with advantages that help the broader economy. Although culture provides many positive, nonfinancial returns to people's lives, which are largely unmeasured, many governments, particularly in Southern, Central, and Eastern Europe, have slashed public funding and reduced support for cultural programs for years. Indeed, prior to the 2008 financial crisis, government spending on cultural services was growing by 5% per year; since then, it has declined by 1% per year on average (Ernst&Young, 2014, p. 15). In terms of employment, the CCIs in the EU employ as many people as the food and beverage service industry do, providing work for nearly 2.5 times more people than automotive manufacturers and five times more than the chemical industry (Ernst&Young, 2014, p. 13).

Across the 27 member States of EU and the UK, based on 2018 data, the music sector alone employed two million people, contributed €81,9 billion gross value added (GVA) annually to the EU 28's GDP, and exported €9,7 billion in goods and services to countries outside the EU 28 (IFPI, 2020). The music industry comprises a multitude of activities and professions, such as composers, songwriters, lyricists, performers, backing musicians, producers, publishers, sound engineers, recording studio staff, technical workers, managers, and workers at music radio stations and TV music channels. It is essential to point out that in Europe, live music has a substantial publically funded component that generates enormous economic value and jobs. National and regional opera houses, such as the Paris Opera, La Scala in Milan, and the Royal Opera House in London, as well as national and regional orchestras, play a vital role for contemporary and classical music, generate cultural capital, and a strong territorial anchoring.

The most striking reality about the creative economy is that creators are its nucleus; indeed, the music industry would not exist without songwriters, composers and musicians. However, although the creators are central to the music industry economy, they are the most vulnerable part of it. Indeed, they produce works that only generate revenue if and when they find an audience and are commercially exploited. Several studies point out a lack of job security for music professionals, highlighting how many artists are often forced to hold more than one job to ensure economic stability. This problem must be taken into consideration by laws and social security standards to provide protection comparable to that enjoyed by employees in other industries.

Maintaining a virtuous cycle of creative talent, artistic expression, entrepreneurship, and investment, as well as proper compensation and remuneration for artists, is critical for the cultural and creative sectors. Improving this cycle by creating the ideal atmosphere for cultural diversity and creativity in the digital era will undoubtedly be a key task for European policymakers. For these reasons, quantifying the size of the music sector is important so that its participants, governments, and other stakeholders are aware of its contribution to the EU's job creation, fiscal receipts, and trade balance. Indeed, a greater awareness of the potential of the creative sector is needed to develop, on the one hand, an appropriate environment and tools that enhance

its long-term growth and to assess, on the other hand, the true value of a sector that is still woefully under-promoted.

Moreover, digitization is profoundly transforming every part of our economy, and creative industries are an integral part of this change. Indeed, as we have seen, CCIs have undergone major structural transformations more than any other industry to adapt to the Internet's omnipresence and impact on business models, consumer patterns, and content development processes. Thus, digitization is not anymore a possibility, but it is an irreversible reality of our days that brings unimaginable opportunities and challenges. Indeed, if, on the one hand, the digitization of the music industry is leading to a globalized music market, on the other hand, enhancement of local repertoire and popular music should remain an important cornerstone of almost every national EU market.

For these reasons, it is essential to have a complete picture of the creative sector to understand the strengths and the weaknesses and how they can be filled by shared efforts involving public institutions, local actors, and private partners. Indeed, to ensure Europe's position as a global leader in the creative economy, shared visions and common policies framework developed at the EU policymakers' level are required. This joint effort should focus on establishing legal and economic safeguards that protect, first of all, the interests and the rights of those who create and invest in musical and cultural content. Therefore, the following two paragraphs will be focused on providing a general overview of the development of digital cultural policies within the European institution to better understand Europe's legislative framework and future objectives in the field of cultural digitization.

2.3. The Development of EU Digital Cultural Policies

The EU's digital cultural commitment is in line with European values and the principles of the EU Treaties. For this reason, the EU's commitment to the cultural sector develops at various levels, according to its objectives, and requires continuous and flexible strategic reflection to keep up with the fast-changing realities of the digital revolution. The interest in enhancing and disseminating European cultural heritage has not always been central to EU policies. Indeed, because of the essential economic character of the EU, the cultural sector initially played a marginal role in European design. There were, in fact, no rules specifically outlining the modalities of community action in the cultural field. Only with the amendments made to the Treaty of the Maastricht Convention in 1993 that the cultural aspect took on a central role, placing cultural cooperation between the Member States as an objective officially recognized by European policies. Indeed, it is with the Maastricht Treaty's coming into effect in 1993 that we can speak of European cultural policy, with the inclusion of Article 128 (after art. 151 TCE, now art. 167 TFUE), which explicitly establishes culture as a European competence and governs its purposes, objectives, scope, and decision-making.

