from the same European Commission also shows that two-fifths (or approximately 40%) of the EU workforce have little or no digital skills (and conversely, approximately 60% are digitally literate) (Panopoulos, 2019). The United States displays more favorable figures, with approximately 84% of all adults being digitally literate (Mamedova and Pawlowski, 2018).

While digital literacy can no doubt be improved further, it is undeniable that digitalization carries several ramifications on the labor market. A recurrent topic in the ongoing debate is whether or not digitalization and digital transformation creates or destroys labor. Some authors and researchers contend adamantly that the digital development is happening to the detriment of human labor, with people being made redundant for most processes and tasks in the future (Ford, 2015; Kaplan, 2015). Others take a more positive outlook and argue that it will in fact create more jobs than it replaces (Jones, 2018).

The truth is that not much is known about the future in this field as predictions thus far have been fragmented and often contradictory, more often than not leaving many fundamental questions unanswered, such as how automatization of work affects the tax-paying ability, and by extension, the very fundament of the welfare state? Why are people eager to pursue technology that could potentially deprive them of their livelihood? Can all workers be reskilled? If not, what becomes of those who cannot? These topics and many others have been explored in this book

Throughout this book, a team of researchers and specialists have investigated various areas of the labor sector and how it is impacted by the digital transformation/digitalization, and what the overall ramifications may be for society at large. In particular, this chapter will seek to expound on the conclusions drawn by the authors throughout their respective chapters, while endeavoring to build up an overall conclusion based on the findings and predictions made in each study.

2. Chapter findings

This following section will seek to elaborate upon the conclusions drawn by the different chapters in regards to the different themes of the digital transformation of labor as stipulated by this book's structure.

The first theme, "Practical utilization of new technologies", looked at how the development of new technology can be applied in practice to enable people to work in ways they have not previously been able to. That is to say, what kind of new opportunities and practices that can be expected for the future, but also the risks and impediments this development might incur on some people, actors or labor traditions.

The next theme, "The role of the digital welfare state", looked at how the transformation of labor markets can affects the welfare state, in particular regard to the funding of the state and the tax revenue system. While this is a broad and complex subject area in and of itself, it is not the focal point of this book. It is nonetheless an important subject to bring up and discuss in context to the ever-changing labor

market that the welfare state relies upon to a great extent via various forms of taxation (income tax, payroll tax and so forth) in order to keep the welfare state funded.

The final theme, "Digital disruption of status quo", looked at how digitalization and the digital transformation (or any particular part of it) can affect certain group or actors. That is to say, will the digital development enable any particular actor to advance their positions on the labor market, or conversely, will it act to challenge any particular actors? Moreover, this theme seeks to understand how the digital developments may disrupt the current status quo and prompt actors to change their mode of operation in the future, if at all.

2.1. Practical utilization of new technologies

Technologies are bound to be utilized in new and different ways. Sometimes new technologies are devised for a specific purpose, and sometimes technologies originally intended from one purpose evolve through time to meet the need of a different purpose. Already at the outset of this book, Bard, Söderqvist and Larsson (Chapter 2, this volume) outlined the most important developments through history of mankind that has resulted in various types of labor and crafts. The chapter also looked at how and why mankind has always been drawn to technology, while asserting that the need of communication has always been at the heart of the human condition and in shaping societies. The authors concluded that a new social, cultural and economic paradigm is forming and that this paradigm will take on a fluid form rather than a concrete equivalent. This indicates that the future of labor will develop alongside the evolution of society and that a whole new set of norms will be developed in the future that is not restricted to mere social norms.

On the more tangible, physical side of the spectrum, Van der Zande, Siri, Teigland and Teigland (Chapter 3, this volume) provided an overview of digitalization and automation along with the three underlying technologies of AI, machine learning and robotics. The aim was to explore the potential of these technologies to replace human capabilities in the workplace while discussing some factors beyond the realms of technology that carry an influence on the pace and scope of job automation. The authors argue that while most future jobs will be affected by automation to some extent in terms of individual activities, most jobs will not be completely automatized. Specifically, full automation of non-routine tasks involving autonomous mobility, creativity, problem-solving, and complex communication, appears unlikely even in the future. However, the authors posit that the nature of jobs will change as mundane tasks become substituted and people are necessitated to work closer together with machines. Industry prime candidates for labor substitution are food and accommodation services, transportation and warehousing, retail trade, wholesale trade and manufacturing. While the authors admit that short-term reskilling will likely be required to enable the reemployment of displaced labor, they do not anticipate that the automatization will incur any long-term unemployment. To cope with the pace of automatization, the authors

recommend an increased focus on education and training for individuals, as well as for organizations, regions and nations.

