albeit having many similarities with the technological development, will only narrowly be included. This, despite that the impact, such as that "displacement destroys industry-specific human capital, leaving affected workers in positions for which they are poorly suited relative to non-displaced workers" (Autor, Dorn and Hanson, 2016, p. 232), is also a possible impact on workers of technological changes on the labor markets. How ideas influence the choice of labor market and social policy is also outside the scope of the chapter (Greve, 2018).

2. Impact of technological change

Labor markets have been, at all times, under change and reconstruction. Technological impact on job has been discussed since the Luddites, and albeit jobs have been wiped away, new jobs have so far been created so that high unemployment has mainly been related to the overall economic fluctuations (Graetz and Michaels, 2015). Anxieties of technology's impact on jobs are a long history – from the Industrial Revolution to the Great Depression and onwards (Mokyr, Vickers and Ziebarth, 2015). The recent anxiety relates to computing power, artificial intelligence and robotics (Autor, 2015), also including, as will be later explained, the stronger polarization on the labor markets.

The consequences of the fourth industrial revolution will presumably be large all over the world. A recent study indicated that until 2030 between 75 and 375 million people should change job, and between 4–800 million people should find complete new types of jobs as a consequence of the implementation of new technology (Bughin et al., 2017). Countries that have thus far only achieved limited progress in automatizing their industrial production due to already low labor cost would be the countries where one could expect the largest degree of change. Another estimation for developed countries shows a variation from around 44% (Slovakia) and 42% (Slovenia) to 22% (Finland and South Korea) (Hawksworth, Berriman and Goel, 2018). It is naturally difficult to predict the future development. In 2003, Autor, Levy and Murnane (2003, p. 1283), three experts, wrote that "navigating a car through city traffic or deciphering the scrawled handwriting on a personal cheque – minor undertakings for most adults – are not routine task by our definition" and that truck driving were areas with "limited opportunities for substitution or complementarity". The development since then indicates that changes in these jobs are now within reach – and a personal check is already almost completely archaic. Thereby, also, those more optimistic about development might perhaps be too optimistic about future job development. Still, their distinction between routine and not routine related to types of task is central to the understanding of the possible impact on the labor market of the changes is important (see Table 9.1).

Routine work is, not surprisingly, mainly at risk of being automated, whereas non-routines are less likely of being at risk. Since the article by Autor et al. was written in 2003, it has been possible to split work-function into even smaller units and thereby increasing the number of functions that can be considered routine tasks. The possible consequence for the labor market has thereby been stronger since, still this distinction has been behind many of the studies trying to depict the

Table 9.1 Skills, risk and consequences of automation split between routine and non-routine work.

	Routine work	*Non-routine work*
Analytical and interactive tasks	Substantial substitution	Strong complementarities
Manual tasks	Substantial substitution	Limited opportunities for substitution or complementarity

Source: Based on Autor et al. (2003, p. 1286).

possible change in number of jobs on the labor market, with Frey and Osborne's (2013) study being central. They expected that within 10–15 years half of the job-functions we know today to be gone. Several subsequent studies have been done on this subject (Arntz, Gregory and Zierahn, 2016; Manyika et al., 2017; Hawksworth, Berriman and Goel, 2018). These studies are, with variations, often close to the results in Frey and Osborne (2013). Refinement since using more detailed knowledge on educational level has helped in understanding types of jobs at risk of being automated.

Figure 9.1 shows the jobs at risk of automation split into high risk of being automated and jobs of high risk of substantial change (OECD, 2017a).

Overall the Figure 9.1 points to than on average 9% of all jobs are in high risk of being automated, whereas jobs at high risk of substantial change is 25%, so that more than one-third of all jobs are in danger. The figure varies across countries, although still so that dramatic changes will be on the way for the labor market in many countries. There are natural methodological challenges with these calculations and how to measure and split jobs into tasks, however, this is not the point here, as despite disagreement about the size, there is a consensus about that dramatic changes will take place. There is a stronger disagreement about whether sufficiently new jobs will be created (Greve, 2017). Still, there will be changes, and presumably fewer jobs, and, at the same time a possible continued development with a split between insiders and outsiders, and stronger polarization on the labor market.[1] Polarization will be a continuation of the trend that has already been toward stronger diversities on the labor markets over the last 20–25 years (see Figure 9.2) and is expected to continue (OECD, 2017b; Goos, Manning and Salomons, 2014).

Figure 9.2 points to the polarization so that especially middle-skill jobs are in danger, and despite this is mainly estimated based on change in wage level indicates profound changes on the labor market, and, there is no indication that this will not continue, despite that one of the possible competence in the future and types of jobs can include different types of care (children and elderly) and also primary education. This is where the level of qualifications might be more in the middle, however, often with a relatively low level of wages. Still overall, it indicates in most professions growing insecurity on the labor markets, but presumably also in the ability to finance welfare states (see more in Section 3).

Polarization will also imply a negative impact on the distribution implying a continuation of the rise in inequality (Brynjolfsson and McAfee, 2014; Reich, 2015).

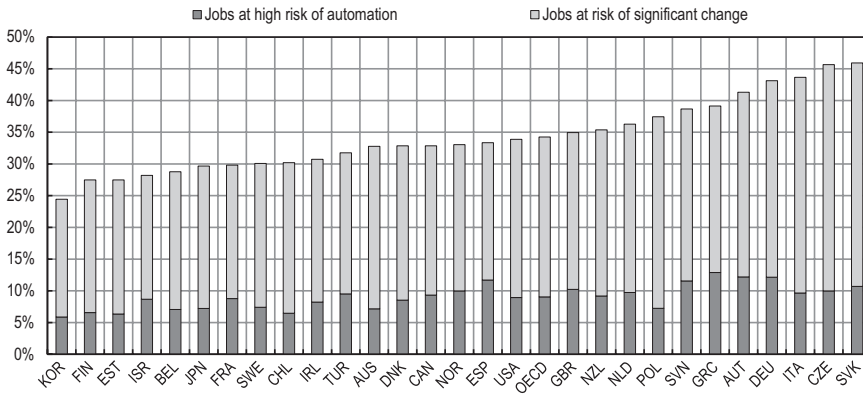

Figure 9.1 The risk of automation in OECD countries.

Source: OECD (2017a), Figure 3.10.

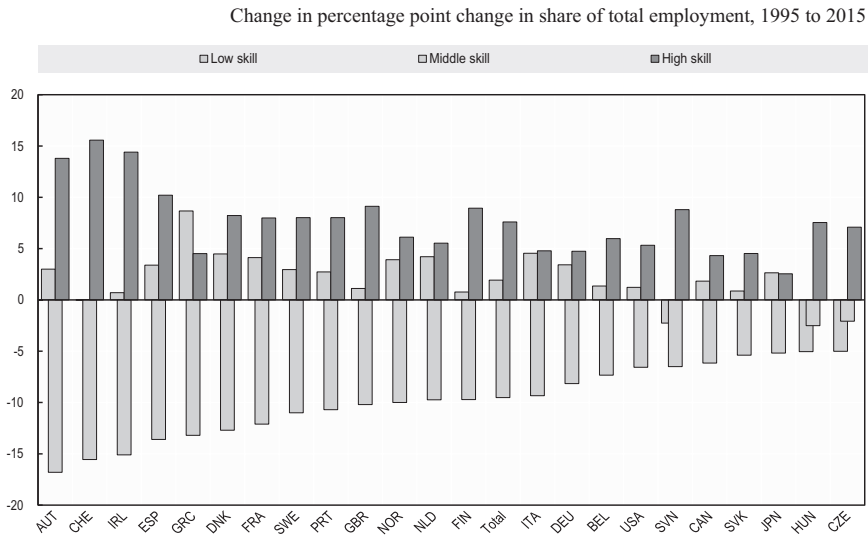

Figure 9.2 Polarization in OECD labor markets 1995–2015.

Source: OECD (2017a, p. 121).

Furthermore, even if jobs will be created, there will be times when some will be left outside the labor market lacking the necessary skills to participate and get jobs. Therefore, this also challenges the ability to finance the welfare states.

Overall, the studies strongly indicate that the level of routinization and education influences the possibility of automation, but also increasingly that middle

and high-skilled jobs are at risk of automation. The change in jobs seems to be stronger in countries where industrial production still is central, and, thus Eastern and Southern Europe are under more pressure than the Nordic and Western parts of Europe. This should, all else being equal, in general imply that the pressure on welfare states will be higher in east and south of Europe. There seems further, even if disagreement on the overall impact on the number of jobs in danger, agreement on that it might increase inequalities and that there as least can be a long transition time where the welfare states have a strong role in ensuring the necessary qualifications for workers in need of moving from one sector or type of job to another. The possible impact on different welfare state types is a topic that is in focus in the next section.

3. Financing and spending in welfare states – impact on preparedness

Welfare states are in the comparative welfare state literature clustered into different "welfare regimes". For a more in-depth discussion of "regimes", see Greve (2019). The presentation here will follow the classical line of *Three Worlds of Welfare Capitalism*, adding Southern Europe and Eastern Europe as clusters. Welfare regimes have been a way to systematize our knowledge on how different countries have some similarities with regard to their welfare state (Von Kersbergen, 2019). The division into these regimes reflects, in relation to financing and spending strong variations, also in the actors involved, and a different mix of state, market and civil society. Just to give a few indicators, Table 9.2 shows the

Table 9.2 Spending on social protection, overall level of taxation and inequality (GINI).

Country	*Social protection % GDP, 2015*	*Taxes and duties as % of GDP, 2016*	*Gini-coefficient, 2016*
Nordic welfare states			
Denmark	32.3	47.3	27.7
Sweden	29.2	44.6	27.6
Continental welfare states			
Germany	29.1	40.4	29.5
France	33.9	47.6	29.3
Liberal welfare states			
UK	28.6	35.1	31.5
Ireland	16.3	23.8	29.5
Southern Europe			
Italy	29.9	42.9	33.1
Spain	24.6	34.1	34.5
Eastern Europe			
Czech Republic	19.0	34.8	25.1
Poland	19.1 (2014)	34.4	33.9

Source: Eurostat (2018).

spending on social protection as percentages of GDP, overall level of taxes and duties and the GINI coefficient for a selection of countries within the EU (Eurostat, 2018).[2]

Table 9.2 shows the simple fact that the Nordic and Continental welfare states often spend more on welfare than in the liberal countries, with Southern (with Italy as the exception) and Eastern European countries spending even less (Adema, Fron and Ladaique, 2011).[3] Whether this reflects the very precise level of social spending is not the central issue in this article. Still, the high level of spending indicates a stronger need for financing as witnessed in the table by higher levels of taxes and duties, and, thus at the outset put more pressure on the Nordic and Continental welfare states with the higher level of spending and taxation than in the other types of welfare state (Bussemeer, Krell and Meyer, 2016). This has, historically, not been a strong issue in the sense that there has been a willingness to pay. Moreover this has been possible with merely a limited negative impact on and possible distortion of the choice between, for example, work and leisure. The legitimacy of the welfare state has also influenced the ability to finance the welfare states, but given the relatively high legitimacy, in especially the Nordic and Central European welfare states, it has been possible even for these types of welfare states to cope herewith (Morel and Palme, 2019).

There are differences in use of state, market and civil society among the welfare states, and, again this points also toward that liberal with more focus on the market and Southern and Eastern Europe with strong familiaristic approaches will be less influenced by the development.

The degree of inequality is also different. And, as shown in Table 9.2, and given that it typically involves a progressive tax system and/or public transfers to ensure a high degree of equality, this implies that if this aim shall be continued to be fulfilled in the future, a stronger pressure on welfare states with aims of redistributing will be needed.

The overall pressure on the income taxation as a consequence of globalization has been discussed for some time, for an early example (Ganghof, 2006). However, it seems still to have been having an only more limited impact, whereas there has been a tendency to lower taxes on companies, albeit at the same time with a broadening of the tax base (Brys et al., 2016). Broadening the tax base is also argued to be part of the solution of the pressure on the tax system related especially to taxation of companies. Here the labor market change might have more profound impact, especially in welfare states with high level of personal income taxation, as people who to a lesser degree are on the labor market also will have less stable income. This, in combination with more income from the digital economy possibly being generated offshore as royalty and capital income (Trepelkov, Tonino and Halka, 2015), increases the pressure. If this is the case, the ability to fund social protections will be weaker than previously.[4] This, however, is not a problem that is exclusive to only the developed welfare states. This development follows the traditional discussion on whether or not (and indeed how) to tax immobile production factors higher than mobile production factors as a way of circumventing the external pressure of funding the welfare state.

A possible way to cope herewith is to introduce a robot tax, as proposed by – among others – Bill Gates, Elon Musk and Stephen Hawking, who also informs us that South Korea has imposed a robot tax (Pieterson, 2018). This is not the place to enter into these issues in detail, but indicates that new ways to ensure financing might be needed. A possible argument being that of Guerreiro, Rebelo and Teles (2017, p. 32): "[A] tax on robots decreases the wage rate of non-routine workers and increase the wage rate of routine workers". However, they also argue that it might influence the distribution negatively. Naturally, those gaining from use of new technologies to have better paid jobs might pay more in tax and duties, but still this will not be able to off-set the income from those losing out if the continued polarization reduces the numbers of jobs, as presented back in Section 2.

4. Which welfare states are most exposed?

This question – whether countries in certain welfare regimes are most exposed – is based upon changes in the labor market and the ability to finance welfare states. Naturally, if looking into individual countries within the EU, there can indeed be variations. Nevertheless, given the size of the welfare states, the need to collect taxes and duties and the degree of inequality, a possible implication is that the countries most exposed are those in the Nordic and Continental welfare regimes.

However, there is a contradiction in the sense that, on the one hand, one could expect the more generous and expensive welfare states to be more exposed due to the possible difficulties in financing the welfare states. This as when fewer are on the labor market, and also that those who are on the labor market often will have lower income due to increased income polarization, which will reduce the ability to finance expenditures. Finally, more people might be in need of economic support from the welfare state. On the other hand, the more developed welfare states seem to be witnessing dwindling changes as a consequence of them having already either offshored or having used technology to reduced employment in the more traditional industrial sector, as shown in Section 2. Thereby the changes and polarization in the years to come might be less strong than in those countries where both the continuing restructuring of the industrial production as well as technological change might imply a stronger pressure on the ability to finance welfare states.

On the financing side, it is not just the risk of lower revenue due to the possibility of fewer employed citizens, but also that more people will be performing activities in the platform economy. While the income there may be lower, there is also a greater risk of it being derived from work done in the "hidden economy", where the digital platforms' owners do not necessarily pay tax in the countries where they offer their services (Greve, 2017). Therefore, even if there is a high number of jobs available, there is a risk that many of those jobs are temporary, working (e.g., even if having a job then the income will be below the poverty line) poor or a type of underemployment.

Overall, the discussion and data as presented in Section 2 and 3 can be systematized as done in the following Table 9.3.

Table 9.3 Impact on countries in different welfare regimes.

	Change on labor market	*Pressure on taxes and duties*	*Pressure on spending*	*Degree of equality*
Nordic	Low	High	High	High
Continental	Low	Middle	High	Middle
Southern	High	Low	Low	Low
Liberal	High	Low	Low	Low
Eastern	Middle	Low	Low	Low

Source: Author's own depiction.

The difference between low, middle and high is the author evaluation based upon the presentations and tables in sections 2 and 3. Where change on labor market is related to Figures 9.1 and 9.2, pressure on taxes and duties and spending follows in Table 9.2. The degree of equality, see Table 9.2, indicates the variation and emphasis on the goals toward equality in different welfare regimes/levels, as well as the size of the public sector and taxes and duties, and thereby the willingness to use the welfare state to counteract the impact of the market.

The implication is that the pressure from digitalization can vary, presumably due to the financing and size of the welfare state as it is today, and the loss of jobs. However, it will also be influenced based upon how the flexibility on the labor market and the educational system (especially lifelong learning) functions as a way of mediating the consequence of technological changes on the labor market. As upgrading, upskilling and development can be important, this is also recommended by those who do not necessarily agree that there will be a lack of jobs (Kaplan, 2015), or even that investment in education reduces the risk of the changes (Oesch, 2013), although so far there is seemingly no indication that this takes place within the European countries (Bengtsson, de la Porte and Jacobsson, 2017).

A core reason for the strong importance of employability of the workforce is that, if more generous welfare states simultaneously receive a lower level of income through the tax system and a higher level of expenditure to income transfers, the possible growing public sector deficit will incur difficulties in keeping the spending consistent, unless other types of financing can be found. The risk of a vicious circle will also be prevalent, as the income transfers in many ways has functioned as automatic stabilizers. If this is reduced, the economy might become more volatile and could also influence the degree of inequality. By the same token, if countries would like to continue having low levels of inequality, then the ability to use the tax system is important, given that welfare states with a high level of taxation have the largest degree of redistribution (Avram, Levy and Sutherland, 2014), and this is due to the more generous benefits and welfare states.

Overall, this indicates that universal and generous welfare states (especially the Nordic and Continental welfare states) are the ones under the most pressure from the changes. At the same time, those countries have already been witnessing strong changes in the industrial sector, which they have managed to cope with.

So, it might be that the consequences are stronger in countries where the recent development toward digitalization comes at a time where there is still a strong need for changes in the industrial sector, and perhaps also a need for change in the future voter expectation for additional welfare.

5. Some concluding remarks

There will be strong and persistent changes on the labor markets in the years to come and there will be challenges in all welfare states, albeit for different reasons.

Southern and Eastern Europe will see challenges stemming from the transformation of the industrial production that has been slower in these countries, which in turn has been a consequence of a lower wage level than in the more mature welfare states.

The Nordic and Continental welfare states face challenges due to the pressure on spending and the ability to finance their welfare states.

The liberal has a position in between as they have less welfare than others, but at the same time have had several of the change in the production structure.

Across welfare states a challenge will be the transformation process, so that even if the loss of jobs will be limited, the welfare states will have to undergo a transition period. If a large number of citizens should be able to keep their jobs or get a new one, they will need to be trained. Thus, lifelong learning seems to be an important aspect in the welfare states' future development.

Notes

1 This article will not go into and describe these concepts; see instead Greve (2018) for an overview.
2 Choice of countries so as they represent the five regimes (in total ten countries) also in order to ensure an overview.
3 Naturally, there are caveats with this presentation as it do not included occupational and fiscal welfare.
4 The EU-commission has in March, 2018 proposed a three-percent-point tax on turnover in companies, presumably as a first step in acknowledging that the existing tax system is under pressure from platforms generating revenues, but paying less tax than traditional companies.

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10 “Gig patients”

Health and dental care in the gig economy

Anthony Larsson and Dominika Sabolová

1. Introduction

The “gig economy” (or the “shared economy”, as it is also known) suggests a new style of employment where workers sustain themselves by performing a number of “gigs” on a freelance basis (often for several different contractors) rather than having a fixed-term employment or a permanent contract at a particular employer (Petriglieri, Ashford and Wrzesniewski, 2018; Shibata, 2019). In a majority of cases (63% according to Petriglieri, Ashford and Wrzesniewski [2018]), the “gig workers” have chosen this type of employment on their own volition. The main reason for doing so is often that it seemingly provides the workers with the possibility to choose their own projects and set their own schedules.

In principle, the “gig economy” allow workers to pick up temporary jobs anywhere in the world, although the percentage of the population engaging in “gig work” varies depending on geographical region. For instance, in the United States alone, between 34% to 36% of the workforce currently freelance, or “gig”; a figure that is expected to have grown into a majority by the year 2027 (Taylor, 2018; Spinner, 2019). In Australia, on the other hand, the numbers are sizably lower (although the exact figures vary) with between 7% to 25% of the workforce expected to find jobs through the “gig economy” (Offer, 2019; Bailey, 2018). In Europe, the numbers are for more fragmented, ranging from an estimated 9% in Germany, to 22% in Italy (New Europe, 2017).

Nevertheless, one major and often overlooked downside in the contemporary debate, is that a consequence of the “gig economy” is that in the future there will be a sizable number of adults who will be without regulated health care and/or dentistry benefits and legislative protection. Moreover, workers will invariably need some kind of insurance coverage as the welfare system (which exists to varying degrees in different countries) may not always provide the necessary healthcare benefits for the workers (DePillis, 2018; Taylor, 2018). However, freelancers are twice as likely as permanent employees to report that they lack traditional health insurance (Spinner, 2019).

Various measures have sometimes been taken in different countries to deal with this situation, but limitations in various forms of regulation has often entailed that this has had limited success. For instance, in the United States, the Affordable Care

Act (ACA), often nicknamed "Obamacare", was first approved in 2010 and fully implemented in 2014 (Courtemanche et al., 2018). Among many other things, the ACA made it illegal for insurance companies to deny US-citizens coverage, refuse to cover treatment or charge higher premiums for pre-existing health conditions (Thompson, 2015; Blumenthal, Abrams and Nuzum, 2015; Rovner, 2018). However, the crux of the matter is that the ACA only stipulates that no higher premiums are to be charged for pre-existing conditions. There are, however, other routes the insurance companies may take. For instance, they may opt for applying high-deductible health plans (HDHPs)[1] and/or increased "patient copays" models, etc. This would entail that the patient's financial responsibility would escalate and, in turn, undoubtedly lead to a new phenomenon of "gig patients" that will severely impact the future health-care and dentistry industries.

Proponents of HDHPs argue that by holding patients financially responsible through high copayments and deductibles, it helps decrease "moral hazard" by stymieing detrimental behavior by patients that would otherwise waste health-care resources and drive up the overall societal costs (Wilensky, 2006). Notwithstanding, such a development would have detrimental effects on some gig workers, as many of them will not be earning much more than minimum wage-level pay (or even less). Even in some countries in Europe, where there is no legally mandated minimum wage and where wages are negotiated between the employees and the employers through so-called "social partners", the "gig economy" impacts welfare by pressing back the wages of the employees and sometimes depriving workers of the full welfare benefits that come with an employment status (Worstall, 2017; Coyle, 2017; Kessler, 2018).

Fact of the matter is that the issue of minimum wage for "gig workers" has been a fiercely debated topic in recent years (Healy, Nicholson and Pekarek, 2017). In 2019, the labor advocacy group Working Washington instituted a campaign for a USD15-an-hour minimum wage for "gig workers" (Eisenberg, 2019). However, a problem is that these propositions only relate to hourly paid work when in many cases "giggers" are paid on the basis of a fixed price per project. Calculated in terms of time worked versus pay, the effective wage can actually be far below the suggested minimum wage level. While it is true that some minimum wage regulations can include so-called "piece work", it is important to remember that the rate is generally estimated on the time taken to complete various tasks undertaken by an "average" worker (Rubin and Perloff, 1993; Gittleman and Pierce, 2015). However, in many cases these tasks may vary too much in order to estimate them to the extent that it can be said that they truly and accurately represent a standard "average". For instance, a telemarketer who gets paid by number of calls made, rather than by commission on successful sales, can have a productive or a slow day depending on how many people pick up the phone. Also, software programming varies immensely depending on task and software, and likewise, the time taken to conduct identical programming procedures may vary from time to time, depending on the hardware used, internet connection, software glitches, etc. This makes average productivity for "piece rates" very difficult, if not impossible, to measure fairly (Shearer, 2004; Lazear, 2000).

More than this, many countries lack proper legislation to fully cover the "giggers". For instance, in the United Kingdom, being classified as employees would mean automatic enrollment in workplace pension and employer contributions, but the legislation defines "giggers" as "self-employed", meaning that more than a million "gig economy" workers in the UK risk missing out on £22,000 (≈ USD27,000) of pension (Partington, 2017). Also, "giggers" will oftentimes find that they will need to sign multiple insurance plans depending on how and where they work. "Giggers" will sometimes also have to acquire a "liability insurance" at their own expense in case something at work goes awry. However, this is a slippery slope, because many insurance policies are not valid for commercial use, and oftentimes local regulations and requirements vary depending on in what city or country the work is being performed. The multiplicity of actors involved may sometimes make it difficult to identify all the actors present and to delineate their areas of responsibilities (which is often needed whenever making a claim to the insurance companies) (Prassl, 2018).

