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Digital Futures and Social Sustainability

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Abstract: The aim of the study is to show how the European Union's vision for digital technology has evolved over the past ten years. In this regard, the paper focuses on three documents: *Digital Futures – A Journey into 2050 Visions and Policy Challenges*, published in 2014; *2030 Digital Compass: The European Way for the Digital Decade*, published in 2021; the declaration announced in March 2022, which calls for strengthening the *EU's Cyber Resilience*. The purpose of the investigation is to show how the coronavirus epidemic and the Russian–Ukrainian war have changed the EU's perception of digital technology, how medium- and long-term forecasts have been transformed, and how the issue of sustainability has been reflected in the texts.

Keywords: coronavirus pandemic, digital future, digital optimism, digital pessimism, EU, sustainability

1. Introduction

The Internet and the online digital world cannot be left out of the concept of human future. The evolution of technology will also affect our communities, social institutions, and human biological possibilities. Within the European Union, the Directorate-General for Communications Networks, Content and Technology develops and implements policies to make Europe fit for the digital age. The board launched its *Digital Futures* project in the fall of 2011, the final report of which was published in 2014 under the title *Digital Futures – A Journey into 2050 Visions and Policy Challenges*. The report separated the short-term – occurring in a few years –, the medium-term, and the long-term changes likely by 2050.

But in the spring of 2020, the world faced the coronavirus pandemic, as a result of which the requirement of social distancing became general for a long time in order to avoid the risk of infection and suppress the pandemic. As a result, many activities have shifted to the digital sphere, from education through work to shopping and entertainment. Of course, this also influenced ideas about the

digital future because what seemed distant in 2014 suddenly became a reality in people's everyday life. For this reason, I also examined the EU document that was published after the outbreak of the pandemic in 2021: *2030 Digital Compass: The European Way for the Digital Decade*. As can be read from the title of the document, decision makers have looked forward and planned for a much shorter time frame, about ten years. But in February 2022, another unexpected event – the Russian–Ukrainian war – entered the vision of these ten years. Therefore, I also included in the investigation a third document (issued in March 2022) of the European Union, which is specifically about strengthening European cyber resistance (European Commission, 2022).

In connection with media and technology research, there have been divisions and typologies for a long time that approach media effects and the mediatized future optimistically or pessimistically. According to Barbour, an American media researcher, people can relate to the world of media in three ways: technological optimism, technological pessimism, or technological ambivalence (Barbour, 1993). Those who are optimistic about media technological innovations believe that media can promote the maintenance of democracy by providing space for public discourses and at the same time help the development of social solidarity. Pessimists primarily see the manipulative power of media content, which can be destructive for both individuals and communities. With the point of view of technological ambivalence, Barbour emphasizes that in the case of media technology, the functionality of media use in this environment cannot be ignored. After all, like most technologies, media can be filled with positive or harmful content and used for beneficial or harmful purposes. During the analysis of the European Union documents, I also examined how optimistic or pessimistic the individual materials are regarding the digital future. Do they emphasize the opportunities or dangers inherent in digital technology, either at the individual level or at the community or societal level? And, at the same time, connected to the question of sustainability, does the online world appear in a more supportive or threatening role?

2. Digital Futures until 2050

The first document to be analysed was published by the European Commission in 2014. *Journey into 2050: Visions and Policy Challenges* is a final report of a project conducted between 2011 and 2013. During this time, the organizers of the research held more than 100 conferences and workshops with around 3,500 participants. Four powerful transformations have been identified by 2050, which are as follows. The first is the blurring of the difference between reality and virtuality. The second is the blurring of the differences between human, machine, and nature. The third is the transition from a lack of information to an abundance of information. And the

