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THESIS SYNOPSIS

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"The Optimistic Blindspot: Hungarian AI Developers and the Future of Work"

Doctoral Dissertation

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Introduction

The question of how technological innovations shape the different aspects of life is not new. From the beginning of history, new technologies meant an advantage over other groups. Technological innovations helped humankind in hunting, warfare, and food production; they made us capable of extending our frontiers and lifespans. New technologies and innovations, therefore, can be viewed as beneficial for society or a constant threat that others can use against us. Research about technological innovations involves research on power, necessity, creativity, adaptation to new situations, networks, and what connections we can find among all these aspects. It is tempting to try to tell what the future might bring, but the context is too complex (Bell, 1999; Borup et al., 2006).

The topics of artificial intelligence, its effect on our current way of managing our life and work, its promises to alter these practices, and its benefits and threats are the focus of public debate, popular science, and pop culture. One of the most popular topics is the relationship between the development of AI and the future of work. In their article about the future of employment, Frey and Osborne started a wave of intensive debate. They state that almost half of all US employment is in danger of computerization (Frey & Osborne, 2013). The OECD working paper on the risk of automation for jobs in OECD countries is much more cautious about the extent of change. The report found that low-skilled employees will face the biggest change in their working patterns, which is the biggest challenge to be prepared for, but in general, the possibility of an enormous workforce being left without a job is very low (OECD, 2016).

In his article about the necessity of reconfiguring discourses regarding artificial intelligence, Z. Karvalics László criticizes these authors for being "alarmists" and presenting a dystopian picture of the future where super intelligent, artificial intelligence-led robots will demolish humankind. Even more moderate "navigationists" hint that without elaborated and well-planned supervision, such intelligent robots can turn out to be dangerous instead of helpful and like the extension of human intellect (Z. Karvalics, 2015). In her review of the books of Ford, Susskin and Susskin, Brynjolfsson and McAfee and Urry, Judy Wajcman articulates her opinion that while drawing a negative outcome of automation and robotization on humankind, none of the authors give voice to the concern of the power concentrated in the hands of only a few corporations and the social consequences of this fact (Wajcman, 2017).

In my research, I will investigate the connection between AI and relevant technologies and the future of work debate from a unique point of view through the eyes of Hungarian IT professionals who have cutting-edge knowledge about the latest improvements in AI. My reason for doing so is manifold. The literature on the topic of the future of work is written by a wide range of experts, each adding different points of view from their respective fields of expertise. In most cases, the central question is whether robots will take over our jobs. Depending on the side they take, authors either reason that a transformative and radical change is about to come that will drastically lower the proportion of humans in the labor market, causing unforeseeable consequences (Frey & Osborne, 2013; Ford, 2017; Brynjolfsson & McAfee, 2016; Huws, 2014) or on the contrary, arguing against such statements and in favor of a slow, manageable transition (OECD, 2016; Kelly, 2023) and rarely taking the third path and urge for the coming of an entirely machine-based economy to free humankind from the drudgery of economically forced labor (Bastani, 2019). Most of the literature focuses on general statements written by academics from the global north, with limited examples from Africa (Chigbu & Nekhweva, 2021), Mexico (Lovett et al., 2004), or India (Bisht et al., 2023; Lingmont & Alexiou, 2020). Data from the European Commission engages with broad topics and provides data that helps to position Hungary within Europe. Still, the macro-level nature of the data does not allow us to make nuanced statements about the participating countries (European Commission,2020, 2021). Seminal work of Hungarian researchers (Tardos & Ságávri, 2021; Keszey &Tóth, 2020; Makó & Illéssy, 2020; Illéssy et al., 2021; Fehér & Veres, 2022) was therefore of great help to draw many-layered pictures of the Hungarian context in relation to the future effects of AI and automation. Through research done in Hungary, we can learn the perceptions and expectations of a wide range of professionals, from blue-collar factory workers to engineers and management to representatives of the trade union (Tardos & Ságávri, 2021; Keszey & Tóth, 2020) and members of the Hungarian AI Coalition (Fehér & Veres, 2022) while the official report on the AI strategy of the Hungarian government reflects expectations of the political field (Magyarország Mesterséges Intelligencia Stratégiája 2020-2030, 2020). This PhD dissertation is part of OTKA research no. K131733 entitled Visions of artificial intelligence and society and, therefore, part of a series of scientific investigations using various methodologies targeting different society groups. Investigations have been done on the expectations of young Hungarian adults (Vicsek et al., 2022). AI specialists participated in a backcasting workshop that utilized their expectations about an optimal future (Pintér, 2023), and this research used scenario-building. The team members helped prepare the methodology used in the

dissertation, as one of its cornerstones was to map foresight methods suitable for research. They constructively commented on the preliminary versions of the publication made from it.

As can be seen, there was one missing piece from the social spectrum: those working and developing the technology at the heart of all the debate. There is research on how AI developers vision the future in general (Vaast, 2022) about their relationship to ethical questions in AI development (Duke, 2022; McDonald & Pan, 2020; Metcalf & Moss, 2019; Pant et al., 2022) but the issue of the future of work and AI through the lens of AI developers is not broadly researched. Although Hungary is not at the front of AI development (Vértesy, 2020), IT professionals, especially those specialized in AI, are positioned of fundamental importance in the future of our country (Magyarország Mesterséges Intelligencia Stratégiája 2020-2030, 2020; Századvég, 2022). IT professionals and specialists in AI are the humans behind all our debates regarding the future of work, from headlines about unethical, discriminatory applications of AI to its undeniable success in science. Therefore, their visions and expectations must be mapped out and investigated in detail. In contrast to laypersons whose expectations can be influenced by many, not scientifically accurate resources or economists who are not necessarily required to have a deep understanding of the technical background behind AI, IT professionals are supposed to have a clear understanding of AI's possible or probable future outcomes. Their knowledge of economic, political, or ethical issues might influence or alter their positions, which also have to be part of the research since their prepositions regarding AI's technological and moral limitations can be decisive regarding innovation's path. Lastly, Hungarian IT professionals can be positioned in a state of "in-between" from two different points of view. First, while Hungary currently is not at the core of AI development (Vértessy, 2020), Hungarian AI developers are elite IT professionals. Secondly, while they are employed by the companies that are key players in the field, Hungarian offices, being mostly subsidiaries, have limited power over decisions regarding development directions (Tardos & Ságvári, 2021).

Theoretical background

For social scientists, research on future events or outcomes is difficult since we want to enquire more about something in the realm of the "not yet" (Brown & Michael, 2003). Although we cannot foresee what the future holds, we can investigate what people imagine will happen in the present and how their expectations about the future interact with their decisions in the present. While in the past, the future belonged to God(s) and therefore was

seen as something that humans cannot have power over, in modernity, especially after the industrial revolution and in modern capitalist systems, knowing as much about the future as possible is essential. (Beckert, 2016). Expectations have performative roles in our lives since they affect what we do in the present to achieve an imagined future state that we anticipate. (Birch, 2017; Borup et al, 2006). Concepts of fictional expectations and imagined futures were introduced by Beckert (2016) to describe how people try to find viable solutions for the future in our modern, fast-paced world with high levels of uncertainty. Fictional expectations are interpretative frames that can aid actors in their decisions when navigating vast numbers of opportunities and outcomes and map plausible actions in a fictional realm of the future interwoven with uncertainty. The role of experts is undeniable when achieving the lowest level of uncertainty is pivotal. Although we can never achieve total certainty regarding the future, the imagined future created by experts and their expectations have performative effects on a vast number of others, as it is commonly believed that their expectations are the most probable ones (Beckert, 2016). Based on this theory, in a world where the future is open and, therefore, the variation of future outcomes is high, when achieving the lowest level of uncertainty means an advantage against others and where experts' expectations and visions about future outcomes are widely accepted and followed, what today is IT specialists expect can shape our future.

Since our future is in the realm of the "not yet," first, we might look at **visions about the future created in the past**. This approach can demonstrate the logic of previously created imagined futures and give additional evidence to the fact that most of the expectations of experts of any given historical period are usually inaccurate (Beckert, 2016). In accordance with the sociology of expectations, visions, and utopias reflect how thinkers, philosophers, and writers perceived the future. Suppose the future is believed to be closed, meaning that it is predetermined and it is impossible to change it. In that case, the topic of the future of work and society is positioned in an imaginary future state, far in the unforeseeable time of humankind, or depicted as an alternative present in an alternative world. There is a transitional period when the future is still in the hands of God, but our actions in the present and their plausible outcome in the future can be accepted as a sign of God's favorable plans. Once the perception of the future opens up and it is believed to be changeable, visions start to search for the answer to what will happen. The reason behind this can be explained by the importance of uncertainty in the open future (Adam, 2008). Therefore, the second part of the Background chapter lists some of the most well-known utopias of the past. The basis of the

analysis is the presence of the following aspects: the perception of work in general, the quantity and quality of work in the future, the role of technology, and how equality is depicted. Throughout history, work was generally believed to be drudgery either because it was done out of necessity or because of its high quantity. Utopias always aim to reach a state where work is a way of self-expression with as little toil as possible. With fewer hours spent on working comes the improvement of its quality. Technology is always described as the key to a better future, and its substituting potential for human labor is favorable exactly because the goal is to minimize hours spent at work for people. (Granter, 2009; Ransome, 1999; More, 2018; Fourier, 1971; Keynes, 1930; Gorz, 1985; Bastani, 2019). The topic of equality is present in the utopias of the past, although its extent is narrower than what our modern society expects. White Christian men are the base group of equality, while women, children, slaves, or foreign workers are depicted as tools or left out from the description of the imagined future (Fourier, 1971; More, 2018).