While certain types of labor may be at risk of being automatized in the future, the digital transformation may also offer some new labor opportunities. Wood, Graham and Anwar (Chapter 4, this volume) discuss how the rise of the "gig economy" has enabled internet users to find new work previously unavailable to them, particularly so via "online labor platforms", which effectively serves as a "global remote gig economy" and provides workers with access to worldwide labor opportunities. In their concluding words, the authors caution against letting the online gig work function as an unregulated labor market. To this end, the authors argue that there must be stipulations made in regards to matters such as the minimum wage (which in some countries may present itself as an obstacle and devaluing the work done by the workers).

To this end, digitalization is also changing the type of labor done in the government and academic sectors as well. Seemingly, the digital development in Europe is that academia and the public sector are gravitating toward a greater sense of transparency and information accessibility inasmuch that policies concerning Open Access and Open Data are being increasingly implemented on a more formal level (Kisjes, 2015; Toelch and Ostwald, 2018). To this extent, the national states and the governments will continue to have an important role in ensuring that the digital transformation is facilitated throughout the academic sector (Maire, Chapter 5, this volume). However, it should be noted that the digital transformation of sciences and the public sector occurs on many levels, with the government playing one essential key role (Asgarkhani, 2005; Tolbert and Mossberger, 2006). In addition, the digital transformation and the development toward Open Access-based knowledge also occurs through bottom-up evolution and top-down policy implementation (Maire, Chapter 5, this volume).

Of course, the issue of transparency and information accessibility is of equal importance also in other workplaces outside of academia and the public sector, as this generates trust. As posited by Bernhardtz (Chapter 6, this volume), trust in cognitive computer systems are key factors in the successful digitalization of labor. Moreover, the author, much like Van der Zande, Siri, Teigland and Teigland (Chapter 3, this volume), contends that digitalization is not likely to prompt automated replacement of laborers en masse any time soon. One of the subsets of labor is of course the organizations creating them. They are in many cases run by corporate boards, and thus it is relevant to understand how the digital transformation affects these boards as there could be far-reaching implications for the labor market on a broader level. Torre, Teigland and Engstam (Chapter 7, this volume) argue that the rapid advancements in AI will lead to corporate boards being challenged in their decision-making process in ways they have not experienced in the past. Specifically, they contend that AI, and the "big data" will become one of the most prominent topics for corporate boards to deal with within the next decade and propose a leadership matrix to assist boards in how to better develop their competence within AI implementation.

2.2. The role of the digital welfare state

Considering what effects the digital transformation has on labor in the context of the welfare state, Blix (Chapter 8, this volume) and Greve (Chapter 9, this volume) posit some welfare states appear better prepared than others for the digital transformation and that in recent years, labor markets have become more polarized whereas in some countries (like Sweden) the effects have hitherto been limited. Among the attributed reasons is the safety net for its citizens as well as the well-endowed structural funds for retraining of displaced workers (Blix, Chapter 8, this volume). However, even in the cases of well-developed and prepared welfare states, the country may still be put at risk in light of the impending digital transformation, particularly in places outside of large urban/metropolitan areas. That is to say that all labor sectors can and will be affected to some degree or another, and most likely they will be affected simultaneously.

Another aspect raised by Larsson and Sabolová (Chapter 10, this volume), is that the "gig economy" may have far-reaching implications for the welfare state through the emergence of "gig patients". These are workers in the "gig economy" who cannot afford to take time off to seek medical attention until their condition reaches a point that makes it absolutely necessary. This makes the condition more resource-demanding to treat, and also, these workers will rarely have the means to pay for their treatment in full, which causes a strain on the welfare sector that will worsen as the "gig patients" grow in numbers.

Typically, advanced welfare societies will have high taxes placed also on middle-income earners (OECD, 2019; Lindbeck, 1986). This, in combination with a shortage of skilled workers in key-segments of the labor market could cause the tax bases to gradually erode. Given the high level of taxes supporting the welfare spending, this would create even stronger incentives for firms to automate work or to buy services on global gig markets via platform-based labor markets. Blix (Chapter 8, this volume) argues, from the perspective of the welfare state, that this may result in further labor market polarization and more strained financing of comprehensive social welfare. Upholding the social contract in the welfare state is already becoming a challenge. Hence, the outcome of the welfare state is contingent on the policy responses of governments, social partners, trade unions and employer organizations (Blix, Chapter 8, this volume; Larsson and Sabolová, Chapter 10, this volume). That is to say, trade unions that are able to adapt to the digital transformation, while providing new forms of support and safety to its members could still remain relevant to its members. As such, it could serve as a counterweight to some of the increases in income uncertainty. Governments could also consider broadening the tax bases to support welfare ambitions, especially for the self-employed. Digitalization carries challenges in all welfare states, but interestingly for different reasons. As illustrated by Greve (Chapter 9, this volume), the challenges dealt to Southern and Eastern Europe stem from the transformation of the industrial production that has been slower in these countries, resulting from a lower wage level than in other more mature welfare states. The

challenges to the Nordic and Continental welfare states, however, emanate from expenditure and the capability of financing the welfare states. In conclusion, the authors argue that education and labor market policy are important for the future employability of workers (Greve, Chapter 9, this volume) and that in order for the welfare state to survive in the way that we know it, judicious reforms are needed (Blix, Chapter 8, this volume).