fourth big transformation is that the world is moving from the primacy of entities to the primacy of interactions. In fact, we can see that these transformations can be clearly identified even after just ten years and will probably take place even before 2050. We can see the creation of hybrid (real and virtual) environments in the case of the Metaverse created by Meta (Social Connections, 2021). The connection of the organic and the technological spheres in relation to the human body already ensures, in the case of some locomotor prostheses, that touch and pain can be perceived by them (Osborn–Dragomir–Betthauser–Hunt–Nguyen–Kaliki–Thakor, 2018). The emergence of digital technology in agriculture is often referred to as Agriculture 4.0, extending the term of the fourth industrial revolution. In terms of information overload, a good summary is provided by the reports that refer to Internet usage in one minute (Heitman, 2022). The primacy of interactions is also indicated by various network analyses, where the network can be characterized not only by the number of nodes but also by the number of edges (Barabási, 2002, 2011, 2013). According to the project report, people will improve their cognitive and physical abilities in 2050 with biotechnological tools. And cyborgs perform tasks as complex as humans do today.

Lum and Bowman's VERGE framework was used as the research methodology of the project (Lum–Bowman, 2014). VERGE (The VERGE General Practice Framework) offers an approach in which six aspects can be used to develop alternative ideas for the future based on scientific results. The six VERGE domains include:

1. how we define ourselves and the world around us;
2. how people, organizations, states, cultures, and nature relate to each other;
3. what technologies (including phenomena such as language and art) connect people, places, and things;
4. what processes and technology we use to create goods and services;
5. how we obtain and consume the goods and services we create;
6. how we destroy or transform the value and the reasons for this (Digital Futures, 2014).

During the project, a total of 11 major topics were identified and analysed throughout. These topics were divided into two large groups, one of them including those that can be connected primarily to human existence and the other social and environmental changes. Its first name was *People* and its motto: "The singularity is approaching!" The second group was named *Systems*, and its motto was: "The matrix is no longer fiction!" According to the report, in 2050, the Internet will connect bits and atoms at the speed of light. Its algorithms will coordinate millions of intelligent objects and bridge the physical and virtual worlds. Five areas were included in the *People* theme: trans-humanistic era, hundred-year-old societies, hyper-connected people, from cradle to grave – work and play, and learning. *Systems* revolves around six major issues: new actors, new polarities, the rethinking of the media, the issue of the arts, sciences, and

humanities, the problems of cities, villages, and communities, new economic models, and, finally, the pursuit of global peace.



Source: Digital Futures, 2014: 6

Figure 1. *Thematic division of Digital Futures*

Now let us take a closer look at the long-term, medium-term, and short-term changes researchers expected for each thematic unit. The study does not aim for a complete list, instead it focuses on the points that did not develop according to expectations, did not appear in time, or turned out to be wrong future expectations.

2.1. People

1. Trans-humanistic era: By 2050, ICT and biomedicine will greatly improve human mental, physical, and psychological capabilities. The cognitive and intellectual abilities of human beings are enhanced through technological implants such as memory and energy storage. As a long-term effect, the study mentions that by 2050 genetically enhanced humans (GEH) will be the majority in the world, and most advanced cyborgs and soft robots will achieve self-awareness. In the medium term, by 2030, they expect development technologies to be widely available to enhance workforce productivity and career development. Available options will ensure effective treatment of chronic diseases. Advances in neuroscience will pave the way for brain-inspired technologies, the so-called NBIC convergence, which represents the ongoing merger of nanotechnology, biotechnology, information technology, and cognitive science. Remedial implants will be widely used by students to maximize university results. At this point, it is worth mentioning the innovation of Anvar Kapur's AlterEgo, which is referred to as intelligence amplification. AlterEgo is a wearable AI device that allows people to get information from a computer by talking to themselves, as if they were hearing a voice in their head. This device enables a

new type of interaction between humans and computers. The report on the near future believes that so-called designer babies will appear, whose appearance (skin, eye, hair colour) is genetically modified before birth.