After outlining past visions of the future, the third part of the Background chapter moves on to **contemporary visions.** This part of the research paper aims to give a well-rounded understanding of the future of work debate by reviewing the opinions of social scientists, economists, laypersons, and other experts. One obvious lesson of the literature is the complexity and diversity of analysis on the topic in recent years. As it is often mentioned, there are three main groups of opinion under many different labels. Typologies created by Firth and Robinson (2020) or Boyd and Holton (2018) attempt to organize authors of the topic into categories based on the similarities they show in their logic to simplify the main perceptions, but sometimes, even the typology creates chaos. Although there are many nuances in the different discussions, there are three main groups. Those who represent a pessimistic view on the future of work mostly see a radical, unstoppable change in the future with high numbers of unemployed since it will be more rational to "employ" robots from a financial point of view. The jobs remaining in the hands of humans will be of lower quality, and because AI will be able to take over jobs from white-collar sectors, there are no other sectors to move (Frey et al., 2013; Ford, 2017; Brynjolfsson & McAfee, 2016; Schwab, 2016). On the other side are those who either expect no radical changes or improvement in the quality of work due to enhanced working conditions achieved by AI and related technologies (Geels & Schot, 2007; Ransome,1999; Bastani, 2019; Miller & Atkinson, 2013). In the middle are most of the economists writing about future technological outcomes who are not as pessimistic about the range of change as the pessimists but not so sure about the definitive

positive effect of technology on the quality of work (Gordon, 2014; Taylor, 2018; Arntz et al., 2019). Although this part enlists a wide range of viewpoints and shows data from various sources, there is still an opportunity to point out some of the weaknesses. First, there are potential flaws in the data from which extrapolations and calculations are made. When an entire model builds on the classification of jobs or tasks, the relevance of that dataset is crucial, and an outdated set of information can lead to false forecasts. Secondly, the importance of unemployment rates is overemphasized, and the growing numbers in the gig economy or precarious jobs are downplayed or ignored. Economists routinely use units of products when considering ways of productivity gains and redistribution, but AI-generated wealth is not feasible for this kind of calculation. There is no precise measure to describe the unit of production made by the Big Five per country. Profits are created in many locations by an army of the cyber proletariat. (Huws, 2014; Dyer-Whiteford et al., 2019; Ernst et al., 2019). Third, the positioning of the education system as the center of positive change (Frank et al., 2019; Spencer, 2018; Ernst et al., 2019) might appeal to many of us, but because of the slow nature of change that can be achieved through it, there should be a long term, mutually accepted vision based on which an entire system could be reshaped. Finally, there is a clear techno-deterministic viewpoint throughout the literature that takes the development and deployment of new technologies as an inevitable fact and amends the current systems or delegates the task of fixing humans to fit into the new requirements of technology.

IT professionals are not at the center of the above-mentioned literature since most of it articulates concerns regarding the future of low-skilled workers and easily automated jobs, and their prospects in the future are not perceived as evidently positive. It seems that IT professionals are the best prepared for the coming of an AI-led economy, and if pessimists are correct and robots take our jobs, they will be the last members of the human workforce. They are highly educated and have acquired the necessary skills to work on- and with AI or at least have a high level of computer literacy. Their preparedness and favorable position mirrored the high demand for IT professionals (Atkinson & Meager, 1986; Bell, 1999; Ford, 2017; Susskind & Susskind, 2018; Brynjolfsson & McAfee, 2016; Schwab, 2016; Dyer-Witherford et al., 2019; Ransome, 1999; Frey & Osborne, 2013). While all these facts are true to them, the question is whether technology can improve to a level that makes even them redundant. IT professionals are key to developing and using novel technologies to a certain point, after which the simplification process comes to make that technology more available for wider but not tech-savvy employees working as members of a global cyber proletariat. This process can

shrink the number of essential IT professionals, and eventually, an AI capable of writing codes might even replace them (Huws, 2014; Dyer-Witherford et al., 2019).

The next part of the Background chapter gives an overview of **the Hungarian context** to shed light on the details and peculiarities of the environment in which research participants navigate daily. Looking at the data presented by PwC Hungary (2019) and Makó and Illéssy (2020), it becomes obvious that the high proportion of jobs in manufacturing and construction puts Hungary's economy in a vulnerable position if the "robots take our jobs" scenario becomes true Automation will first strike those traditionally white-collar jobs mostly held by females, which consist of simple computational or administrative tasks, while the blue-collar, male-dominated industries will be the last to fall for automation (PwC Hungary, 2019). Makó and Illéssy looked at the same phenomena but used a different methodology. Instead of looking at industries, they distinguished jobs based on their complexity. This mode of grouping occupations aims to prevent the mistake of stating that an entire industry shares the same level of skill sets and professional backgrounds while, in truth, manufacturing or construction involves both high- and low-skilled and educated labor force (Makó & Illéssy, 2020). Data focusing specifically on the level of IT usage at firms and computer literacy of the citizens show that while the technicalities are readily there to enable the use of the internet and Hungarians generally believe that ICT development is beneficial for society in general, most of the population only have basic computational skills. The high demand for IT professionals with advanced, AI-related levels of proficiency and the perception of high expenses of introducing AI technologies prevent Hungarian firms from entering a more technologically up-to-date way of production (European Commission, 2020, 2021). Considering the importance of manufacturing and automobile industries in Hungary's economy and pairing this fact with the founding of the PwC report (2019) and research of Makó and Illéssy (2020), studies conducted by Tardos and Ságvári (2021) and Keszey and Tóth (2020) about the perception of managers, workers, and trade union representatives regarding automation was essential for my research. Managers seemingly shared the expectations of the "not real change" group (Boyd & Holton, 2018) and pointed out that in Hungary, firms struggle with the shortage of IT professionals; therefore, the threat of robots taking human jobs is not real. While the lack of sufficient IT personnel is a real problem, management also hinted that until human labor is cheaper and readily available, the headquarters probably won't finance the deployment of new technologies. Managers in both industries found AI and robotics to be a challenge and showed a positive attitude towards it,

while blue-collar workers were more restrained or negative and articulated their fear of being replaced by robots (Tardos & Ságvári, 2021; Keszey & Tóth, 2020).

The section on lay expectations starts from the premise of the sociology of expectation, stating that expert visions have a performative role that helps society to create a mutually imagined future towards which we aim to go (Beckert, 2016). If this statement is true, then images of this imagined future should also be present in laypersons' expectations. Research collected from various geographies showed that people's location and perceived possibilities to change their situation were focal in their future expectations. One general edification is the rejection of the pessimist "robots will take our jobs" narrative (Lovett et al., 2004; Keszey & Tóth, 2021 Winkelhaus et al., 2022; Chigbu & Nekhwevha, 2021; Vicsek et at., 2022) which doesn't mean that participants were optimists about how technology will affect their work life (Bhargava et al., 2021; Bisht et al., 2023).

Preliminary Assumptions

There are two main fields of inquiry: the presence of mainstream discourses in the accounts of Hungarian AI developers and IT professionals and their ethical considerations regarding future outcomes. The general assumption of the research is that participants won't differ in their logic from Western experts in that they will perceive work as an essential value in society and will have a general optimist view of AI and its effects on the world of work. Research questions investigating AI developer's ethical considerations do not have a hypothesis since these topics are examined through open questions to give space for the participants to answer freely.

Methodology

The fourth chapter of the dissertation covers the **methodological background**. In its first part, a summary is provided about different, previously used techniques in social sciences to investigate topics related to the future. Later, there's an overview of forecasting methodologies and a presentation of scenario-building.

Using scenario-building combined with the interviews enables the researcher to harness the positive aspects of both methodologies to get a better-rounded view of the topic of the research. Interviews will be essential in many ways. First, in contrast to the DELPHI method, one interview can cover all the different topics, and the researcher has the opportunity to ask

for further details in case an unexpected topic arises or the participant would overlook issues that are otherwise important for the research. The anonymity is still ensured, and we don't have to worry about peer pressure. Also, the semi-open interview structure gives space for the participants to include topics and perspectives that they find important and might be missing from the list of questions.