2.3. Digital disruption of status quo

The topic of "privacy" is a concern that features prominently amidst the discussion of digitalization. That is to say, trust and confidence in a specific new technology is fundamental in order for it to develop further, and the same goes for digitalization by and large, as was further elaborated by Bernhardtz (Chapter 6, this volume). If technology is not considered secure and/or trustworthy, it will not gain the support of its prospective users. As information access is becoming increasingly more widespread and easily accessible, citizens have become increasingly more concerned with how their personal data is processed. This has prompted new legal frameworks. In the EU, the General Data Protection Regulation (GDPR) was launched on 25 May 2018. Larsson and Lilja (Chapter 11, this volume) have investigated how the implementation of GDPR may affect the future types of businesses, or more specifically asking the question: *In what way may GDPR influence the labor market of tomorrow, and what businesses are at risk*? The authors conclude that there is still much work to be done by companies seeking to secure full GDPR compliance, even though there is steady progress being made in the area. Going forward, the authors argue that while GDPR challenges all organizations dealing in large volumes of personal data, it will primarily hit the smaller studios for online game developing, while "big tech" companies are likely to not be too inconvenienced by GDPR. On the other hand, GDPR will also provide opportunities for other types of businesses, such as for consultancy in digital strategy and for professionals in analytics and software architecture.

While prior chapters of this volume has asserted that the digital transformation and automation does not run the risk of entirely replacing all types of labor in the near future, it may change to some extent in regards to individual activities (Van der Zande et al., Chapter 3, this volume; Bernhardtz, Chapter 6, this volume). On this note, an argument raised in regards to automation of labor is that it induces inequality amongst certain individual groups of society. The assertion is that while automatization may replace one person's job, it enables someone else to make more money on their assets. Castronova (Chapter 12, this volume) argues that "these unequal slices are part of a growing pie". As previously mentioned by Van der Zande et al. (Chapter 3 this volume), reskilling of labor will likely be required in order to enable the reemployment of displaced labor. However, Castronova (Chapter 12, this volume) highlights the problem of what is to become of the multitude of low-skill laborers who will find their jobs automatized and who perhaps have no obvious alternative routes to meaningful work at their disposal.

Particularly so, young men with low-skilled jobs may feel so resigned that they opt to stay at home playing video games rather than look for work and/or reskill themselves due to the perceived lack of incentives of putting in the extra effort. On this account, digitalization may provide additional opportunities to this group of people, as the author predicts that there in the future will be a way for them to earn revenue by being paid in some capacity by game companies. Essentially, the author describes a development toward a gamification process in which young, (predominantly) male unemployed low-skilled workers are able to play the companies' video games in order to earn some small point-based incentives that can be liquidated in the form of purchasing power. As this point-based system develops in the coming decades, it will become increasingly more viable and may in many cases present an alternative form to money as legal tender. At the same time, wealthier citizens who also play the same video games may utilize the "pay-to-win" features so often present in online games, meaning they pay for items with real-world money in order to gain access to features in the game that are otherwise closed to the player (or sometimes even necessitated to buy in order to progress further through the game). Thereby these "big spenders" are effectively funding the low-skilled workers now being "paid" to play. The author contends that this may help curb the inequalities placed upon the unemployed low-skilled workers, as within a generation, playing games for money would come to be seen as a legitimate occupational choice, while also securing a way for income gains from technological progress to be distributed to the low-skill population.

Graham and Anwar (Chapter 13, this volume) extrapolated upon the "planetary labor market" in digital work. Specifically, this signifies that digital technologies have been deployed in order to bring about a labor market that can operate at a planetary scale. The authors argued that the concept of geography will not be made irrelevant even though technological advancements exist to facilitate a "planetary labor market". Rather, the planetary labor market utilizes digital technology and geography by helping clients to operate across geographical borders at minimal cost. That is to say, although the planetary labor market allows workers to sell their labor power globally, these workers are still tethered to the physical place where they live and work on a day-to-day basis.

Another recurrent question has been how digitalization affects women's future career opportunities in regards to the "digital gender divide". Larsson and Viitaoja (Chapter 14, this volume) highlight the relative lack of women in the Western countries undertaking science, technology, engineering and mathematics (STEM) subjects, which results in there ultimately being fewer women working with information and communication technology (ICT) related jobs. The authors argue that while digitalization may provide for more flexible working conditions that benefit women, the digital development also incurs a risk of bringing about more atypical and cynical work arrangements, to the detriment of women. Moreover, there is an added risk that the emergent automatization will begin to harvest some of the professions traditionally dominated by women. The chapter concludes that women's disposition in tech appears to be more about attitudinal issues and less

about legal/regulatory issues. While the situation is gradually improving, more coordination among different efforts is needed in order to successfully safeguard the future position of women in the digital era.