2. Super-centenarian societies: In 2050, people will live longer and healthier lives. Nano-robots and bio-computers will be commonly used for diagnosis and treatment, extending lifespan. Among the long-term effects, it is mentioned that medical, technological, and lifestyle improvements will extend human lifespan, health, and productivity by 50-75%. Neuro-medicine will make breakthroughs in the treatment of Alzheimer's disease and other degenerative neurological/brain diseases. Medical research confirms the ability to manipulate physiological processes at the cellular and molecular level. The medium-term expectation for the future, projected for 2030, was largely modified by the coronavirus pandemic. The report stated that fewer people would become infected and die from viral, bacterial, or parasitic infections. It is also a medium-term expectation that healthcare and medicine will increasingly become digital, virtual sciences. As a short-term change, they expected in 2014 that lifestyle diseases — obesity, diabetes, heart disease — would decrease through incentives, education, and data feedback. Globalization and cultural diversity would encourage the exploration of alternative therapies and medicines.

3. Hyper-connected human: The Internet will continue its expansion, the development of photonic networks, quantum, organic computing, as well as technology that bridges the physical and virtual worlds will appear. In the long term, human society will be characterized by ultra-connectivity, new digital storage technologies will appear, and optical network technologies will be developed in order to further increase capacity. In the medium term, new network architectures will appear, and nano-sensors and devices will be everywhere. Their short-term prognosis proved correct when they predicted that congestion would develop in the corresponding parts of the wireless spectrum.

4. From cradle to grave – work and play: Technology will continue to shape the nature of work and the dynamics of organizations and labour markets. The permanent workplace will be a relic of the 20th century. As a long-term effect, realized in the report by 2050, artificial intelligence will replace people in the usual system administrator tasks. Robots will take over most manual work in manufacturing and agriculture. Professional roles will become predominantly project-based. The following two points were also predicted for 2030, but the closures caused by the pandemic brought them to 2020: Leisure activities and inter-work interaction will be realized almost exclusively through virtual technologies. It was written that job creation would lag behind job losses in the near future. Working remotely from the corporate office / shared work environment will become the norm. Education and

retraining will focus on web-based providers and applications. These issues have indeed come true, partly also as a result of the pandemic.

5. Learning: The boundaries between the different levels and directions of education will become more and more blurred, learning will be characterized by greater flexibility, and individualized, lifelong educational paths will appear. In the field of learning, with the introduction of distance learning due to the pandemic, many mid- and even long-term expectations for 2020 have already been realized. Examples include the appearance of virtual educational spaces, the continuous recording and sharing of personal learning experiences with others. The physical classroom is being supplanted by the augmented realities of digital learning for most people. What remains to be seen is the long-term emphasis on simulations in education, the spread of brain–machine and brain–brain interfaces. In the near future, the researchers of the project predicted that cheap online education alternatives would enrol more students than face-to-face courses. Overall, we can say that the pandemic has perhaps accelerated the occurrence of long-term trends in the education sphere.

2.2. Systems

The topics belonging to the Systems group affected the following areas.

6. New actors, new polarities: In the next 20-30 years, people will be empowered more than ever before to share knowledge, make informed and responsible decisions, and become active players on the global scene. The digitalization of life will strengthen the growth of equality. By 2050, new forms of democracy will be created, while citizens will be characterized by context-aware personal data management (PDM). Social cohesion will be threatened by critical challenges in the medium term. By 2030, biometric identification will become extremely sophisticated and difficult to evade. In the near future, pervasive ICT will form an unprecedented medium for social interaction, and new platforms will appear among social networks.

7. Rethinking media: Social media will replace traditional editorial media as the dominant form of media. Editorial media will still exist, but only as part of social media. As a long-term prognosis, we can read in the report that the last international media giant will fail by 2050, and this failure will mark the end of the hierarchical media era. The absence of large organizations or institutions at the top will allow the arts, media, and creative fields to rewrite the rules, affecting education and professional standards. This vision of the future will become more and more improbable, as Meta, Google, and other big tech companies are taking over

the place and role of the old ones, and they are doing all this with strengthened power. Some of the long- and medium-term effects seem almost comical: The last few bookstores will close for good, fact checking in politics, reporting, and fundraising will become redundant, media sensationalism will be a dying art because information will be so quickly validated by a digitally savvy audience. And in the near future, it is believed that the New York Times bestseller list will disappear, and the demand for classical art and literature will decrease. Personal online codes of ethics will begin to emerge. Virtual relationships will be prioritized and valued. On the whole, the prognoses for the world of media were perhaps the strangest, both in terms of their content and their probable time course.