This research utilizes the Shell method because it is rooted in corporate usage, which makes it simple, compact, and time-efficient even in small groups. To avoid the tendency to use mental filters and values that participants are comfortable with, role-play and other games will be used to facilitate open-mindedness and out-of-the-box thinking.

Results

 The fifth chapter is dedicated to the **Results** of the research and has two main parts: the first part discusses the results of the interviews, while the second part is about the visions created during a scenario-building workshop. **Interviews** are analyzed according to the main themes that occurred in them. First is participating in AI developers' visions about the future of work in general by the year 2050. There are two recurring elements in this part. First is the conviction that although AI will change the way we work, this will be a slow and graduate process that will leave us time to adjust. Secondly, they argued that there is currently hype around AI and that the technology is not as powerful or smart as laypersons like to believe, which makes it unnecessary to be afraid of it within the timeframe of the next thirty years. Experts displayed a strong sense of techno-optimism throughout the interviews, saying that AI and related technologies will help and enhance humans in their work instead of completely substituting them. Even the potential of disappearing blue-collar jobs was perceived as a positive outcome because they saw a general improvement in the quality of the remaining jobs. Best-case scenarios created by them reflected a general wish to achieve a better life- and work conditions for everyone. Part of this better future involved an educational system committed to providing IT skills at all levels of schooling and a wide range of jobs augmented by AI to ensure objective decision-making and precision. Regarding ethical questions, interviewed developers didn't show initial interest in the ethical aspects of AI and showed limited solidarity towards the losers of a highly automated, AI-augmented future labor market. While they broadly acknowledged the potentiality of technological unemployment, only a minority tried to think about solutions, while the majority only expected the government to find some solution. Ethical issues mentioned in the mainstream media were

mentioned but not as examples of the negative consequences of AI on society. Developers generally thought that even in cases of racial profiling, AI was working perfectly only with bad-quality data collected by biased humans. Interviewees perceived themselves as members of an elite group. Hard work and expertise were mentioned as their key to success, first to get admission to the best universities and, after graduation, to enter a very competitive and small fighting arena in the AI-related job market.

AI developers created two scenarios during the scenario-building workshop: one best- and worst-case scenario by the year 2050. The best-case scenario is titled Slow World and reflects participants' desire for a future in which AI helps humans to achieve an inclusive labor market, AI-enhanced jobs, and the possibility of easily changeable careers through adequate education of broad skills needed in the labor market. Although the best-case scenario wasn't revolutionary in that AI developers couldn't imagine a future radically different from the status quo and only emphasized improving the quality of work in the future, it was created through a lively conversation. In contrast, the creation of the worst-case scenario proved to be difficult to imagine. AI developers agreed that the worst outcome by 2050 would be the absence of AI improvement, but they had difficulties imagining what would cause it. Finally, they decided to come up with the theme of war and build the worst-case scenario on it. Even in this case, AI was portrayed partially as the savior of humanity, even in its current state.

Discussion

After reviewing the topic of how the future of work is imagined by representatives of the social sciences, economists, futurologists, laypersons, and experts, I gave a short depiction of the national context in which this research took place and presented the methodology that was used to conduct it. The previous chapter demonstrated the research findings separately and then compared to each other. This section will provide the answers to the research questions and embed them in the literature or note the novelties.

Reflecting on the Preliminary Assumptions

Preliminary Assumption no 1.: The presence of mainstream discourses in the account of Hungarian AI developers and IT professionals

Preliminary Assumption 1/a: The fundamentality of work as a value

Based on data presented in the Hungarian context part of the Background chapter, the

preliminary expectation for this research question was that since Hungarians think that work is important both on a personal and societal level, IT professionals participating in this research will have the same opinion. Although interviewees and AI developers of the scenario-building workshop put different levels of importance on work on the personal or social level, there was an overarching agreement that paid work must be part of the future, too.

It cannot be denied that attitudes towards work dated before the Industrial Revolution (Granter, 2009) were still relevant and seemed preferable for IT professionals in the interviews. According to Gorz, they perceived the definition of work as an activity done for financial compensation outside the home to achieve someone else's goals (Gorz, 1985) as drudgery. In their vision, an ideal future shouldn't involve any work in the Gorzian sense or should be redefined to emphasize satisfaction and self-expression.

Experts in this research reflected a mixture of the pessimist but mostly the "not real change" (Boyd & Holton, 2018) argument. In line with the logic of Campa (2014) and Autor (2015), they agreed that robots would be able to substitute humans in blue-collar jobs and positioned this possibility as a moral duty in case of dangerous, health-damaging working conditions. The theory of the hollowing out of middle-skilled jobs (Autor, 2015; Bessen, 2016; Ernst et al., 2019) was present too in the accounts when they envisioned the disappearance of jobs with routine tasks as a plausible and favorable outcome. Developers participating in the interviews found it especially important to emphasize that AI will not simply destroy jobs entirely but transform them into a new, more enjoyable form that will let employers engage in more mentally stimulating tasks. AI developers of the scenario-building workshop didn't articulate this opinion openly, but their best-case scenario was centered around the idea that AI will be able to make work more enjoyable in every sector. In summary, it can be said that AI developers and IT professionals didn't envision a workless future but saw technology as enhancing humans; therefore, they only focused on the changing nature of work and not change in its importance.

It is worth noting some implications in supporting the idea of the essentiality of work in life and society throughout the research. First, although interview participants belong to the same social network and, therefore, they might loosely know each other, they were expressing their opinions and visions individually without being under peer pressure. This indicates at least some level of a common understanding of values attached to work and employment among IT

professionals specialized in AI-related fields. The group dynamics of the scenario-building workshop showed how a vision that challenges the centrality of paid work in society and promotes a radically different alternative gets dismissed as irrational and even dangerous, even though it was initially supported by half of the group. Secondly, the results show the lack of narratives that support the idea of consumption substituting work as a status indicator (Kahn & Wiener, 1967; Granter, 2009; Ransome, 1999; Habermas, 1985). While traditionally, paid work done out of the home is considered a pivotal aspect of a predominantly male identity, and the type of job or occupation one has as a class membership signifier, these relations have been changing since WW2. A growing number of workers with substantial disposable income can spend their salaries on things other than necessary, such as basic goods. As Baudrillard puts it in his critique of the capitalist system, the workers are robbed of their identity and given a fake one based on the consumption of fashion, goods, and services (Baudrillard, 2016). While these products promise to give the identity of the consumer and signal their position in society, goods made in mass production not only unable to be truly personal but can artificially create needs that incentives longer working hours (Ransome, 1999; Baudrillard, 2016; Habermas, 1985; Marcuse, 1964). Regarding the future of work, the logic of consumed goods as an identity signifier could have been used in the debate for a workless future. If our identity is not connected to work and technology can generate products and services instead of humans, then distributing the wealth created by technology can sustain our consumer habits while we enjoy participating in other activities.

Preliminary Assumption 1/b: Quantity of work in the future

As was discussed throughout this document, expert visions about the future of work gained popularity because of their expectations of a radical decline in the available jobs that will be done by humans in the future (Ford, 2017; Brynjolfsson & McAfee, 2016; Frey & Osborn, 2013). In a socio-economic system that's built on human labor-generated consumption and where the value of work is held highly both for the individual and as a duty towards society, the vision communicated by experts of high level of unemployment and the coming of a threat that can eliminate the building blocks of our identity naturally will get attention. Depending on their background and their perception of the capabilities of technology, people either agree with this statement or emphasize the strength of capitalism to maintain itself by shaping the use of technology to its own needs (Spencer, 2018; Huws, 2014; Autor, 2015). The research question regarded which opinion will be supported by Hungarian AI developers and IT professionals with the preliminary expectation that as members of professionals currently

building these potentially disruptive technologies, they will represent an optimist, neutral position in this debate.

As was mentioned during the discussion of the previous research question, developers broadly shared the notion that while robotics will substitute humans, AI will only enhance them and simultaneously improve the experience of work. The quantity of work in the future, therefore, was perceived as stable, although slightly less than how much we work nowadays. IT professionals generally expected the workweek to be shorter, around 3-4 days, but not less. IT professionals participating in the interviews broadly shared the opinion that although change is inevitable, it will be slow enough to give time for human labor force to adjust. They generally applied the main points of Autor's (2015) and Ernst and colleagues (2019) logic that only a small part of the loss in the number of total hours spent on work will be due to the rising number of the economically inactive population while most of the decrease will be the effect of improved productivity achieved by AI and related technologies that will allow fewer working hours while maintaining levels of consumption. The limitations of this logic either weren't mentioned by the participants or weren't considered. Based on the literature, AI might not take, only enhance humans' jobs if the tasks performed are complex enough and if the labor supply is elastic (Autor, 2015; Ernst et al., 2019).