Drawing upon available literature in the field, this chapter serves as an analytical commentary on the phenomenon of "gig patients". Specifically, the aim of this chapter is to investigate the wider ramifications this group of people could have to the welfare society and the future of labor, and the possible courses of actions that can be taken to deal with the emergent situation of "gig patients".

2. Discussion

2.1. The cause of "gig patients"

For many workers, the "gig economy" offers an irresistible allure where they are free to set their own schedule. Likewise, whenever entrepreneurs need to enlist help, or as their entrepreneurial company grows, the "gig economy" offers a way out of the expense of having payroll insurance, employee benefits, sick leave and vacations. Thus, entrepreneurs only need to pay for the work they need, whenever it is needed. Since the advent of digital technology along with information and communications technology (ICT) devices, an increasing number of workers and entrepreneurs alike have begun to identify themselves as "digital nomads" (Sisson, 2017). This means that they no longer depend on work in traditional workplaces, but are free to work anywhere and whenever, as long as there is access to a laptop computer or a tablet computer and an adequate internet connection (Müller, 2016). Conversely, it is also possible to gain many different short-term workplaces via the "gig economy". That is to say, the "gig economy" offers a wide array of freelance jobs available on the online market for various professions and skillsets.

Unshackled from the constraints placed by managers and corporate norms, workers can choose the assignments they feel put their talents to the greatest use while choosing only the assignments that they find appealing. The workers thus have a sense of agency in what they produce and how to manage their own life situation. However, while the personal freedom is far-reaching, the stakes are also exceptionally high and the cost may be far more than a financial one.

The workers are invariably expected to always produce and deliver and to always be on top of their game (Petriglieri, Ashford and Wrzesniewski, 2018). Keeping one's level of productivity at top capacity at all times is a constant struggle, and invariably means working long hours (Sinicki, 2018). Distress and distractions can erode one's level of productivity, as can various forms of obstacles that may appear along the way. Of course, various forms of health-related issue also act as impediments, which risks creating a vicious circle where the worker is less productive due to stress and/or illness, but yet has to compensate by putting in more hours to make up for lost productivity, which consequently serves to worsen the stress and/or illness (O'Connor, 2018).

As previously mentioned, one of the greatest boons for those contracting labor is not having to pay for various forms of welfare benefits. On the flipside, this is also one of the greatest banes to the workers. That is to say, the "gig economy" rarely or never offer workers any benefits of any kind that is commonly found among the traditional social safety net, such as sick pay, parental leave, paid vacations, paid course training, etc. Thus, "giggers" lack the possibility to take paid leave and receive such low wages that they are unable to take time off and fund their own health care. The aforementioned tendency of "giggers" lacking traditional health insurance serves to further deepen the problem. The ramifications of this situation is that it risks creating a vicious circle for "giggers" who are sick becoming even sicker without the means of doing much about it. For example, La Duke (2016, para.5) writes that "the increasing loss of dental benefits means that many in the "gig economy" decide to stop going to the dentist or, at the very least, reduce dental visits". Of course, this holds true for virtually any other health-care procedure as well, such as optometry, physiotherapy, and in extreme cases, possibly even procedures such as oncological treatments. Some reports even suggest that the stress levels "giggers" are subjected to can lead to an increase of cardiovascular diseases and even cancer (Ahuja, 2017; Tran and Sokas, 2017; University of Oxford, 2018). A 2019 study by the American Heart Association indicates that those working long hours (more than ten hours for at least 50 days a year) may run a 29–45% greater risk of stroke (Fadel et al., 2019).

These groups of people are unlikely to seek out the medical attention they need in time due to the constraints of their work-life situation in the "gig economy". These people will be known as "gig patients", and can be expected to increase in numbers unless preemptive action is taken before the problem becomes widespread. Already now, a staggering 54% of adult US-citizens claim that they have delayed health-care treatment because they cannot afford it, and this number can be expected to grow steadily as the pool of "giggers" grows larger (Carter, 2018).

2.2. The "gig patients'" effects on the welfare services

Beyond the personal tragedies of the "gig patients", there is also the aspect of them adding further strain on the welfare resources due to the more advanced care needed in order to treat them when they finally do seek treatment as opposed to if they had sought treatment sooner. Another factor in this is that in many of

the more popular "gig companies", the workers can make less than USD500 per month, while the typical US-consumer in 2017 was responsible for USD1,820 in deductible payments and another USD4,400 in out-of-pocket costs (Dyrda, 2017; Bloom, 2017; New, 2017). Naturally, these numbers do not add up, which means that the "gig patients" are falling deeper in debt. Sixty-nine percent of adults in the US claim are paying for significant health-care expenses using different means such as savings, credit cards, disposable income, loans from family and friends, etc. (Lagasse, 2018). Moreover, this also means that the health-care providers have difficulties in getting paid for their services. In the US, 73% of health-care providers have reported that it takes them at least one month (or longer) to collect payment from their patients and that 68%, or more than two-thirds, of all patients in 2016 could not pay their bill balances in full (TransUnion, 2017). For dentistry, the figures are also grim. Recent studies have shown that several European countries lack sufficient insurance coverage for patients and that fewer Europeans with low incomes tend to visit the dentist today, especially following the 2008 European financial crisis (Elstad, 2017).

This raises the question as to whether or not the health-care service and dentistry, in its current format, can survive the surge of "gig patients" in the long run. For the labor market, "gig patients" are a very negative occurrence, as they signal that the workplace in question is unsafe. As La Duke (2016, para.7) states:

> Gigs are often the result of larger companies outsourcing the most dangerous jobs to individuals. Most individuals lack the resources to acquire proper regulatory training, and what's more, many small companies are actually exempt from regulatory protections for workers.

Given this context, it would be in society's interest to curb the growth of the "gig patients", but the question is how to best deal with the situation?

2.3. Dealing with the "gig patient" situation

In some cases, a consequence of trying to deal with the current situation is that some "giggers" who operate under the "digital nomad" way of life, are able to take up jobs for different companies in the world while they themselves move to a low-cost country (Dal Fiore et al., 2014; Reichenberger, 2018; Gaid, 2019). The minimum wage-level payment they receive may not last longer in one of these countries than it would in their home countries, the "digital nomads" may even be able to find more affordable health and dental-care in these low-cost countries (Backe, 2018). While "digital nomads" do come in all different shapes, forms and sizes, many of them are young, able-bodied, single and without a family to support or any other strings tying them down to any particular place (Tynan, 2015). This, however, is not the case for everyone in the "gig economy", and even for many of those who do who fit the archetypical description of a "digital nomad", that particular lifestyle may not present itself as an option. Moreover, many "digital nomads" still run the risk of being laid off and losing their "gig", irrespective of

where they are (Backe, 2018). Likewise, they may also fall on hard times and end up becoming "gig patients" in the countries in which they are currently residing.

In terms of dealing with the "gig patients" that already exist, there are a number of measures the health-care and dentistry industry can take. On a more immediate level, it is important to catch the "gig patients'" affliction as soon as possible (possibly in connection when seeking treatment for a different ailment), and make sure a treatment plan is administered before the malady escalates into a worse (and more difficulty treated) condition. Given the fact that "gig patients" are often already deep in debt, payment options will need to be transparent and clearly defined up front so that there is no shock for the patient when the bill arrives. Ideally, there should also be some flexibility in arranging a payment plan, where smaller installments are paid over a longer period of time, with the possibility of adjusting the payments alternatively shortening or extending the time period as necessary, as long as there is a steady installment being continuously paid (Spinner, 2019). Moreover, health-care services will need to be open for securing ways of further simplifying the payment process. One practical way is to offer access to a secure and easy online payment system, which would eliminate credit checks before delivering the services. Another way of providing simplified payments is to explore ways of consolidating bills from multiple visits by the same "gig patient" so that the procedure in setting up a payment plan becomes more seamless and automatized (Spinner, 2019).

A lingering issue has been whether or not "giggers" are workers or self-employed, which in itself is a critical distinction on which a number of key entitlements hinge, including the aforementioned issues of holiday pay, sick leave, possible minimum wage and so forth. To this end, there needs to be clear legislation from the national government delineating between the two concepts, and where it will be made clear into which category of the two "gig work" falls under. There also needs to be clear-cut regulations in regards to liability insurances, and whether the contractor or the worker should be responsible for arranging them. To this end, there also needs to be an overview of the available insurances available to the "giggers" to ensure that the terms are fair to this category of workers, and that potential legislative loopholes that do exist in this space must be remedied.

Another issue is that societies in many countries today rely too much on "giggers" to enforce their own workplace rights. This becomes a problem inasmuch that the people that are most likely to have reason for grievance are also the ones who are the least able to assert themselves. As an example, in December 2018, the UK Employment Tribunal registered a mere 0.2% of claims made by agency workers, even though they comprise close to three percent of the workforce (Judge, 2018a). To this end, there will be a need for labor unions to stay more attuned to the developments in the digital space and the "gig economy", as this remains a weak spot for many unions (which is to a large part tied to the unclear legal regulations on "gig work") (Matthias, 2019).

In addition, it is essential for governments to allocate enough resources to their respective labor market enforcement agencies, so that they can seek out firms that make cynical use of dubious labor contracts or keeping substandard records of their

workers and their respective purview, etc. Ideally, these labor market enforcement agencies can even take preemptive action in rooting out the companies that do not comply with the rules and labor laws of the country. Moreover, it is essential that the labor market enforcement agencies seek to be as strategic as possible in their activities. Recent findings suggest that "giggers" in areas with weak labor markets are most vulnerable to non-compliant behavior (Judge, 2018b). Specifically, this means that people who lack other local options for work are unable to "vote with their feet" when they are handed a raw deal or are subjected to unlawful practices. To this end, a recommendation would be to employ a place-based enforcement strategy, targeting various hotspots in areas that have little competition within a particular market. In that way, the labor market enforcement agencies could prioritize the most affected places while also maximizing their impact, and hopefully causing ripple effects to surrounding areas until these agencies have mustered enough resources to gain a wider geographic coverage.

It is true that the "gig economy" is spreading fast, perhaps leaving people with few options in the future, as traditional employment may well decrease. However, the "gig economy" can only thrive as a format if enough people seek themselves to it to begin with. While added taxation on actors seeking to enlist "gig labor" might have a stymieing effect on the wider spread of the "gig economy", it is important that citizens are informed, ideally at an early stage, what it means to be a "gig worker" and all the ramifications that follows, so that they can make an informed decision of whether or not to pursue this work format.

3. Conclusion

The aim of this chapter was to investigate the wider ramifications that "gig patients" could have to the welfare societies and the future of labor. The results of this study indicate that while the "gig patients" are not yet a widespread problem, they can be expected to increase substantially in the future unless preemptive action is taken soon. The "gig patients" to date only affect the workers partaking in the "gig economy", but may have more far-reaching impact on society at large, and in particular regard to the welfare sector.

While the problem in part stems from the desire of employers to rid themselves of any added cost of labor short of wages, another factor is mankind's need to feel in control of their own time and being free to choose their own assignments. In this sense, it may in some cases risk becoming an "illusion of choice", where the worker is not actually free, but rather caught in a vicious circle where they cannot afford to tend to their health, thereby eventually becoming "gig patients" (Sinicki, 2018). The problem is complex inasmuch that it involves several different parties. On the one hand, it involves both the concerned parties themselves, i.e., the contractors and the workers. On the other hand, it also involves several external actors, such as the insurance companies, the national governments, national labor laws, labor unions, the health-care services, etc. As such, there needs to be a clearer legal definition identifying the role of the "giggers", if they are to have the legal status of "self-employees" (with the tax deductions and benefits that

entails) or if they should be considered employees (with the social net and welfare benefits that entails). Once in place, the other practical labor-law issues will need to be tethered out, and social partners among the "gig economy" would need to be established in order to for there to be a community of practice established, from which people could make their own informed decisions about the "rules of the game" and as to whether or not the "gig economy" is a type of work that caters to their interests and needs. That is not to say that the current "gig economy" does not provide for optimal solutions for some people. For instance, for people looking for a part-time job, or for an extra job on the side of their regular employment during the odd hours, the "gig economy" can provide a solid opportunity (Ravenelle, 2019; Sinicki, 2018). Nevertheless, workers intending to find a means to support themselves on a fulltime basis need to operate under clearly defined premises in order to avoid the risk of becoming "gig patients". By instituting a community of practice, a clear legal framework and fair standards, the risk of facilitating "gig patients" should be mitigated.

Note

1 A high-deductible health plan (HDHP) entails a health-insurance plan that has lower premiums and higher deductibles than a traditional health plan would have (Buntin et al., 2011; Kullgren et al., 2010).

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Part III

Digital disruption of status quo

11 GDPR

What are the risks and who benefits?

Anthony Larsson and Pernilla Lilja

1. Introduction

The General Data Protection Regulation (GDPR) was implemented across the European Union (EU) on May 25, 2018. In its most basic form, it is a regulation on data protection and privacy for all individuals within the (EU) and the European Economic Area (EEA) territories. In addition, it also restricts the export of personal data outside these geographical areas (European Parliament and Council of the European Union, 2016). The underlying intention of implementing the GDPR was chiefly to provide the European residents a level of control over their personal data, while also harmonizing the regulatory environment for international business within the EU. Even though the United Kingdom voted to leave the European Union via a referendum on June 23, 2016, the Westminster Government has confirmed that the GDPR will be brought into UK law (NLA, 2018). Although an EU directive, GDPR actually transcends national borders, making its relevance an international concern. That is, for any company (European or otherwise) whose business touches the EU and those failing to comply with the GDPR, regardless of national origin, faces a fine potentially equal to four percent of their company's global revenue, or €20 million (≈ USD22.3 million), whichever is greater (Ashton, 2018; Hart, 2017; Hon, 2016).

However, the implementation of this new directive has caused some concerns and will continue doing so for the foreseeable future. While it is possible to regard GDPR as a punitive construct, it may also serve as a catalyst in prompting companies to transform the way they handle data and manage risk and compliance that will enable them to become more competitive in the digital economy (Ashton, 2018). Given its recent introduction into the European legal framework, there is currently a dearth of available scientific research in regards to the ramifications of GDPR. Thus, this chapter will serve as a phenomenological/speculative study based on the available literature and best-practices in order to anticipate the future ramifications of GDPR in a labor market that is becoming increasingly digitalized (Kim, Sefcik and Bradway, 2017; Cooper and Endacott, 2007; Elliott and Timulak, 2005; Murphy and Dingwall, 1998). The overarching research question is: *In what way may GDPR influence the labor market of tomorrow, and what businesses are at risk?*

2. Background

The origin of GDPR is rooted in an ambition of creating a framework that safeguards personal data. According to the European Commission and Article 8 of the Charter of Fundamental Right of the European Union, everyone has the right to the protection of personal data (European Commission, 2018; European Communities, 2000; Fuster and Gellert, 2012). Within the EU, personal data may only be collected and used for legitimate purposes and must be protected from misuse (Ashton, 2018).

As several incidents have shown, concerns about the misuse of personal data have been far from unwarranted. A case in point was the *Cambridge Analytica*-scandal that was unraveled in 2018 (some two month before the implementation of GDPR) (Schneble, Elger and Shaw, 2018; Townsend, 2018). To this point, a study by the Ponemon Institute (2017) found that the total average cost of a data breach for businesses is USD3.62 million (≈ €3.08 million). Adding to this is that the likelihood of being breached is continuously increasingly rising, all the while companies are dealing with an "information explosion", where they keep collecting increasingly more data about a growing number of people (Ashton, 2018).

3. The aim of GDPR

In light of the developments mentioned in the introduction, GDPR seemingly presents itself as the perfect antidote as its jurisdiction can reach far beyond the geographical confines of the EU. Still, there are several problems associated to GDPR, as it carries a slow and unwieldy implementation process. A study by McKinsey has shown that it can take some companies years before completing all the necessary implementations, and depending on the starting position of the company, the cost can be significant (in many cases more than €10 million/≈ USD11.2 million) (Mikkelsen, Soller and Strandell-Jansson, 2017).

GDPR affects any and all companies operating with European customers, although those affected hardest are those holding and processing vast amounts of consumer data, such as technology firms, marketers and the data brokers who connect them (Hern, 2018). Although an increasing number of companies are becoming increasingly aware of the existence of the GDPR mandate, many are not sure about how to proceed with the implementation itself. While some first-movers have raced ahead, they have acted in manners that have, and continue to, incur unnecessary costs. McKinsey surveyed 60 major European companies and found that only ten percent had mature cybersecurity risk-management practices, while 45% of respondents replied that they would need to make significant investments in basic tools to comply with GDPR requirements (Mikkelsen, Soller and Strandell-Jansson, 2017).

Given the fact that roughly 90% of all surveyed companies to varying degrees lack the readiness for GDPR, it is important to consider that its most essential end-goal is privacy (even though the law as such does not make use of that word explicitly) and how to deal with the protection of sensitive data when processing client and employee data (Håkansson, 2017). However, that is not all. Beyond the "privacy"

aspect, there is also the matter of "trust" and "risk". Essentially, these three concepts can be considered the cornerstones of GDPR (Cameron, 2018; Garber, 2018).

3.1. Privacy

The concept of "privacy" has had different meanings depending on context. At the heart of the matter, privacy involves the control, use and disclosure of personal information (Solove, 2008). Privacy can be understood as existing on a continuum, meaning that a person's level of privacy can either increase or decrease, and by varying amounts at that (Cofone and Robertson, 2018). Privacy may also be something that the individual chooses to surrender, and by different amounts, depending on the situation and the individual's preferences, often in exchange for perceived benefits. Often personal privacy, such as divulging one's name to someone, is sacrificed by means of gaining or improving trust with another actor, or to get them to reciprocate the same action (Gaudeul and Giannetti, 2017). Moreover, individuals tend to be more willing to freely sacrifice privacy if the reason for doing so appears transparent and it is clear for what and how the information sacrificed will be used (Oulasvirta et al., 2014).

At bedrock, GDPR seeks to aims to permeate privacy, while at the same time allowing for different sectors to contribute to new norms and best practices that may apply to the new specific, and often digitalized, circumstances (Buttarelli, 2016). Privacy is essential, because in a digitalized society, breaches of privacy, or "privacy harms" becomes far more salient. To this end, there are numerous ways in which personal privacy may become violated. According to Salie (2017), there are six inherent risks of personal privacy violation:

1 **Discrimination**: *Use predictive analytics for determination on individuals*.

   The use of predictive analytics by the public and private sector can be used by actors to make determinations about the people's propensity to fly, find jobs, obtain clearances or get a credit-card approval. The use of associations in predictive analytics may carry negative impacts on certain individuals, which can lead to discrimination of these people from various services.

2 **Embarrassment of breaches**: *Create public awareness by exposing personal information – identity theft*.

   This includes data breaches at various businesses and institutions that may serve to expose personal information of thousands of customers, employees, patients, clients, etc. Adding to this is the all-time high occurrence of credit-card fraud and identity theft.

3 **Abolishment of anonymity**: *Removing only a few data sets can lead to re-identification*.

   Barring rules for anonymized data files, it is possible to combine data sets. Given the circumstances, this might make it possible to re-identify certain people by combining various subsets of data.

4 **Government exemptions**: *Collecting and adding more and more personal information to government databases*.

   For instance, various government databases will collect personally identifiable information (PII). This includes name, potential aliases, ethnicity, gender, date and place of birth, social security number, passport and driver's license numbers, home address, telephone numbers, photographs, fingerprints, various financial information such as bank accounts, employment and business information, etc.

5 **Data brokerage**: *Selling of unprotected and incorrect data profiles*.

   Some companies will collect and sell consumer profiles that are not explicitly protected under the legal frameworks. The data files used for various forms of big data analysis may contain invalid data about individuals. They may also use data models that are faulty as they relate to individuals, or simply be flawed algorithms.

6 **Data misinterpretation**: *Having more data is no substitute for having high-quality data*.

   While it is possible to find any number of political expressions on various social media platforms, these statements do not constitute a reliable representation of voters. To this effect, it has been know that a substantial share of tweets and Facebook posts about politics around the world have in fact been computer-generated.

As illustrated above, the key success factor for organizations will be the role and importance of information management and governance in data privacy. However, in the strictly legal sense, "privacy harm" will often take the form of a "visceral and vested approach", which means that it involves some dimension of palpable physical injury or financial loss and that the harm must have *de facto* occurred (i.e., is real rather than perceived) (Solove, 2014). However, that is not to say that privacy issues cannot cause various degrees and forms of emotional distress. Since these cases are difficult to prove and/or measure, the individuals are often subjected to the concept of "trust".

3.2. Trust

The basis of "trust" implies that the individual has trust in various data controllers (the person responsible for all personal data contained by the organization) to treat personal information justly and professionally (Buttarelli, 2016; European Commission, 2019). The amount of data stored throughout the various cloud services are for 2019 expected to be in the ranges of ten zettabytes (ZB), corresponding to approximately ten trillion gigabytes (Hofman et al., 2017). Much of this data includes crucial records that make it possible for individuals, businesses and

even governments to continue functioning. This includes, but is not limited to, identity and vital statistics records, financial records, legal documents, contracts, ownership and land records. In addition, records related to the Internet of Things (IoT) will also be stored on cloud services (Hofman et al., 2017). This stresses the need of secure servers and trust in the ability of the data holders to guarantee due and proper management of data, so that information does not fall into the wrong hands. As expressed by Duranti and Rogers (2014, p. 203) "[e]ven as we have ever greater access to untold stores of information, our right to know comes at a rising cost to our privacy and anonymity, due to a complex web of data collection and surveillance, benign and not. These stores of information, furthermore, are accumulated and extracted from sources we often cannot know or evaluate".

However, there is reason to question the security of cloud-based record-keeping, even in the absence of malice. This includes issues such as managing trans-jurisdictional data flows, establishing accountability for data breaches, and establishing due process for when a cloud service provider ceases to operation/function (Duranti and Rogers, 2012). Given the potential risks, establishing trust then becomes essential for those service providers wishing to attract customers. Likewise, establishing a bond of trust with the service provider becomes essential for individuals seeking to utilize that particular service above a different one, as individuals will seek to maximize their benefits while at the same time reducing the perceived risks.

3.3. Risk

Privacy risk generally refers to a situation that involves the potential loss of control over one's personal information. That is to say, when such information about you is used without your knowledge or permission (Lee, 2010). To this end, privacy risks exist wherever an actor collects, uses, shares and/or manage personal information relating to their staff, customers, clients, patrons, students, etc. (New Zealand Government, 2016). Risks commonly exist in terms of two separate values, "likelihood" and "severity". In the context of privacy, the "likelihood" is characterized by the probability that harm may be caused by the processing system. In turn, "severity" characterizes the magnitude of the impact on the victims (De and Le Métayer, 2016).

According to the OECD (2016), it is impossible to entirely eradicate digital security risk when carrying out action that rely on the digital environment, although the risk may be mitigated through the implementation of digital risk management. On this account, it is incumbent on Europe's independent data protection authorities to foster risk management through the implementation of GDPR, so that there is transparency and accountability to all individuals and businesses enterprises (Buttarelli, 2016). Nevertheless, the price of conformity demanded by GDPR may be a steep one for certain types of businesses. As such, it is important to tether out what future business will find themselves challenged by the implementation of the GDPR-framework, and what businesses that can thrive from it.

4. Business challenged by GDPR

One of the greater challenges can also be an opportunity. While true that business may be aided by GDPR as they are forced to structure and harmonize their customer data, the process in doing so may indeed be a costly and time-consuming endeavor. It is estimated that roughly 90% of the companies lack readiness for GDPR (Håkansson, 2017). Thus, many organizations will need to commit to undertaking large investments in revamping their information structure. On the outset, it may appear that such investments would only be done out of necessity rather than a means of generating business value. However, it is important to remember that business value of such investments are not simply squandered, as the pertinent data is polished, validated and organized in a new structure that allows for easier adherence to GDPR standards while also ensuring that the data is collected, stored and used more wisely for data analytics and possibly even for generating knowledge that may be usable for artificial intelligence (AI) solutions. As stated, the main challenge going forward is that so many organizations lack the readiness for GDPR, and possibly even the ability to afford to commit to the necessary investment needed to do so. To make matters worse, GDPR came into effect at the last week in the month of May, a time of year when large parts of the industry (especially the bank and finance sector) are reluctant to take on large-scale transformations as they tend to start scaling down their activities in preparation for the summer holidays. Adding to the burden was that the launch of GDPR came in the backwater of the recent implementation of MiFID 2, another large regulations project that has incurred large ramifications on the bank and finance sector (Finansinspektionen, 2019; Prorokowski, 2015). Many organizations in the bank and finance sector were already stretched thin following this reform that the implementation of GDPR came across as an anticlimax that did little to boost the motivation among the employees.