The digital transformation as indicated previously by Larsson and Lilja (Chapter 11, this volume), consultancy in digital strategy is a business venture that can be expected to capitalize on the digitalization and digital transformation processes. However, this naturally raises the question how consultancies themselves will cope with the digital developments. Larsson, Andersson, Markowski, Nilsson and Mayor (Chapter 15, this volume) have investigated this topic closer and found that the development of analytics tools will be quintessential and that digitalization carries the greatest advantages during the analytical phases of consulting. Nevertheless, an impending risk of digitalization is that organizations may be tempted to try optimizing their performance by having in-house data scientists take on more of the consultants' traditional tasks. This may result in suboptimal results, or in some cases, the consequences may even be dire. For that reason, the authors recommend a tighter future collaboration between consultants and data scientists so that their efforts may be synergized.

One may deduce that the digital transformation carries profound impact on specific job functions, but another important issue is how it affects the overall sustainability of the labor market and society at large. Larsson and Lindfred (Chapter 16, this volume) investigated how labor conditions are affected by the introduction of circular economy in order to achieve circular businesses and societies and what role digitalization plays in this. The authors conclude that circular economy is fundamentally reshuffling our current economic system and that it may facilitate the creation of new jobs in a variety of different fields, such as in manufacturing, marketing, sales, refurbishing and reverse logistics, etc. A variety of other enterprises would change the way they conduct business as well and there will be a greater overall shift toward a sharing economy. In this way, circular economy should be regarded as an innovation and a strategy for businesses as well as for society at large. The authors also contend that digitalization will continue to be a vital instrument in making the circular economy come to pass.

3. Concluding comments

As mentioned in the introductory chapter (Larsson, Chapter 1, this volume), this book endeavored to explore the changes and impact that digital technology could have on the future of labor. The overall results of the studies have concluded that the digital transformation of the labor market is an ongoing process that will have a profound overall effect on labor, but to varying extents when it comes to particular aspects of it. Mankind's pursuit of technological advancements is a constant that will never change. As such, technology will always continue to evolve and the labor landscape is never completely static. Looking at the three different overarching themes this book has explored, one can summarize it in the following ways.

3.1. Practical utilization of new technologies

In regards to the theme of "Practical utilization of new technologies", new digital technologies such as AI, machine learning and robotics will indeed help automatize and streamline various processes. This may cause certain types of labor to become replaced, especially low-skilled, menial labor, which means that some of the workers in this category will likely need to undergo some reskill training (Van der Zande, et al., Chapter 3, this volume; Bernhardtz, Chapter 6, this volume). On higher, executive levels, digital technology such as AI may be used in ways that alters how corporate boards operate, although Torre et al., (Chapter 7, this volume) argue that corporate boards they investigated tended to be cognizant of the importance of AI implementation as a key competitive advantage and did not view AI as threatening to replace job positions in the corporate boardroom.

On a broader, more mundane level, is the digital economy's enablement of the "gig economy". Through the development of "online labor platforms", workers will have access to worldwide labor opportunities (Wood et al., Chapter 4, this volume). However, on the flipside, cost of labor will oftentimes be a decisive factor when contracting workers (all else being equal), meaning that especially low-skilled workers would perpetually have to work at minimum wage level, in the event that their country uses such a system (Todolí-Signes, 2017; Stewart and Stanford, 2017). In other cases, worker wages risk becoming a "race to the bottom", provided the country does not have a high density of labor-union membership with labor unions that have the power to make wage stipulations for its members (Singh and Zammit, 2004; Chan, 2003; Stewart and Stanford, 2017). Even so, it is not certain if these labor unions can indeed uphold their standing in a "gig economy", as this has proven challenging so far (O'Connor, 2019; Meyer, 2016; Minter, 2017). Moreover, a high density of labor union membership may not be possible in certain countries due to political reasons or otherwise. The idea of forcing a raised minimum wage internationally has also been discussed but it remains a highly contentious topic with much of the debate centered on the sheer feasibility of implementing such in practice (Badham, 2017; Worstall, 2017). Needless to say, this will be a much debated subject over the next decade. However, as Maire (Chapter 5, this volume) pointed out, the digital development will also prompt the spread of information to become more detailed and freely accessible in the academic community. This will in turn no doubt foster further research on the effects on the gig economy in regards to its opportunities and its limitations as well as help bolster people's awareness around this complex issue.