Preliminary Assumption 1/c: Quality of work in the future

Since its initial publication of The Future of Employment: How Susceptible Are Jobs to Computerization by Frey and Osborne in 2013, the debate on the future of work argues not only about the quantity but also the quality of jobs in the future. As always, there is a spectrum of opinions, from labor-enhancing and productivity-boosting expectations to inevitable de-skilling, inhumane jobs (Campa, 2014; Autor, 2015; Bessen, 2016, 2019; Miller et al.,2013; Ernst et al., 2019; Huws, 2014; Dyer-Whiteford et al., 2019; Spencer, 2018). The research question investigating this aspect of future visions intended to explore how AI developers and IT professionals imagine the quality of work in the future.

There wasn't any hypothesis for this research question due to the complex situation of the Hungarian context of this topic. As was depicted previously, there are contradictory perceptions of how automation and AI will shape the Hungarian labor market (Makó & Illéssy, 2020; PwC Hungary, 2019). Also, the situation of Hungarian developers as employees of global market leader companies in the development of AI and related technologies but working in subsidiaries and, therefore, being away from the center of decision-making, might

impact their perceptions of the quality of work available for Hungarians in contrast to the Western expectations of universal changes. After conducting the research, it can be concluded that Hungarian IT professionals share positive expectations of improvement in the quality of work in general, thanks especially to AI in the future, regardless of where people live. The concept of quality improvement was strongly connected to the fact that technological innovations will reallocate the labor force into white-collar, high-skilled jobs that can be done in an office environment or from home. This argument is not novel in the literature. Bell's seminal book about post-industrial society (Bell, 1999) found the growing significance of knowledge and science-based jobs as the basis of the next era of economic evolution (Williams, 2008). Research done on how employees on different levels of the firms' hierarchy perceive automation's effect on their job satisfaction and expectations regarding job security found that engineers, managers, and white-collar employees usually have a positive attitude and see AI and automation as a challenge or a tool that enhance their productivity and opens new possibilities for them in their career (Keszey-Tóth, 2020; Bisht et al., 2023; Siemon & Kedziora, 2023; Bhargava et al., 2021; Brougham & Haar, 2020; Winkelhaus et al., 2022; Lingmont & Alexious, 2020).

Not only were negative expectations and the possibility of AI and automation causing de-skilling or sub-employment (Spencer, 2018; Huws, 2014; Dyer-Whiteford, 2019) missing from the visions and expectations of participating AI developers and IT professionals, but they collectively believed that the high technological pervasiveness of a job would cause higher job satisfaction for everyone regardless of their position.

Preliminary Assumption no 2. Ethical considerations in the discourses about the future of work

As it was stated before, equality has never been the focus of utopias throughout history. Goals like better quality of life, better working conditions, shorter working hours, or dissemination of elements of drudgery within work might have been set to achieve a better future for humanity in general, but some level of power imbalance always remains. Slaves, women, and children were routinely used or misused for the greater good of Humanity, a.k.a. white men (Ransome, 1999). Utopias, written by distinguished thinkers of a given era, shouldn't be looked at as blueprints of a better future society but as an image of an ideal future state that we should aim for. In the eyes of the modern reader, though, these ideas often seem closer to a dystopia. Slaves, or generally speaking, foreign workers, used to take up mentally and

physically tolling labor (More, 2018); women and children used as rewards for men after a hard day's work (Fourier, 1971) or the clash between victims and winners of a system to create a new, better world (Marx, 2013) would hardly be part of the mainstream imaginations of an ideal future society. For this reason, it is interesting to investigate how research participants handled the topic of equality and other ethical questions in their visions. Although they aren't trained to solve today's moral problems for the future, nor were they initially immersed in the thought of utopias, they are still members of an intellectual group with at least a university education, knowledge of foreign languages, and study or work experience from abroad which makes them more probable to have a better view of the bigger picture.

Expectations regarding the level of embeddedness of ethics and the importance of accountability in the case of a technology whose power to radically transform our lives are repeatedly acknowledged as of utmost importance. The performative power of experts' visions of a future in which AI and automation will play central roles implies that ethical issues and problems raised by them and expected to be counted for in the future will shape our mutually accepted imagined future. Also, ethical issues that are not part of the discussion might cause the consolidation of discriminatory practices within these technologies. For these reasons, it is of foremost importance to draw a picture of how and to what extent AI developers and IT professionals think about ethical issues in relation to AI and the future of work.

Preliminary Assumption 2/a: Top-of-mind awareness of ethical issues

Both the structure of the interviews and the scenario-building were intentionally designed to leave space for participants to articulate their ethical concerns before they were directly asked about them at the end of the discussion. Given their educational credentials and foreign language knowledge, the preliminary expectation of the research was, that scandals and negative publicity around AI and robotics that were making headlines during the time of the research will be mentioned and reflected on for two reasons. First, the assumption is that participants would be interested in news regarding their field of expertise and, therefore, be aware of the ongoing issues. Secondly, they were expected to mention pieces of media coverage of AI and robotics to defend it since the nature of the newsrooms is to volume up problematic aspects of a technological novelty that is surrounded by such great hype.
In contrast to these assumptions, neither the interviewees nor the scenario-building workshop group mentioned ethically questionable aspects of AI and related technologies without being

directly asked to do so. Only two developers discussed the difficulties blue-collar workers will face in the future once robots take their jobs at the beginning of our interview. One of them believed that it is the duty of developers and engineers to invent new ways of production that substitute humans in dangerous or health-damaging environments, and it's the responsibility of both the government and those involved in the newly unemployed to find a better use of their working capabilities. The other developer mentioned the necessity of universal basic income to level the benefits and drawbacks of AI within society.

Similarly, the AI developers of the scenario-building workshop didn't bring up any ethical issues during the creation of either scenario. During their debate about the best-case scenario, they admittedly tried to create a vision that puts the happiness and satisfaction of everyone in the forefront without actually discussing ethical questions of any sort. Instead, they assumed that a flexible and inclusive labor market, fewer working hours, and a reformed education would satisfy the requirements of a just society.

Preliminary Assumption 2/b: Ethical issues after directed questions.

In the last module of the interviews, AI developers and IT professionals were asked directly to consider the ethical considerations of their visioned optimal future and the consequences of AI applications in general. As was described in detail in chapter 5 of this document, participants presented only limited interest in the possibly unethical applications of AI or negative consequences posed on certain social groups. In accordance with their optimist expectations about AI and automation in general and their perception that these technologies have the potential to bring better living conditions regardless of social status, it would be logical for them to share the ideas of Keynes (1930) or Miller and Atkinson (2013) and expect the redistribution of productivity gains in the form of either lower prices or shorter working hours. On the contrary, one repeatedly recurring theme was the widening of the wealth gap between the richest and the poorest that AI will not be able to lessen but can be used to widen it even further. This point of view is widely shared in the literature among the critics of the promised prosperity and equality of an AI-imbued future economy and except forecast the growth of existing inequalities (Spencer, 2018; Autor, 2015; Huws, 2014; Dyer-Witheford et al., 2019).

Preliminary Assumption 2/c: Perceived responsibility

The last research question targeted participating AI developer's and IT professionals' views about their personal role in shaping what kind of AI technologies will be marketed in the

future. Do they realize their potential to influence the direction of development or put the responsibility elsewhere? While there are examples of IT professionals showing organized opposition against certain developments (Tung, 2019), the semi-peripheral situation in Hungary might translate into a more passive observer mentality of AI developers and IT professionals. The future of work debate is often framed in the logic of technological determinism when the topic of development and intended use is removed from the realm of society. Engineers and developers are often pictured as working along an internal, scientific logic that is independent of the socio-economic structure in which these people work and the technologies will be used (Wyatt, 2008; Campa, 2014; Ernst et al., 2019; Vicsek, 2021).

Based on the research, it can be stated that Hungarian AI developers and IT professionals participating in the study fit mostly into the category that Vaast (2022) called a tangential model of expertise, with their self-identification as scientists or explorers, their conviction that the real change is in the far future, and their abstention from liability.

They clearly saw themselves as members of an elite group. First, they perceived their educational background and the respective universities they attended as the best in the country and thought the field of their studies to have higher prestige and importance than others. They also believed that within the field of IT, being an AI developer or working closely to this field is the top of the profession. Hard work and a general interest in mathematics were listed as needed skills to become an AI developer. Participants admitted that the small size and importance of the Hungarian market makes it even more difficult to join a company that develops AI, but this fact was only mentioned to present their own achievements in an even better light, therefore showing little sympathy towards other IT professionals.

Participants didn't take responsibility for how AI is developed or for what it will be used. The Hungarian context wasn't mentioned or used as a reason for their opinion. Developers, in general, were believed not to have the power to have a say, nor to have the responsibility or duty to do so. This belief was broadened to the neutrality of technology itself. There's no evil, or malicious AI, only low quality of data used to teach the algorithm that is produced by humans who either weren't trained properly to use the correct labels for datapoints, or the company wasn't providing efficient information.