Organizations processing large volumes of data and sensitive data material may also face challenges in implementing GDPR (Ashton, 2018). Obvious examples of actors affected by GDPR are the "big tech" companies, such as Google and Facebook, but it is likely that smaller companies will be hit more severely, such as studios for online game developers (Kottasová, 2018). GDPR is expected to have a huge impact on both landlords and tenants, as both categories will gain greater control over their personal data (NLA, 2018). Other examples of affected industries are the health-care sector, as well as the aforementioned bank and finance sector. These sectors are all examples of industries that routinely collect and store personal data about their customers/clients; data that will need to be anonymized. To that extent, these organizations (and any other organization processing sensitive personal information) will need to take meticulous care and establish a rigid set of routines in order to ensure that the data is kept safe.

Another aspect to consider is that due to GDPR, all companies are subject to data cleansing, regardless of whether or not the data per se is considered "sensitive". Data cleansing (or "data scrubbing") refers to the process in which an actor identifies and removes/amends data within a database that is either incorrect,

incomplete and/or duplicated. Under GDPR, there is an added stipulation that data that is either irrelevant or unnecessary should be removed as well (GDPR Report, 2017). This is generally done in a bulk process, and with the GDPR implementation, this needs to be performed on a regular basis.

The process of data cleansing will force organizations to preemptively consider what types of data they wish to store about the customers, as too much stored data may lead to added bureaucracy down the line. GDPR will also prompt organizations to consider if any of the data they have stored is actually relevant to the organization's enterprise or if it borders on any potential gray areas, as the threat of sanctions may make the organizations more selective about what types of information they seek to collect and store (Ashton, 2018).

Another challenge to the organization's employees is that the new GDPR rules and its associated procedures may have a perceived steep learning curve. This problem should, however, be transient and will likely dissipate once the new routines become more commonplace. Furthermore, this challenge is inherent to organizations that have predated GDPR. New organizations founded after the implementation of GDPR will become "natives" of the new regulatory system and should be more equipped to handle the routines that follow in order to ensure GDPR compliance.

5. Businesses aided by GDPR

The onset of GDPR has oversaturated the market with services purporting to sell GDPR-compliant solutions and services (Ashton, 2018). These solutions tend to be comprehensive and seek to structure the documentation on the database systems the organization aims to use as well as help the organization keep track of what type of information that is kept in each database section, what classification the data has, and the reason for storing each particular dataset, along with the processes for data cleansing.

Another type of business that is bolstered by the implementation of GDPR, are the companies providing cloud storage. "Cloud storage" in this context refers to a model of computer data storage that stores digital data in logical pools. The physical storage spans multiple servers (possibly even in multiple locations), and the physical environment is generally owned and managed by a hosting company (Mohamed, 2018). The advantages for opting for a cloud-based solution is that it allows for a better optimization of IT resources as cloud solutions contain virtually unlimited scalability and have great flexibility, while generally also being cost-effective (Tolsma, 2018). Cloud services are also used to a large extent to store various GDPR-compliant agreements between, for instance, the data controller and the data processor (the person who processes data on behalf of the data controller) (Voigt and von dem Bussche, 2017; European Commission, 2019). Hence, we can expect to see an increasing number of cloud-service providers cropping up in the future, marketing themselves toward keeping GDPR data safe.

Needless to say, legal experts and lawyers are also expected to see a boost to their businesses following the implementation of GDPR. While software and

automated digital systems may guide organizations through the process easily and make data processing manageable, legal advisors/lawyers will help companies understand the implications of GDPR for their specific enterprise, while ensuring full GDPR-compliance (Rishikof and Sullivan, 2017).

The emergence of GDPR has given rise to a new profession, namely that of "data protection officer" (DPO). The function of a person carrying this title is to ensure that the organization handles data in a manner that complies with GDPR standards. That is not to say that a DPO is a required function in all organizations. Rather, the need of a DPO is contingent on a number of factors such as organizational size, if the organization is a governmental agency, or if the organization's core business is centered on large-scale and/or systematic monitoring of personal data, etc.

GDPR may also result in new assignments for consultants in digital strategy, as it opens up areas in which there may be need for various forms of advisory services, especially so given the urgency that many companies are faced with in ensuring complete GDPR compliance throughout their organizational processes.

Other professions benefitted by GDPR tend to be those that are veered toward structuring and/or building up foundations for data management. This may include professions such as software architects, solution architects, software developers and data-analytics professionals. In the future, it is not unlikely that AI-solutions will gain a greater foothold in the management of data, and thus, professionals who possess skills related to AI-programming are likely to benefit from GDPR, at least in the not-too-distant future.

By the same token, following the digitalization process, customers will indubitably expect "smarter" (i.e., more customized) products and services, which in turn is enabled by the possibility of companies to combine different pools of data that they may have on their customers. To that extent, the companies will have to walk a tightrope between delivering perceived value to the customers, while at the same time not acting in a manner that makes the customer feel uneasy and supervised. That is to say, upholding integrity and trust will be paramount for companies seeking to secure customer loyalty. In this respect, GDPR may help to strengthen the bond of trust between the companies and their customers in the sense that the customers feel if not empowered, then at least informed, by the ability to choose what information to share with whom, while also possessing the ability to withdraw their consent at their own behest.

6. Legal ramifications

The legal ramification of GDPR is that consent is much harder to obtain and prove due to the fact that the directive permits use of personal data only in limited and clearly delineated circumstances (Villers, Vonner and Nédélec, 2016). This, in turn, will most certainly prompt organizations to examine and re-examine how they collect and use personal data. The will results in there being much larger quantities of bureaucracy and paperwork documenting what personal data is used and in what way the organization uses it. The fines imposed by GDPR

for non-compliance are administered by individual member state supervisory authorities. If an organization incurs several infractions on the GDPR, it is fined according to the gravest infraction, rather than being penalized separately for each individual infraction. Nevertheless, this does not mean that recalcitrant companies are let off lightly, given the possible sums involved. Specifically, the following ten criteria are used when determining the sum of the fine issued due for infractions against GDPR (European Parliament and Council of the European Union, 2016).

- **Nature of infringement**: This denotes the number of people affected, the damage incurred, the duration of the infringement, and the purpose of processing.
- **Intention**: This determines whether the infringement is caused intentionally or by negligence.
- **Mitigation**: This concerns the actions taken by the organization to mitigate the damage to the data subjects.
- **Preventative measures**: This looks at how much technical and organizational preparation the organization had previously implemented in order to prevent its non-compliance (if any at all).
- **History**: This considers past relevant infringements, and past administrative corrective actions taken under the GDPR, ranging from warnings to bans on processing and fines.
- **Cooperation**: This considers how cooperative the organization has been with the authorities in remedying the infraction.
- **Data type**: This concerns what types of data the infraction impacts.
- **Notification**: This is contingent on whether the infringement was proactively reported to the supervisory authority by the organization itself or by a third party.
- **Certification**: This is determined by whether or not the firm had previously been qualified under approved certifications and/or if it had adhered to approved codes of conduct.
- **Other**: Aggravating or mitigating factors may include financial impact on the organization from the infraction.

As previously mentioned, at the upper level, organizations risk facing fines potentially equal to four percent of their company's global revenue, or €20 million (≈ USD22.3 million), whichever is greater (Ashton, 2018; Hart, 2017; Hon, 2016). This fine entails infractions against: (1) the basic principles for processing, including conditions for consent; (2) the subjects' rights (as outlined in the directive); (3) the transfer of personal data to a recipient in a third country or an international organization; (4) any obligations pursuant to EU Member State law; (5) any non-compliance with an order by a supervisory authority (European Parliament and Council of the European Union, 2016).

However, while the aforementioned denotes the higher level, there is also a lower level of infractions that carries a fine. This fine constitutes €10 million

(≈ USD11.2 million), or two percent of the worldwide annual revenue of the prior financial year, whichever is higher. This includes infractions of: (1) the controllers and processors as outlined in the directive; (2) the certification body as outlined in the directive; (3) the monitoring body as outlined in the directive (European Parliament and Council of the European Union, 2016).

7. Concluding discussion

This chapter sought to answer the research question: *In what way may GDPR influence the labor market of tomorrow, and what businesses are at risk?*

In answering this question, it should be stated that while GDPR had been in the pipeline for years prior to its implementation in May 2018, a 2017 survey showed that approximately 90% of all companies were poorly prepared for GDPR (Håkansson, 2017). Even still, many organizations struggle with securing full compliance throughout their data systems. According to a study conducted by Deloitte, one fifth of organizations only aimed for bare minimum compliance at the outset of GDPR (Gooch et al., 2018). However, the recruitment of DPOs appears to have increased internationally in recent times, with the UK in the lead with 92% of respondent companies having assigned a DPO. Since then, organizations have by and large been taking measures in continuing their GDPR implementation, with 92% of the respondents feeling confident in their long-term ability to comply with GDPR standards (Hawker, 2018). Notwithstanding, in the immediate term, many companies will still need to address today's challenges of responding to data requests, especially in terms of online tools, as these enable consumers to make mass data requests, which may in turn help the companies secure long-term customer loyalty (Gooch et al., 2018; Hawker, 2018).

Moving forward, GDPR aims to ensure that the personal data stored by companies is structured, which means it is machine-readable and stored in an interoperable format (Voigt and von dem Bussche, 2017). This can in turn aid the future development toward AI solutions. Still, ensuring that the data is structured can be a laborious and resource-consuming process that can have detrimental effects on some actors on the market. Specifically, this affects companies that collect and process large volumes of personal data. While the larger companies (i.e., the "big tech" companies) will likely manage to weather the storm, smaller companies processing large volumes of personal data (such as studios for online game developers) are likely to be hit harder by GDPR. By the same token, GDPR may also provide new business opportunities in other categories of ventures, especially for consultants in digital strategy and professionals with skill sets in analytics and software architecture.

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12 Players for hire

Games and the future of low-skill work

Edward Castronova

1. The coming wave of inequality

The technological system within which we live has irresistible imperatives to promote the development of more efficient means of production. Intelligent systems are increasingly deployed to perform work that low-skill humans used to do. At the moment I write, people are no longer employed to handle money, and those who drive vehicles for pay are in the cross-hairs of automated driving systems. It is apparent that most jobs that require little skill will eventually be done by a digital entity.

In the past, the invention of new machines for doing low-skill work caused disruption, but also led to an explosion of new employment opportunities for low-skill workers. In the Industrial Revolution, automated looms put weavers out of work, but they also created a factory system whose explosive growth provided employment and wages for millions of low-skill workers. It is often overlooked that the Industrial Revolution caused a population explosion of unprecedented magnitude. That would not have been possible if low-skill people were unable to find work that would feed many new mouths.

When a technological change puts millions of people out of work, a social change must necessarily result, one in which some work becomes available. With the factory system, the work that did become available was dirty, oppressive, harsh and crushing to the spirit. But it was work. People survived. They survived because, having lost their incomes from farming or weaving or whatever old craft they used to do, they sought about for some way to make money, some way to eat. In the nineteenth century, they found their way to factories. And so, populations migrated from countryside to towns, cities exploded in size, the urban proletariat was born, and so on and so forth. Automation put people out of work, but those people went off and did *something* else.

In our current moment we must ask, where will all the drivers go? Forrester predicts that automation will cause a net loss of seven percent of current jobs over the next decade (Forrester, 2016). That is just the beginning. If we think about the low-skill people who are about to be displaced, we can wonder, what sort of work will they be able to find? Or, be driven into? Their children will come of age knowing full well that they cannot live by the usual jobs of low-skill

people. By what means will these new generations of low-skill workers gather up enough food and housing to stay alive? For if there are any means at all, they will surely seek them and secure them. They will find something to do, something they can do that machines cannot, and that others who have means will pay them for.

Who are those others, the ones with means? They are the people with high skills. As the digital age progresses, there will continue to be high demand for the services of bright people, the creative ones, the emotionally intelligent ones and the best of the best human servants. Entertainers, technicians, engineers and performers of all stripes, will do better and better. Anyone whose special gifts are impossible for a machine to recreate will find themselves doing very well indeed. And then the other group who will do well, of course, are those who own the machines themselves. Those who own a share of the profits produced by machines will gain income at the same rate that the machines displace low-skill workers. Every time a self-driving car puts a taxi driver out of work, the owner of the car earns more money. Thus there will be three types of wealthy people: Those who own machines, those who design/build/operate machines, and those who provide services that only people can provide.

The system as a whole will get richer and richer. Every time a machine replaces a person, it does so because it is better at the job. It produces more at the same cost, or the same amount at a lower cost. Otherwise, there would be no reason to make the replacement. But this means that each time a machine does a person's job, the economy as a whole gets richer. More stuff is made at lower cost. Automation is a force for efficiency. It induces economic growth. It makes money. And that money will go to the people at the top, the people with ownership or irreplaceable skills.

Automation thus necessarily induces inequality, at least in the first moment. One man is out of a job, another man makes more money on his assets. But these unequal slices are part of a growing pie. The question becomes, what happens in the second instance – after the driver loses his job, after the car owner gains more wealth. What happens then? What new social arrangement might happen? Is there some new way that the rich person can hire the poor person? A new system whereby the money of the wealthy moves into the pockets of those who are looking for anything to do in return for money. If the car driver can no longer provide car-driving, can he provide something else?

In the very near future, we will be facing the reality of hordes of low-skill workers with no meaningful work. Indeed, this is already happening. In the late 1970s, 7% of men in their 20s with less than a bachelor's degree did no work at all in the preceding year. In 2015, the number was three times higher, 22% (Swanson, 2016). Unpublished research by economists suggests that large numbers of low education young men have abandoned the world of work simply because of the joys of video-game play. Facing a choice between seeking work or staying at home playing games, many young, low-skill men seem to be choosing the games. It is a sign that the real world of work is becoming less rewarding for those with low skills.

2. Options for the low-skilled

In the nineteenth century, low-skill workers went to work in factories. What will they do in the twenty-first century?

One common idea is that education can change these dynamics. It cannot. It is patently unfair to try to address this problem by pressuring people to go to engineering school. For surely all this will do is start an arms race among high-skilled workers. If the technological economic system requires only ten percent of the workforce to operate at full capacity, then only ten percent of the workforce will be employed as operators. Training up millions more people to have the necessary operating skills will only unleash a vicious competition among them, driving down the wages of those who do get the jobs. Consider: If you have 100 people whose skill is ranked from zero points to 100 points of ability, and you will hire only the top ten, it does not help anybody to teach them all five more points of skill. You will still only hire the top ten, the people with skills from 95 points to 105 points.

Skilling up the workforce only makes sense if there will be an increased need for high-skill people. But the dynamic of technological explosion in which we live is such that for every new high-tech job that is created, two lower-tech jobs will be destroyed. This is simply because people are more expensive than machines. The system will do everything in its power to get its work done with the minimum number of people. It is going to try to shed people whenever and wherever it can. Teaching low-skill people to be somewhat better technicians than they currently are is a losing strategy for them.

Instead, we must think of other ways that a low-skill person can do paid work for others. What kinds of things can low-skill people do that machines simply cannot? This question forces us to unpack the concept of "low skill". What we really mean, by now, is that low-skill people are the ones that machines can replace. They are currently working in a way that a machine can do. Whatever is special and unique about human thinking, whatever we have that machines cannot have, may well be present in the minds of the low-skill workers; but right now, that special sauce is not a part of their work. Low-skill workers may have high skills, at something; but the work they do today is work that a machine will be doing soon enough.

If low-skill workers are becoming defined as "those whose jobs will be automated", it follows that if those people are to survive, are to eat, they must bring up within themselves, and express to the world, some set of skills that cannot be automated. It also follows that the term "low skill" applies to a lot more of us than would have been expected under traditional definitions of the term.

Earlier I argued that the only people who will be compensated in the automated future are (a) those who own machines, (b) those who operate machines, and (c) those who perform services that only people can perform. If the low-skill displaced masses do not own machines and are unable to become operators, only one avenue of compensation is open to them: Service.

The question is, what kind of human-only services can low-skilled people provide, in massive numbers? For there will surely be huge masses of displaced

low-skill people. The answer here is not going to do tennis instruction or lawn care. In the future we are facing, if every rich person had 10,000 butlers and maids, it would still not be enough employment. The technological disruption will therefore drive some kind of huge social disruption that creates new ways for a few privileged people to move income toward massive numbers of the technologically unemployable population.

3. "Low-skill" people can play games

All of us can play video games, regardless of skill. The game industry excels at creating systems in which both angry lawyers and stoned teenagers can make their way. Games offer a range of skill challenges, by design. Games are designed so that all the players have fun, including those whom the outside world would call "low skill".

Skill effects within games are tightly managed by the designers. Designers make acutely conscious choices about when, where and how the real-life cognitive and physical skills of the players will have an influence on game outcomes. Games are now designed to adjust dynamically and automatically to the perceived abilities of the players. Is this player dying quite a lot? Remove some of the zombies. Not dying enough? More zombies! It could be argued that games are designed to reward skills that the market finds less valuable, precisely in order to capitalize on the way people feel underappreciated. The point is that whatever the outside world may think of skills, game design seeks ways to make every player appreciated, regardless of skills.

Designers also carefully manage when, where and how the real-life monetary resources of the players can affect the game. In many games, it is possible to spend extra money to get a better sword, or more life potions or unlock a faster horse or a new level. Whereas in other games, no amount of outside money can affect what you can achieve in the game.

Designers manage skill, money and time as well: Some players have quite a lot of time to spend in a game, others do not. It is up to the designers how long it takes to achieve things in the game.

As a result of these designer decisions, the game industry finds itself unwittingly serving as a vast global agora of skills, time and money. Designers can increase or decrease the impact of player skill, money and time input, and in so doing they give their games a certain profile. Different games appeal to different players. Players can move from game to game, according to their resources and tastes.

Some games are so big in scope, time length and space that they can accommodate widely different types of players. Different parts of a single game may appeal to the skill-rich, the money-rich and the time-rich. This is seen most clearly in the free-to-play revenue model. A game run on the F2P model opens its doors to anyone. Anyone can play the game, free of charge. At some point, however, some aspect of the game either requires or encourages payment. Perhaps the game has 100 levels, and the first 50 are free. You have to pay to unlock the other 50. Or the

game has 100 levels, all completely free, but it takes two years to get to level 100, unless the player buys some sort of special equipment. F2P games make money by charging for extra game features.

The free-to-play model has exploded across the industry in the last decade. It has turned out to be fabulously lucrative. A free game has the lowest possible barriers to entry, and can quickly gain a large population of players. Those players create buzz and excitement; they confirm to the world that it is a good game. Production costs are such that even if only a fraction of players ever pay for something, the revenues gained far exceed the costs of providing the game free to all the others.

It is understood colloquially among game designers that the revenues of F2P games follow the same patterns as casinos, in that a few big spenders are enough to make the casino turn a profit – even if you give free drinks to hundreds of low-spending people. These big spenders are known as "whales". The game industry has whales as well. There are people who spend thousands of dollars every month on the most trivial of game items. A very large portion of revenues are provided by a small percentage of the player base. Gamasutra reports that less than one-fourth of one percent of F2P players generate almost half the revenue (Rose, 2014). "Conversion rates" – the percentage of players who spend any money at all – can be as low as three percent or one percent, yet the game still turns a profit. The free spending of a few is sufficient to support the game.

What then is the role of all the other players? What purpose is served by all those people in the casino who drink their free drinks and gamble away comparatively tiny amounts of money? Those people are a critical part of the revenue model, for they form the social environment within which the whale can make friends, and compared to whom the whale looks like the awesome person he wishes to be. Without the free-drink gamblers, the casino whale has nobody to talk to and nobody to impress with his casino privileges and private rooms. The same holds for F2P games: Without the free gamers, the spending gamer has nobody to talk to and nobody to impress.

Thus there are two elements that explain why big spenders will provide revenues to companies that allow free access: A communion aspect and a comparison aspect. The communion aspect is easily enough understood: Rich people get lonely too, and a thriving game community gives them a social world for making friends. The comparison aspect is a little more complicated, so let us unpack the social dynamics of a F2P game. Consider three ways that a person might spend real money:

1 You can spend money on cosmetic items – better looking hats, a neat new car, a sword that glows or a cute pet. You look better in the game.
2 You can spend money to overcome or get by annoying parts of game play. Perhaps in order to play the next puzzle, you have to wait 20 seconds. That is annoying! So you can spend real money to reduce the wait time. Or, there may be a certain item that you need to get to the next bit of fun. Perhaps getting the item requires a lengthy, boring quest. So you can go through the lengthy, boring quest, or, you can just buy the item at the store.

3 You can spend money to enhance your power. This is usually known as "pay-to-win". In a PTW system, real money has to be spent to get a car with competitive speed, or armor decent enough to withstand serious combat. You can still play without these things, but unless you have great skills as a player, you will consistently lose.

Note that each of these ways of spending enhances a comparative difference between the spending player and everybody else. Cosmetic spend (1) enhances the social prestige of the spender, just as flashy diamonds do in the real world. Convenience spend (2) allows people who are short on time, or who are bored, to move quickly to more entertaining parts of the game. They get ahead quicker and look more competent with respect to the game systems. Competitive spend (3) allows people to dominate other people, to beat them and to get ahead.[1] In all of these cases, the spender looks better than everyone else. Compared to people who do not spend, he has better-looking items, he skips the annoying parts and he directly puts a beatdown on them. The spender is playing the game in first class.

Psychologically and socially, first class only exists if there is a second class. Thus the comparison role of all the free players is simply to be the second class. Their job is to sit in second class precisely so that the first-class passengers can feel good about having been able to board first, get better food and have more space. In an airplane, there are physical reasons why not everyone can have the privileges of the first-class passengers. But in a game, there is no reason at all. There is no reason whatsoever why a game company could not give all players the same privileges they give to spenders. Thus the lines that are drawn between the spenders and the non-spenders are wholly artificial. They exist only because drawing them induces the spenders to spend. And therefore, one of the main purposes of the free players is simply to be present in the environment as those-who-did-not-spend. Their job is to form a comparison group, against which the spender looks impressive indeed. And then, alongside that comparative context, to be available for friendship, camaraderie or romance. The free players make it a real social world, one worth paying for.

4. Playing games for money

Free-to-play games illustrate that there is a role in games for people who do nothing but play. They do not have to be smart, they do not have to be good, they do not have to be pretty, they do not have to be dedicated, honest or loving. They just have to hang around, and – this is important – be PEOPLE. The humanness of the members of a game society is essential to the formation of meaning in that society. Only human beings can serve. It is a job only people can do.

True, a savvy game operator could try to skunk his whales by populating his game with lifelike AI. But word would get around, and one whiff of people-faking would drive all the whales out overnight. The game Barbie Online had troubles because no real boys were signing up, so the company added artificial boys. It did not work; players knew the boys were not real and the game fizzled. The same

thing happened with Canadian dating site Ashley Madison: Many of the "women" on the site were bots, but it only took a few email leaks to bring the scam to light. It is one thing for one computer to trick one person in one interaction – the "Turing test." It will be a long, long time before a crowd of AIs can fool a crowd of people for years. It will be strange times, though, as game companies will guarantee sentient players the way grocery stores guarantee fresh vegetables. On the other hand, nothing kills a game like empty servers. Locations are designed to keep the real people bumping up against one another. Critical mass is critically important.

In games, we already see how valuable pure humanity is. Whatever the markets may say, pure simple humanity is a good thing. People with means are willing to pay money to be in community with other folks who get in for free. But how much will they pay? Is the willingness of big spenders to spend enough to send the street cost of game-playing into negative territory? Consider: Twenty years ago, all players paid the company for the right to play the game. These payments fell and fell. Now they are at zero across wide swathes of the industry. Why should not the price trajectory continue into negative territory? Can the spenders support not only the game-playing of poorer people, but their incomes as well?