Since 1993 Europe has implemented many projects dedicated to culture, but it is in 2001 that the need for coordination mechanisms between the Member States to facilitate the development and growth of the information society related to cultural projects is expressed through the establishment of the National Representatives Group (NRG). The NRG was created at the behest of the European Commission and the Member States, with the main mission to coordinate digital policies and programs related to the cultural sector in order to have wider fruition by all European citizens. In this context and under the supervision of the NRG, one of the most important programs, launched in 2002 and financed by the European Community, is the MINERVA project. Indeed, MINERVA has been responsible for coordinating and harmonizing national activities for the digitization of cultural heritage, stimulating the development of a European shared cultural space and a long-term digital preservation view.

Some years later, in 2005, the Commission, with the program Europe i2010, launched a new policy strategy for the information society and gave ICT a key role in promoting inclusion and improving quality of life. Indeed, the new strategic framework

i2010 proposes three new and forward-looking priorities for European policies. The first aim is the establishment of a Single European Information Space offering affordable and secure high-bandwidth communications, quality, and diverse content and digital services. The second purpose is the promotion of world-class performance in research and innovation in the ICT sector to reduce the gap with Europe's main competitors. Finally, the third objective is to promote an inclusive information society that is consistent with sustainable development and prioritizes better public services and quality of life (European Commission, 2005). It is important to underline that the main and forward-looking challenge of the i2010 program is the "e-Inclusion", which means ensuring that ICT benefits all citizens by enhancing access and improving the quality of life through the dissemination of key public services, such as in the medical and social fields. Within the i2010 program, the digital libraries initiative represents one of the most interesting and important digital projects to strengthen cultural diversity and promote Europe's vast cultural heritage. Indeed, on the one hand, digital libraries make it possible to gather, organize, and digitize a significant amount of cultural content that embodies the richness and diversity of European heritage while also making it accessible to a larger number of citizens. On the other hand, cultural heritage digitization ensures the conservation of cultural assets that would otherwise be degraded by time, such as audio-visual materials.

However, it is important to underline that there are many obstacles to overcome to accomplish effective digitization. First of all, financial challenges, as significant investment is required to execute the work properly, and secondly, organizational challenges since even digitized contents require upkeep to avoid deterioration. It is with this purpose that the first European digital library, known as *Europeana*, was launched in 2008. Nowadays, *Europeana Collections* counts more than 50 million digitized voices, allowing to explore the digital resources of European museums, libraries, archives, and audio-visual collections, resources that allow retracing the history of Europe from the past to the present day. First and foremost, *Europeana* is a significant step forward in the field of digitization, highlighting the great potential that digitization of cultural property may offer to more democratic cultural distribution.

The preservation and dissemination of cultural heritage have not only a social value but also a great economic value because it boosts economic growth and produces

new opportunities in industries that are strongly linked to cultural digitalization, such as tourism, education, and new technologies (Comité des Sages, 2011, p. 36). It is within this context that the European Commission launched, in 2010, a ten-year strategy known as Europe 2020, based on the three priorities of smart, sustainable, and inclusive growth (European Commission, 2010, p. 3). Indeed, studies in recent years have shown that the cultural sector is one of the pillars for development and the achievement of inclusive and sustainable growth.

According to the 2014 Ernest&Young report's, the cultural sector accounts for 4.2% of European GDP, employing about seven million people, and continuing to grow even during the economic crisis of 2007-2008. For this reason, culture must be seen as a fundamental sector, not only because it fosters creativity and innovation in times of crises but also because it is a vital economic engine. Therefore, on the one hand, it is necessary to develop policies that promote sustainability and social cohesion, seeking the active participation of stakeholders and the local community and creating awareness of the value of our shared heritage. On the other hand, given the complexity of the digitization process, as it was underlined by the Comités des Sages, it is necessary to implement and develop private-public partnerships that could finance and foster the process of digitalization of cultural heritage through an efficient and forward-looking view (Comités des Sages, 2011, p. 13). Nowadays, Europe seeks to position itself as a world leader in the promotion of its vast cultural heritage. To achieve this objective, taking into account the severe hit that the sector has suffered during the pandemic, Europe is implementing an important program for 2021-2027, which supports, innovates, and promotes the cultural and creative industry throughout the 27 Members States.