Responsibility was mostly delegated to the state or the government to reorganize entire systems and to prevent or punish firms when they misuse AI or related technologies. During the interviews and the scenario-building workshop, participants generally positioned AI and technology as having neutral or positive attributes only.

Conclusions

The history of thoughts about the future and what it holds for us is as long as the history of humankind itself. There wasn't an age when humans wouldn't try to foresee what might come to them. There are special circumstances that define who is entitled or thought to be capable of telling what the future holds and to what extent these forecasts influence actions in the present. Expert visions about their imagined futures can have significant consequences in the present because their expectations have the power to move financial investments, innovations, and human capital in one direction toward a mutually accepted outcome (Adam, 2008; Beckert, 2016; Birch, 2017; Borup et al., 2006).

Investigating the future of anything is not only not scientific but also not possible. Therefore, this research aimed to examine how a group of experts envision their imagined future without measuring the probabilities of them becoming realities. The objective of this document is to provide a comprehensive picture of how humans were thinking about the future of work in the past, how both laypersons and experts think about it in the present, and most importantly, what aspects and measurements Hungarian AI developers and IT professionals consider when building their own version of it.

The most important findings of the research are summarized in the following section.

Strong presence of technological determinism

Whether AI developers and IT professionals talked about best- or worst-case scenarios, some presumptions were irrefutable. First, the coming of an AI-dominated future is unstoppable. Second, it shouldn't be halted because it will cause a general increase in our living standards. Interviewees either belittled the negative effects of AI (slow change, it won't be drastic, society will have time to adjust) or thought other actors like the Big Five or, generally speaking, "the market" for abusing AI.

The inevitability of the growing importance of AI was justified by their belief that the improvement of AI equals the improvement of society, too. The notion that technology in itself is neutral was the basis of their arguments, but this conviction often depended on the nature of the aspect of AI they were talking about. Technology, and especially AI, was depicted as neutral only as long as its negative aspects were debated. In the case of scandals about racial profiling or autonomous weaponry, AI was a neutral tool in the hands of

malicious politicians or greedy companies. On the contrary, AI was given agency and mentioned as a conscious actor when its use in education or health services was mentioned. In many cases, AI was perceived to be better than humans, even when decision-making directly affects humans' lives, like the job of a judge or medical doctor. Scenarios created during the scenario-building workshop exemplify this best. While in the best-case scenario, AI and other technologies connected to it were the foundation of a better, more inclusive, and self-expression-centered world of work, AI developers couldn't envision a worst-case scenario in which AI and technology in general would be the cause of a negative, dystopian future. Instead, the technological determinist way of thinking was used. They imagined a future where politicians start a war causing suffering that will only survive because AI will help citizens.

Ethical convictions and the lack of solidarity

According to the sociology of expectations, how experts envision the future can influence a wide range of other actors' decisions in the present and can create a mutually accepted imagined future towards which humanity should approach. If we take this logic, we also have to admit the importance of what aspects are mentioned in these visions and the consequences of what has been left out. If we build technologies and shape entire systems of education, economy, and societies around it, if the central goal is solely to develop AI without giving equal importance to considerations of how technology will affect those systems it interacts with, not only might we solidify existing inequalities but also won't be prepared for the unintended consequences we didn't want to see.

As was stated before, Hungarian AI developers and IT professionals fit mostly into the category of the tangential model of expertise (Vaast, 2022), meaning that their strong sense of techno-optimism is paired with the perception of the future as distant and abstract and with self-identification of being a scientist working outside of the realm of social mechanisms. By this description, research participants overemphasized the positive aspects of technology and downplayed the risks. The lack of empathy and solidarity towards those who will lose their jobs because of technology and the depiction of them as potentially dangerous, aggressive neo-luddites who must be tamed to maintain a better future for the winners of the future is problematic for many reasons. Developers participating in the research thought that the transition from the current way of production to a more AI-enhanced, complex, and enjoyable state would be slow and gradual. Therefore, the state would easily handle the number of blue-

collar workers who are losing their livelihoods while everyone else would enjoy better jobs and working conditions. Participants believed that the broad implementation of AI would lead to higher productivity; therefore, "the market" would obviously invest in it. Since labor demand for highly skilled, tech-savvy employees will be constant, participants believed that expectations of the market and actors of the economy regarding the skillsets and level of expertise needed in this AI-led economy would be effectively communicated and accepted by society in general.

Reasons for the lack of ethical considerations can be explained from different points of view. First, we mustn't forget that the importance of work as a value was central to the research developers because they agree with this statement on a hypothetical basis and are all employees. As was demonstrated before, IT professionals are high earners with great bargaining power in the labor market. For this reason, it is irrational for them to agitate against their employees and against the industry they are prominent members of. At the same time, they could be the whistle-blowers and caution the public if needed (Strümke et al., 2022). Another reason is their strong belief in meritocracy and hard work, which was repeatedly mentioned when asked about their career progress and why they chose to work in IT. Throughout the research, participants presented a strong belief in meritocracy independent of their age, stage of career, gender, or place of residence. Finally, participants might not put ethical problems in their focus and thought that the overall situation of society would not change because of the timeframe of the research. The next thirty years might not be far enough, while the current system's stability and the perceived prosperity it has brought can be believed to originate from its efficiency (Granter, 2009).

Research conclusions from the sociology of expectations point of view

Experts' visions about the future of work are important because they influence other actors' strategies and actions in the present (Adam, 2008; Beckert, 2016; Birch, 2017; Borup et al., 2006). If we look at the visions of Hungarian AI developers and IT professionals from this point of view, we must first clarify some details. Can it be said that Hungarian participants are experts? In the research, participants were collected by using a mixed method of deciding who can be considered an expert based on the article of Mauksch and colleagues (2020). The difficulty of definition lay in the fact that being an expert in AI involves a variety of occupations, university majors, and, in the case of a small market such as Hungary if they

could find an AI-related job at all or had to move to other professions while being active in the IT community. Participants identified themselves as experts and referred others they considered experts.

The second question is whether Hungarian participants shared the same visions as those shared by their Western counterparts. The answer is yes, although with a strong emphasis on the techno-optimist, techno-determinist strain. The narrative of "robots will take our jobs" and the implication that it will bring the destruction of capitalism or our civilization (Brynjolfsson & MacAfee, 2016; Ford, 2017; Frey et al., 2013) was rejected, and an optimistic-neutral position was supported (Gordon, 2014; Miller & Atkinson, 2013; Ransome,1999).

Finally, we should ask if they agree that the way they imagine future outcomes will inform others how to act. The answer is no. Participants didn't believe that their personal convictions and views could affect anyone's decisions regarding the future. Part of their reasoning was their situation as experts living in Hungary, a country they regarded as situated far from the center where decisions are made, and their position as employees, therefore, being only a small cog in a big machine.

Limitations and further research areas

The research presented in this paper was limited to a few experts from the field of AI development. Although data saturation was reached, findings cannot be generalized. Due to the current nature of IT as a profession and the concentration of workplaces in the capital, the overwhelming majority of participants were male, in their thirties, living in Budapest. As was stated, participants either self-identified as experts or were referred by others as experts. This added to the fact that female AI developers and IT experts are underrepresented. Females, with one exception, who were referred were pleasantly surprised and wouldn't self-identify as experts otherwise. This points to the need for further research with different methodologies to select participants that could address this problem.

Due to the limitations posed by the COVID-19 pandemic, the scenario-building workshop had fewer participants than planned. The fact that the timeframe of the research and the uncertainty about the next waves of lockdown made it impossible to conduct more workshops that would have ensured wider coverage of opinions is a huge limiting factor of the research. Further research should be done with more scenario-building workshops with AI experts working in different fields in different locations.

The final limitation to every research exploring topics around AI is its rapidly changing and improving nature. The data presented in this paper is already outdated. Even the developers and experts participating in this research couldn't clearly define AI, and this confusion is expected to continue with the introduction of a faster and smarter version of it.

This research attempted to shed light on a very narrow slice of the vast knowledge of the interplay between society and technology, therefore there is plenty of room to explore other aspects of it. Further research should focus on the role and responsibility of universities in shaping students' attitudes toward their role in how AI will be developed. Do students enter these institutions already with a techno-deterministic attitude? How does a university facilitate this or redirect it to a more inclusive direction?

While females are underrepresented both in this research and among AI developers in general, it would be worthwhile to examine their situation and role in a mixed-gendered work environment. Can we find any differences in how they approach a project? Are they employed in the same positions as their male counterparts? Would an only-female study show different results, and if so, why?

Maybe the most obvious next step is to widen this research's scope and repeat it internationally. Results from the V4 countries would highlight the existence of regional similarities or showcase differences. Also, as one of the key assumptions of this research was that AI developers and experts perceive their role in shaping and directing AI innovation is different in the USA, it would be beneficial and ambitious to conduct the same research with them.