Consider again the F2P revenue model. The iron equation of F2P is eLTV > eCPA + Ops, where eLTV is the expected long-run revenue value of a player, eCPA is the cost of acquiring that player, and Ops is the operations cost of the game. Generally, what seems to happen is that large numbers of free players are attracted into the game initially, but then most of them fall away. Over time, the paying players make up an increasing share of the player base. As this happens, companies spend less on acquisition.

What does "acquisition" mean? Typically, this is a marketing cost. Advertising – on mainstream TV, for example – can drive millions of players into a game. So long as the marketing costs (plus operations) are exceeded by the revenues that these players bring in, the marketing is worth doing.

We are considering here a second possibility, one that has not yet been tried but is surely around the corner: Paying players to play. If a large player base is important for a game, and if the main source of revenue comes from a comparatively small segment of the player base, it might well make sense for companies to pay players to come in. Paying players directly is just another acquisition cost. Instead of marketing to people, you pay them.

Initially, paying players will look like the lame maneuver by developers who lack confidence in their product. But the same was once said of developers who gave their games away for free. The stigma against F2P fell when the industry realized how much money it made. One can expect a similar acceptance of play-for-hire.

Some games are doing this already, though indirectly. In *EVE Online*, it has become possible for a player to earn enough in-game currency to purchase a pass that allows them to play for free for one month. The pass card replaces what would have been a real-money cash payment. Since the company sets the rate at which in-game currency can be earned, it is effectively paying the players for their

in-game labor, which it then allows them to translate into a good – the pass – that has real-world cash value. Another game, *World of Warcraft*, has a similar system. Indirectly, these games are hiring people to play.

And why not? Economics teaches that transactions should occur whenever they are beneficial to both parties. Companies will almost surely gain from paying players; it is probably more efficient than marketing at getting people into the game. As for the player, it is surely the case that for some people, earning money in a game is just better (almost as lucrative and much more enjoyable) than earning it out of game. The in-game compensation is better than the out-of-game compensation. It is a better job, all things considered: For for-hire players, one suspects, the money would be just so-so, but the work environment would be outstanding.

This applies especially to the situation of a low-skill worker who has just lost a job to automation. His choices are to take a worse job (that he will surely lose in the near future), try to skill up or go begging. What person facing this situation would not leap at the chance to earn money while playing a video game? Thus it stands to reason that the number of people willing to work in games, even for small amounts, will increase as automation does. Paying players to pay generally makes sense for the game companies, and will make sense for more and more workers as time goes on. It is a practice destined to grow.

The typical dynamics of player bases – with the free players coming early but then leaving, while whales stick around – suggest that the practice of paying players to play games will be concentrated at the launch of a game. The company will allocate budget to the hiring of millions of players, anticipating that they will be in the game for a relatively short period. Over time, these player wage costs will fall. Yet while the for-hire players are there, the whales will become dedicated to the game for the long haul. The spending of the whales will then sustain the game for a long period. As for the for-hire players, their lifestyle will be one of migrating from game to game, picking up rewards during the launch phase of new games and then moving on when the money starts to dry up.

5. How play for hire will emerge

Right now, the environment for compensated play is clouded by overlapping institutions and regulations. Games often have multiple currency systems in place. The real world does too, of course. Laws and regulations constrain this space in ways that nobody yet understands. Yet some things are clear.

The practice of working for money online has become widespread if not yet common. New research indicates that large numbers of people around the world participate in a global market for online jobs (Lehdonvirta et al., 2015). Oxford University has recently launched the world's first Online Labour Index (University of Oxford, 2016). The online labor market exists and seems to be growing.

Precedent also exists for the idea that wealthy people can pay extra money to make a game more enjoyable. Games have their shops, and game companies accept credit cards, debit cards, PayPal and various kinds of points and credits and

time cards and what have you. There should be no problem sending purchasing power from the vaults of the rich into the vaults of the game developers.

It is the ability of poorer people to get money *out* of games that faces legal questions. In principle, a game company could simply hire players as employees. This is highly unlikely to be a first step (or a second or a third or a seventeenth), however, since the regulatory overhead on hiring is incredibly burdensome. What is more likely is a system that evolves from payment practices that already exist.

Under current US law, anyone who makes money in a game has to report the earnings when they are liquidated in the form of real-world currency. It is not clear what would happen if someone were to earn gold inside a game and then trade that gold for something in-kind, like rent. But this could happen. It could happen today, in fact.[2] A player can already earn in-game money and give it to his landlord in lieu of rent. Players can already sell their game assets for real-world cash. Thus there is already some precedent for players to be able to transfer some of their in-game earnings into outside purchasing power.

Also it is important to realize that the world of finance is facing a wave of disintermediation. Technology is beginning to allow an almost unlimited variety of ways to transfer purchasing power among people. Technology also allows game companies almost unlimited ways to craft incentives without falling afoul of the law. For example, today, one would not want to allow whales to directly hire underlings within a game for anything that could be liquidated, because this would enable money laundering. But there is no opportunity for money laundering if whales pay USD1 million to the game company and the game company provides one million piles of random, sellable loot worth USD1 on the eBay market.

There might evolve a market that translates game time into game assets, such as time cards, that can then be quickly and easily traded for real money on the outside. Or a game company could make a deal with a credit-card company so that game time yields bonus points on the card. Since the card can be used to pay rent and buy groceries, the game time translates quickly into real purchasing power. Current law covering these points systems does not handle them as income, so there would not apparently be any tax or reporting burden. Another possibility would be to pay players with an undercover currency, such as Bitcoin. These types of changes will represent a minimal disruption to current practices, but they will be the first signs of an emerging general change in employment patterns.

Once the basic idea is established of paying players to play, there will be some sort of legal and regulatory push to normalize the practice and make it explicit. There will be controversy. Initial objections will come from different parties. Developers, or at least the purists among them, will say that paying players to play undermines the whole idea of a game. Perhaps it does. But since it makes economic sense, it will happen anyway. Pundits and lawmakers will say that players are being exploited, that games are becoming sweatshops. Perhaps. But as inequality reaches soul-crushing levels, sweatshop employment within a game will look like a fairly humane alternative for people who cannot find work. Academics

will lament the transfer of inequality and oppression from the real world into the game world. Yes, that will be sad. But since it will allow some people to eat who otherwise would starve, it will have to be accepted. The transition will be no different from that which drove farmhands into the factories. Sad; much was lost; but it was the best alternative. Social critique, policy and aesthetics will have to give way. That is why it is called *disruption* and not merely *change*.

After the play-for-hire model has been normalized, low-skill work will shift into games on a large scale. It will be found that for most people who do not have a particular skill or an inherited lump of wealth, one of the best ways to spend time is to play games and, with the meager earnings, make the best life one can. Consider the minimal lifestyle necessary to sustain a full-time job playing games:

- 2000 calories a day
- 100 square feet of living space
- Internet access
- Game gear
- A few pieces of furniture

Given that the work can be performed anywhere with internet, the costs of space and food can be very low. The needs of a working gamer will cost no more than a few dollars a day. Although, to us, this looks like a terrible lifestyle indeed, remember that this person is spending all of his time inside a game, a place designed to make him feel quite good. True, there will be other people in that space who are doing even better. The people with money to spend in there will do so, and they will have the most powerful weapons, the fastest cars and the best-looking outfits. Yet the in-game difference between the rich and the poor can be managed in ways that are impossible out-of-game. The wealthy people in the game can be shown how very wealthy they are, while the poverty of the poor can be hidden from the poor themselves. The comparisons of rich and poor, and the emotions and self-esteem of them all, can be managed by the game developers. Thus while the outer world will provide nothing but glaring contrasts, the in-game world will be everything to everyone.

As developer Gordon Walton once said, "Everybody wants to be a hero" (Castronova, 2013, 15:25). In the play-for-hire game, everyone will still be a hero. But some of them will be paying a lot of real money to be a truly amazing hero, while others will be receiving a very modest amount of real money to be a pretty good hero. They will all be happy. And by this means, the vast wealth produced by automation will trickle down from the owners and the operators to the low-skilled. For it will turn out that the low-skilled were not all that low-skilled after all. They all have something that every human has; an ability to entertain other humans, just by being human. Every player of a game provides entertainment for every other player. It stands to reason that some people, even many people, could get paid to do this entertaining. And the job of being an in-game entertainer will become ever more attractive as the jobs available in the outside world steadily decay.

6. Concluding discussion

6.1. A timeline

The developments discussed in this chapter are already underway. I am told that developers have been aware of the option to pay players but have held back because of legal and regulatory barriers. And yet, as we have seen, young low-education people are already exiting the workforce in much larger numbers. Games are already taking advantage of distinctions between time-rich, skill-rich and money-rich players. The net cost of playing games is becoming negative for some players.

6.2. Within five years

These trends will result in the implementation of a new business model in the game industry. At least one game will innovate around current regulations and set up a system in which most players are given financial incentives to play. The incentives will be indirect: Points on a card, virtual items that can be sold for money, etc. These will be known at first in the industry as "player-retention incentives". They will probably enter discussions as a way to lower churn in the player base, to keep lukewarm players around who might otherwise leave. The game will have a strong pay-to-win element, and will earn huge revenues from spenders. Compared to these revenues, the costs of "player retention incentives" will seem trivial.

The next game in the cycle, still within five years, will go a step further and offer "player retention incentives" to all players from the beginning. This model will also succeed, and the industry will become aware of the new model. After that, most new games will try to develop innovative ways of paying their players.

6.3. Within ten years

These innovations will be complete. Game companies will have created streamlined and efficient ways to channel purchasing power from richer players to poorer ones. A share of the revenues provided by whales will be spent efficiently to generate launch buzz and possibly to keep the overall player numbers up. This will be a standard tactic in the industry.

At the same time, in the outside world, automation will continue. Job prospects for low-skill workers will keeping eroding until it reaches the point that the reservation wage – the minimum wage for which a worker is willing to take a job – will have fallen well below the legal minimum wage. This means that low-skill workers will have greatly increased their willingness to work in games. For many young people, the fantastic work conditions will more than offset the low pay that games offer. Working in games will be more attractive than any job available in the real labor market.

Nonetheless, at this point the game workers will still not generally see themselves as such. They will see themselves as unemployed and unemployable. Yet they will say that they are keeping themselves afloat by going into games and

"playing smart", bringing out whatever purchasing power they can. It will at first go almost completely unnoticed that that purchasing power is becoming large enough to cover the meager costs of living which most low-skill workers have come to see as normal. Low-skill people will have become accustomed to living far away from urban centers, with no car, no entertainment, minimal clothing, basic housing, no health care and poor food. Their lives will be lived on the internet. And on the internet, through pay-for-hire games, they will earn enough to support their minimal bodily needs.

6.4. Within 20 years

These trends will have changed the relationship of low-skill people to the labor market. Among those who have no technical abilities and no ownership shares of capital, many if not most will earn their living within multi-player online environments. There will be millions of play-for-hire players all across the globe. If populations in China and India participate, the numbers will be in the billions. For-hire players will have become conscious of this social role; they will understand that playing is their contribution to society. They will express pride at the quality of their play. Indeed, those who do not "pay-to-win" will be quite proud of their hard-earned accomplishments relative to the wealthy who buy their way forward. Players will see themselves as experts in their game of choice and will think of that virtual place as an important social and even political entity. Players will be organized into pressure groups. There will be uprisings and strikes and boycotts in games where compensation is deemed unfair. Meanwhile the wealthy will jump from game to game, always seeking the very best experience for their money. The sad history of inequality and politics will gain a number of new chapters, this time online.

Of course, there are a number of trends that go in a different direction. Fertility is falling in the developed world, which undercuts any labor-surplus argument. In the developing world, incomes are rising, which should increase demand for goods from developed countries. Half the population – women – do not seem to fall into intensive game play in the way this argument assumes. Any prediction could be wrong.

Yet there is a trump card here: The argument here is ultimately driven by technologies of AI, robotics and virtual reality; and technology, at this state of evolution, is beginning to dominate every other trend. It is not unreasonable to assert that tech is becoming the only trend that matters. Technological change has become so powerful and rapid that it is now fair to say that tech does not react to society, tech creates society. That includes everything: Law, gender norms, employment and, of course, games. Even climate change, that great problem of our time, will fade as a public issue as technology remakes how we live. How much energy is required to keep five billion unemployed people happy in their comfy, VR-enabled chairs?

If technology is truly a dominant force, then we can expect technologies of entertainment and automation to create a vast labor market for low-skill game players. It is a new service sector that will thrive in decades to come.

Acknowledgments

I am grateful to Mike Sellers, Joshua Fairfield and Isaac Knowles for helpful comments.

Notes

1 Industry insiders say that PTW motivates spending far more than the other two. At the same time, in US culture at least, PTW generally outrages the player base. As a result, the PTW angle is less used in the United States. In other cultures, PTW is considered acceptable. Game designers try to design PTW in such a way that it makes money on net, that is, so that the added revenue from purchases offsets the lost revenue from players who quit in anger.
2 In China, the game currency QQ Coin was being used as street money until the Chinese government quashed it. However, quashing currencies is a tough task. Black markets always survive.

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13 The global gig economy

Toward a planetary labor market[1]

Mark Graham and Mohammad Amir Anwar

1. Introduction

> *The more production comes to rest on exchange value, hence on exchange, the more important do the physical conditions of exchange – the means of communication and transport – become for the costs of circulation. Capital by its nature drives beyond every spatial barrier. Thus, the creation of the physical conditions of exchange – of the means of communication and transport – the annihilation of space by time – becomes an extraordinary necessity for it.*
>
> – (Marx, 1973, p. 524).

Our world of work is seemingly in crisis. Everywhere we look there are bold proclamations about the ways that technologies are expected to destroy, move and deskill jobs.[2] This chapter seeks to begin from these visions of a rapidly changing world of work, and argue that we are witnessing the emergence of a "planetary labor market" in digital work. By changing the geography of work, a planetary labor market introduces some serious concerns for the livelihoods and structural power of workers. Now more than ever is David Harvey's (1990) famous maxim about the relative power of capital over labor relevant.[3] This chapter points to a need for a reinvigorated program of research and activism to tackle this fact.

Today's online outsourcing platforms host all manner of jobs: ranging from click-work to the training of machine-learning systems to transcription to live personal assistance. These online outsourcing platforms, by becoming key intermediaries in the labor process of outsourced work (Casilli and Posada, 2019), potentially augur a radical shift in the scales at which capital can interact with labor.[4] Upwork, a platform that boasts of having 12 million registered workers, explains the advantages to clients with the following text on their website: "online work can happen wherever there is a reliable internet connection – an office, home, café, or rooftop. This also means you can choose who you work with, among a larger pool of people from around the globe" (Upwork, 2019, para.2). One of the world's largest online outsourcing platforms, Freelancer.com (2019), display their logo and the statement "25 million lives changed" over a map of the planet (noting that their location is "everywhere"). Similarly, Appen, a platform company with workers who train machine-learning systems in 180 countries,

explicitly advertise their "global crowd" of workers on their website (Ruby, 2019). The increasing digitalization of work and recent advancements in automation and communication technologies do not just augment the labor process with digital data, digital processes and machines; they also embed it in stretched-out networks of production: with tasks quickly passed in complex assemblages from person to person, person to machine, and machine to machine.

While these arguments are better covered elsewhere, this chapter instead seeks to build on them to make an argument about the spatial implications of these changes.

We will use online outsourcing/platform work as a key case of "digital work" in the rest of the study. Work, in other words, done over the wires and mediated through a platform; work that does not necessarily require proximity between the worker, the work itself and the site of the immediate delivery of the work. The relative lack of fixed organizational infrastructure needed for the online outsourcing sector means that it can be characterized by a broad geographic spread. Unlike traditional forms of employment, companies that outsource digital work, and platforms that mediate those relationships, tend to avoid any formal employment of workers and do not need to share proximity to workers. Jobs are instead listed on digital platforms that allow workers to bid for them. These jobs might take anything from minutes (e.g., click-work or image-tagging) to months (large writing tasks or web design) to complete. According to Heeks (2017), there are about 70 million registered platform workers globally, in the market for work that the World Bank estimates will grow to USD15–USD20 billion by 2020 (Kuek et al., 2015). The economist Guy Standing (2016), meanwhile, predicts that by 2025, platforms will mediate one-third of all labor transactions. The scale and scope that some of these platforms can achieve is in part driven by the development of planetary-scale infrastructures of computation (Bratton, 2016).

Because of the rapid rise of digital work around the world, we ask in this chapter whether we are seeing the emergence of a "planetary labor market" in digital work. To answer this question, we outline the scalar and spatial changes that have been occurring in labor markets, review their implications for the balance of power between labor and capital, and advance some possible responses to ensure that we do not get trapped in a global race to the bottom in which there are constant downwards pressures on wages and working conditions.

The argument that we make here is largely conceptual. However, we illustrate our argument with examples from a five-year (2014–2018) study of digital work in some of the world's economic margins. We conducted semi-structured interviews with 65 online platform workers in South Africa, Kenya, Nigeria, Ghana and Uganda, recruited from one of the world's biggest online labor platforms, Upwork. We sought maximum diversity in our sample, and our respondents were characterized by a range of different attributes, such as number of hours worked on the platform, different types of work activities and income earned. Most workers in our sample had multiple accounts on various platforms such as Freelancer.com, Fiverr.com and Peopleperhour.com. We also recruited Upwork workers through social media (Facebook and LinkedIn) and snowballing. The primary sampling

goal was to ensure a diversity of worker experiences. As such, this chapter presents selected cases that indicate the existence of activities, issues and concerns rather than a representative view. Through the interviews we sought to understand the socioeconomic background of workers, the nature and types of work done by these workers, career prospects, livelihood challenges, income, worker-worker and worker-client interactions, strategies to win bids, to stay competitive, to demand higher wages and negotiate working hours and actions to avoid the various risks inherent to platform work. All the worker names have been changed.

2. Moving beyond local labor markets

To describe what is meant by a planetary labor market, it is first useful to describe what labor markets are. A nineteenth-century hiring fair, such as the one described by Thomas Hardy in *Far From the Madding Crowd*, is used by Fevre (1992), in his book about the sociology of labor markets, as a way of illustrating an abstract definition of labor markets through five key distinct processes. These are: informing employers (employers learning about availability and skills of workers), informing workers (workers learning about jobs), screening workers (employers obtaining enough information about workers to decide if they could be hired for a job), screening employers (workers learning about their employers) and offers to buy or sell labor (the actual negotiations and pitches made by workers and employers). Labor markets, in other words, are a way of describing a convergence of workers and employers in specific places and times. While scholars as far back as Karl Marx posited that this convergence in competitive labor markets is a fundamental characteristic of capitalist society, various planned economies in the late twentieth century likewise relied on the concept of a labor market to govern the management and distribution of the labor force (Brown, 1970).

In Hardy's hiring fair, the spatial and temporal co-presence of agricultural workers and employers allowed the five previously-mentioned processes to converge. However, while co-presence has traditionally been a necessary condition for most of these conditions, it has not been a sufficient one. Kalleberg and Sorensen (1979, p. 351) define labor markets as "the arenas in which workers exchange their labor power in return for wages, status, and other job rewards. The concept, therefore, refers broadly to the institutions and practices that govern the purchase, sale, and pricing of labor services. These structures include the means by which workers are distributed among jobs and the rules that govern employment, mobility, the acquisition of skills and training, and the distribution of wages and other rewards obtained contingent upon participation in the economic system." But, ultimately, those institutions and practices still require some level of space-time convergence between employers and workers.

It is important here to distinguish between the way that labor markets have been conceived in orthodox classical economics, and their actual characteristics. Orthodox conceptions put forward a perfectly competitive market that can provide both firms (buyers) and workers (sellers) with perfect information. Wages are set by the relationship between supply and demand, and "workers can move

freely in response to changes in supply and demand in different parts of the market" (Kalleberg and Sorensen, 1979, p. 354). Kalleberg and Sorensen (1979) give examples of such markets as the migrant labor market in California, and the 1970s labor market in Afghanistan. In both cases, wages were relatively uniform and institutional forces only had a small influence.

In practice, it is rare for labor markets to fit these sorts of perfect property, instead, labor markets function in imperfect and uneven ways. Workers comprise different classes, genders, races, nationalities and other groups that can get segmented into different functions in labor markets. These markets are further built on, and performed through imperfect information, irrational social behaviors, politics, institutional arrangements and practices, customs and prejudices. As Peck (1996, p. 5) has argued, labor markets are "socially constructed and politically mediated" arenas, "structured by institutional forces and power relations". Thus, we get segmented labor markets functioning at multiple scales and spaces to produce variegated outcomes for workers (Grimshaw et al., 2017). In these segmented or split markets, workers have little opportunity to cross into other groups and are thus constrained to a limited set of outcomes: with factors like gender or race influencing segmentation (with, for instance, women earning lower wages than men) (Bonacich, 1972; Reich et al., 1973).[5]

The takeaway point here is that labor markets function in complex, imperfect, exclusionary ways. When speaking about a physical meeting place, like a hiring fair, the very concept serves as a multi-scalar abstraction. We use the idea of national or regional labor markets not to imply that everyone in those nations or regions have equal opportunities to read or access the market; but rather as a way of indicating that there are distinct economic, social and political enablers and constraints that put rough, porous, but still real geographic boundaries around Fevre's five processes. This is not to say that workers are not enrolled into global-scale associations and production networks. Indeed, workers in many economic sectors have been for centuries (Hunt, 2002). But, as Fevre (1992, p. 14) notes, "Labour markets need have neither a fixed time nor a fixed place, but they must have some sort of time and place otherwise how could people use them? If they do not know when and where, workers cannot find jobs and employers cannot hire workers".

Much of this discussion assumes a located place of work – a farm, factory or office that a worker needs to be physically present in, in order to perform their duties. But, as the nature of work changes, so too must our conceptions of the boundedness of labor markets. Here it is useful to draw on the concept borrowed from geography of a relational understanding of space (Massey, 2005). Rather than only thinking of space as a canvas, it is rather something that can also emerge from social relations (Hudson, 2001). This vision of space as relational and emergent, rather than pre-existing, is useful because it offers a productive way of understanding the impact of digital technologies on labor markets. Stephen Graham (1998, p. 174), in an influential piece on the intersections between technology and space, builds a relational understanding, noting that "such a perspective reveals how new technologies become enrolled into complex, contingent and

subtle blendings of human actors and technical artefacts, to form actor-networks". He continues: "new information technologies, in short, actually resonate with, and are bound up in the active construction of space and place, rather than making it somehow redundant".

If we apply these sorts of understandings to the contexts of work, the boundedness of earlier visions of labor markets evaporate. Building on an actor-network understanding of work as constituted through a broad range of associations with objects, Jones (2008, p. 12) further argues that "working practices, the experience of work, the nature of workplaces and the power relations in which people's working lives are entangled require a theoretical understanding of global-scale interrelationships if they are to be properly understood". Describing how work is increasingly performed through global networks of human and non-human objects, he adds: "Contemporary work is becoming less constituted through localized, physically-proximate relations and increasingly constituted through distanciated relations. These multiple spatial associations increasingly extend to the planetary scale" (p. 14). This starting point – moving beyond an understanding of work as inherently local – allows Jones (2008, p. 15) to then build his "global work" thesis:

> Rather than understanding work as a practice undertaken by social actors located in discrete material spaces and framed in a linear chronology, work is reconceptualised as a complex set of spatialised practices involving humans and non-humans . . ., and which is constituted in relational space with a disjunctive, non-linear chronology. . . . This is 'global' work because this reconfigured concept captures the qualitative degree to which all work practices are constituted through distanciated . . . socio-material relations.

As the places of work move beyond single locations, this offers us a pathway for thinking through the impacts of globalization on workers.