3.2. The role of the digital welfare state

The following theme, "The role of the digital welfare state", indicates that while the functions of the welfare states will be impacted differently by the digital transformation (depending on how advanced/mature the welfare is in each respective country), all labor sectors of the welfare state will be affected to some extent

(Blix, Chapter 8, this volume; Greve, Chapter 9, this volume). The high taxation levels will serve as an incentive for companies to automatize as much as possible of their work, or purchase services on gig markets with for the purpose of paying as low wages as possible (and by extension, less tax). This risks creating a highly polarized labor market, for even if not every single aspect of all types of work can be automatized, and even if workers can reskill themselves to get other proficiencies in a digitalized society, as suggested by Van der Zande, et al. (Chapter 3, this volume) and Bernhardtz (Chapter 6, this volume), it does not change the fact that the "gig economy" is making its way into the labor market. The "gig economy" may lead to a "race to the bottom" in wage setting, at least in some economies. This, in turn, will have detrimental effects on the state's ability to generate any sizable taxation income on labor, which on no small measure will worsen as the occurrence of "gig patients" grow in numbers (Larsson and Sabolová, Chapter 10, this volume). Thus, the challenges of upholding the "social contract" will become increasingly more difficult, as the ability to provide the same standard of welfare as today will likely decrease substantially.

3.3. Digital disruption of status quo

The final theme, "Digital disruption of status quo" has shown how different types of sectors are affected. On a larger level, the "gig economy" and the "planetary labor market" has less to do with fostering more job opportunities across geographical borders, but more to do with using digital technology to enable businesses to operate across countries at minimal cost (Graham and Anwar, Chapter 13, this volume). To this end, Castronova (Chapter 12, this volume) argues that a new type of "point-based" economy may gain a foothold in the digital era that caters to disillusioned low-skilled workers who are unable to reskill themselves, and/or unable to undertake "gig work". This new type of economy would allow this group of people to gain some kind of "trade-in" benefits through "gamification" of their hobbies. This would ensure that this group of people is not kept entirely passive, while also enabling companies to earn revenue through the "labor" done by this group of people. As such, the economic system may evolve too to some extent alongside the labor market, fostering the emergence of other forms of "alternative" and "virtual" currencies not too unlike cryptocurrency.

Of course, there will always be privacy concerns, and policy regulations that seek to address these will indubitably have far-reaching consequences on the labor market as well. For instance, the implementation of new legal frameworks, such as GDPR, means that there will be a greater need in the future for specific types of professions, particularly so for consultancy in digital strategy and for professionals in analytics and software architecture (Larsson and Lilja, Chapter 11, this volume). To that end, it is prudent to ask what becomes of consultancy in the future and how is it expected to change following digital advancements. The importance of analytics tools will continue to grow, and consultants will need to collaborate more closely with data scientists (Larsson, Andersson,

Markowski, Nilsson and Mayor, Chapter 15, this volume). It is to that possible end that we may see more data scientists entering the "gig economy" taking on freelance work at various occasions to collaborate with consultancies at different stages during different projects. While the "gig economy" may indeed serve to drive worker remuneration down, it is not given that this is the case for specialized trades such as data scientists. That is to say, the skills possessed by various types of specialists are not necessarily mutually interchangeable with another specialist. They may be, but the skill possessed is often individual and different competencies may be better suited for different tasks. However, a possible consequence of this is that specialists, such as data scientists seeking to perform "gig jobs" may have to market themselves harder to become more widely recognized for their individual and unique specialization in their field in order stay ahead of the competition. Alternatively, the consultancies may expand their businesses to also employ data scientists to their team of specialists to a greater extent than what is done today.

There are, however, a few other issues apart from the development toward a "gig economy". Castronova (Chapter 12, this volume) raises the issue of inequality induced by digitalization to certain individual groups of society. Although Castronova focuses on the young male low-skilled workers, other groups may be adversely affected as well. For example, the "digital gender divide" may be further widened as automatization of professions traditionally dominated by women start escalating and reskilling is made difficult due to the fact that there is an underrepresentation of women studying STEM subjects, resulting in fewer women working with ICT-related jobs (Larsson and Viitaoja, Chapter 14, this volume). To this end, working toward attitudinal change on a societal level is paramount in order to ensure that women have a future position and, if need-be, the same preconditions as men to reskill themselves.

Research has indicated that a digital transformation provides the preconditions for societies to adopt a circular economy (Wilts and Berg, 2017; Hobson and Lynch, 2016). As elaborated by Larsson and Lindfred (Chapter 16, this volume), this does not only serve to achieve sustainability in the economy and the resources of society, but one may also expect to see the creation of new types of work. Specifically, specialists in component remanufacturing and product refurbishment, product remarketers and various types of specialists in reverse logistics may find a boost in a circular economy. Still, more importantly, is the way in which a circular economy could change existing business practices in the future. For instance, in recent years, an increasing number of companies have transitioned from traditional workplaces to open-plan office spaces. This has largely been attributed to the evolvement of mobile technology and "knowledge work" (i.e., workers whose main specialty is knowledge, e.g., lawyers, scientists, programmers, etc.) becoming a more prominent feature in the modern labor market. This means that in recent years people have become less bound to a specific workplace than in the past, allowing for alternate, more cost-reducing and space-saving solutions such as "hot-desking", open workstations, group workstations and so

forth (Peterson, 2014; Davis, Leach and Clegg, 2011). While these solutions may be cost-saving, they may also have adverse effects on productivity as well as staff morale (especially so for "hot-desking") due to factors such as stress, conflicts and noise-levels, etc. (Christou, 2018; Myers, 2016; Stillman, 2018).