8. Arts, sciences, humanities: The challenges facing humanity will be increasingly global and closely related. Creativity will be the key to exploiting the new opportunities offered by science and technology. As a long-term effect, the report mentions that, thanks to technological development and a better understanding of data, it will be increasingly possible to deal with interconnected global challenges. At the same time, people will be creatively active, informed, and thus will have more influence on political decision-making. In the medium term, virtual science will be the new norm, and scientists and citizens worldwide will collaborate in the digital space with the help of holographic work environments. In the near future, high performance computing (HPC) will enable the processing of big data to identify previously unrecognized patterns. The democratization of art will allow for public participation – unleashing everyone's creative potential, and 3D printers will become mainstream.

9. Cities, villages, communities: Cities will grow into megacities, with sustainable transport, new buildings built from innovative materials and connected to a higher super-network, the Internet of the future. By the way, this thematic section was divided into four large clusters, and this is where we often encounter the question of sustainability in the document.

Citizenship Cluster: In 2050, our economy will be based on a more optimized and personalized consumption in which individuals will be informed and empowered. Depending on their needs, values, and lifestyle, they will be able to decide which economic model(s) they want to participate in. In order to sustainably manage common natural resources, the use of domestic energy sources will be carefully planned, and regional integration will be examined more thoroughly. Growing awareness of the vulnerability and scarcity of water and land will appear.

Governance Cluster: Intergenerational partnerships and cultural changes will modify patterns of community solidarity as a new mixed culture develops. Increased citizen participation in civic decisions, such as the allocation and prioritization of community resources, will be characteristic.

Transportation, Cyber and Technology Cluster: Cyber-physical systems will have a huge impact on the quality and cost of urban life. Smart city infrastructure will integrate information from public and private spaces to create cleaner, healthier, and more efficient living conditions. Smart home and smart city networks will allow people to stay in their own homes for elderly care and healthcare (ambient-assisted living – AAL). Commuting time will be reduced as work and productivity will be decentralized. A decrease in the number of single-owner cars will take place – more walking, carpooling, and public transport will be popular.

New Urban and Community Economic Dynamics Cluster: Communities are built around individual, local, and/or shared interests. An "economy of the common good" will emerge: an online economic system based on values that embeds the economy in the social context, local values, and local natural resources. Local foods: "urban" food production and regional foods will re-energize local economies and businesses. 3D printing will transform communities, especially in housing and social care. Food will divide communities: "food oases" of high-quality food will emerge among the wealthy, while "food deserts" of low-quality food will multiply among marginalized communities.

10. New economic models: Technological and social innovations can significantly change the world economy. Advanced manufacturing will bring most of the production back to the local, sustainable dimension. As a long-term end state, the following can be read in the report: non-linear, circular economic models will be formed; production will be local and sustainable. Also, the dominance of decentralized production chains will come in production. Ecological economic management will spread rapidly, and a kind of "post-consumer" economy will be created. In the medium term, the research and innovation industry will continue to make impressive advances in green technologies. And in the near future, the authors of the report expect that access to the Internet and to the vast amount of data generated by businesses will become a basic right. Digital manufacturing technologies will rapidly be adopted by private industry and traditional individuals.

11. Striving for global peace: In the next 30-40 years, societies will be characterized by the tension between individual and collective interests, as well as two opposing models:

1. a society where only a few make decisions,
2. one that is characterized by new forms of a society without classes and hierarchies.