3. Toward a planetary labor market

Although the "global work" thesis is useful for providing a framework that allows us to carefully think through the impacts of globalization on workers and the ways that the places of work move beyond single locations, in the rest of this chapter we will argue that it is important to think about the relationships between employers and workers as more than simply distanciated social relations. Using the idea of a "planetary labor market" allows us to show that not just work can be highly (globally) connected, but rather temporary states of co-presence between workers and employers can be brought into being. Like Jones (2008), we build our understanding of a planetary labor market on a relational understanding of space. Specifically, we draw from Doreen Massey (1993, p. 61) who argued that:

> Different social groups and different individuals are placed in very distinct ways in relation to . . . flows and interconnections. This point concerns not

> merely the issue of who moves and who doesn't, although that is an important element of it; it is also about power in relation to the flows and the movement. Different social groups have distinct relationships to this anyway-differentiated mobility: some are more in charge of it than others; some initiate flows and movement, others don't; some are more on the receiving end of it than others; some are effectively imprisoned by it.

As such, the moments of co-presence that will be described later in this chapter rarely fit either the orthodox idea of labor markets or resemble Hardy's nineteenth-century hiring fair. While digital-work platforms have enabled the potential coming together of employers and workers on a planetary scale, the labor market for digital work that is developing is characterized by both asymmetrical scalar relationships and uneven spatial ones: with workers and employers having very different possibilities to read and participate in the labor market. In other words, the argument put forward in this study is that a planetary labor market is not simply a "global" extension of Hardy's hiring fair. It facilitates coming-togethers that can transcend the spatial boundaries that constrained the convergence of employers and workers, but remained shaped and characterized by multi-scalar and asymmetrical technological, political, social, cultural and institutional factors.

3.1. Applying Fevre's characteristics

This section returns to Fevre's (1992) five characteristics of labor markets ("employers learn about workers, workers learn about jobs, employers obtain information about workers, workers obtain information about employers and offers to buy and sell labor transpire") and asks how they apply to the planetary labor market brought into being through online outsourcing. Within each of the following sections, we outline a range of concerns that relate to the structural power of labor *vis-à-vis* that of capital. This strategy is neither intended to imply that these are the only concerns, or that there are not benefits (such as flexibility) to workers at the individual scale.

3.1.1. Employers learn about workers

In the case of online outsourcing, employers (i.e., "clients") have genuine planetary reach when learning about workers. Employers list requirements needed from their workers on online labor platforms, and workers from around the world then bid on those jobs – allowing employers to collect certain information they need about any potential worker. The fact that online outsourcing platforms tend to have a massive oversupply of workers on them (Graham et al., 2017b) means that workers are eager to supply any information that potential employers require. This will typically include location, ratings, reviews, previous clients' feedback, but may also include work history, previous experience, number of hours worked, education and a host of interpersonal skills. When we compare the ways in which employers learn about workers to the ways that workers learn about jobs, the

scalar differences in how workers and employers can read the planetary labor market become apparent.

Figure 13.1 shows where workers on the world's largest online labor platforms are based (Ojanperä, 2019). It demonstrates that Upwork and Freelancer's claims to host workers from almost everywhere on the planet are true. However, it is also obvious that there are distinct patterns to the supply of online labor power with large concentrations of workers in a few countries. Employers can join these platforms to either find workers in specific places (for instance when language skills are needed) or to put a job out to competition from workers that can be located anywhere.

This huge number of people who sign up to look for jobs ends up creating a huge oversupply of labor. In Table 13.1, we present data collected from Upwork on a single day in October 2018, to estimate at the potential oversupply of labor on the platform. The table compares the number of people signed up on the platform by country, with the number of workers who have ever earned at least USD1 or worked at least one hour on the platform. Even with such a low threshold of what constitutes work, we see a massive oversupply in the sample of countries in Table 13.1. Globally, less than seven percent of people who register for jobs are ever able to secure one.[6]

While the geography of online labor is far from equally spread around the world, the relative ubiquity of digital connectivity, and the affordances that digital labor platforms provide, mean that employers can now find new workers on the other side of the world in minutes, as long as workers have relevant ICT tools and internet connectivity. However, for workers, the combination of the global market and the oversupply of labor power (or at least the perception of the oversupply of labor power) is experienced as something that significantly depresses the wages they are able to command (see also Graham et al. (2017a) and Wood et al. (2019) for more on this point). Adele, a data-entry worker in South Africa described how this situation played out on the platform Upwork: "You go apply for a job and somebody else will come and apply for less than dollar. Other people are bidding too low and it was people from the Philippines and India. I was angry because they bid too little and . . . Yet they are happy. Yeah, I was quite pissed off there; I was like no way are they doing this!"

3.1.2. Workers learn about jobs

Workers on online outsourcing platforms naturally have a geographically expanded pool of jobs to bid for, compared with the jobs available in their local labor markets. Most platforms allow workers to bid for jobs from anywhere. However, this differs from a simple state of co-presence for two reasons. First, while workers can learn about task vacancies on platforms, clients often reveal relatively little about themselves. Second, these platforms tend to facilitate vertical communication rather than horizontal communication (between workers), thus limiting the associational power of workers.

On the first point, the ability for workers to learn basic information about the jobs, but relatively little about their bosses is particularly pronounced for workers

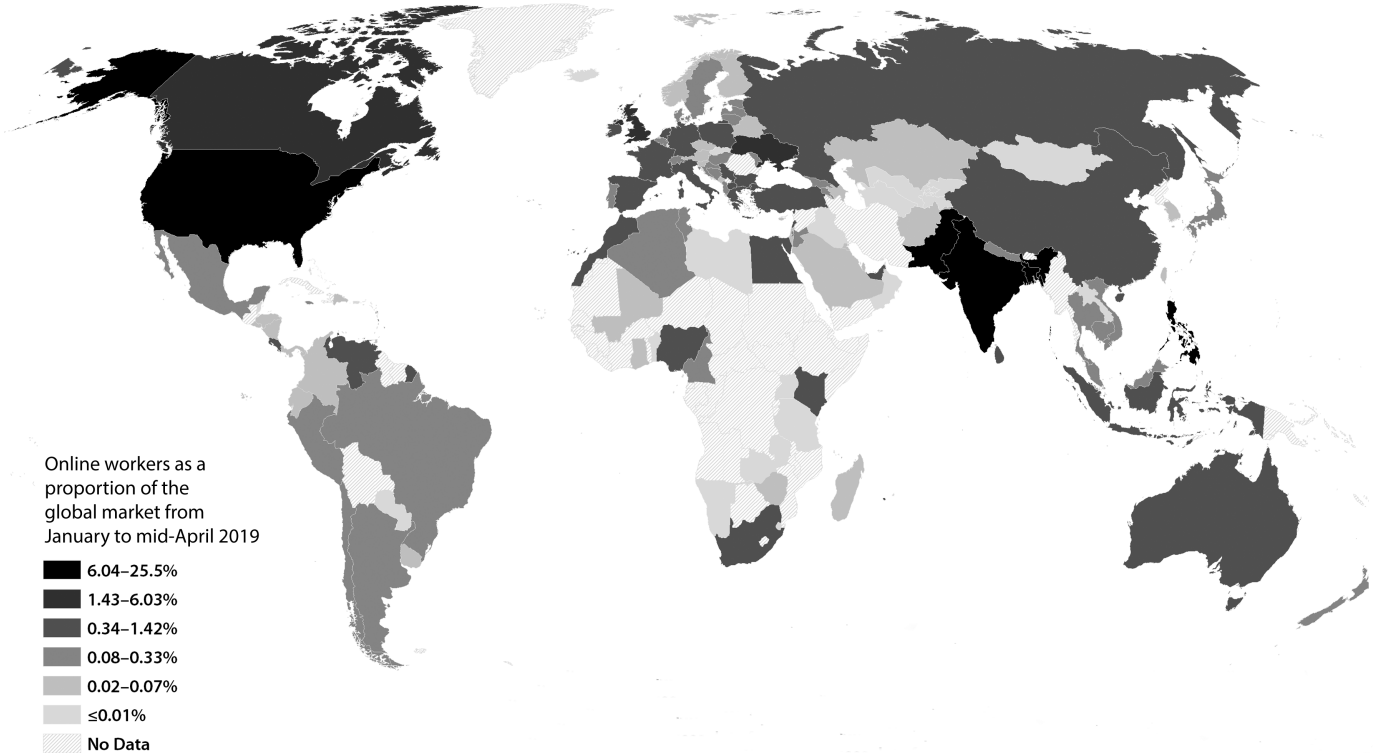

Figure 13.1 The availability of online workers (Ojanperä, 2019).

Source: Reproduced from Graham, M., and Anwar, M. A. 2019. The Global Gig Economy: Towards a Planetary Labour Market? *First Monday*. 24(4). doi.org/10.5210/fm.v24i4.9913 under Creative Commons license.

Table 13.1 Oversupply of labor on Upwork.com.

Country	*Potential workforce*[a]	*Successful workers*[b]	*Over-supply*[c]	*Over-supply percentage (%)*
Global	1,891,648	128,259	1,763,389	93.2
United States	581,717	23,845	557,872	95.9
India	249,698	22,772	226,926	90.8
Philippines	164,757	18,869	145,888	88.5
Pakistan	66,681	6,032	60,649	90.9
United Kingdom	56,644	2,924	53,270	94.0
Ukraine	55,604	8,506	47,098	84.7
Egypt	35,299	1,295	34,004	96.3
Kenya	18,508	898	17,610	95.1
Malaysia	13,385	317	13,068	97.6
South Africa	12,723	593	12,130	95.3
Nigeria	8,032	297	7,735	96.3
Vietnam	7,574	669	6,905	91.1
Ghana	1,656	50	1,606	96.9
Uganda	1,176	31	1,145	97.3

a. Total searchable worker profiles.

b. Worker with at least USD1 earned.

c. Potential workforce minus successful workers.

Source: Data for October 24, 2018, collected and analyzed by the authors.

doing short-term and fixed-price jobs such as document conversion, transcription and writing jobs. Some longer-term jobs such as web-chat support, digital marketing and virtual assistants should in theory allow workers to learn more about clients and their businesses over the course of time and therefore build a relationship of trust with them. Yet, even with these longer-term jobs, many workers struggle to get to know their clients. A Kenyan data-entry worker, Eidi, noted that despite working on a content generation project for over a year, she only knows her line manager who sits in Uganda and has no idea who the main client is, or the owner of the project. Some clients do not tell workers in detail what the job actually requires them to do (see Figure 13.2, simply advertising "repetitive" work).

Here it important to remember that the affordances of online outsourcing platforms are designed for workers and clients to connect with one another, rather than for workers to connect with each other. Historically, the inability for workers to have any effective virtual co-presence has severely limited associational power (Wood et al., 2018). While Fordism enhanced workplace bargaining power (based on the ability of workers to threaten to stop the entire production chains) by uniting workers at the point of production (i.e., physical factories), it decreased marketplace bargaining power (based on the possession of scarce skills and low levels of general unemployment) by bringing a global reserve army of labor under capital's control (Silver, 2003). The point is if by fixing labor in a place often gives it power, it can also be undermined by multiple spatio-temporal fixes created by capital since the crises of the 1970s (1973 oil price crisis, 1973–1974 stock market crash, the fall of the Bretton Woods System) (Harvey, 2011, 2001).

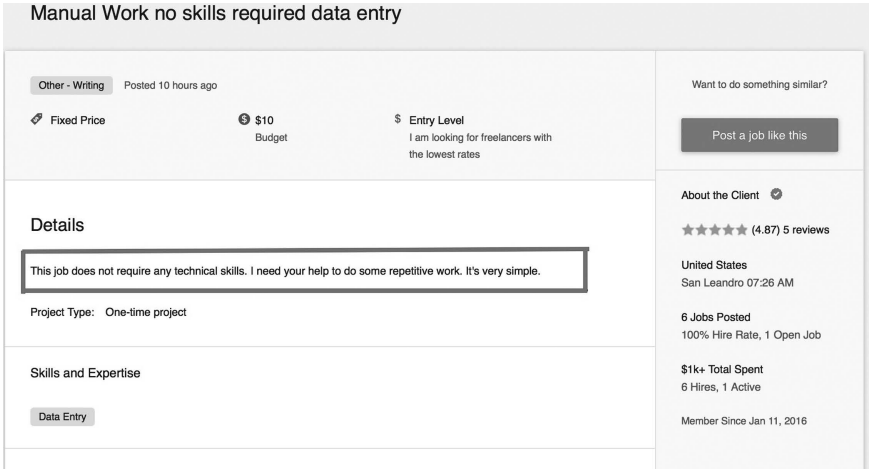

Figure 13.2 Job advert on an online outsourcing platform, revealing little detail of the task being advertised.

Source: Authors' own depiction.

Put differently, relocation of production gave new entrant labor forces a sense of class identity and bargaining power at the workplace, but the ease with which production can be relocated meant an undermining of marketplace bargaining power and threats of job losses. The mobility of capital through the reorganization of production techniques (fragmentation and relocation of production) has tended to weaken the associational power of workers due to the incorporation of a mass of unemployed and unorganized workers who are hard to unionize. Workers lack a sense of collective identity as a working class and a weak state regulatory framework delegitimizes trade unions, making it incredibly hard for such organizations to deliver benefits to workers (Silver, 2003).

These trends have continued with the emergence of digital work that can be performed by a global pool of unorganized workers separated by large physical distances, and workers lacking common linguistic and cultural characteristics. The inability for platform workers to have any effective virtual co-presence severely limits their associational power (see also Wood et al., 2018). This largely relates to the nature of digital work, the technical structure of platforms, the transaction of digital work through the internet, and a global pool of workers who are fragmented and commoditized.

The demand by clients for work to be completed before a set deadline forces workers to confine themselves to their workplaces (usually their rooms), working long hours with high work-intensity to avoid losing wages. Mukondi, in Kenya, was doing internet research for a US-based company dealing with sales of secondhand and end-of-life mobile phones. She was working close to 80 hours a week and as a result, did not have enough time to meet other online workers in the

locality or socialize with them. We asked all workers in our sample if they know anyone in their locality and if they meet with them regularly. While some workers knew other digital workers in their cities, they usually find it hard to socialize with them. One of Mukondi's coworkers on this job contract went to the same university in Nairobi, and they never met. Instead, workers tend to utilize whatever time they have to find new work, instead of trying to establish connections with workers either through the internet or locally. As another Kenyan worker, Isa, who does search engine optimization, said: "when you're busy you have no time to go look for another guy". Since there is intense competition between workers on a global scale on these outsourcing platforms, it is understandable that workers will want to prioritize continuously looking for work instead of developing capacities for collective organization. The extreme physical separation of digital workers also makes any collective organization or physical co-presence unlikely. We found a few local networks of platform workers in Ghana, Nigeria and Kenya, where multiple small groups of workers (two to three workers in a group) have developed close working collaboration. Workers also develop networks through social media, although the utility of such networks to transform worker power is debatable.

Figure 13.1 indicates that a range of underlying economic, social and political factors end up bringing into being particular geographies of work. While work can in theory be done from anywhere, myriad factors end up influencing concentrated economic geographies of jobs. Irrespective of its actual geographies, digital work is sufficiently mobile for workers and clients to feel that the marketplace they are operating in is truly global. The result is that workers can lose a sense of any collective organization and feel replaceable, while clients exploit this lack of associational power of workers to exert their demands on workers (also see point 5). Ben, a virtual assistant in Kenya, explains the feeling of being replaceable. He said, "basically I can do what I want but there is always that feeling like what happens tomorrow if the company can't afford me, do I have to cut my salary or what happens if I wake up in the morning and there is this email from Upwork, contract ended. That's the email I fear the most".

3.1.3. Employers obtain information about workers

The way platform work is designed and transacted over the internet reveals stark asymmetries in the ways in which employers and workers obtain information about each other and what they do with that information. While the bidding process enables labor power to be bought as a commodity in the market, a real sense of this commodification comes from the nature of the digital work and types of job contracts offered on digital platforms. Due to the digitally-intensive nature of work activities traded on these platforms, these work tasks can be broken down into simpler tasks (or "gigs") which can be completed by individual workers in a matter of minutes or hours from their homes. Since these tasks can finish quickly, they have to repeat the same bidding process in order to secure new jobs (though some experienced and top-rated workers may get repeat clients who offer work to them directly). There are relatively few jobs advertised that allow some form

of trust or working relationship to develop between workers and the employers – usually hourly contract jobs such as digital marketing, social media management, and virtual assistant. But even here there is a problem. Some platforms give clients the power to pay workers only if they are satisfied with their work, and as a result, some workers do not get paid even after they submit their work to clients.

This level of fragmentation of work and commoditization of labor power means the employer-employee relations become contingent (Barker and Christensen, 1998; Barley and Kunda, 2006), and employers are under no obligation to help workers build long-term careers on platforms. The potential for workers to gain experience and build up knowledge and skills for future career development is also constrained, meaning less scope for workers to upgrade to high-skilled and high-income jobs on platforms. A data-entry worker with no formal education and training is highly unlikely to go on to software development tasks or graphic design. Clients do not usually provide/offer training for their platform workforce to upskill them.[7]

Employers are able to demand any information they want prior to the job offer and workers are obliged to supply that information in a codified and quantified form (ratings, hours worked and wage rates), allowing clients to assess the workers' quality and ability to work. Since only workers bid for jobs posted by employers, they signal (or give information to) employers on platforms about their quality which employers use to screen workers and make an informed decision who to award the contract. Employers, with all the information about bidding workers at their disposal, are able to choose the workers they want to work with, which might be the worker with the lowest hourly rate, or the top-rated worker irrespective of their rate. In other words, clients have the ability to access all the information they need before awarding the job contract to workers, who usually know little about their clients (see point 4). The technical infrastructure of the platforms generates and amplifies an information asymmetry between buyers and sellers of labor – in order to favor the buyers (see Graham et al. (2017a) for more on this point).

One of the most significant tools that employers use to learn about workers is the rating system (Wood et al., 2019). As one worker, Mukasa, in Uganda, told us, no client is willing to work with new freelancers with no ratings or feedback, making it difficult for newcomers to land a job easily on platforms. During a group discussion with five platform workers in Abuja, Nigeria, they told us that they had to spend months searching for their first job due to an initial lack of ratings. Clients sometimes use this power asymmetry to exploit workers, by offering extremely low-paid work in return for good reviews and high ratings. Adele, in South Africa, told us that she did her data-entry work for a client at less than one dollar per hour for about a week (usually eight hours a day). She said "it was quite tough and I'm like okay, but at least he gave me that shot. He gave me that because after he did give you a good review and feedback". Onochie, a virtual assistant in Nigeria, explained the importance of ratings for his profile and said:

> I will say my secret is, every client that I work with, I try to leave the best type of impression. Even if the job is not great, I can actually offer to give the

> client a refund. Not that it was my fault that the whole thing went wrong. . . . So, I paid him back and I told please I do not want a review from you. I do not want a [negative] feedback. That is why I decided to give your money back. So, for every client I work with, I try to do the best possible job that I can, so you can give me the best possible feedback.

3.1.4. Workers obtain information about employers

While the information that employers gain about workers can be used as a form of control, some information about clients can also be visible to workers, such as location, whether or not their payment method has been verified and an overall feedback score from other workers at the time a bid is placed. However, some specific platforms like Freelancer.com do not allow information on clients hiring history, such as total money spent on hiring workers or average hiring rates, to be made available at the time of bidding. Such information would be useful to workers during the bidding process.

As already discussed in point two previously, many workers do not know the identity of their clients or even the nature of their business when placing bids for specific jobs. Referring to her client, Adele in South Africa explained: "She said just do the job and then send it to her. I don't know what she is using these for". Similarly, Kobi in Ghana did data-entry work for an American client by sorting 5,000 questions into different subject categories. He said, "It is like a high school website where students post questions and then they get tutors to answer for them. I think I was doing some kind of back-end work, I'm not too sure what I was doing, but I know that there were questions that people needed to answer". The fact that workers can usually only obtain the type of information employers want to release about themselves makes it hard for these workers to upgrade into new job types.

Workers we spoke to told us that they would often find that the person hiring them on a platform is actually an intermediary working for a client who is located elsewhere (a finding replicated in Graham et al. [2017a]). Since digital work can be transferred easily from one location to the other, multiple levels of intermediation can take place, which can effectively obscure knowledge about the source client. This inhibits the ability of workers to take action against their clients in the events of threats of unfair dismissal and non-payment of wages. Since workers and clients are usually separated by large distances and often based in different legal and regulatory landscapes/setting, it is hard for workers to imagine how they would hold clients to account through courts.

Workers are ultimately given just enough information about clients in order to allow transactions to take place. But the fact that workers often cannot see much about the production networks that they are embedded into, or learn much about their clients, limits their bargaining power. For instance, a worker who does not even know what industry they are working in would have a hard time offering knowledge they learnt on the job to other potential employers.

3.1.5. Offers to buy and sell labor transpire

The four previous characteristics all allow a planetary labor market to be brought into being,[8] supporting offers to buy and sell labor across the world. According to Horton et al. (2017), 90% of transactions on Upwork.com are across international borders.

The offers that occur in this international market are characterized by a huge power imbalance between workers and clients. The high-level of individualization and commoditization of labor power, the planetary scale of the labor supply for the platform work and an intense competition between workers means that workers are both left to fend for themselves and compete against one another. The international nature of the transactions that occur leave many workers with an understanding that local labor regulations are of little use in protecting them against some of the worst problems they experience in the platform economy. Some workers we spoke to in places as varied as Kenya, Uganda and Nigeria earned USD1 per hour or less for some of their jobs. However, it was generally understood that not only do their clients have no sense of what a local minimum wage is in their jurisdiction, but also that such considerations would be unenforceable due to the contract types and the fact that local regulators would have little power over foreign clients. Not only are wages often bad, but so too are working conditions. Zain in Ghana explained: "Yes, there's been days that I've stayed up for two days of no sleep at all, not even 30 minutes of sleep because there's a project, I have to get it done and the pay is shit, but you have to get it done". Again, the international nature of the market leaves the sorts of relationships that are set up to encourage Zain to work for days without sleep entirely unregulated.

Workers' lack of bargaining power is also exemplified by the fact that clients can decide to end the contract at any time (without payment of wages), if they are not satisfied with the work submitted by workers. This is particularly pronounced for workers doing fixed-rate or "piecework". Several article writers (mostly paid per article) we interviewed reported that they did not get paid for their article after they submitted their work to their employers because the employers did not like it. One platform worker (editor, web research and data entry) in Ghana, Quinn, edited a book for an American client and clocked 40 hours for a total of USD400, but only got paid USD200 and, despite several complaints made to the platform, she was not paid at the time of the interview.

The lack of structural power for platform workers both manifests in, and is manifested through, the inability of workers to collectively bargain. Offers to buy and sell labor happen at the individual level, making it hard or impossible for workers to take advantage of collective bargaining agreements, or use their collective power to withdraw labor. Dabiku in Kenya was of the opinion that collective bargaining through unions is a good idea. But he remarked, "locally it is unfortunate guys do not trust each other that is one thing. So actually, even [setting up] meetings is always a problem". He was also of the view that while unions would be of help for local work, nothing can be done when clients are located in the US or Canada.

As the millions of offers to buy and sell labor transpire on digital labor platforms, the asymmetries of information and pre-existing asymmetries of power are put into practice by clients. In other words, while people buy and sell labor in a spatially-unbounded way, there is a scalar mismatch in reach, mobility and information that severely limits the bargaining power of workers.

3.2. Planetary labor futures

Following the call by Strauss (2018, p. 626) for "sustained critical attention to what is distinctly spatial about the processes that are of interest, how place matters to those processes, and how scale is relationally constructed . . . and experienced in the production of precarious work situations", this study has explored the ways in which inequality is structured into online labor markets when they are scaled up to the planetary level. We have seen, following Fevre (1992), that employers can learn about workers, workers learn about jobs, both parties learn about each other and transactions take place in ways that seemingly ignore some of the traditional limitations of time and distance. Employers and workers, through the affordances of digital technologies, can seek each out on a genuinely world-spanning scale, escaping some of the constraints that previously bound them exclusively to their local labor markets. Most importantly, many previously bounded labor markets were both transactionally and discursively insulated from a global reserve army of labor and the downward pressure on wages and working conditions that it brings about (Huws, 2003).[9] A market that is planetary in scale will cease to have any of those brakes on the erosion of working conditions. Yet, while all of these interactions occur between economic actors in different parts of the world from one another, what we see is not just Hardy's hiring fair scaled-up to a global-level or scaled-down onto the head of a pin. Instead of seeing the space of the labor market through a Euclidean lens in which geography is a pre-existing canvas on which economic relationships can be formed, the spaces of labor markets are instead relational and emergent.