2.4. The EU Digital Cultural Guideline 2021-2027

The “Creative Europe Programme” launched the 26 May 2021 represents the new EU digital cultural policy framework for the period 2021-2027, and has replaced the former Programme (2014-2020) with the projects “Creative Europe” and “Horizon 2020”. The Programme is fully aligned with the main objectives of the Commission in the cultural field that are drafted in the: Commission Communication on a New European Agenda for Culture (2018), the Council’s multiannual Work Plan for Culture (2019-2022), the Joint Commission/High Representative Communication "Towards an EU strategy for international cultural relations" (2016) and the Commission Communication "Towards an integrated approach to cultural heritage for Europe" (2014), all of which call for culture to play a more significant role in our Union's future social, economic, and international development (European Commission, 2021, p. 11). The new Programme builds on and continues the structure of the previous one, but with a significant increase in the budget: respectively 2.4 billion compared to the previous 1.4 billion of Euro (European Commission, 2021, p. 6).

The Program's broad aims are to protect, develop, and promote European cultural and linguistic variety and heritage, as well as to boost the competitiveness and economic potential of the cultural and creative industries, particularly the audio-visual industry (European Commission, 2021, p. 6). In particular, it enhances the artistic and inter-cultural cooperation at the European level, promoting the cultural sector's competitiveness, innovation, and sustainability. Moreover, it fosters the freedom of artistic expression, intercultural dialogue, and social inclusion, encouraging the active participation of people with disabilities, people belonging to minorities, and marginalized groups (European Commission, 2021, pp. 6-7). The Programme takes account of the dual nature of the cultural sector, recognizing, on the one hand, the intrinsic and artistic value of culture and, on the other hand, the economic value of that sector, which, as we have seen, strongly contributes to EU’s growth and innovation (European Commission, 2021, p. 7).

However, despite the numerous potentialities of the cultural sector, today's culture is going through one of the most imposing crises of the last century due to the pandemic emergency. The cultural sector was among the most affected by the COVID-

19 crisis, which accelerated specific trends already caused by globalization and digital transition. Indeed, the cultural sector has not only suffered a severe economic recession as a result of the multiple lockdowns but also had to adapt fast to digital transformation in order to survive. For this reason, the Program stressed the need to mobilize substantial economic resources to support both initiatives that promote cultural rebirth and the many professionals who were hard hit during the pandemic (European Commission, 2021, pp. 11-12).

At the same time, it is necessary to develop new business models, particularly by exploiting new digital technologies, to ensure the EU's position as a world leader in innovation and cultural promotion. The digital transition, strongly accelerated by the COVID-19, leads to a big structural change, with a huge impact on the modes of creation, management, dissemination, access, consumption, and monetization of the cultural sector (European Commission, 2021, p. 12). Given the complexity of the problem, a European and cross-border approach is required to address all of these issues. Indeed, effective outcomes can only be accomplished by a collective and shared effort, which will help Europe maintain its position as a world leader in the cultural policies.

The EU's uniqueness and success stem from its capacity to respect and promote the different history, languages, and cultures of its Member States while developing common feelings and standards that have ensured peace, stability, and prosperity. The EU is and must aspire to become, even more, an example of "soft power" based on ideals and values such as human dignity, solidarity, tolerance, freedom of expression, respect for diversity, and intercultural dialogue, values which should be the source of inspiration for the world of tomorrow (European Commission, 2007, p. 3). Respect for cultural and linguistic variety, as well as the promotion of its enormous cultural history, is at the heart of the European project, which is more than ever necessary in a globalizing world (European Commission, 2007, p. 2).