In a circular economy, yet another iteration of the workplace may appear. Larsson and Lindfred (Chapter 16, this volume) argue that in the future, the coworking spaces may turn to a more "Airbnb-style" of workplace, where companies can book an apartment or home for a few hours for whenever an "office" is needed. Due to mobile technology and "knowledge work" it may be possible for people to sit at various locations and still manage to work together with colleagues, at times remotely and at times together at a coworking space. There are no proper studies yet available that show how this setting would affect the staff's productivity and/or morale, and more research into this space is encouraged.

3.4. Synthesis – where do we go from here?

The point of departure for this book was to explore some of the overarching themes in which digitalization and digital transformation can be expected to impact the labor conditions to some degree or another. Through a series of analytical accounts provided by several experts in their respective field, this book has provided an anthology of potential future scenarios and developments for the future of labor, with each study weighing in on the possible opportunities and challenges respectively that the future development stand to offer. Given the results from all the chapters covered in this volume, the ten most important overall takeaway predictions for the future of the labor market can be summarized in Table 17.1, with the advantage/opportunities listed on the left-hand side and the disadvantages/challenges listed on the right-hand side:

The first sentence of this book's introductory chapter (Larsson, Chapter 1, this volume) drew upon the ancient Chinese proverb that "a journey of a thousand miles begins with a single step" (Keyes, 2006, p. 107). At the end of these thousand miles and upon starting a new journey of a thousand miles, the lingering question is: "where do we go from here?" The future of the labor market as we know it is contingent on many different things. It is by and large an iterative process in which we may only know the true outcome by repeated evaluations and follow-ups of each implemented change and/or innovation. Therefore, securing a system of necessary checks-and-balances will be of paramount importance to ensure a successful digital transformation. Notwithstanding, the digital transformation of labor affects everyone to some extent and thus the issue must be broached by politicians and policy-makers. Naturally, additional research is needed to assess, for instance, the opportunity costs of reskilling workers, the effects on productivity and morale in adopting "Airbnb-style" workplaces (as mentioned previously), ramifications of parallel economies (such as using a point-based system), and any number of ethical and/or political ramifications associated to this development. Hence, the time has come for a proper debate on the digital transformation of labor and what direction it should take in the future.

Table 17.1 The ten most prominent advantages and challenges brought forth by the digital transformation of labor covered in this book.

	Advantages (+)	*Challenges (–)*
1	Automatization will not replace all types of labor.	Certain types of labor and processes will be more affected than others.
2	Automatization and AI will continue to develop and expand into additional types of professions, creating new job opportunities.	Automatization and AI will continue to develop and expand into additional types of professions, eliminating job opportunities.
3	Workers affected by automatization may undergo reskill training to stay active and/or relevant on the labor market.	Not all workers are able or willing to reskill.
4	Workers unable or unwilling to reskill may find sustenance through new types of alternative economies.	Digitalization induces inequality to certain individual groups of society.
5	The "gig economy" will become increasingly more widespread and will have fundamental impact on the labor market, creating new and freer opportunities.	The "gig economy" will become increasingly more widespread and will have fundamental impact on the labor market, with risks of more atypical and cynical work arrangements.
6	Digitalization of labor will have consequences on the welfare states. Some states are better prepared for this.	Digitalization of labor will have consequences on the welfare states. Some states are less prepared for this.
7	The "gig economy" provides new opportunities and freedom for people to work whenever and wherever they like, choosing the assignments of their own liking.	The "gig economy" can lead to "gig patients" and may have detrimental long-term effects on the welfare system.
8	More flexible working conditions for women.	Risk that automatization will harvest women-dominated professions.
9	The workplace for office work may shift to become more itinerant, with employees working at different places rather than at one specific address, especially for those workers whose professions qualify as "knowledge work". This can help keep costs down.	Unclear how itinerant workplace for office work affects the staff's productivity and/or morale.
10	The circular business model could help companies save resources while still securing sustainability and profitability.	The linear business model is consolidated into the mindsets of most businesses, making it difficult to change.

References

Asgarkhani, M., 2005. Digital government and its effectiveness in public management reform. *Public Management Review*, 7(3), pp. 465–487.

Badham, V., 2017. *Worker Exploitation: Without An International Minimum Wage, We're All Worth 10 Bucks*. [online] The Guardian. Available at: <www.theguardian.com/commentisfree/2017/may/01/worker-exploitation-without-an-international-minimum-wage-were-all-worth-ten-bucks> [Accessed 26 Sep. 2019].

Chan, A., 2003. Racing to the bottom: International trade without a social clause. *Third World Quarterly*, 24(6), pp. 1011–1028.

Christou, L., 2018. *The Effectiveness of Hot-Desking: Is This Really the Future of the Workplace?* [online] Verdict. Available at: <www.verdict.co.uk/effectiveness-of-hot-desking> [Accessed 26 Sep. 2019].