It is this understanding of space that we seek to bring to discussions about digital work. The discussion in this chapter should encourage us to move away from thinking about labor markets as bounded spaces that you could draw on a map. In a planetary labor market, everything does not happen everywhere. But, key spatial constraints (e.g., the need for commuting, to leave the house and to obtain visas and permits) can be circumvented. This forces us not to imagine away the always-existing economic geographies of work, but to ask questions about how they will shape and be shaped by the potentials for planetary-scale interactions.

Thomas Friedman (2005, p. 110) famously pointed to a globalized world that would allow for "the sharing of knowledge and work – in real time, without regard to geography, distance, or, in the near future, even language". But, as much as some firms and clients might want it to, a planetary market does not do away with geography; it rather exists to take advantage of it. Platforms use uneven geographies to facilitate labor arbitrage, cross-border competition and are able to foster what Peck (2017, p. 42) refers to as an "offshore consciousness". To be

clear, references to local labor markets, national labor markets and planetary labor markets should never be made to ignore the myriad ways that those labor markets are brought into being by multi-scalar exogenous factors which, in turn, lead them to be socially and spatially segmented and fragmented. The spatial and scalar prefixes (urban-, local-, national-, etc.) that we add to labor markets instead are intended to signify enablers and constraints that serve to cluster coming-togethers of employers and workers within particular economic geographies. These enablers and constraints can be technological barriers (e.g. transportation costs and the availability of broadband), political (e.g., the availability of visas and work permits), social (e.g., availability of skills and language fluencies), economic (e.g., local reserve wages) and spatial (e.g., work and workers that inherently have to be in particular places).

Underlying material economic geographies of workers and clients are therefore never fully transcended, work is never fully commoditized, and there remain national and regional practices and institutions which govern the purchase, sale and pricing of labor on platforms. But none of those national and regional practices determine the shape of the market as a whole. This is not to say that labor markets in non-digital contexts do not have similar ways of empowering and disempowering different groups. The material architectures, norms, laws and relationships in traditional labor markets all bring particular power dynamics into being. However, what is different in the digital context is that co-presence and the transitory proximity that platforms bring into being is illusory. While workers can, in theory, connect from anywhere, they lose the ability to control a key part of their agency that they otherwise have in any other context: their control over space, and their ability to bring into being labor geographies that are at least in part on their own terms (see e.g. Herod [2001]). Because employers and workers have significantly different abilities to control space, the planetary labor market is a context that serves to further undermine the structural power of labor vis-à-vis that of capital.

This manifests in six key ways. First, mass global connectivity is bringing onstream a massive *oversupply of labor power, mainly from lower-income segments of the world population*. There are far fewer digital jobs than there are people able and willing to do them. The "elemental rationale" of offshoring has always been to cut and suppress costs (Peck, 2017, p. 10), it should therefore come as no surprises that online outsourcing continues the trend. Second, many workers seeking jobs in a planetary labor market are *replaceable and interchangeable*. This is not just due to the oversupply of labor power, but also to the fact that production networks can be footloose while workers are tethered to place. Third, workers mostly interact as *competitors rather than collaborators*. For digital workers, this situation arises primarily because there are few physical sites at which to assemble with coworkers and because the highly commodified nature of their jobs can lead to competition on price above all else. Digital platforms deliberately limit the amount of horizontal information that workers can glean about one another, and the distributed nature of work means that workers have few opportunities to engage in collective action afforded by spatial proximity.

Fourth, there is a *lack of transparency*. Although workers can use digital tools to find jobs on the other side of the planet, the networks and platforms used to mediate those jobs can also conceal much about the nature of those activities. In other words, workers often know little about the production networks that they are embedded into and are offered few opportunities to economically upgrade skills or value-chain positions. Fifth, there is a relative *lack of agency* amongst workers to have their voice in, or shape, their labor conditions. The affordances of most types of digital work tend to be closed to workers – in part because workers rarely have any stake or control in the physical or digital means of production in the digital economy. If we extend spatial metaphors to online labor platforms, they are not public markets; they are rather private spaces. Finally, *workers tend not to be protected by labor* laws. Because the labor market extends well beyond any individual jurisdiction's ability to regulate it, self-regulation tends to be carried out by platforms and clients. Labor laws that exist to protect workers are ignored in some cases, sometimes even willfully.

These issues amplify each other, and all serve to undermine the structural power of workers. And they are all possible because of the specific designs of planetary labor markets that use space against workers. The issues outlined in this chapter paint a picture of a grim future for the balance of power between labor and capital that is likely unsatisfactory to anyone who does not run an outsourcing company. But what can be done if we want to envision and see more equitable outcomes? The solution cannot simply be to turn our backs on innovations in information and communication technologies. We can likely never go back to a world only characterized by local labor markets. Despite the concerns presented here,[10] the digitally mediated relationships presented in this article are far from inevitable. There are two primary reasons why we believe this to be the case. First, all of the digital and virtual infrastructure deployed to bring a planetary labor market into being ultimately depends on material infrastructures, organizations grounded in physical places, and real-world regulation. Current configurations of infrastructure and regulation are thus far from inevitable. Interventions such as platform cooperatives, attempts at cross-border regulation and horizontal organizing amongst workers are more effectively covered elsewhere (Graham and Anwar, 2018; Graham and Woodcock, 2018; Irani and Silberman, 2013; Wood et al., 2018), but the simple point here is that by understanding the spatialities and temporalities of contemporary labor markets, we can better shape them. We can no longer think about labor markets for digital work as being simple shapes on a map.

Second, the ways in which technologies are deployed to produce specific time-spaces and not others do not dictate how we necessarily use, produce or jump over geographies. Indeed, code and algorithms coproduce spaces that are often malleable and hackable (Zook and Graham, 2018). Workers and their advocates have thus far certainly found ways of using technological infrastructures in unintended ways that work in their favor (Wood et al., 2018), and we will need more of this if workers are to exert any significant amount of agency in the labor process. But to build or perform alternatives, we again need to base our efforts on realistic

understandings of the relationships between economic actors, technologies and the spaces they bring into being. In Hardy's hiring fair, we would not expect workers to be able to collectively bargain or form a picket if they misread the opportunities and constraints provided by their spatial proximities.

4. Conclusion

This chapter ultimately builds on Doreen Massey's (1994) "global sense of place" – a sense of how distant people, places and processes are always inherently enrolled into any local relationships. We do that by showing that we can use five characteristics of labor markets to think about how online labor platforms create labor markets that are planetary in scope. It has also shown some of the ways in which constructing a planetary labor market changes the balance of power between labor and capital. We have demonstrated not that geography has been eliminated, nor that places have been made irrelevant. No virtual space has been created allowing employers and workers to coexist beyond the confines of the physical realm. Rather what has happened is that digital technologies have been deployed in order to bring into being a labor market that can operate at a planetary scale, and has particular affordances and limitations that rarely bolster both the structural and associational power of workers. Digital technologies that underpin online labor markets help clients operate unboundedly and trans-spatially, and allow them to reconfigure the geography of their production networks for almost zero cost. Workers meanwhile can sell their labor power globally, but still are tethered to the locales in which they go to bed every night.

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Notes

1 This chapter was originally published as "Graham, M., and Anwar, M. A. 2019. The Global Gig Economy: Towards a Planetary Labour Market? *First Monday*. 24(4). doi.org/10.5210/fm.v24i4.9913". Permission for reprint has been granted by the copyright holder. Thank you to *First Monday* for allowing us to republish this piece.
2 In addition to numerous models that have been created to predict how many jobs artificial intelligence will destroy, it is estimated that up to one-third of all jobs in the United States are offshorable (Peck, 2017).
3 David Harvey (1990, p. 19) noted, "labour power has to go home every night". Capital therefore is always able to take advantage of its relative mobility compared to labor.
4 Large platforms began to emerge after 2008 as a new business model that controlled information in bottlenecks in between digitally-mediated economic, social and political activities. According to Srnicek (2016, p. 48) "Platforms, in sum, are a new type

of firm; they are characterized by providing the infrastructure to intermediate between different user groups, by displaying monopoly tendencies driven by network effects, by employing cross-subsidization to draw in different user groups and by having a designed core architecture that governs the interaction possibilities".

5 The precursor to segmented theory of labor market is the dual labor market theory which describes two distinct sectors in economy that do not have mobility between them. The primary sector is characterized by strong wages, benefits and security, while the secondary sector is characterized by jobs that often require little training, have high-turnover, low wages and insecure contracts (Doeringer and Piore, 1985). The dualist model failed to incorporate the processes of social reproduction and the role of the state in correcting market failures, contributing to workforce reproduction and also regulatory functions, such as enforcement of employment contracts (Peck, 1996).

6 Too much should not be read into the specific oversupply percentages. On one hand, these numbers could be overestimates because it is possible that many people create profiles without having any intention to search for jobs. On the other, it is possible that they are underestimates, because platforms have an interest in keeping pay just above the reserve wage in a variety of industries, there have been time-limited efforts to limit worker sign-ups from some countries.

7 This is not to say that opportunities for workers to learn new skills and earn high income from platform jobs are not present at all. But the point is those who succeed in doing so often come from prosperous family backgrounds and with previous training and education. For example, white South Africans are much more likely to succeed and earn money on platforms than other groups in the country, largely due to their better socio-material conditions. There are 104 workers on Upwork.com in South Africa (on October 25, 2018), who have completed 1000 hours and earned USD10,000 worth of work and all but seven are white.

8 Furthermore, the nature of many digital work platforms, with work done remotely, collaboratively and in real time, means that the "workplace", rather than the just the labor market, could be considered to be planetary (bearing in mind similar geographic caveats discussed in this chapter). This, however, is a topic for another paper.

9 This is not to claim that local labor markets ever reach any sort of equilibrium. Indeed, much important scholarship has taken place refuting such ideas and instead arguing that labor markets are locally constituted (Hanson and Pratt, 1992; Harvey, 1989; Peck, 1989). It is nonetheless clear than many bounded labor markets have been able to avoid an erosion of working conditions through the relative scarcity of labor power and better regulatory frameworks instituted by states.

10 Here it is worth bearing in mind that the planetary scale of the market allows many workers to access jobs and income that they simply would not otherwise have access to. The biggest problem for many potential workers is not that the labor market is full of bad jobs, but rather that they are excluded from those jobs in the first place (as we outline in the section on oversupply). However, the fact that bad jobs are better than no jobs should not stop us from interrogating the conditions that bring these jobs into being.

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14 Identifying the digital gender divide

How digitalization may affect the future working conditions for women

Anthony Larsson and Yamit Viitaoja

1. Introduction

The digital transformation is rapidly changing how we conduct business and working conditions by and large (Demirkan, Spohrer and Welser, 2016). Technologies that underlie computers, robots and smart equipment are becoming increasingly more advanced, and in turn, transforming organizations much faster nowadays than in the past. Thus, it is easy to gain competitive advantage by being well-versed in digital innovation and transformation. This has led to an increase in the need for future employees to become tech-savvy, as the IT professions can be expected to grow significantly worldwide in the years to come (Vincent, 2017; Kahn, 2017; Winick, 2018). For instance, in the US alone, IT jobs are expected to have grown by 22% from the 2010s through the 2020s (Thibodeau, 2012). However, in spite of significant worldwide growth, women are still under-represented in IT and the tech industry overall (Colby, 2017; Trauth, Nielsen and von Hellens, 2003; Trauth, 2006; Bernhardt, 2014). This, in turn, has dire consequences on women entrepreneurship by and large. For instance, research shows that women hold only 5.5% of all commercialized patents in the United States, while only representing 12% of all US innovators (Hunt et al., 2013; Nager et al., 2016). Also, only 26% of the computing specialists in the Silicon Valley area were made up by women in 2013, a figure that has remained roughly dormant since 1960, with an even bleaker outlook in the engineering profession, where women constituted just 12% of the force in 2013 (Guynn, 2015).

To this end, the average US-born male is roughly nine times more likely to contribute to an innovation as opposed to the average female. Perhaps surprisingly is that in spite of this modest level of female innovators, the US might still outperform Europe. This is even the case in purportedly "progressive" and "liberal" countries that tend to proudly avail themselves of providing "equal opportunities". For instance, Sweden, which is commonly known as being among the most gender equal citizens in the world and boasting the strongest views in favor of gender equality, scored a perfect 100 points in 2019 (the highest possible score) in the World Bank Group's study "Women, Business and the Law index score" (together with Belgium, Denmark, France, Latvia and Luxembourg) (World Bank Group, 2019). However, these figures only tell part of the story and there is still a

long way to go. For instance, women hold only six percent of all commercialized patents, i.e., a half percentage point more than the United States (Ädel, 2016). This is in spite of the fact that recent figures from the WIPO has shown an all-time high number of women innovators internationally (WIPO, 2018; Von Hall, 2018). Moreover, in the areas of start-ups and venture capital (VC), the situation is just as, if not even more, dire. Approximately 94–99% of all private and public Swedish VC is awarded to male founders' teams (Dahlgren, Lundeteg and Nord, 2017; Billing, 2015, 2018; Olsson Jeffery, 2019). This is not for a lack of interest, for instance, in 2016, more than half of the start-ups awarded cash by the county's leading incubator were run by women (Savage, 2016). Still, the amount of means awarded through this channel does little to stem the overall disparity and the uneven distribution is apparent also in other areas. For instance, in tech, roughly 82% of all tech cash is given to male entrepreneurs in 2016 (The Local, 2016). A subsequent, more detailed, study showed that this figure had climbed two percentage points to 84% in 2018 with 15% being awarded to mixed teams, and a mere 1% being awarded to teams consisting exclusively of females (Olsson Jeffery, 2019; Wisterberg, 2019).

More so, in Sweden, the participation of women working in the industry is merely 23%, far lower than the EU average at approximately 30% (Edwards, 2017; Roden, 2016; Eurostat, 2018; Fogelqvist, 2016). In fact, Sweden has the third lowest number of women working in the industry (trailing the Netherlands and the United Kingdom respectively) (Fogelqvist, 2016). The situation is somewhat less somber in the information and communication technology (ICT)[1] industry, which has seen a slight increase to 29% women employees in 2017, from 28% the preceding year (IT&Telekomföretagen, 2017; Wisterberg, 2017).

In an unpublished case study by the Swedish women career network International Women Group (IWG Group), it was found that out of 26 women joining a custom-designed 12-month mentorship program called "Empowered Mentoring Program" (EMP), 13 attendees were executive leaders in major Swedish businesses with the remaining 13 women joining as "mentees", i.e., female participants with the aspiration of becoming a future business leader (IWG Group, 2018). The study showed that among the mentees, only one of the members had their program fee (at roughly USD1100) paid for by their employer organization. The study found that there were many different reasons as to why these companies declined to pay for the tuition of the women employees. These arguments included age-related reasons, with the mentee being deemed too young (the ages of the attendees varied between ages 21–35). Other arguments were that that the mentees were not deemed to be experienced enough, or that the company felt no need of establishing a future executive role in their company for that mentee to fill for the foreseeable future. Still, a follow-up evaluation a year after the conclusion of the mentorship program showed that the participating mentees, all active in digital professions, tended to change their career and employer in favor of a better position elsewhere, and in some cases some even started their own company. The mentees posited that attending a mentorship program provided them with a new personal network and instilled them with more confidence, while also boosting

their knowledge in digitalization. A recurring contention during the follow-up was that the mentees expressed disappointment with their former employers for not supporting them in their ambition of acquiring leadership insights and skills, which ultimately resulted in them leaving their former workplaces. Hence, it is easy to assume that companies need only to support leadership training programs in order to remedy the problem of the digital gender divide. It is true that this would undoubtedly help women already with an interest in the tech industry, and it is also true that supportive employers are essential to any sense of wellbeing at any workplace. However, a lingering problem is the fact that many women eschew not only the tech industry, but technology at large.

One may contend that the reason why fewer women access and use ICT is that it is not infrequently a direct consequence of their unfavorable conditions in regards to employment, education and wage. Studies have shown that when controlling for these variables, women actually tend to be more active users of digital tools than men (Hilbert, 2011; D'Mello, 2006). The "digital gender divide" may thus become an opportunity. That is, given that women are proficient in, and enjoy using ICT, and that the digital transformation of society provides tools that can improve the human living conditions, ICT represents a real and present opportunity to overturn the challenges of gender inequalities. This includes factors such as improving access to secure employment, wage, education and health services.

Thus, the premise of this study is to provide an analytical commentary based on available research literature and on the authors' "best practice" insights and reflections. In doing so, the aim of this chapter seeks to understand how digitalization and the digital transformation may affect the digital gender divide of business investments and women's overall role in a future digitalized labor market in the Western hemisphere.

2. Discussion

2.1. The digital gender divide

The concept of a "digital divide" refers to the gulf between those who have ready access to computers/smartphones (or equivalent) and the internet, and those who do not (Ragnedda and Muschert, 2013; Selwyn, 2004; Rogers, 2001). Adding to this, there is also a notion of a "digital gender divide", which purports that there is a discrepancy between women's and men's access to IT technology (Cooper, 2006; Cooper and Weaver, 2003; Hilbert, 2011).

According to a 2018 OECD report, there are many root causes as to why there is gender-based digital exclusion (Borgonovi et al., 2018). The most prominent reasons include restricted access to digital tools in the form of affordability, lack of proficiency and/or education and deficiencies in technological literacy in addition to inherent gender biases and socio-cultural norms. While connectivity by and large is a problem for the developing parts of the world, the aforementioned factors affect women all across the world. Worldwide, there are approximately 327 million more men than women who possess a smartphone and can access mobile

internet. On average, women are approximately 26% less likely than men to possess a smartphone. In South Asia and Africa these proportions are particularly prominent as they stand at 70% and 34%, respectively (Borgonovi et al., 2018).

2.2. The dwindling number of ICT-education

In Europe, there is currently a decreasing percentage of Europeans with ICT-related education (irrespective of gender), while there is (paradoxically) a growing demand of ICT specialists and digital profiles (Quirós et al., 2018; Wever, 2012). This is a problem also in the US, Asia and other regions as well (Umoh, 2017; Nkhoma, Dang and Lu, 2012). Naturally, there are many reasons the interest in pursuing an ICT-related education is falling. According to Selwyn (2003b), there are a number of factors that have constituted the main reasons as to why ICT has failed in popularity over the past few decades.

2.2.1. Limited access to material resources and economic restrictions

Undoubtedly, access to ICT is contingent on there being available resources in the form of money and materials (Murdock, Hartmann and Gray, 1995). Needless to say, there will always be differences in the ability of the individual ability to purchase and/or lease IT equipment, along with the relevant accompanying services, such as internet, etc. While most people in the Western hemisphere will own some kind of electronic device, the quality thereof may vary. In the event that such a device of adequate standard is not available, the universities and public libraries will often provide some degree of accessibility to IT services available to all at little or no cost (Liff and Steward, 2001; Holley, 2013). However, while universities and libraries will provide access to these facilities and provide people with at least a basic standard of equipment for use, there are indications that these facilities merely reinforce the existing patterns of the students' ICT use in "private" settings (Selwyn, 2003b; Henderson, Selwyn and Aston, 2017; Ramalingam and Kar, 2014). That is to say, universities and libraries do not tend to be as effective in actually widening the level of ICT usage to the category of individuals who were not already using ICT but rather helps increase the levels of use among those individuals who are already using it. In that way, there is a distinction between the de facto access to ICT, and the effectiveness it carries (Lim, 2002; Wilson, 2000). More aptly formulated by Rogers (2001, p. 105) publicly available ICT facilities "can provide the public access function, but they need adequate computer facilities, adequate access time per user and help desk facilities which were not [always] available".

2.2.2. Cognitive disparities

Although access to ICT tools is a prerequisite to using them, the difference between using them and not using them is not solely a matter of a so-called "equipment gap" between the "have" and the "have-nots", as the "equipment gap" has been steadily shrinking in the past few decades (Krieg, 1995; Ottestad and Quale, 2009).

There has been some scientific debate regarding people's cognitive proclivity to use technology (Bain and Rice, 2006; Mitzner et al., 2010; Colley and Comber, 2003; Heflin, Shewmaker and Nguyen, 2017; Cai, Fan and Du, 2017). Naturally, possessing an interest and knowledge in how to use a certain type of technological equipment are obvious factors, albeit underpinned by the individual's experience of, and attitudes toward, using technological devices (Durndell, Macleod and Siann, 1987; Kang and Yoon, 2008). Naturally, one could argue that that technological experience and technological disposition are inherently intertwined, as the more a certain type of behavior is carried out, the more one's attitude about said behavior is formed and reinforced. For instance, Todman and Monaghan (1994) contended that if one has a positive initial experiences with, for instance, a computer, one is prone to display more positive affective attitudes toward computer interaction in the future.

To this end, psychologists have highlighted a range of cognitive and affective factors that act as important determinants that affect a person's interaction with technology. This includes perceived ease of use, perceived behavioral control, self-efficacy, and perceived ability (He, Chen and Kitkuakul, 2018; Ajzen, 2002; Wu, Hsia and Tennyson, 2011). Though it is important to emphasize that there is indeed a complex relationship between attitudes and casual factors and the way these are affected by other psycho-social factors. As in the case of computers, there is historical linkage between mathematical ability and level of interest toward computers (Schumacher, Morahan-Martin and Olinsky, 1993; Selwyn, 1999; Miller and Varma, 1994; Shashaani, 1995). Yet, in other contexts, there is research to indicate that attitudes are significantly correlated with people's creativity level (Kuśpit, 2016; Offir, Golub and Cohen-Fridel, 1993), learning and social self-image (Katz, 1993; Demo, 1985; Blascovich and Tomaka, 1991) and locus of control (Tomer and Eliason, 2000; Woodrow, 1990).

2.2.3. Technophobia

A different psychological component concerns various forms of "phobia" of various digital objects and technology, commonly referred to as "technophobia". This signifies individuals who harbor negative opinions and/or anxiety toward the use of technology and consequently tend to use it less often, even when it poses no real or immediate threat (Brosnan, 1998; Nimrod, 2018; Selwyn, 2003b). In this way, technophobia serves to obfuscate the individual's perception of a particular type of technology inasmuch that they will believe that it is "not for them".

Much of the research carried out in this area has focused on the avoidance of ICT in various settings, such as one's workplace or home (Khasawneh, 2018; Shashaani, 1993; Colley, Gale and Harris, 1994). The premise has often been that the aversion toward ICTs is brought on by either ignorance, lack of experience or an apparent deep-rooted adverse reaction stemming from the belief that the ICT is somehow posing a threat to the user (Rosen, Sears and Weil, 1993; Felt, Schumann and Schwarz, 2015; Brosnan and Davidson, 1994; Holzer, 2015; Oliveira and Jerónimo, 2016). This approach has historically often departed from the notion that an individual's aversion to ICT constitutes a transitory frame of

mind that can somehow be "conquered" or at least "treated" (Rosen, Sears and Weil, 1993; Kennewell, 1992; Richard, 1997). Research from the late twentieth century would often contend that technophobia differed little from the anxieties surrounding the introduction of any kind of technology throughout history and that anxieties regarding the use of ICT would erode when they became more commonplace (Selwyn, 2003b). However, research indicates that technophobia is still just as relevant and present in this day and age as ICT usage tends to create new situations in which not even teachers/instructors always possess the needed skills or credentials to deal with them optimally, which makes it difficult for people to develop a sense of in-depth competence (Fernández-Cruz and Fernández-Díaz, 2016; Revilla Muñoz et al., 2017). Moreover, it is known that technophobia is a particularly recurrent and prominent phenomenon among senior individuals (Hou, Wu and Harrell, 2017; Rosen and Weil, 1995; Johnson, 2012). However, technophobia may also correlate with other individual characteristics, although there is contention as to whether or not gender is such a factor as results have varied (Trauth, Quesenberry and Huang, 2010; Hogan, 2009; dos Santos and Santana, 2018).