Finally, it would be beneficial to investigate the expectations of parents whose children are in the first few years of elementary school regarding how they envision the labor market that awaits their children. Are they expecting a mostly AI-driven labor market or even a jobless future? If so, are they actively planning to provide the necessary skills and knowledge for a potential career in AI development or related fields? This question would move the timeline of this research further away and put in focus one of the most important stakeholders of a peaceful and prosperous future: the parents of those whose present it will be.

References

Adam, B. (2008). Future matters: futures known, created, and minded. *Twenty-First Century*

Society, 3(2), 111-116.

Adam, B. (2010). History of the future: Paradoxes and challenges. *Rethinking History*, 14(3), pp.361-378.

Andreescu, L., Gheorghiu, R., Zulean, M., & Curaj, A. (2013). Understanding normative foresight outcomes: Scenario development and the 'veil of ignorance' effect. *Technological Forecasting and Social Change*, *80*(4), 711–722.
https://doi.org/10.1016/j.techfore.2012.09.013

Applebaum, H., (1992). Work and its future. *Futures*, 24(4), pp.336-350.

Arntz, M., Gregory, T., & Zierahn, U. (2019). Digitalization and the Future of Work: Macroeconomic Consequences. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3413653

Arntz M.- Gregory T.- Zierahn U. (2016) The risk of automation for jobs in OECD countries: A comparative analysis: Social, employment and migration working papers No. 189

Atkinson J.- Meager N. (1986) Changing working patterns. How companies achieve flexibility to meet new needs. National Economic Development Office.London.

Autor, D. H. (2015). Why are there still so many jobs? The history and future of workplace automation. *Journal of economic perspectives*, *29*(3), 3-30.

Baša, K., & Baša, P. (2022). Attitudes towards work in Visegrad group countries.

Banerjee, A., Niehaus, P., & Suri, T. (2019). Universal basic income in the developing world. *Annual Review of Economics*, *11*(1), 959-983.

Basso, P. (2003). Modern times, ancient hours: working lives in the twenty-first century. Verso.

Bastani A. (2019). Fully automated luxury communism. Verso

Baudrillard, J. (2016). The Consumer Society: myths and structures.

Beckert, J. (2016). Fictional Expectations And Capitalist Dynamics. Cambridge: Harvard University Press.

Bell, D. (1999). The Coming Of Post-Industrial Society. New York: Basic Books.

Bessen, J. E. (2016). How computer automation affects occupations: Technology, jobs, and skills. Boston Univ. School of Law and Economics research paper, (15-49).

Bessen, J. (2019). Automation and jobs: When technology boosts employment. *Economic Policy*, *34*(100), 589-626.

Bhargava, A., Bester, M., & Bolton, L. (2021). Employees' perceptions of the implementation of robotics, artificial intelligence, and automation (RAIA) on job satisfaction, job security, and employability. *Journal of Technology in Behavioral Science*, *6*(1), 106-113.

Bidadanure, J. U. (2019). The political theory of universal basic income. *Annual Review of Political Science*, *22*(1), 481-501.

Birch, K. (2017). Techno-economic Assumptions. *Science as Culture*, 26(4), pp.433-444.

Bisht, N. S., Trusson, C., Siwale, J., & Ravishankar, M. N. (2023). Enhanced job satisfaction under tighter technological control: The paradoxical outcomes of digitalization. *New Technology, Work and Employment*, *38*(2), 162-184.

Borgulya, A., & Hahn, J. (2008). Work-related values and attitudes in Central and Eastern Europe. *Journal for East European Management Studies*, 216-238.

Boschetti, F., Price, J., & Walker, I. (2016). Myths of the future and scenario archetypes. *Technological Forecasting and Social Change*, 111, 76–85. https://doi.org/10.1016/j.techfore.2016.06.009

Bishop P. – Hines A. -Collins T. (2007) The current state of scenario development: an overview of techniques. *Foresight* vol 9. Iss 1 p. 5-25

Borup, M., Brown, N., Konrad, K. and Willia, H. (2006). The sociology of expectations in science and technology. *Technology Analysis & Strategic Management*, 18(3-4), pp.285-298.

Boyd, R., & Holton, R. J. (2018). Technology, innovation, employment and power: Does robotics and artificial intelligence really mean social transformation? *Journal of Sociology*, *54*(3), 331-345.

Börjeson L. et al, (2006) Scenario types and techniques: Towards a user's guide. *Futures* vol 38 p 723-739

Brown, N. and Michael, M. (2003). A Sociology of Expectations: Retrospecting Prospects and Prospecting Retrospects. *Technology Analysis & Strategic Management*, 15(1), pp.3-18.

Bradfield R. et al 2005, : The origins and evolution of scenario techniquesin long range business planning. *Futures* vol 37 p. 795-812

Brynjolfsson E. and McAfee A. (2016) The second machine age. Work, progress and prosperity in a time of briliant technologies. Norton

Campa, R. (2014). Technological growth and unemployment: A global scenario analysis. *Journal of evolution and technology*, *24*(1).

Cecchini, R. A. (2020). Business Is Changing: Expert and Public Opinion on the Future of Work and Artificial Intelligence Through Social Media Research Doctoral dissertation, Toronto Metropolitan University.

Chermack, T. J., Lynham, S. A., & Ruona, W. E. (2001). A review of scenario planning literature. *Futures research quarterly*, *17*(2), 7-32.

Chigbu, B. I., & Nekhwevha, F. H. (2021). The future of work and uncertain labour alternatives as we live through the industrial age of possible singularity: Evidence from South Africa. *Technology in Society*, *67*, 101715.

Cottey, A. (2019). The future of work: disciplined useful activity. *Journal of Global Responsibility*, *10*(3), 271–286. https://doi.org/10.1108/jgr-11-2018-0075

Dastin, J. (2018, October 10). Insight - Amazon scraps secret AI recruiting tool that showed bias against women. Reuters. https://www.reuters.com/article/idUSKCN1MK0AG/

De Wispelaere, J., & Stirton, L. (2004). The many faces of universal basic income. *The Political Quarterly*, *75*(3), 266-274.

Duke, S. A. (2022). Deny, dismiss and downplay: developers' attitudes towards risk and their role in risk creation in the field of healthcare-AI. *Ethics and Information Technology*, *24*(1), 1.

Dyer-Witheford, N. (2015). Cyber-proletariat: Global labour in the digital vortex. Between the lines.

Dyer-Witheford N.- Kjosen A. M.- Steinhoff J. (2019) Inhuman Power. Artificial Intelligence and the Future of Capitalism. Pluto Press

EIGE, (2023). Gender Equality Index 2023. Towards a green transition in transport and energy, Publications Office of the European Union.

Ernst, E., Merola, R., & Samaan, D. (2019). Economics of artificial intelligence: Implications for the future of work. *IZA Journal of Labor Policy*, *9*(1).

Etzler J. A. (1836) The paradise within the reach of all men without labor by powers of nature and machinery. London

Eurobarometer 508 (2021) Values and identities of EU citizens: Summary.

Fehér, K., & Veres, Z. (2022). Trends, risks and potential cooperations in the AI development market: expectations of the Hungarian investors and developers in an international context. *International Journal of Sociology and Social Policy*, *43*(1/2), 107-125.

Ferry, W. H. (1964). The Triple Revolution. *Liberation, April*.

Firth, R., & Robinson, A. (2020). Robotopias: mapping utopian perspectives on new industrial technology. *International Journal of Sociology and Social Policy*, *41*(3/4), 298-314.

Ford M**.** (2017) Robotok kora HVG Kiadó Zrt,

Fourier, C. (1971). Harmony in the Utopian Vision of Charles Fourier. Translated by Jonathan Beecher and Richard Bienvenu. Beacon Press, Boston

Frank, M. R., Autor, D., Bessen, J. E., Brynjolfsson, E., Cebrian, M., Deming, D. J., & Rahwan, I. (2019). Toward understanding the impact of artificial intelligence on labor. *Proceedings of the National Academy of Sciences*, *116*(14), 6531-6539.

Frey, C. and Osborne, M. (2013). The future of employment: How susceptible are jobs to computerisation?. Oxford Martin School.

Geels F.W., Schot J**.** (2017) Typology of sociotechnical pathways. *Research Policy* 36, 2007

Ghatak, M., & Maniquet, F. (2019). Universal basic income: some theoretical aspects. *Annual Review of Economics*, *11*(1), 895-928.

Giddens, A. (2007). The consequences of modernity.

Gini, A. (1998). Work, identity and self: How we are formed by the work we do. *Journal of business ethics*, *17*(7), 707-714.

Gorz A. (1985) Paths to paradise. Pluto Press, London

Granter, E. (2009). Critical Social Theory And The End Of Work. London: Ashgate Publishing Limited.