3. Three Case Studies

3.1. Introduction to Case Studies

The ICTs have become indispensable in all aspects of our daily lives, to the extent that it is no longer possible to live, work or socialize without taking technology into account. They are the primary tools that allow information to flow immediately from one side to another of the globe without geographical borders. Indeed, new technologies are establishing a new interaction between humans and technological devices, resulting in new sorts of social ties that can no longer be overlooked. As a result, a dichotomy is increasingly developing between geographical division and ideological closeness. Indeed, forming relationships is no longer necessary to meet in person; instead, relationships are formed through involvement in virtual communities. As we have seen, art and music are not isolated from this process; instead, they are an essential part of a process that is fundamentally altering the traditional relation audience-performer interaction in all of its manifestations.

In this chapter, three case studies will be analyzed in which the application of digitization to the music sector has produced different results, with its philosophical, political, cultural, and business implications.

First, it will be presented the most innovative applications made by AI to the different aspects of the music industry. Indeed, on the one hand, AI represents an incredibly effective and efficient tool with the promise to integrate and increase human capabilities; on the other hand, it raises several important philosophical and ethical issues that cannot be ignored to ensure sustainable development of technology in the near future.

Secondly, the Berliner Philharmonic's online streaming platform, known as Digital Concert Hall, will be analysed, considering all the successful strategies and policies that since 2009 have been put in place. Indeed, on the one hand, the DCH "revolution" developed a new relationship between audience and performer; on the other hand, it widened the audience making access to the music product of the great orchestra more global and democratic.

Finally, the huge role that social media plays in the creative industry will be outlined due to its interactive characteristic. Indeed, social media could be an incredibly powerful tool in the artist's hand to communicate his inner creative world. As described in the last paragraph, the pianist Igor Levit represents a positive example of how social media can be a handy tool to create a close link with the audience. All these examples contribute to creating an objective picture of the possibilities and challenges that the classical music sector has to face with the advent of the digital revolution.

3.2. The Application of Artificial Intelligence to the Music Industry

Artificial Intelligence is destined to improve our society significantly. Among the numerous fields where it may be applied, the music industry is one of the most interesting and promising. Indeed, in the music industry, an increasing number of innovative applications are being developed capable of automating the creative process, which was typically connected with nature and human creativity.

The application of AI in the music industry could be divided mainly into three categories: music streaming, where it is used to personalize the content based on data from user activities, music composition, where the AI is used to create, enhance, or complement music content, and music marketing, helping the industries with new A&R (artist and repertoire) discovery. Firstly, the most common use of AI in the music industry is to collect and personalize data for digital platforms, such as Amazon, Spotify, or Apple Music, to guarantee the consumers' content based on their history and activities. Indeed, if more than 40 thousand songs are uploaded to Spotify every day, equating to more than 14 million and a half in a year, it's easy to see how this massive amount of data and musical genres must be transferred to listeners through systems that can recognize the audience's passions and interests (Mazza, 2020). Another example in the field of machine learning and data analysis is the personalized proposal of Spotify, known as Discover Weekly: a collection of songs that the user has never heard before but that, thanks to an algorithm that consults the ratings made, it analyses the data and studies the preferences of the user. Thus, machine learning represents a handy tool because it personalizes the offers, helping to match the artists with the user's interest.

The second important application of AI in the music industry is related to the field of musical composition. In this case, the AI is used to assist composers by improving existing musical works, either by completing or writing songs in the manner of previous composers or according to a specific musical genre, or by composing new musical pieces. In many record companies, the use of AI to support research and development started several years ago. For example, Sony Music, in 2016, created software, the Flow Machine, able to create music based on a vast amount of learned repertoire from Bach to Beatles (Mazza, 2020). In recent years, several music companies, such as Universal Music, have invested in platforms such as AI Music and Humtap, able to support humans in recording rooms by providing a set of data, based on machine learning principles, on which to build new sounds for future compositions (Mazza, 2020). Finally, through a platform called ALICE, the Australian-based start-up Popgun gives the possibility, due to deep learning and neural networks training based on thousands of songs, to accompany or augment musical compositions (Sennaar, 2019). This type of application, in which the machine supports human abilities, gives the possibility to create music even to non-professional musicians, clearly opening a debate on the importance or not of owning specific technical skills to create music.

The third application of AI helps the music industry to comb through music and find promising musicians, simplifying the scouting work. This is the Warner Music Group case, which last year acquired a technology start-up that uses an algorithm to review social data, streaming, and tours to find promising talents in the music scene (Marr, 2019).