A long-term forecast in the report is the reduction of global income differences and the reduction of poverty, the realization of nearly universal basic food security, while in the medium term, access to energy services and the appearance of growing global energy demand are mentioned, as levels of key non-renewable resources

reach supply or cost limits. At the same time, climate change issues are changing the way we think about security. Post-World War II global governance arrangements begin to decline; the emergence of increased multilateralism will be likely. And in the near future, challenges related to the global burden of disease will be expected to contribute to social and developmental instability. The Russian–Ukrainian war that started in February 2022 completely overrode the report's expectation that the 2020s will be characterized by a "continuing decrease in the number of large-scale armed conflicts between states".

When evaluating the document, we must mention that compared to its importance, artificial intelligence is mentioned less than expected (it is mentioned three times in the text), and areas that we would now classify as AI are named differently (Csepeli, 2020). In the end, it is not surprising because the European Union began to deal more intensively with the issue of Artificial Intelligence from 2018, and the regulatory environment was not outlined until 2021 (European Commission, n. d.).

In connection with the analysis method of the Digital Futures – 2050 project, it is also worth noting that a Hungarian-related research that examines social futuring offers a multidimensional analysis framework in its methodology (Aczél–Csák–Szántó, 2018). Analysts Zoltán Oszkár Szántó and János Csák develop the normative while Petra Aczél the conceptual-discursive concept of social future potential. However, both texts equally use Ray Kurzweil's motto at their beginning. The EU report highlights that: "Futurologist Ray Kurzweil predicts that by the end of the 21st century we will have experiences the equivalent of 20,000 years of progress at today's rate of change" (Kurzweil, 2014), while Szántó says:

> People's behaviour often goes through three phases while thinking about the effects of future technology: they imagine its ability to solve old problems with awe and admiration; then they are afraid of the new, serious dangers of new technologies; and, finally, they realize that the only viable and responsible way is to carefully select a path of development that realizes the beneficial effects while keeping the dangers under control. (Szántó, 2018)[1]

It should be added, however, that the human-social aspect is the primary consideration in the study of social future potential by Hungarian researchers, while the technological aspect is the focus of the EU document. And in the literature, following Jasanoff and Kim, the latter is also referred to as socio-technological imaginaries (Jasanoff–Sang-Hyun, 2015).

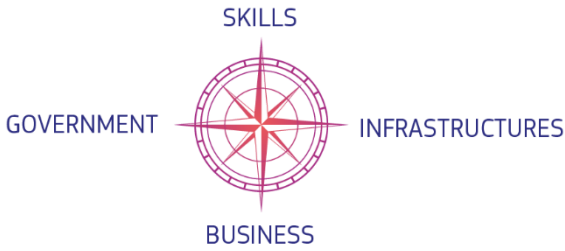
The technological vision emerging from the EU report published in 2014 is clearly optimistic. The opportunities provided by digital technology are more emphasized in the text than the dangers. This does not mean that the disadvantages of technological development, the dangers of social division, are not mentioned

1 The original Hungarian text was translated by the author of the article.

but that in a much smaller proportion than the opportunities. Although the authors emphasize the possibility of diversity and multiple outputs, they still consider the digital future to be fundamentally controllable and effectively shaped.

3. COVID Corrections – Europe's Digital Decade: The Goals Set for 2030

The next document on the digital future of Europe was published in 2021, and it already includes the corrections that resulted from the effects of the coronavirus pandemic. As the first page of the document states: "In just a year, the COVID-19 pandemic has radically changed the role and perception of digitalisation in our societies and economies, and accelerated its pace" (Digital Compass, 2021). Compared to the Digital Futures report, the text *2030 Digital Compass: The European Way for the Digital Decade* focuses on a shorter time horizon. In addition to being less optimistic, it is characterized by a shift in emphasis from the point of view that the dangers and harmful effects of digital technology and the regulatory reflections on them dominate. "The pandemic has also exposed the vulnerabilities of our digital space, its dependencies on non-European technologies, and the impact of disinformation on our democratic societies" (Digital Compass, 2021). And, at the same time, sustainability also appears strongly in the document, listing at length the areas where the digital solution can be the green solution. "Digital technologies can significantly contribute to the achievement of the *European Green Deal* objectives. The uptake of digital solutions and the use of data will help in the transition to a climate-neutral, circular and more resilient economy" (Digital Compass, 2021). The Commission proposed the creation of a so-called digital compass in order to more easily outline the EU's digital aspirations for 2030. The compass defines the most important milestones along four points, which are the following: the digital capacities of infrastructures, education and skills, and the digital transformation of businesses and public services.