2.2.4. Ideological refusal

Another reason why some people make less use of ICT is because of ideological reasons (Van Dijk, 2012). That is to say "want nots" rather than "have nots" who refuse to engage with ICT for ideological reasons despite being able to do so in practice. This practice often carries a non-conformist angle that purportedly conveys an act of opposition against technology, more often than not by individuals who can afford to do so (Hesselberth, 2018; Selwyn, 2003a). As expressed by Bauer (1995, p. 19): "The resistance against information technology is mostly local and a matter of 'intellectuals'; it is mainly informal, individual and passive, such as a refusal to work with computers".

There are, of course, many different reasons for why one would take on such an ideological stance, but Norman (1993) theorized that there is an apparent clash between the "hard" nature of machines and the "soft" nature of the humans that are expected to use them. That is to say, humans are inherently good at the aspects that are intrinsic to human nature, such as creativity, invention, empathy and emotion. People adhering to these views while eschewing the use of ICT can therefore be regarded as deliberate non-users of technology (Selwyn, 2003b).

2.2.5. Diffusion theory

Diffusion theory believes in a recurring "s-curve" of expansion of technology use in society (Rogers, 2003). This relates from initial groups of "early adopters" all the way through to the majority of the population, who adopt the technology at a later stage (Mohr, Sengupta and Slater, 2010). According to this theory, those who do not pick up on technological advancements, in due course, are considered "laggards", and that societal use of an innovation is hastened by its relative advantage

(e.g., the degree of benefit it provides as opposed to what it purports to replace) (Rogers, 2003). The internet, for instance, is considered to possess a high degree of relative advantage, as expressed by Rogers (2001, p. 97): "Compared to postal mail, email via the internet is faster, cheaper and quicker. Compared to books or other sources of information, the World Wide Web is a more convenient means of searching for information (that is, if an individual has access to a computer and modem)".

2.2.6. Total cost of ownership

Another reason, on a business level, that might act as a deterrent toward engaging oneself in ICT is the total costs of ownership (TCO). This is particularly the case for entrepreneurs and small and medium-sized businesses (SME) (Lochner, 2005; Kirche and Srivastava, 2017). That is to say, the initial purchase cost of ICTs may be misleading, as it in fact only constitutes a smaller sum of what one ends up having to pay in the end. Associated costs, such as new software, installation, transition costs, employee training, security costs, disaster-recovery planning, ongoing support and future upgrades actually account for the largest economic drain over time (Kling, 1999; Kagan, 2018). While the cost of a computer for business (desktop or laptop) can range from approximately USD400 for a basic model with limited storage space to USD3500 for a top of the line computer, the TCO amounts to much more than this, both in actual cost and in time expenditure (Thompson, 2017). This in turn, may act as an incentive of seeking oneself to lesser technology-oriented ventures.

According to Power (2004), 20 computers costing USD1000 a piece (i.e., with a total cost of USD20,000) would after three years cost approximately USD38,240 in TCO (including the initial purchase cost) when accounting for the cost of maintenance, supplies and electricity, etc. To this end, Figure 14.1 gives a rough example of what some of the associated TCO are for entrepreneurs and SMEs (Lazar, 2016; Betts, 2004).

Benchmark	*Amount*
Average annual revenue spent by SMBs on IT expenses.	6.4%
Average sum spent by trade associations on hardware and software every year.	USD74,000
Number of IT costs occurring after the initial purchase.	80%
Annual average cost per unmanaged PC.	USD5000
Number of minutes spent each week by employees per week trying to fix PC problems or helping a coworker.	30
Average amount spent each month by firms when all IT expenses are factored.	USD700

Figure 14.1 Examples of figures included in ICT total cost of ownership (TCO) for entrepreneurs and small- and medium-sized businesses.

2.3. Digital opportunities and barriers for women on the labor market

While the aforementioned factors are inherently valid for both men and women, they tend to have a greater impact on women, given the fact that women already have historical disadvantage of taking up ICT-related jobs and educations (Quirós et al., 2018; Nsibirano, Kabonesa and Madanda, 2012). On the other hand, digitalization and the digital transformation offer a variety of opportunities for female empowerment and for a greater degree of female participation in, for instance, labor markets, financial markets and entrepreneurship. In theory, digitalization would appear to favor the female labor force, as women, on average, face lower risk of being replaced by machines, as compared to men (AlphaBeta, 2017; Hanrahan and Evlin, 2017; Simonton, 2006). This is often on account that women are more likely to work in occupations that need social, interpersonal, creative and decision-making skills (Hanrahan and Evlin, 2017). According to studies, women also tend to outperform men on most measures of educational attainment worldwide (indubitably in itself also a form of "gap", but nonetheless a topic for a different debate) (Bidwell, 2018; Bilton, 2018; Van Hek, Kraaykamp and Wolbers, 2016). In theory, possessing high levels of social skills complemented with higher educational attainment and advanced digital literacy, would account for a competitive advantage on the labor market. Moreover, digitalization would, at least in principle, make it easier for workplaces to implement a greater degree of flexibility (Ang et al., 2018). This would make it easier to combine paid work with various forms of caring responsibilities since these tasks are still generally carried out by women (OECD, 2018; Graham, 1993).

While women may benefit from such a potential increased flexibility in work, this flexibility may come at a cost of the conventional type of "fixed contract" employment, in favor of less transparent and more insecure and unclear types of arrangements, such as turning more toward a freelance-based format, with "gig-contracts", contractors, self-employed consultants, "zero-hour" contracts, internships, volunteers, etc. (UK Department for Business, 2017). This in turn, may lead to cynical and unscrupulous use of new, atypical, work arrangements that seeks to exploit low-skilled and/or low-paid labor, which in turn erodes the quality of the working conditions (OECD, 2017; UK Department for Business, 2017). This is but one example of the many existing barriers that serves to obstruct this potential advantage, preventing women from acquiring many beneficial opportunities, including employment and entrepreneurial ventures (Krieger-Boden and Sorgner, 2018).

In addition, it is not solely the potential working conditions that may pose a problem. As mentioned previously, male-dominated jobs have been (and are still) at the greatest risk of becoming automatized, and we have hitherto mostly seen this development occurring in such sectors as agriculture and manufacturing (Gordon, 2018; Fraser and Charlebois, 2016; Belton, 2016). However, in the future, automation is expected to spread to other (if not all) sectors as well, albeit to different degrees (Ford, 2015; World Economic Forum, 2018). This, in turn,

includes sectors harboring professions traditionally dominated by women, such as retail trade, food and beverage services.

Moreover, jobs are expected to grow in various sectors that are traditionally female-dominated, such as business services, health, education and social services (Yate, 2019; OECD, 2017). At the same time, there are still huge gender differences in the educational system throughout the various fields of studies (OECD, 2017). This means that, if perpetuated, women run the risk of benefitting less from new business opportunities in various STEM[2]-related occupations (OECD, 2017).

2.4. Finding a way forward

The issue concerning the digital gender divide is indeed complex and deeply rooted, and involves many different aspects in various settings. As such, there is no universal "fix-all" solution. However, one prudent place to begin is at school. At the age of 15, the digital gender gap is not ostensible. While girls tend to underperform boys in specific digital-related activities and skills, they tend to outperform boys in other areas that are valued by employers, such as collaborative problem-solving skills (Borgonovi et al., 2018). Girls, by and large, also tend to have greater literacy skills, while boys often have better numeracy skills, although by how much continues to be a topic of contention (Lindberg et al., 2010; Henry, Lagos and Berndt, 2012; Borgonovi et al., 2018). Curiously, however, the literacy gap is bridged at the age of 27 for the average man, while men's lead in numeracy skills tend to increase with age (Stoll and Notter, 2000; Borgonovi et al., 2018; Feinstein, Vorhaus and Sabates, 2010). This affects women's opportunities in the aforementioned STEM professions and for this reason there is a pressing need to provide the possibility for adults to upgrade their skills in various areas, and for women to be given the chance to strengthen their skills in areas pertinent to STEM subjects. In this regard, the digital era provides for flexible solutions in removing barriers to adult education, but this necessitates coordination across various institutions and actors, such as education and training institutions, employers and social-policy institutions (Borgonovi et al., 2018). This is exemplified by the fact that women are less likely than men to engage in massive open online courses (MOOCs), which are often given as free courses and cover broad ranges of different topics (Zhenghao et al., 2015; Davis et al., 2017).

A major component here is the attitudinal issues. According to the OECD, only 0.5% of 15-year old girls wish to pursue a career as ICT professionals, as opposed to 5% of boys in the same age group, while twice the number of boys expect to become future engineers, scientists or architects (Borgonovi et al., 2018). In this regard, female role models in STEM are important from a signaling perspective and for encouraging girls to enter STEM at an early age. However, success at increasing the number of girls/women studying STEM does little to overcome any problems if women continue to be faced with unchanged biases in the workplace. For that reason, there is also a need for actions that seek to address the systemic bias perceptions that in turn serve to perpetuate the digital gender divide. For instance, as mentioned previously, there still exists a problem with the overall

lack of representation among female entrepreneurs and innovation team. While there are some favorable developments in terms of an increase of overall female participation in patenting activities over the past decade (with ICTs increasing relatively more than other technological domains), the increase is occurring at such a slow pace that it will be the year 2080 before women are involved in half of all patented inventions within the five largest IP offices (IP5) (Borgonovi et al., 2018; Romei, 2018; Burk, 2018; Shaw and Hess, 2018). Notwithstanding, there is potential for betterment. Data shows that VC firms with at least one female partner are more than twice as likely to invest in a venture with female representation in its management team, and three times as likely to invest in female CEOs (STEMconnector, 2017; Stengel, 2017; Kerpen, 2018). To this extent, there is a need for coordination among different initiatives that seek to bridge the digital gender divide in addition to changes that make it possible for corporations to facilitate "top-down" investment in female leadership.

That is to say, gender equality is a global issue that needs to be supported not primarily by legislation but by changed modes of business practices and conventions. In this context, "bottom-up" initiatives such as disruptor firms have preliminarily shown to have a greater impact on closing the gap on the digital gender divide. In 2017, female-founded companies comprised 4.4% of all VC deals in the US, which despite its low-sounding figure, is actually the largest percentage since 2006 (Boorstin, 2018).

3. Conclusion

The aim of this chapter was to understand how digitalization and the digital transformation may affect the digital gender divide of business investments and the role of women in a future digitalized labor market. The results of this study indicates that there is still a digital gender divide present, particularly in regards to the low numbers of women entering STEM-educations and professions, and the challenges of women entrepreneurship in ICT-related ventures (often coupled with the difficulty for women founder's teams in securing VC). However, the study concludes that many of the aspects that specifically act to the detriment of women in STEM and ICT professions carry attitudinal connotations. That is to say, changes in attitudes, behavior and habits would have more fundamental impact than changes in policy and regulation. To this extent, female role models in STEM and promotional campaigns will have an important role to inspire and motivate girls and women to seek out a career in these areas. Also, it is essential to find ways to combat the systemic bias perceptions against women by increasing and improving the coordination among the various initiatives that seek to bridge the digital gender divide. Moreover, organizational/strategic changes that make it possible for corporations to facilitate "top-down" investment in female leadership should be encouraged and incentivized.

However, this chapter has also shown that digitalization process, in and of itself, may have various ramifications on women's working conditions on the future labor market. It is true that the emergent automatization will likely start to harvest some professions that have traditionally been women-dominated professions. In

this case, a system for reskilling the women who risk being made redundant must be set in place in good time before the automatization of their jobs have been completed.

It is also true that the digital transformation may lead to an improvement of securing more flexible working conditions in ways that benefit women. However, while this development is not expressly geared toward women specifically, there is also a risk of more atypical and cynical work arrangements emerging in professions that are overrepresented by women. For that reason, there is a need for lawmakers to ensure that there is an adequate system of checks and balances in place that makes it impossible to make cynical use of various legal loopholes in the labor laws. Also important is that there is increased transparency and awareness among the social partners that seek to cooperate in securing working relationships and mutually agreed upon goals among employers and employees.

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Notes

1 Information and communication technology (ICT) refers to all technical means used to handle information and aid communication. This includes computer and network hardware, as well as any associated software.
2 STEM = Science, technology, engineering and mathematics.

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15 Consulting in the digital era?

The role of tomorrow's management consultants

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1. Introduction

The term "consultant" can indeed take on many different forms. At bedrock, it refers to a professional who provides expert advice within a specific, specialized area (Oxford Dictionaries, 2018; Tordoir, 1995). Consultants are commonly differentiated as being either "internal" or "external" consultants, depending on what function they serve or to whom they provide consulting advice. An internal consultant typically refers to someone operating within an organization. They may be consulted on their area of expertise by others within the same organization. An external consultant, on the other hand, typically refers to an externally employed expert who provides assistance or advice to an actor on a temporary basis, usually in exchange for a fee (Armbrüster, 2006; O'Mahoney and Markham, 2013).

While the two categories are similar inasmuch that they both adhere to issues concerning confidentiality, risk project, project termination, etc., there are several practical differences between them as well. For instance, internal consultants are usually contracted in a rather informal manner as opposed to external consultants, and tend to be considerably cheaper to contract. They also tend to have a better knowledge about the organization from the outset than an external consultant. However, their strong tie to the organization carries the innate risk of them becoming overly cautious and/or apprehensive in taking or suggesting an action that would risk upsetting someone with the ability of influencing the internal consultant's career in either direction. They may also lack certain skills in facilitating organizational change (Cummings and Worley, 2013; Burtonshaw-Gunn, 2010).

External consultants, on the other hand, are often able to select their clients according to their own criteria and/or profile. They are generally looked upon as being more prestigious, which in turn elevates the organizations expectations for them to achieve their goal. This, by extension, enables the consultants to probe difficult issues and assess the organization in a more objective manner, devoid of any personal attachments and without fear of reprisals from the manager (Cummings and Worley, 2013; Scott and Barnes, 2011).

Moreover, consulting firms range in size from sole proprietorships, consisting of a single consultant, and small businesses consisting of a small number of consultants, to mid- to large consulting firms. The latter of which may in some cases

be multinational corporations. This type of consultant generally engages with multiple and changing clients, which are typically companies, nonprofit organizations or governments.

While a plethora of specific types of consultants exists, this chapter will primarily focus on management consultants, as this is one of the most common, and among recently graduated university students, most popularly sought after types of consultancies (Wickham and Wilcock, 2016; White, 2011; Hope, 2016). One of the reasons for this is that management consulting is known to generate high streams of revenue, both for the individual consultant, as well as for the consultancy firm, with some recent university graduates receiving offers from top firms with a remuneration approaching or even exceeding USD90,000 in their first year (Nisen, 2013; Harvard Business School, 2018; Management Consulted, 2018).

Management consultants are typically external consultants who provide the client management with strategic and/or operational advice (data driven). The reason why companies hire management consultants is explained by Greiner and Metzger (1983, p. 7):

> Management consulting is an advisory service contracted for and provided to organizations by specially trained and qualified persons who assist, in an objective and independent manner, the client organization to identify management problems, analyze such problems, and help, when requested, in the implementation of solutions.

As the digital transformation continues to make its way through various businesses, the consultancy profession is no exception, as pointed out by Christensen, Wang and van Bever (2013). Digital transformation aims to increase efficiency, competitiveness and accessibility of consultants by transitioning much of their businesses to digital technology. However, there is currently a lack of research on how digital transformation affects the role of management consultancy in the future, as there is confusion as to how consultants should structure their digital business (Marriage, 2018). There is also a pressing issue in regards to whether or not the consultants as we know them today are likely to look the same tomorrow, given the technological advancements (Czerniawska, 1999).

Thus, the overarching research questions are:

RQ 1: *How may digitalization influence the consultant's role of tomorrow?*
RQ 2: *How may the profile of the typical consultant change in the future?*

As a theoretical/speculative study, this chapter seeks to draw upon some of the available literature and the authors' own best-practice experiences in exploring some of the most pressing issues of the digitalization of consulting of today, with an anticipation of how the role of consultants may come to develop in the near future (Kim, Sefcik and Bradway, 2017; Cooper and Endacott, 2007; Elliott and Timulak, 2005; Murphy and Dingwall, 1998).

2. The background of traditional consultancy

A recurring point throughout the years has been contention that consultants receive vast amounts of money for their services and that much of this money is spent on impractical data and poorly implemented recommendations (Turner, 1982). Thus, in order to reduce waste, there is a need for potential customers to better understand what consulting assignments can accomplish. Historically, the traditional role of a consultant has been "to advise and assist the client in carrying out the project definition and contracting process, as well as with the management and execution of design, plus administration, supervision and quality control of the . . . contracts" (Harrison and Lock, 2004, p. 85). Typically, the consultant carries out a lead role in a given project, but falls short of overall project management and/or integration inasmuch that they are generally not accountable for, or in charge of, all parts of the project (Harrison and Lock, 2004).

The years following World War II are often described as the "emergent period of management consulting" (Srinivasan, 2014, p. 259). During this period, consulting entrepreneurs would highlight the significant contrasts between the status quo and broad cultural logics and use insights from outside their professional field to suggest solutions to problems. Moreover, they would emphasize the larger societal benefits of the proposed solutions, establish the uniqueness of their profession by establishing social codes, and establish relationships with prominent actors outside their professional field in order to legitimate their problem-solving models (David, Sine and Haveman, 2013). This evolution would eventually lead to an industry consisting of various actors and firms that are conceptually similar, but yet markedly differently positioned (Srinivasan, 2014).

In later years, various corporations have begun making increased use of titles that include "consultant" (Srinivasan, 2014). These staff members are effectively "internal consultants" (as described earlier in this chapter). These consultants provide the company with specialized expertise, but as "internal" consultants they are an integral part of the organization. As such, they do not generally bring in the "outside" perspective that clients often seek (Srinivasan, 2014). Arguably, the external perspective has traditionally been of key importance as Fincham, Mohe, and Seidl (2013, p. 6) identify management consulting as including "any activity that has as its apparent justification the provision of some kind of support in identifying or dealing with management problems, provided by individuals, groups, or organizations that are external to the particular management domain and which are contracted by the management on a temporary basis". The added value that external consultants bring to their clients is that the consultants are able to provide them with unique expertise, innovation and/or swiftness not readily available to the client (Momani, 2013; Srinivasan, 2014). To this end, a vital component of management consulting has also been the ability of providing advisory services by specialists who can assist the client in an objective and independent fashion in identifying management problems, analyzing problems, proving suggested courses of actions and in some cases, even assist in the implementation of solutions (Greiner and Metzger, 1983).

In time, however, the value proposition of the consultancies have gradually shifted from providing specialists to solve clients' business problems to granting

clients the ability to tap into the consultancy's knowledge base, as many clients and consultancies have similar access to the resource pools for hiring new recruits, i.e., promising graduates from top business schools (Sarvary, 1999). This means that consulting firms in the past couple of decades have had to emphasize the power of its collective knowledge rather than the individual expertise among its staff (Srinivasan, 2014).

The term "consultant" has shifted meaning from solely pertaining to expert advice during a limited amount of time, to also including concepts such as staffing consultants, or contractors (Hyman, 2016; Berry and Oakley, 1994; Turner, 1982). Some companies have employed a strategy of hiring consultants rather than employing staff, as it enables them to quickly cut back on staffing costs whenever recession looms (Banks and Coutu, 2008; Baumann, 2009).

3. The four phases of consulting

Prior to implementing solutions, the solutions in question need to be devised and clearly articulated in the upcoming implementation plan. This is typically done along with the consultants during a phase called "solutions design" (or something to that effect) (Griffin, 2017). These are executed by either the management consultants or the organization itself.

In an oversimplified manner, consulting can be expressed as consisting of four different phases: (1) the pre-analysis phase, (2) the problem-identification phase, (3) the analysis phase and (4) the implementation phase (as depicted in Figure 15.1). These four phases each carry their own potential issues.

3.1. Pre-analysis phase

Initially, there is the pre-analysis phase that seeks to answer the "why" of what needs to be accomplished. In a strictly oversimplified and theoretical world, this phase can be omitted and a consultant would be able to dive right in to deal with the problem at hand. However, in practice this is rarely, if ever, possible, due to

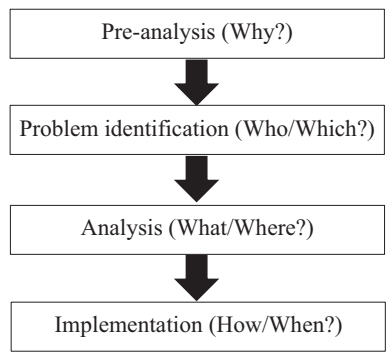

Figure 15.1 The four phases of consulting (authors' own depiction).

the fact that the management consultancy services are ever so often subject to various forms of organizational politics and demands from other hierarchical levels within the organization (Verlander, 2012; Hodges, 2017). Moreover, the local executive in charge of contracting the consultant ever so often lacks the insight in the actual (or perceived) problem at hand and often needs someone to guide them in taking the next steps (Cummings, 2010; Keuning, 2007; Cohen, 2016). This problem was highlighted in a 1989 landmark study, in which Yoshida (1989) coined the famed expression, "the Iceberg of Ignorance". This pertained to the realization that only 4% of an organization's frontline problems are known by top-management, 9% are known by middle-management, 74% by managers and 100% by employees.

By and large, the issue of "the Iceberg of Ignorance" remains a problem to this day and age (Jankowski, 2017; Corey and Elliott, 2018; Ray, 2016; Albert, 2018). In practice, this means that the management consultant during the initial phase is often tasked with greeting staff across the hierarchy (i.e., not only executives), in order to acquire a level of empathy and gaining a better understanding of their situation, why it is important, and how to go about helping the organization achieve its aspirations (Gourguechon, 2017; Poulfelt and Paynee, 1994; Senge and Krahnke, 2014).

3.2. Problem-identification phase

The problem-identification phase that seeks to answer the "who" or "which" that lies at the root of the client's problems (Heiser and Farah, 2018; Benn, Jones and Rosenfield, 2008; Schmidt, 2017). This phase is a critical part in the management consultant's work as it seeks to establish the problem as identified not only by the client but also by the consultant. That is to say, the way problems are defined affects the ability to solve them (Kubr, 2002; Ashkenas, 2012; Conoley, Conoley and Gumm, 1992). For instance, a company might find itself struggling with declining revenues/profits, or with increasing costs. They might lose market shares but fail to understand why.

In order to be able to identify root causes and solve these problems, the consultants typically start by gathering quantitative and qualitative data, mainly from internal data sources but also external if needed (Newton, 2010; Andler, 2016). Examples of internal data can be financial data, company annual reports, interviews, surveys, etc. External data sources that may be used are e.g., competitor annual reports, interviews with external experts and customer surveys. The internal and external data is used to build a solid foundation in order to understand the industry context as well as the internal starting point from where to undertake the analysis.

Analyzing the collected data to understand root causes is instrumental to every project. Management consultants often operate from a hypothesis-driven structure when developing the right choice of methods and tools for their tasks (Liedtka, 2006; Rasiel, 1999; Garrette, Phelps and Sibony, 2018). This means that the management consultant will depart from their best, educated guess of an answer to a

given problem. It should be stressed that a hypothesis-driven deduction is not "a shot in the dark", based on conjecture or personal opinion, but rather on background information, preliminary data analyses and input from various experts in the field and actors in the organization (Hamann, 2012; Weiss, 2011). While there may not be too many concrete facts upon which to base the hypothesis during the early stages of the engagement, more facts emerge the further a consultant delves into the client's engagements, meaning that the hypothesis development is the result of a highly organic and evolving process. This approach allows the consultant to quickly gain a grasp of the organization and finding a hypothesis that can either be supported or rejected rather than having to start from a blank sheet.

Nevertheless, this phase places a lot of demands on the consultant as this is a phase in which several mistakes are prone to be made. According to Kubr (2002, p. 186), common issues during this phase include:

- Mistaking symptoms for problems
- Having preconceived notions about the causes of the problems
- Looking at problems only from one sole technical viewpoint
- Disregarding how the problem is perceived in other parts/sections of the organization
- Miscalculating the sense of urgency of the problem
- Incomplete/deficient problem diagnosis
- Failure to clearly articulate the focus purpose

It is thus the role of the management consultant to help the organization avoid these common pitfalls by bringing in an objective perspective. Organizations may face difficulty in trying to avoid these kinds of mistakes due to internal forces of power and politics (Mintzberg, 1983). Although the consultant may also face such difficulties, they are often in a better position to assume an objective/neutral standpoint (Greiner and Metzger, 1983).