Given the vast potential of AI, its applications are moving beyond recommendation engines, promising a more open and democratized sector for professionals and non-professionals alike. In general, it is possible to observe collaboration among platforms to develop the potentiality of the technology, trying to automate and improve processes related to the music industry. The only perplexity associated with AI development in the music field concerns the scope of artistic competence: the eternal question of what art is or is not. The debate is current and remains open. Should art be limited to what is created by the human mind? Is it possible that machines, once they learned how to create artwork, replace artists? One thing is

sure: the development of Artificial Intelligence should always be focused on improving the abilities of human beings rather than on their replacement.

3.3. The New Reality of Concerts: the Berliner Philharmonic's Digital Concert Hall

The digital transition brought several innovations that substantially modified the traditional way of listening and participating to musical performance in the musical environment. This is the case of the Berliner Philharmonic's digital platform, known as Digital Concert Hall that allowed listeners from all over the world to enjoy the performances of the great orchestra with high-quality video and audio. In line with its tradition, the Berliner Philharmonic Orchestra continues its attempts to reach out to a new audience and maintain its reputation as a leader in technological development and innovation with the launch of its virtual platform. The orchestra started to assume international recognition under the guidance of the conductor Herbert von Karajan, who was known for his musical performances of the highest level and research of the audio quality of recordings farsighted for the time. The appointment of Simon Rattle as Principal Conductor of the Berlin Philharmonic in 2002 ushered in a new era for the orchestra, understanding the necessity to develop new opportunities and strategies to keep up the technological change expanding its audience. Under his leadership was launched several important and forward-looking initiatives, including the project "Zukunft@BPhil"¹, which promotes an educational program for the understanding of classical music by the population. Indeed, according to Sir Simon Rattle, the initiative developed under the "Zukunft@BPhil" should always remind «that music is not a luxury but a fundamental human need. Music should be a vital and essential element in the lives of all people» (Uhl, Schmid, and Zimmermann, 2013, p. 51). It is with this objective in mind that was developed the idea of the online streaming platform DCH, in order to solve two important problems that music start to face in the XXI century: the substantial reduction of CD and recordings due to the arrival of digital platforms, and the necessity to enlarge the audiences, attracting the new generations.

¹ A translation of Zunkunft@BPhil would be Zunkunft=future, @=in, BPhil=Berliner Philharmonic, "future in the Berliner Philharmonic".

The project, not only has managed to address and exploit technological change, but also has had a revolutionary impact on many fronts. Indeed, first of all, the DCH platform gave the possibility to create new audience communities and follow the orchestra's performances, usually sold out, at half of the price, making classical music more democratic and accessible. Secondly, the DCH streaming concerts are not just a reproduction of live concerts, but to ensure the audience a unique experience, they are recorded, owing to Sony and Samsung's collaboration, with exceptional audio and video quality (Diaz Rodriguez, 2018, p. 86). It is essential to underline that developing such high-quality digital technologies would not be possible without the support of an important sponsor as Deutsche Bank, which is financing Digital Concert Hall's innovation since the beginning. Indeed, as has already been mentioned in paragraph 2.1., the development of digitization in the cultural field requires substantial public and private investment, without which it is unthinkable to achieve satisfactory and effective objectives. Indeed, nowadays, thanks to longstanding sponsorships, the DCH provides the highest audio-visual broadcast quality in the field of video streaming, combining an ultra-high definition video signal (UHD) with a lossless transmitted audio signal in studio quality (Hi-Res Audio), establishing a new standard in the field that ensures an acoustically authentic concert experience. By making innovative use of the latest technologies, the Berliner Philharmonic has succeeded in making their performances accessible as authentically as possible to a global audience that was unable to regularly visit a concert hall (Uhl, Schmid, and Zimmermann, 2013, p. 52).

Indeed, according to Bakhshi and Throsby, the new communication technologies applied to performance lead to the public's expansion in three dimensions. Firstly, the *audience broadening*, since it allows to reach a more significant portion of the public interested in the product. Secondly, the *audience diversifying*, since it brings in new customers that do not currently attend, and finally, the *audience deepening*, as it increases and intensifies the engagement of the public with the cultural institutions through the interactivity of the social media and the possibility to participate via streaming to the events (Bakhshi and Throsby, 2011, p. 209). Statistics confirm the theory: since the beginning of the DCH, 50% of revenue is generated by people living outside the European Union, and the age of the average consumer is lower than the age of the traditional public.