Gruetzemacher, R., Paradice, D., & Lee, K. B. (2020). Forecasting extreme labor displacement: A survey of AI practitioners. *Technological Forecasting and Social Change*, *161*, 120323. https://doi.org/10.1016/j.techfore.2020.120323

Habermas, J. (1985). The theory of communicative action: Volume 1: Reason and the rationalization of society (Vol. 1). Beacon press.

Halman, L., Reeskens, T., Sieben, I., & van Zundert, M. (2022). Atlas of European Values: Change and continuity in turbulent times (p. 96). Open Press Tilburg University.

Halman, L. C. J. M. (2001). The European Values Study: A Third Wave. Sourcebook of the 1999/2000 European Values Study Surveys. EVS/WORC/Tilburg University.

Herke, B., & Vicsek, L. (2022). The attitudes of young citizens in higher education towards universal basic income in the context of automation—A qualitative study. *International Journal of Social Welfare*, *31*(3), 310-322.

Hungarian Investment Promotion Agency. (2023). *Business Services Hungary 2023. Report on the Hungarian Business Services Industry.*

Huws U. (2014) Labor in the global digital economy. Monthly Review Press, New York

Illéssy, M., Huszár, Á., & Makó, C. (2021). Technological development and the labour market: How susceptible are jobs to automation in hungary in the international comparison?. *Societies*, *11*(3), 93.

IMCORE Project Scenarios Workshop Guide: https://imcore.files.wordpress.com/2010/02/imcore-futures-scenarios-workshop-guide.pdf

IVSZ. (2020, July 6). A digitális gazdaság súlya a magyar nemzetgazdaságban • IVSZ. https://ivsz.hu/a-digitalis-gazdasag-sulya-2019/

Jobin, A., & Ienca, M. (2019). The global landscape of AI ethics guidelines. *Nature Machine Intelligence*, *1*(9), 389–399. https://doi.org/10.1038/s42256-019-0088-2

Juhász, K. (2022). Az SSC szektor Magyarországon-Helyzetjelentés a pandémia után. *ACTA PERIODICA*, *25*, 4-13.

Kahn, H., & Wiener, A. J. (1967).The year 2000; a framework for speculation on the next thirty-three years.

Kelly, L. (2023). Re-politicising the future of work: Automation anxieties, universal basic income, and the end of techno-optimism. *Journal of Sociology*, *59*(4), 828-843.

Keszey, T., & Tóth, R. Z. (2020). Ipar 4.0 az autóiparban: a fehér-és a kékgalléros munkavállalók technológiaelfogadási aggályai. *Vezetéstudomány*, *51*(6), 69-80.

Keynes J. M. (1930) Economic possibilities for our grandchildren in Revisiting Kynes 2010 MIT Press

Király, G., Pataki, G., Köves, A., & Balázs, B. (2013). Models of (future) society: Bringing social theories back in backcasting. *Futures*, *51*, 19–30. https://doi.org/10.1016/j.futures.2013.05.001

Központi Statisztikai Hivatal: Foglalkoztatottak száma rész- vagy teljes munkaidős foglalkozásuk szerint, nemenként [ezer fő] 2009-2023 https://www.ksh.hu/stadat_files/mun/hu/mun0012.html

Központi Statisztikai Hivatal: . A 15–74 éves népesség napi átlagos időráfordítása nemek szerint https://www.ksh.hu/stadat_files/ido/hu/ido0002.html

Kumar, K. (1978) Prophecy and progress. The sociology of industrial and post-industrial society. Penguin Books

Lehdonvirta, V., Shi, L. P., Hertog, E., Nagase, N., & Ohta, Y. (2023). The future (s) of unpaid work: How susceptible do experts from different backgrounds think the domestic sphere is to automation? *Plos one*, *18*(2), e0281282.

Lindgren M.- Bandhold H. (2003) Scenario Planning. The link between future and strategy. Palgrave Macmillian.

Lingmont, D. N., & Alexiou, A. (2020). The contingent effect of job automating technology awareness on perceived job insecurity: Exploring the moderating role of organizational culture. *Technological Forecasting and Social Change*, *161*, 120302.

Lovett, S., Coyle, T., & Adams, R. (2004). Job satisfaction and technology in Mexico. *Journal of world business*, *39*(3), 217-232.

MacKay B.- Tambeau P. (2013) A structuration approach in scenario praxis. *Technological Forecasting & Social Change*. vol 80 p.673-686

Magyarország mesterséges intelligencia stratégiája 2020-2030. (2020). In *www.digitalisjoletprogram.hu* (ISBN 978-615-81665-3-9). Digitális Jólét Nonprofit Kft. https://digitalisjoletprogram.hu/files/2f/32/2f32f239878a4559b6541e46277d6e88.pdf

Makó, C., & Illéssy, M. (2020). Automation, Creativity, and the future of work in Europe: A comparison between the old and new member states with a special focus on Hungary. *Intersections*, 60/2, p. 112-129

Makridakis, S. (2017). The forthcoming information revolution: Its impact on society and firms. *Futures*, *90*, 46-60.

Marciniak, R., Móricz, P., & Baksa, M. (2018). A digitális transzformáció új hulláma a hazai szolgáltatóközpontokban. *H. Dóra (Szerk.), Budapesti Corvinus Egyetem, A stratégiai menedzsment legújabb kihívása: a*, *4*, 26-33.

Marciniak, R., Móricz, P., & Baksa, M. (2020). Digitális transzformáció a magyar üzleti szolgáltató központokban. *Multidiszciplináris kihívások, sokszínű válaszok-Gazdálkodás-és Szervezéstudományi folyóirat*, (2), 116-139.

Marcuse, H. (1964) One-Dimensional Man. Studies in the ideólogy of advanced industrial society. Beacon Press Boston

Mauksch, S., Von Der Gracht, H. A., & Gordon, T. J. (2020). Who is an expert for foresight? A review of identification methods. *Technological Forecasting and Social Change*, *154*, 119982. https://doi.org/10.1016/j.techfore.2020.119982

Martelli A. (2014) Modells of scenario building and planning. Facing uncertainty and complexity. Palgrave Macmillian.

Marx K. (2013) Capital volume I-II. Wordworth Edition

McDonald, N., & Pan, S. (2020). Intersectional AI: A study of how information science students think about ethics and their impact. *Proceedings of the ACM on Human-Computer Interaction*, *4*(CSCW2), 1-19.

Mead G. H**.** (1932) The Philosophy of the Present University of Chicago Press

Meinert, S. (2014). Field manual-Scenario building.

Metcalf, J., & Moss, E. (2019). Owning ethics: Corporate logics, silicon valley, and the institutionalization of ethics. *Social Research: An International Quarterly*, 86(2), 449-476.

Applica sprl, Tarki Social Research Institute, Meuleman, B., & Roosma, F. (2020). *Attitudes towards adequacy and sustainability of social protection systems in the EU*. European Commission. https://doi.org/10.2767/04757

Miller, B., & Atkinson, R. D. (2013). Are Robots Taking Our Jobs, or Making Them? *The Information Technology and Innovation Foundation*. https://itif.org/publications/2013/09/09/are-robots-taking-our-jobs-or-making-them

Milosavljević, M., & Vobič, I. (2021). 'Our task is to demystify fears': Analysing newsroom management of automation in journalism. *Journalism*, 22(9), 2203-2221.

Mische, A. (2009) Projects and Possibilities: Researching Futures in Action. *Sociological Forum*, 24(3), pp.694-704.

Moravec, H. (1988). Mind children: The future of robot and human intelligence. Harvard University Press.

More T. (2018) Utopia. Global Grey Books

Mülberger, A. and Navarro, J. (2017) The promises of science. Historical perspectives. *Centaurus*, 59(3), pp.167-172.

O'Brian F. A. (2004) Scenario planning: Lessons for practice from teaching and learning.

European Journal of Operational Research vol 152 p.709-722

Oláh, E. (2021). A feltétel nélküli alapjövedelem megítélésének empirikus elemzése YouTube hozzászólásokon keresztül. *Metszetek-Társadalomtudományi folyóirat*, *10*(3), 68-93.

Oláh, E. (2019). Alapjövedelem- Édes bevonatú keserű pirula? *Metszetek-Társadalomtudományi folyóirat, 8(1),* 159-181.

Pant, A., Hoda, R., Tantithamthavorn, C., & Turhan, B. (2022). Ethics in AI through the Developer's Prism: A Socio-Technical Grounded Theory Literature Review and Guidelines. *arXiv preprint arXiv:2206.09514*.