Davis, M.C., Leach, D.J. and Clegg, C.W., 2011. The physical environment of the office: Contemporary and emerging issues. In: G.P. Hodgkinson and J.K. Ford, eds., *International Review of Industrial and Organizational Psychology, Volume 26*. Chichester, UK: John Wiley & Sons, Ltd., pp. 193–237.

European Commission, 2019. *High-level Group Publishes Report on Impact of Digital Transformation on EU Labour Markets*. [online] Employment, Social Affairs & Inclusion. Available at: <https://ec.europa.eu/social/main.jsp?langId=en&catId=1226&furtherNews=yes&newsId=9344> [Accessed 26 Sep. 2019].

Ford, M., 2015. *Rise of the Robots: Technology and the Threat of a Jobless Future*. New York, NY: Basic Books.

Frost and Sullivan, 2019. *Digital Transformation of the Future of Work, 2019*. [online] Research and Markets. Available at: <www.researchandmarkets.com/research/3vt8hg/digital?w=4> [Accessed 26 Sep. 2019].

Hobson, K. and Lynch, N., 2016. Diversifying and de-growing the circular economy: Radical social transformation in a resource-scarce world. *Futures*, 82, pp. 15–25.

Jones, D., 2018. *Digitisation Will Create More Jobs Than It Replaces*. [online] CEO Magazine. Available at: <www.theceomagazine.com/business/innovation-technology/digitisation-will-create-more-jobs-than-it-replaces> [Accessed 26 Sep. 2019].

Kaplan, J., 2015. *Humans Need Not Apply: A Guide to Wealth and Work in the Age of Artificial Intelligence*. New Haven, CT: Yale University Press.

Keyes, R., 2006. *The Quote Verifier: Who Said What, Where, and When*. New York, NY: St. Martin's Press.

Kisjes, I., 2015. *The Evolution of Open Science – How Digitization is Transforming Research*. [online] Elsevier. Available at: <www.elsevier.com/connect/the-evolution-of-open-science-how-digitization-is-transforming-research> [Accessed 26 Sep. 2019].

Lindbeck, A., 1986. Limits to the welfare state. *Challenge*, 28(6), pp. 31–36.

Mamedova, S. and Pawlowski, E., 2018. *A Description of U.S. Adults Who Are Not Digitally Literate*. [online] Statistics in Brief. Available at: <https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2018161> [Accessed 26 Sep. 2019].

Meyer, J., 2016. *Unions Hate the Gig Economy, but Workers Love It*. [online] Foundation for Economic Education. Available at: <https://fee.org/articles/unions-hate-the-gig-economy-but-workers-love-it> [Accessed 26 Sep. 2019].

Minter, K., 2017. Negotiating labour standards in the gig economy: Airtasker and Unions New South Wales. *The Economic and Labour Relations Review*, 28(3), pp. 438–454.

Myers, D., 2016. *New Economic Thinking and Real Estate*. Hoboken, NJ: John Wiley & Sons, Ltd.

O'Connor, S., 2019. *Gig Economy Agreements Promise a Brighter Future for Trade Unions*. [online] Financial Times. Available at: <www.ft.com/content/25271b48-38eb-11e9-b856-5404d3811663> [Accessed 26 Sep. 2019].

OECD, 2019. *Under Pressure: The Squeezed Middle Class*. Paris, France: OECD Publishing.

Panopoulos, D., 2019. *The Role of Digital Transformation in Labour Markets and Business Ecosystem*. [online] European Business Review. Available at: <www.europeanbusinessreview.eu/page.asp?pid=2889> [Accessed 26 Sep. 2019].

Peterson, K., 2014. *Why Companies are Doing Away With Assigned Desks*. [online] CBS News. Available at: <www.cbsnews.com/news/why-companies-are-doing-away-with-assigned-desks> [Accessed 26 Sep. 2019].

Singh, A. and Zammit, A., 2004. Labour standards and the 'race to the bottom': Rethinking globalization and workers' rights from developmental and solidaristic perspectives. *Oxford Review of Economic Policy*, 20(1), pp. 85–104.

Stewart, A. and Stanford, J., 2017. Regulating work in the gig economy: What are the options? *The Economic and Labour Relations Review*, 28(3), pp. 420–437.

Stillman, J., 2018. *New Harvard Study: Your Open-Plan Office Is Making Your Team Less Collaborative*. [online] Inc. Available at: <www.inc.com/jessica-stillman/new-harvard-study-you-open-plan-office-is-making-your-team-less-collaborative.html> [Accessed 26 Sep. 2019].

Todolí-Signes, A., 2017. The 'gig economy': Employee, self-employed or the need for a special employment regulation? *Transfer: European Review of Labour and Research*, 23(2), pp. 193–205.

Toelch, U. and Ostwald, D., 2018. Digital open science – Teaching digital tools for reproducible and transparent research. *PLOS Biology*, 16(7), p. e2006022, pp. 1–11.