Indeed, it is very important to stress that the essential value that DCH introduces for cultural institutions is its enormous educational value, as it gives the possibility, through the new technologies, to bring the excellence of classical music, first of all, among students and the new generations that rarely have the possibility to join the live concerts due to the prohibitive prices. In addition, to live concert streams, the service provides subscribers with access to the Berliner Philharmonic's archive, which contains all of the orchestra's performances dating back to the beginning of the recording, as well as a variety of materials and extra content, including interviews and information about the orchestra and its musicians. All of these factors, combined with effective and forward-thinking social media campaigns through Facebook, Twitter, Instagram, and Youtube, have helped to create a community of listeners who are always up to date and maintain direct contact with the orchestra, paving new paths for the relationship between performers and audience.

The DCH maintains the traditional concert format, but the relation between the public and the performers is deconstructed because the conditions are changed. This new experience creates several different emotional reactions both for the public and the musicians. On the one hand, the audience, in front of their computer, thanks to the excellent direction and the numerous ultramodern cameras installed, benefits not only from the audio experience of the concert in streaming, but also from the visual experience that goes from the framing of the entire concert hall to shots of individual musicians (Diaz Rodriguez, 2018, p. 88). On the other hand, in the musicians the streaming performance could give "an extra click", as being aware of the much larger audience than the one usually present in the concert hall, they might feel a greater motivation to perform better (Diaz Rodriguez, 2018, p. 88).

In conclusion, it was possible to see how the application of ICTs to the cultural institutions brings several important innovations in different fields that, according to Bakhshi and Throsby, could be divided into four categories: the *innovation in audience reach*, since the ICTs enlarge the audience involving the new generations, the *innovation in art form development*, as they encourage experimentation and innovation, the *innovation in value creation*, as with new technologies cultural institutions are developing new tools to attract the public by increasing their economic value, and, finally, the *innovation in Business Management and Governance*, as the

ICTs are enabling new business model and stimulating creative financing solutions, in response to a changing financial environment (Bakhshi and Throsby, 2011, p. 208). These categories fit perfectly into the Berliner Philharmonic through DCH. Indeed, the new technologies have not only given the possibility to the whole world to listen to one of the greatest orchestras of our times, but they also allowed Berliners to position themselves among the most outstanding innovators and experimenters in the field of digital diffusion of classical music. Indeed, The Berliner Philharmonic has created a business concept based on both a new economic model and a new music knowledge methodology.

However, to stay in the vanguard, what are the following barriers the Berliner Philharmonic orchestra will try to break? What is the direction in which the experimentation and diffusion of classical orchestral music are going? Finally, are the digital platforms going to replace the magic and ritual moment of the concert in presence? According to Robert Zimmerman, the Managing Director of Berlin Phil Media, until February 2021, the first point concerning new technologies is to continue developing audio and video quality by switching the transmissions to 5.1 format and the recordings to 3D (Diaz Rodriguez, 2018, p. 95). The second point related to the relations with the customers is to continue to strengthen the relationship with the virtual community. The third point that refers to the distributions is the achievement of a broader and more inclusive educational program that could also open the doors for new markets (Diaz Rodriguez, 2018, p. 95).

Finally, to answer the last question, it is very important to underline the importance that the digital platform represents for the business and the survival of the music industry during the pandemic crisis. Indeed, during this last year, when all live performances were blocked, digital platforms have been the biggest lifesaver for the art and the creative industry. However, the intention of streaming platforms as the DCH is not to substitute the experience of the live concert but is to provide more instruments in order to enlarge the access to the concert experience. Indeed, one thing is certain: the live concert experience cannot be replaced because they represent a ritual moment of the human community where people choose to share the inexplicable and magical experience of music.