Pintér, R. (2023, June 29). A mesterséges intelligencia, a Munka és a társadalom Jövője: Számítsunk a váratlanra. Qubit. https://qubit.hu/2023/06/29/a-mesterseges-intelligencia-a-munka-es-a-tarsadalom-jovoje-szamitsunk-a-varatlanra

Porter A. L. (2004) Technology futures analysis: Towards integration of the field and new methods. *Technological Forecasting & Social Change* vol 71 p. 287-303

Pulkka, V. V. (2017). A free lunch with robots–can a basic income stabilise the digital economy?. *Transfer: European Review of Labour and Research*, *23*(3), 295-311.

PwC Hungary (2019): How will AI impact the Hungarian labor market. In *www.pwc.com*. PwC Hungary. https://www.pwc.com/hu/en/publications/assets/How-will-AI-impact-the-Hungarian-labour-market.pdf

Ramírez, R., Mukherjee, M., Vezzoli, S., & Kramer, A. M. (2015). Scenarios as a scholarly methodology to produce "interesting research." *Futures*, 71, 70–87. https://doi.org/10.1016/j.futures.2015.06.006

Ramirez, R., McGinley, C., & Rissanen, J. (2020). Scenario planning in science-centric organizations. *Futures & Foresight Science*, *2*(2), e30.

Ramos, G. (2022). AI's Impact on Jobs, Skills, and the Future of Work: The UNESCO Perspective on Key Policy Issues and the Ethical Debate. *New England Journal of Public Policy*, *34*(1), 3.

Ransome P., (1999)**.** Sociology and the future of work. London. Routledge

Rasmussen, L. B. (2008). The narrative aspect of scenario building-How story telling may give people a memory of the future. *Cognition, communication and interaction: Transdisciplinary perspectives on interactive technology*, 174-194.

Riesman, D. (2020). *Abundance for what?*. Routledge.

Rimler, J. (1999). A munka jövője. Új fogalmak, feltételek, forgatókönyvek [The future of work. New concepts, conditions and scenarios]. *Közgazdasági Szemle (Economic Review-monthly of the Hungarian Academy of Sciences)*, *46*(9), 772-788.

Robertson, J., & Robertson, J. (1985). *Future Work: Jobs, self-employment and leisure after the industrial age*. Aldershot: Gower.

Roosma, F., & Van Oorschot, W. (2020). Public opinion on basic income: Mapping European support for a radical alternative for welfare provision. *Journal of European Social Policy*, *30*(2), 190-205.

Rothenberger, L., Fabian, B., & Arunov, E. (2019). Relevance Of Ethical Guidelines for Artificial Intelligence – A survey and evaluation. *European Conference on Information Systems*. http://dblp.uni-trier.de/db/conf/ecis/ecis2019.html#RothenbergerFA19

Rowland, N. J., & Spaniol, M. J. (2017). Social foundation of scenario planning. *Technological Forecasting and Social Change*, *124*, 6–15. https://doi.org/10.1016/j.techfore.2017.02.013

Schutz A. (1959): Tiresias or Our Knowledge of Future Events *Social Research* vol 26 No 1,

Schwab K. (2016) The Fourth Industrial Revolution. World Economic Forum

Siemon, D., & Kedziora, D. (2023). From Accountant to Software Developer–Transforming Employees with Robotic Process Automation (RPA).

Sowa, K., Przegalinska, A., & Ciechanowski, L. (2021). Cobots in knowledge work: Human–AI collaboration in managerial professions. *Journal of Business Research*, 125, 135-142.

Spaniol, M. J., & Rowland, N. J. (2019). Defining scenario. *Futures & Foresight Science*, *1*(1), e3.

Spencer, D. A. (2018). Fear and hope in an age of mass automation: debating the future of

work. *New Technology, Work and Employment*, *33*(1), 1-12.

Strümke, I., Slavkovik, M., & Madai, V. I. (2022). The social dilemma in artificial intelligence development and why we have to solve it. *AI and Ethics*, *2*(4), 655-665.

Susskind R.- Susskind D. (2018). A szakmák jövője. Hogyan változtatja meg a technológia a szakemberek munkáját? Antall József Tudásközpont, Budapest

Századvég Közéleti Tudásközpont Alapítvány (2022) Informatikus Életpályamodell Elemzése. Zárótanulmány 2022 Július 15

Tardos, K., & Ságvári, B. (2021). The impact of digitalisation on society and industrial relations in Hungary: a comparison of corporate, employee and trade union perspectives. In *The impact of digitization of the economy on the skills and professional qualifications, and their impact on working conditions and labor: Volumen I* (pp. 825-891). Thomson Reuters Aranzadi.

Taylor A. (2018) The automation charade.*Logic*. Iss 5. https://logicmag.io/failure/the-automation-charade/ Accessed on 05.20.2020.

Thompson, E. P. (1967). Time, Work-Discipline and Industrial Capitalism *Past and Present* vol 38 pp 56-97

Tung, L. (2019, January 17). Google employees protest: "Stop work on AI for Pentagon drone video analysis." ZDNET. https://www.zdnet.com/article/google-employees-protest-stop-work-on-ai-for-pentagon-drone-video-analysis/

Vaast, E. (2022). Future imperfect: How AI developers imagine the future. ICIS 2022 Proceedings 5.

https://aisel.aisnet.org/icis2022/ai_business/ai_business/5/?utm_source=aisel.aisnet.org%2Ficis2022%2Fai_business%2Fai_business%2F5&utm_medium=PDF&utm_campaign=PDFCoverPages

Veress, A. (2020). *Ez még a jövő zenéje-A munka jövőjére vonatkozó trendek hatása a magyar üzleti szolgáltató központok munkaerőpiacára* (Doctoral dissertation, BCE Gazdálkodástudományi Kar).

Vicsek, L. (2021). Artificial intelligence and the future of work–lessons from the sociology of expectations. *International Journal of Sociology and Social Policy*, *41*(7/8), 842-861.

Vicsek, L., Bokor, T., & Pataki, G. (2024). Younger generations' expectations regarding artificial intelligence in the job market: Mapping accounts about the future relationship of automation and work. *Journal of Sociology*, *60*(1), 21-38.

van Notten P. W. F. et al (2003) An updated scenario typology. *Futures* vol 35 p-423-443

Van Parijs, P. (2010). Alapjövedelem: egy egyszerű és erőteljes gondolat a huszonegyedik század számára. *Esély, 2010/5*

Végvári, B., Gelencsér, M., Kurucz, A., & Szabó-Szentgróti, G. (2022). Basic income: opportunities or problem?. *Regional and Business Studies*, *14*(1), 5-15.

Vértesy, D. (2020). A mesterséges intelligencia fejlesztéséért folyó globális verseny és Magyarország= The Global Race for AI Development and Hungary. *Köz-gazdaság*, *15*(1), 197-202.

Wajcman, J. (2017). Automation: is it really different this time?. *The British Journal of Sociology*, 68(1), pp.119-127.

Walsh, T. (2018). Expert and non-expert opinion about technological unemployment. *International Journal of Automation and Computing*, *15*(5), 637-642.

Washington, A. L., & Kuo, R. (2020, January). Whose side are ethics codes on? Power, responsibility and the social good. In *Proceedings of the 2020 Conference on Fairness, Accountability, and Transparency* (pp. 230-240).

Wigan, M. R. (2020). Rethinking IT professional ethics. *Australasian Journal of Information Systems*, *24*. https://doi.org/10.3127/ajis.v24i0.2851

Williams, C. (2008) Re-thinking the future of work: Beyond binary hierarchies. *Futures*, 40(7), pp.653-663.

Wilson, N., & McDaid, S. (2021). The mental health effects of a Universal Basic Income: A synthesis of the evidence from previous pilots. *Social science & medicine*, *287*, 114374.

Winkelhaus, S., Grosse, E. H., & Glock, C. H. (2022). Job satisfaction: An explorative study

on work characteristics changes of employees in Intralogistics 4.0. *Journal of Business Logistics*, *43*(3), 343-367.

Winner, L. (1985). Do Artifacts Have Politics? [Review of *Do Artifacts Have Politics?*]. In D. MacKenzie & J. Wajcman (Eds.), *The Social Shaping of Technology-How the Refrigerator Got Its Hum* (pp. 26–38). Open University Press.

Wright G.- Bradfield R.-Cairns G. (2013) Does the intuitive logics method- and its recent enhancement- produce "effective" scenarios? *Technological Forecasting and Social Change* vol. 80 p. 631-642

Wright G.-Cairns G. (2011) Scenario Thinking. Practical approaches to the future. Palgrave Macmilian

Wyatt, S. (2008). Technological determinism is dead; long live technological determinism. *The handbook of science and technology studies*, *3*, 165-180.

Z. Karvalics, L. (2015). Mesterséges intelligencia – a diskurzusok újratervezésének kora. *Információs Társadalom*, 15(4), p.7.

List of publications related to the dissertation:

Horváth, Á., & Vicsek, L. (2023). Visions of Hungarian Artificial Intelligence Specialists about the Future of Work and Their Roles. *Science, Technology and Society*, *28*(4), 603-620.