Tolbert, C.J. and Mossberger, K., 2006. The effects of e-Government on trust and confidence in government. *Public Administration Review*, 66(3), pp. 354–369.

Wilts, H. and Berg, H., 2017. The digital circular economy: Can the digital transformation pave the way for resource-efficient materials cycles? *International Journal of Environmental Science & Natural Resources*, 7(5), p. 555725, pp. 1–4.

Worstall, T., 2017. *An Amazingly Bad Idea – An International Minimum Wage*. [online] Forbes. Available at: <www.forbes.com/sites/timworstall/2017/05/01/an-amazingly-bad-idea-an-international-minimum-wage> [Accessed 26 Sep. 2019].

Afterword

Impact of digitalization on employment and working conditions

John Øvretveit

1. Introduction

How will the digital transformation impact workers in different countries? Will it increase existing inequalities? Will it cause greater political unrest? These are just some of the questions that this book addresses. Some readers will be asking, "will my job disappear, or be made easier or more demanding?" And, "what advice should I give my adolescent daughter or son about the education, skills and occupation to seek so as to be sure of a job or income?" Not all chapters agree on the answers, and the speed of change is so rapid that predicting the future would be risky, even for the next five years. But there are some indications, and this short afterword both risks some predictions and gives reflections on the chapters.

2. Effects on employment

There are different views about whether digitalization will result in more jobs, and if so how quickly, or conversely, if it will lead to significant unemployment. One conclusion that several chapters are in agreement about is that digitalization has been associated with fewer traditional full-time employment jobs and with more alternate job arrangements, often with the worker as a self-employed contractor that takes on various "gigs", a trend that is likely to continue and spread. However, association is not causation and there is disagreement about how much the move from the traditional employment structure to this new "gig" structure is caused by digitalization and how much is caused by certain dynamics of capitalism. It is likely to be both, with digitalization making it possible and easier to move full-time to part-time employment and create a new, contracted "reserve army of labor" with (for the employee) less favorable employee-type benefits. As with most predictions and generalizations in this field, much depends on which occupation and which type of market, state economy and digital infrastructure we are considering.

While some chapters support the contention that more new jobs will be created in the emerging digital economies of most countries, it remains uncertain how soon and how many, and to what extent, these jobs will make up for the work that is automated-away. What is clear is that most new jobs will require new skills, and retraining will be needed for many workers to be able to perform with digital

technologies as a greater or lesser part of the new labor requirements. This transformation of work is likely to cause social disruption as in previous technological change eras. But the speed of change and the nature of the change could be faster and more significant as the changes from farm to factory, from horse to vehicle and from steam to oil-based civilizations. Adding uncertainty to these predictions is the advent of artificial intelligence (AI) in its various forms, and how this will replace some work and occupations and transform many others. That is to say, speech recognition and instruction made possible by AI is beginning to impact many occupations in different sectors around the world.

3. Effects on working conditions

For most occupations, digital technologies will be an increasing part of the work day and work demand. For some health-care workers this has reduced the time they spend with patients and increased the intensity of work. For some, automation and digital devices have increased the amount of time workers can spend with patients. To this end, much is dependent on design and implementation. For most, mobile devices and widespread internet and broadband has increased remote working and the "always on" phenomena touched upon by some chapters. Remote working has its advantages and disadvantages as we have seen from the research reviewed.

4. Political and economic effects

The role played by government funding of research and digital infrastructure has been an underestimated factor in making possible large fortunes and high incomes. Certainly, the early years of the digital era have led to high incomes for those with the high levels of education and skills required. Concomitantly, the income and job opportunities of many occupations have been reduced, leading to increases in inequity of wealth. This, together with the financial crisis of 2009, has resulted in widespread dissatisfactions, expressed politically in various ways. A case has been made that social media have increased these dissatisfactions and allowed political mobilization and organizing. The impact on traditional democratic processes was underestimated. These movements may lead to strong regulations and possibly pro-labor legislation.

5. Conclusion

What then should be our advice to children? My practical advice is:

- Learn the basics of programming using the new games and toys, so as to understand how this works.
- If you have an aptitude for this, learn more of the principles, but recognize automation will replace much coding work, and consider working with digital networks and systems to be part of the 5G-powered world of the Internet of Things (IoT).

- Better still, learn about user-centered design and working in multi-professional teams to humanize the crude machine-person interfaces we have at present. Make these technologies work for the less literate or people with cognitive difficulties to enable them to benefit from the positive aspects of digitalization and reduce the "digital divide".
- Learn how to work with digital assistance and techniques to perform your profession or occupation – even personal service work such as nursing or psychotherapy, where people both want and can afford a human will be supported by considerable technology.
- Consider plumbing or electrical contracting, or handyman work for maintenance: It will take a long time for robots and digitalization to replace these and some other occupations and trades.

If none of this appeals, find something for income, because the "guaranteed income for all" may take some time. Good luck!

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Note: **Boldface** page references indicate tables. *Italic* references indicate figures.