3.4. The Impact of Social Media on the Music Creative World

The development of social media has completely changed the way people communicate, influencing all aspects of human beings, including social life, business, politics, and even the creative and music industry. This new media type has an increasing impact on consumer behaviour, particularly in terms of awareness, information gathering, generating opinions, and purchase decisions (Margiotta, 2012, p. 9). Indeed, consumers are rapidly abandoning traditional media and advertising in favour of new social media, which is viewed as a trustworthy source of information due to its consumer-generated nature (Margiotta, 2012, p. 9). With the revolution of the social media and the new technologies, the music industry has drastically changed: digital music downloads have supplanted traditional album purchases, music videos on YouTube have supplanted music television, and social media sites such as Instagram and Twitter, have replaced the traditional advertising tools to establish a musician's celebrity. In fact, social media is becoming an increasingly important tool for the management and promotion of the creative industry from at least three different perspectives. First, they help bring the public to performances and artworks of their interests by matching artwork to the public (Poole, 2011, p. 14). Indeed, social media significantly reduces the distance between the artist and the fan. They allow artists to bypass traditional advertising tools and create market niches based on the communion of interests (Poole, 2011, p. 14).

Indeed, nowadays, both artists and cultural organizations tend to use social media as a platform of promotion and information, creating a virtual community of shared interests that could bring new potential audiences to their works and performances. Secondly, social media, thanks to their interactive form of communication, reduce the distance between the artists and the public and encourage interaction, creating collective and engaging arts communities. Indeed, through social media, the artist can choose to share with his follower private pieces of his life, increasing the connection and enabling the fan to feel part of the artist's world. Finally, cultural organizations and artists, on the one hand, can use social media as tools to understand and listen to the public's preferences and, on the other, to build an artistic awareness. Indeed, it is possible to utilize social media both passively, analysing the reputation of the artistic work through the monitoring of comments and feedback, and

actively, delivering various messages that can increase visibility and foster a sense of community around shared ideas (Poole, 2011, p. 15).

Through this analysis, it was possible to see how the overall realization of the image of a music star depends heavily on its representation in the social media environment. In fact, since consumers use social media to conduct their research of information, develop opinions, and make decisions, a strong presence on social media is crucial for successful image management. However, social networking has also ushered in a slew of music developments that are not always good for performers. Indeed, since artists usually have to market themselves, they must now consider not only the music they create but also how to engage with their audience and how to better sell their product.

In the next paragraph will be presented the eclectic figure of Igor Levit, a young and gifted pianist, who has used social media as a winning tool not only to share his art but also to overcome the dark period, from the artistic and human point of view, of the pandemic crisis.

3.4.1. How to Save Music during the Pandemic: Igor Levit's House Concerts

Igor Levit was born in Nizhni Novgorod, Russia, in 1987 from a Jewish family; his father Simon is an engineer, while his mother, Elena, is a pianist and a pedagogue. Levit began playing piano at the age of three under his mother's tutelage, showing from a young age an indisputable talent. In 1995 his family moved to Hannover, Germany, where at the Hochschule für Musik, he completed his piano studies with the highest score in the institute's history. According to the New York Times, Igor Levit represents one of the "most important artists of his generation" for his music and his political and social commitment, to the point that in October 2020, he was recognized with the Order of Merit of the Federal Republic of Germany.

The German-Russian pianist, already known among music lovers, becomes famous during the first weeks and months of the 2020's pandemic period, starting to stream house concerts from the living room of his apartment in Berlin. The Levit's house concerts rapidly became a ritual Internet appointment for thousand of people

confined in their house due to the coronavirus. As Igor explained, the idea of house concerts was completely unplanned and came to his mind spontaneously, first of all as a way to “break the chain of loneliness” (Boutsko, 2020). Indeed, Levit remembers that when all the concert halls were closed during the beginning of the pandemic, he was feeling completely useless and without any purposeless; for this reason, the house concerts format has represented healing, a “moment of salvation” (Boutsko, 2020).

The first house concert was streamed on Twitter the 12 March 2020 and was watched by 350,000 people. The pianist reached fifty-two Twitter concerts that every night for thousands of people during the pandemic, at 7 p.m. sharp, became a real appointment with music: Igor arrives in front of the camera, dresses in casual black, barefoot or in a sock, he sits down at the piano, spends some word about the repertoire he is going to play and starts. The stream was running, and the viewers with its amazing comments were multiplying by second. The picture was flickering in between, the sound quality was modest, but the interpretation was as brilliant and uncompromising as at a concert in a sold-out hall. Almost every night, the music was available for all. It was not anymore a product packaged for elites, it was what it is meant to be: a means to experience community with other people. Using Levit’s words: «it’s no longer about repertoire [...] it is about being together» (Boutsko, 2020). During this period when people cannot embrace each other, music offers one of the few ways to experience intimacy: something that touches emotions without any physical contact. Through the house concerts, the German-Russian pianist enlarged his virtual community, continued to give meaning to his music, and fought loneliness. However, what is the feeling of playing alone in your own apartment in front of an invisible Twitter community instead of a sold-out concert hall? According to Levit «it’s very strange. It is very different, but surprisingly, it is almost more intense» (Boutsko, 2020). The appointment launched by the young pianist receives such popularity that for the twenty-second night of the series, he was invited to broadcast one of his house concerts from Bellevue Palace, the residence of the German president.