Source: 2030 Digital Compass

Figure 2. *Digital compass*

Regarding safe and sustainable digital infrastructures, 5G network coverage will be available everywhere in the EU. Regarding the production of high-tech semiconductors, the goal is to double the EU's share of the world's total production by 2030. In the area of innovation, the emphasis must be placed on the new quantum technology. In terms of the development of expertise and the acquisition of digital skills, the goal set for 2030 is the training of an additional 20 million ICT professionals and the creation of gender balance in this area. And at least 80% of the population should have basic digital skills. In the field of digital transformation of enterprises, technological development is directed towards cloud-based services. By 2030, 75% of EU businesses will use cloud services, artificial intelligence, and big data. At the same time, innovation must be continuously encouraged and strengthened. The digitization of public services reaches 100% in the case of key services, that is, complete digitization. All European citizens will have online access to their health data, 80% will use a digital ID. On 26 January 2022, the Commission proposed a solemn inter-institutional declaration on digital rights and the principles of the digital decade, which covers six priority topics, related rights and principles putting people and their rights at the centre of digital transformation – not technology. Accordingly: they support solidarity and inclusivity, as the pandemic has deepened polarization; ensure freedom of choice in the online space, which should come with the regulation of large technology companies; promote participation in the digital public sphere; enhance the safety, protection, and empowerment of individuals; promote the sustainability of the digital future. The Union has also adopted a strategic plan that fits well with the ideas and sets out the tasks to be done and the goals to be achieved between 2020 and 2024 (Strategic Plan 2020–2024).

4. War Correction on the Vision

On 24 February 2022, Russia invaded Ukraine. The outbreak of the war in the physical sense was preceded by atrocities and hacker attacks taking place in the digital sphere. Not surprisingly, a few days after the start of the war, on 8 March, the EU strengthened its cyber resilience.[2] Armed conflict, hybrid warfare naturally turned European attention towards the possibility of the worst, most pessimistic scenarios. The optimism characteristic of the 2010s has reversed: instead of opportunities, the priority has been to take stock of the dangers as the level of cyber threats has increased, exacerbated by the situation in Ukraine

2 The provisional agreement was concluded on 13 May 2022. Online available at: <https://www.consilium.europa.eu/hu/press/press-releases/2022/05/13/renforcer-la-cybersecurite-et-la-resilience-a-l-echelle-de-l-ue-accord-provisoire-du-conseil-et-du-parlement-europeen/> [Accessed on: 24.08.2022].

and the risk of cyber security incidents within the EU. Therefore, the Union formulated short-term goals such as strengthening and accelerating the pace of European cooperation in the field of cyber security, expanding efforts to increase the fight against disinformation. This included calling on tech companies to take additional voluntary measures to combat online disinformation and information manipulation.

5. Summary

The aim of the study was to present and analyse three documents on the digital future of the European Union, which were published in 2014, 2021, and 2022. The ideas about the digital future, which were particularly optimistic in the 2010s, became pessimistic due to the coronavirus pandemic and the Russian–Ukrainian war, and the emphasis shifted from opportunities to dangers and threats. The documents work with an increasingly shorter time horizon: the initial 40 years became 10 and then even less. Of course, the materials released as a result of the war are not, in the strict sense of the word, visions of the future but quick action plans, as this must be a priority in the EU in the spring of 2022. We can also see a difference in how well and efficiently the digital future is considered to be shaped by the individual documents, and we can see that trust in regulatory efficiency and the effectiveness of long-term shaping has decayed by 2022.

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