These concerts are the cry of an artist who found himself without his audience. They are the voice for all that category of artists, often ignored by the politics, who are experiencing the tragedy of losing not only their job but also their reason for living. Igor’s experiment was a successful experiment despite his privileged position as an

internationally renowned artist. Indeed, it paved the way for possible new forms of performance able to reach a global audience. The house concert's concept represents the Russian-German pianist's personal attempt to save his art despite the lockdown and to launch new economic models in a field that, given the historical context, is in desperate need of it.

Conclusion

In the last thirty years, ICTs have expanded rapidly, causing a digital revolution. The mobile telephone, Internet, and electronic exchange of information and digital transmission systems have contributed to the development and growth of the so-called *Information Society*. Given this important transition, it is possible to observe that many present European policies have concentrated on digital literacy, Internet diffusion, and digitation of the cultural heritage, which are fundamental strategic forms for ensuring cultural, economic, and socially sustainable development. However, there is still a critical disparity, known as the “digital divide”, between different geographic areas or populations for access to communication and information services. Indeed, with the advent of the digital era, those territories, which are excluded from the diffusion of broadband platforms, have been even more marginalized. For this reason, the European Union, like other international institutions, plays a significant role by encouraging states, regions, and local governments to establish suitable technical infrastructure through their policies.

Indeed, it is important to stress that digital technologies themselves are neutral, which means they do not have the power to bring about any change. However, important public-private investments and common policies are needed at the global and local levels in order to deliver universal digital benefits and to avoid any further marginalization. On the contrary, maintaining the *status quo* while technology progressively pervades every sector can critically widen disparities and create irreversible destructive tendencies.

As it was possible to observe through the present research, the digital transformation, accelerated by the pandemic period, has strongly influenced all aspects of our life, including our cultural experiences. The impact of new technologies on our culture has stimulated innovative projects and new business models, which on the one hand, have changed the music industry forever, and on the other hand, have stimulated an important ethical and philosophical debate that cannot be ignored in order to develop a sustainable digitization process.

It was possible to observe generally three crucial trends. Firstly, if the application of AI in the music industry has strongly enlarged the creative and business

tools of the music industry, at the same time, it stimulated a debate about the creative relationship between humans and machines. Secondly, the development of digital platforms has enabled cultural institutions to reach a global public, expanding their audience, but also stressing the need to develop digitization through the support of major public-private investments and forward-looking policies. Finally, digitization has profoundly changed many aspects of the artist-public relation, empowering the artist's commercial and creative tools, but on the other side underling the necessity to develop strong and solid safeguards for the protection of the involved actors' interests.

Given these considerations, the digitalization process is not a simple transition, nor is it without obstacles; however, if it is developed considering its weaknesses and exploiting its strengths, it could represent an essential and unique opportunity for the introduction of new cultural experiences and for the strengthening of the music industry's "creative power". Indeed, it is important to stress that digitalization must be developed on the basis of the values of *Digital Humanism*. Maintaining a virtuous cycle of creative talent, artistic expression, entrepreneurship, and investment, as well as proper compensation and remuneration for artists, is critical for the cultural and creative sectors. Improving this cycle by creating the ideal atmosphere for cultural diversity and creativity in the digital era will undoubtedly be a key task for international institutions, policymakers, cultural industry, and civil society. Only in this way will it be able to create the conditions for wider circulation of culture, increasing access and inclusion for all people. Rethinking growth through development models that respect the community and enhance our rich heritage are the most important goals for establishing a sustainable future.

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Glossary of acronyms

AI: Artificial Intelligence

CCI: Cultural and creative industry

DCH: Digital Concert Hall

EU: European Union

ICT: Information and Communication Technology

IFPI: International Federation of the Photographic Industry

IT: Information Technology

NGR: National Representatives Group