3.3. Analysis phase

Following the problem-identification phase, is the analysis phase, which seeks to answer the question concerning "what" and possibly even "where" something needs to be addressed. The analysis phase may actually consist of several sub-stages, depending on the analysis and research methods carried out (Biggs, 2010). During this phase, the consultant(s) will carry out an in-depth diagnosis of the problem, while assessing the type change the organization will have to undergo in order to achieve the purposes of the assignment while also assessing the client's performance, resources, needs and aspirations (Harrison, 2005; Kubr, 2002). The consultant(s) will at this stage determine the client's attitude toward change and if the client is likely to carry out suggested changes without much ado or if they need further convincing before taking action (Kubr, 2002). During this phase the consultant(s) will be able to see some possible solution emerging from the data processed. Nevertheless, a lingering issue with this phase is that fact-finding often

receives the least amount of attention (Kubr, 2002). At the same time, decisions regarding what data to look for and what data to disregard predetermines the relevance and quality of the proposed solution(s).

Another problem is that by manipulating processes by, for instance, collecting data and talking to people, the consultant may effectively yield the potential to influence the client's firm, even if on a micro-political level (Armbrüster, 2006). This may lead to altered behaviors among the client's staff as a direct result of the consultant's presence, through what is known as the "Heisenberg effect" (Verlander, 2012). This carries certain similarities to the "Hawthorne effect" and refers to a phenomenon in which the presence of a consultant/researcher affects what is being researched (Simonton, 2010). However, the role of the consultant goes further than that, as a central part of succeeding with actionable analyses is getting the organization to internalize the results of the analysis. The consultant typically helps the organization through the problem formulation where they together contextualize and articulate the problems, thus opening up for the possibility of launching concrete initiatives to address the identified problems (Baer, Dirks and Nickerson, 2013).

3.4. Implementation phase

Finally, there is the implementation phase, which seeks to answer the question concerning "how" a proposed solution could be enacted and integrated into the firm's operations. This phase marks the culmination of the consultant and the client's collaboration. If no implementation occurs, the consultant's efforts are at best incomplete or at worst have failed (Kubr, 2002). It is important for consultants to also be part of the implementation phase if they wish to influence, monitor or oversee the changes being put into practice (Baaij, 2014; Kubr, 2002). It is, however, not the consultant's prerogative to opt whether or not they should take part in the implementation.

Oftentimes, the clients believe they have the necessary skills and capacity to run the implementation by themselves, even though they, more often than not, actually lack the necessary skills. Alternatively, they may lack the finances or the interest needed to fund the implementation phase. In other cases, it is a combination of both of these reasons. In these events, it is difficult, if not to say wrong, to blame consultants for unsuccessful implementations. Consultants whose sole focus lies on a specific area of expertise and who need not concern themselves with the regular business routines of their clients would indeed have more time at their disposal, meaning that they can implement solutions at a far more rapid pace. Moreover, they also possess the required skills and knowledge to carry out these implementations, often drawing upon insights gained from past projects. However, it is important to bear in mind that the effects of consultancy may sometimes materialize after some time has passed after the completion of the project. Likewise, it is not possible to measure the firm's performance had they not chosen to enlist a consultant or vice versa. Hence, it may in some cases be difficult to

estimate the causality between consultancy and firm performance (Baaij, 2014). However, as previously discussed, management consultants are often hired to aid top management in assessing a situation and suggesting possible routes forward, rather than actually implementing a solution. In such cases, the possibility of informed choice, rather than an implemented solution, is what the organization gains from hiring consultants.

4. The digitalization of consultancy services

Management consultants of today are devoting much of their time to conducting analysis, possibly in vain, since they do not always know the extent to which their work is actually going to be implemented, or even if it will ultimately remedy the problem at hand (Kubr, 2002; Srinivasan, 2014). A consequence of this is that consultants may find it tempting to opt for the "low-hanging fruits" in the interest of achieving quick results rather than spending time on more profound and complex problems (Chase and Kumar, 2010). Thus, a salient issue that has been subject to much debate is to what extent, if at all, consultants are solving the "right" problem (Spradlin, 2012). That is to say, clients will still continue to experience the need for consultancy services, but there is an increased need for the clients to reduce their risk while still ensuring that they receive sustainable solutions that address the core of their problems (Newton, 2010). What distinguishes the best management consulting firms is their ability to go beyond the quick and sometimes simple solutions to solve the complex problems and achieve real and sustainable change. By being able to do so, they create a reputation for themselves that leads to repeat business.

With digitalization shaping the business environment, we see increasing data availability and ranges of analytics tools, leading to larger datasets to analyze and more data to navigate (Sivarajah et al., 2017; Newman, 2015). Digitalization and the digital transformation is changing the way companies do business and the problems they face, and thus also the consultant's role (Bieler, 2014). This chapter will take a closer look at what happens when the consultant is challenged to adapt to the changing market conditions to stay relevant to their clients.

The consultant's role is heavily influenced by data. Consultants tend to be data-driven in the sense that they often use different data sources in their work, using experience to bridge the gap between data sources (Curuksu, 2018). Clients hire consultants for expertise they cannot get in-house. Will digitalization make these skills available to everyone? If data access and analysis is facilitated by digitalization and made possible for everyone to learn and excel at, then what need is there for consultants at all? Several identified factors seem to decrease the need for external management consultants in the future, such as increasing data availability and increasing availability of analytics tools (Davenport, 2017). These factors, outlined next, might also change the way we look at a consultant project, leading to more modularization of the business.

4.1. Increasing data availability

Once it is simpler for organizations to gather data (internal as well as external data), they do not need to hire consultants to find data that was previously difficult to find. However, consultants will still have important functions to fill, even if gathering such data will be done to much less extent. To this end, datasets still need to be interpreted and consultants are able to infer personal experiences when making these interpretations. That is to say, consultants use business judgment and experience to bridge the gap in poor datasets. Examples of external data sources often used by consultants are industry reports, expert networks with industry experts and research and surveys done by large strategy houses. With increased access to these sources, now most of them are only a Google search or a phone call away, it is no longer necessary to bring in consultants to piece together information.

With higher quality of internal data and ways of gathering data getting better, the need for relying on external input and data sources will likely also decrease. This will decrease the need to rely on management consultants to present facts. However, management consultants also, to a large extent, provide tacit, experience-based knowledge. This allows for rapid diagnosis of situations based on heuristics, which is (barring other instructions) a set of default, go-to rules that have been developed over an extended period of time following a process of repeatedly having to address similar problems in other organizations (Newell, Shaw and Simon, 1959). As contended by Baer, Dirks and Nickerson (2013), problem formulation is a central and complex part of organizational development. For this reason, consultants who possess the ability to do this in a swift manner will likely continue to be in high demand, as opposed to the articulated knowledge of different management solutions, which will become widely accessible through networks of shared data.

4.2. Automation of organizational processes

Organizational processes are invariably complex systems, meaning that they consist of a network of several highly interactive and interrelated elements, with each of these performing its own function (Gino, 2002; Langlois, 2002). In regards to the aforementioned "four phases of consulting" (as mentioned in Section 3), digitalization impacts the first pre-analysis phase in that complex organizational processes will likely become more automatized in the future due to the advancements of various robots and AI-algorithms (Daugherty and Wilson, 2018; Davenport and Ronanki, 2018; Manyika and Sneader, 2018). Consequently, the traditional setup of most organizations of today may very well change in the near future as robots may come to take on increasingly more complicated challenges, requiring no human involvement.

The automation process that follows the digital transformation also entails that organizations are able to operate in a more agile manner, while reducing lead-times (since machines operate faster than humans). This means that it will become

more difficult, perhaps even futile, for the consultant to establish relationships with the staff with the intent of gaining insights into how the business operates. That is to say that the hypothesis-driven approach may yield less information if used in the same manner as it has been used hitherto. Moreover, digital systems and algorithms can amass vast quantities of data, meaning that the future consultants will be less likely to contribute "hard facts" that are not already known to the organization and its AI system. Hence, the consultant's "know-what" will become less important in the future, and rather the emphasis will come to rely on the consultant's "know-how", in terms of their ability of tethering out information from complex systems.

4.3. Increased availability of data-analytics tools

Increased data accuracy and higher quality of internal data, combined with an increasingly advanced analytics tool readily available to the public, makes it easier for companies to set up in-house analytics teams (Isson and Harriott, 2016; Bell and Zaric, 2013). This is already in progress with companies such as Walmart, IBM and FedEx, as they rely on analytics teams in order to gain a competitive advantage over their rivals (Bell, 2015; Mochari, 2015).

Reverting back to the four phases of consulting (found in Section 3), the second phase of "problem identification" becomes a salient issue at this stage. During this stage, the consultant devotes much time toward identifying the management problems, analyzing data to understand the root causes of these problems and attempting to devise solutions to these problems. We have seen from companies using in-house analytics teams that such arrangements are especially helpful during the third phase of a project, namely during the data analysis. It is possible that this third phase may in the future be transferred from external management consultants in favor of having it handled by the organization's in-house analytics teams.

4.4. Complex analytics tools

The access to advanced analytics tools will also increase the speed and quality of data analysis, as machines can detect patterns in big data better than humans and are not prone to the same risks of making subjective and arbitrary interpretations as humans. However, many, if not most, of these complex tools will require a sizable amount of training in order to become fully versed in them. This can in turn affect the consultant's work in different ways. One might be that consulting projects will become "modularized", where the client might request a team versed in using a certain tool or skill set. It can also lead to the internal analytics team becoming considerably streamlined, meaning that consultants will have very few sets of skills outside the designated analytics tool, which in turn may lead to a diminishing need for consultants.

While the aforementioned trends would seem to decrease the need for external management consultants in the future, there are also some other factors that work in the consultants' favor. Specifically, one such factor is the consultant's

prerogative to ask the right questions, as this is often contingent on the consultant's experience of the subject matter, as well as their decision-making abilities. Another factor working in the consultants' favor in the future is the project-based business model. These factors are discussed in greater detail next.

4.5. Asking the right questions

As previously discussed, the most important factor of a consulting project is the ability to define it accurately. Thus, it is crucial to understand the business objective to delimit the scope of what it is supposed to achieve (Hanna, 2016). Trying to find patterns in large datasets without knowing what to look for will undoubtedly lead to valuable time being wasted. As the need to have someone who knows how to ask the right questions is such an important factor, it is quite possible that there may even be an increase in the need of consultants in the future. Especially with the increased amounts of data, consultants will likely be needed to navigate the data to an even larger extent than today.

A research study conducted by the management consulting firm McKinsey and Company interviewed executives in data-driven businesses (Barton and Court, 2013; Díaz, Rowshankish and Saleh, 2018). The executives agreed that the business objective was crucial. While access to data and tools may increase the speed of the analysis and the possibility to analyze more things than in the past, it is still critical to understand the desired outcome and what problems there are to resolve. This is becoming even more important, since the quantity of data seemingly continues to grow in numbers. The external consultants have an additional advantage from conducting multiple projects within certain functional capabilities, leaving them with experience the client may lack. They also offer an outside in perspective, to look at the business from an external perspective which might be valuable. This is clearly explained by Curuksu (2018, p. 19):

> Predictive analytics may be used to identify risks and opportunities such as economic forecasts, cross-sell/up-sell targets and credit scoring. But the type of intuition that consultants develop to ask questions, pose hypotheses and drive executive decisions is still the realm of science fiction, not existing computer programs. Hence, the arrival of data scientists and big data analytics does not eliminate the need for traditional business professionals.

4.6. Big data does not mean accurate data

While data availability increases, it does not necessarily mean that the data accuracy is high (Delgado, 2015; Schuck, 2018). There are several studies showing the contrary, for example a study conducted by Deloitte (Lucker, Hogan and Trevor, 2017). The data might be from a limited sample, respondents might not answer accurately and so on. Making decisions based on inaccurate data may be even worse than making decisions based on experience combined with data. This will likely keep the demand for management consultants in the future at a stable level.

4.7. Updating extant business models

In adapting to the changes in the business environment following the digital transformation process, some consultancies have opted to capitalize on big data and advanced analytics by extending their service offerings to this category as well, providing niched and specialized services to customers needing assistance in these areas specifically. BCG Gamma and McKinsey Analytics are a couple of examples working in this direction (Curuksu, 2018; Duranton, 2019; McKinsey and Company, 2019). That is to say, rather than losing this market by leaving it up to the client's in-house analytics teams to handle, the consultancies have expanded their service offerings to better accommodate for this type of demand. Boston Consulting Group has adopted an approach where data scientists from BCG Gamma work together with the management consultants to solve the issues clients face (Duranton, 2019; AI Multiple, 2019).

Digital transformation has become a salient part of management consulting, as this transformation constitutes a major change required for their clients to survive in a digitalized world. Management consultants become key players in this regard, as the transition to a digital environment is more about management than it is about technology. Putting digital on the top management agenda, introducing agile working methods and enabling for experimentation are parts of becoming a digitally mature organization (Snow, Fjeldstad and Langer, 2017). To enable digital transformation, management consultants thus aid the organization in designing and adjusting routines in tandem with the introduction of new technologies, making it possible for the organization to use these new technologies to achieve a new, digitally-enabled, state of business. For this reason, management consultants play a pivotal role – while new technologies and analytics are a key component of becoming digitally mature, these tools are of no value unless combined with the relevant management principles. In this sense, digitalization, although often mistakenly regarded as an end state, is in essence an implementation of technological tools, which, combined with appropriate management practices, enable organizations to function in a digitalized world.

4.8. Combining management consultants with data scientists

As previously discussed, the advanced analytics tools will require an extensive amount of training from the consultants' part in order to gain proficiency in them (Consultancy.uk, 2018b). Additionally, these tools will require proficiency in statistics (Tong, Kumar and Huang, 2011). One possible way for management consultants to retain their strong market position would thus be to collaborate with data scientists, who possess knowledge of both statistics and the advanced analytics tools (Flinn, 2018; Granville, 2014). This way, the benefits of the management consultants, such as business intuition, decision-making abilities and the sense for detecting the right questions to ask, may be combined with the technical expertise of the data scientists. This, in turn, leads to strong analytical capabilities. By basing at least part of the analysis carried out by the management consultant on solid

data science would in all likelihood improve competitiveness as society moves further into the fourth industrial revolution (4IR).[1] The aforementioned project-based business models would likely facilitate a transition to teams consisting of both management consultants and data scientists. An example of this approach is the previously mentioned Gamma team at Boston Consulting Group.

4.9. The project-based business model and the project processes

Management consultants are often employed on a "need basis". While digitalization improves the convenience of having an on-going business support that provides the organization access to data so that they may make informed decisions based on the available data, there will always be fluctuations in an organization's workload and there will be times when the available staff will not have the ability or the resources to be able to solve the organization's challenges. For shorter and/or irregularly occurring projects with occasional spikes in workload, it will (even in the future) likely be easier to temporarily enlist the services of a trained task force than hiring new people with the right skills and talent.

In truth, we have already witnessed part of the digital transformation of the consultancy industry in the form of cloud-based *Kanban* boards,[2] provided by e.g., Trello, Waffle (GitHub), etc. (Błaś, 2016; Swartout, 2018). There are also more advanced cloud-based project-planning tools that view the whole process in a flow-like manner, where it is possible to zoom into the small parts of the project and add information and comments on the right granularity level. This enables real-time follow-up of the consultants' work, as they update the progress. Commenting the posts with thoughts and questions to be asked, may also facilitate the communication between the consultant and the client. There are possibilities to connect Kanban boards or project-planning tools to communication platforms such as Slack, so that the client is instantly notified when the consultant makes a comment. One may expect these features to develop even more so in the future in order to make the notification scheme even more seamless while upholding fast communication routines.

4.10. Opportunity for scalability, growth and flexibility

Of particular interest to the consulting industry is the strong potential of digitalized business models for scalability. Contrary to traditional consulting, where the number of projects and growth are limited by human resources, technology-based consulting allows scalability and growth without raising cost to a similar level (Werth, Zimmermann and Greff, 2016; Stampfl, Prügl and Osterloh, 2013). Earlier in this chapter we have identified and discussed a number of key areas and strategies that could enable technology-cognizant consultants to gain competitive advantages in the future digitalized economy. By facilitating certain processes to become more technology and customer based, consultants gain a possibility to focus on their primary decision-supporting competences, therefore consulting services can be provided in a more flexible, more individualized and more cost-efficient manner.

Deploying digital technologies will enable routine information-based tasks of consulting to become increasingly more automated and outsourceable, therefore boosting the effectiveness of physical resources, potentially reducing expenses and time invested by consultants in the services. Additionally, the non-routine essential value-generating and business-operating factors will be further enhanced. The digital transformation of consultancy also allows consultants to become more flexible both in terms of time and space, as they are no longer bound by the constraints of having to travel to the client at any one particular location (Nissen and Seifert, 2015). By integrating customers and potential third-party actors, whose help consultants may enlist for specific processes (e.g., statisticians, programmers, interface designers, etc.), into a digital interface, it is possible to facilitate a service process that is more efficient in acquiring and storing information, while providing more economical and individualized solutions. The changing roles and activities of the consultants as they evolve from traditional consulting to digital consulting, should in theory lead to increased scalability, higher growth and flexibility. Latecomers, who are too slow to recognize the potential and to embrace the power of digital technology in consulting, could soon find their services becoming obsolete or too cost-inefficient in order to provide meaningful services in the future world of consulting.

4.11. Further opportunities, risks and implications of digital consulting

The degree of success a consulting service can expect to reap through transforming conventional processes into digital ones is primarily dependent on the consultants' ability to cater for the changing needs of their customers in the technology-oriented market. While digital consulting carries many benefits over traditional consulting (such as greater flexibility, faster lead-times, more cost-efficiency and better catchment area), there is still a discernible resistance to the digital transformation of consulting among a great portion of clients as well as consultants. Indeed, digital consulting has made great headway, with many newer innovations such as web-based file-hosting systems (e.g., Dropbox) becoming more commonplace in everyday consulting use. However, due to a general lack of knowledge and trust in new technologies and their capabilities, many people tend to be skeptical and cautious of using them, at least initially.

The disparity between the standards and practices used in digital solutions as well as in consultancies themselves, is also the cause of significant barriers for widespread implementation of digital consulting. By establishing international and national standards for the services provided via digital consulting, it would be possible to make the future consulting practice more compatible with pre-existing consulting practices, meaning that already established conventions could unequivocally also be part of the new digital consulting practice. In 2017, the *ISO 20700:2017 Guidelines for Management Consultancy Services* were developed as a guideline for people or organizations for the effective management of management consulting services (ISO, 2017). By drawing upon research and experience

from a wide array of management consultancies around the world, the *ISO 20700:2017* seeks to increase transparency and effectiveness for clients as well as consultancies and aims to provide practical guidelines based on outcome while emphasizing the importance of understanding the clients' needs (Boler, 2017). To this end, a practical first step could be to update the *ISO 20700:2017* guidelines to establish a set of recognized standards that better reflect the aspects relating to digital consulting. In doing so, it would be possible to further strengthen and increase trust for and acceptance of these types of services.

To ensure maximum benefits at minimal loss for consulting providers, it is essential to clarify and to further discuss some novel opportunities and risks from perspective of both the consultant and the client. Over the past decade, the digitalization process has allowed for reduced direct face-to-face interaction in specific stages of the consulting project (in some cases the interaction may be exclusively digital on a remote basis). Using this virtual approach enables consultants to deliver customized solutions anytime and anywhere while optimizing the workload to gain a sustainable competitive advantage. Besides financial benefits and the improved flexibility of consulting services, such new type of interaction is advantageous for the client as the availability of consulting is not contingent on arranging physical meetings. Moreover, this digital type of interacting reduces much of the waiting times associated with arranging physical meetings, which in turn helps expedite the consulting project. That is not to say that the potential lack of physical meetings is without concern. It is known that face-to-face meetings help strengthen the bond of trust between the consultant and clients (Taylor, Daymond and Willard, 2018; Goman, 2016). While physical consulting meetings take a back-seat, the clients continue placing higher demands on the quality of their consultancy services (Bryder, Malmborg-Hager and Söderlind, 2016; Nissen, 2018). To that end, there is a risk that the reduced direct client-consultant interaction incurs added communication difficulties, a sense of deindividualization and weaker client-advisor relationship.

Another risk consultants must beware of is the fact that digitalization and automation of processes make consulting services increasingly prone to cyberattacks and fraud. Responsible dealing with data and adequate stability of the infrastructure are essential for successful digitalization of consulting services. Moreover, the protection of personal data as well as business data needs to be guaranteed (Schuster, 2005). When developing solutions utilizing digital technology, consultants need both to uphold the client's trust and to offer legally valid data security (Nissen and Seifert, 2015).

The lack of common practices, standards and regulatory framework in information security is an impediment to the implementation of digitalization in the consulting industry. Legal ambiguities are of particular concern, since consulting services are based on large amounts of complex data from various sources. For example, when a consultant working on the behalf of their client, extracts information about consumers from market data and then processes this information using an analytical application, an additional data-privacy approval may or may not be needed depending on the context and legal framework of the country of the

client being serviced. Thus, added consideration should be given to relevant security technologies and concepts so that the consultants are completely familiarized with all the intricacies of data security and privacy in an international setting.

All of the aforementioned factors may have damaging effects on the client-consultant trust, which is in and of itself an integral component of consulting (Glückler and Armbrüster, 2003). From a strategic point of view, it is important to establish a feeling of cohesion between the involved parties beyond the limitations of digitalization, consequently it is highly desirable for clients to feel secure about the privacy of their data and to have the continuous support and access to a consultant through personal contact if need-be.

Research studies have shown that rising degree of digitalization of consulting services lead to an observable shift in the clients' expectation and service quality criteria (Nissen, Seifert and Blumenstein, 2015). The personal client-consultant relationship decreases in significance from the client's perspective, whereas factors such as support availability, privacy and data security, reaction capability, efficiency, aesthetics and compensation rise in importance. Given the growing number of clients wishing to have a combination of digital-consulting services and conventional personal consulting, it is essential for consultants to continue to accommodate the client's wishes rather than coerce them into a style that panders to the consultant's convenience at the expense of the client's trust. To this end, it is vital that consultants ensure that they have a secure and stable digital platform and analytics infrastructure, so that the designed digital-consulting products serve to strengthen the trust and relationship with their clients. Nevertheless, a great part of the challenge for future consultants is to ensure that the quality and balance of traditional/digital services live up to the satisfaction of the ever-changing demands of their customers.

5. Conclusion

The premise of this chapter was to explore the future role of management consulting following digitalization and the digital transformation. The chapter set itself out to explore the following two research questions:

RQ 1: *How may digitalization influence the consultant's role of tomorrow?*
RQ 2: *How may the profile of the typical consultant change in the future?*

In doing this, this chapter drafted up a model outlining the four phases of consulting, consisting of the pre-analysis phase, problem identification phase, the analysis phase and the implementation phase (illustrated in Figure 15.1).

In response to RQ 1, this chapter concludes that data analytics tools will play a central role in the future. Above and beyond, it is primarily phase 3, i.e., the analysis phase, that will see the greatest benefits of digitalization. As such, the overall digitalization (and digital transformation) may decrease the perceived need for (external) management consultants in the future, as various forms of analytics tools, AIs, algorithms, scripts, etc. may become available on the market

that purports to enable for organizations to take ownership of their own optimization process.

There will undoubtedly surface companies whose business model seeks to capitalize on the advancements of digital tools in order to sell various iterations of customized package solutions to organizations in order for them to optimize their own business performances in the belief that they are saving on consultancy costs. Hence, companies may find it tempting to outsource this task to their in-house data scientists. This, in turn, may have disastrous effects as part of the consultant's role is to help the client contextualize/articulate the problem, something which the client's invariably lack the insight to do on their own accord. Management consultants also possess "tacit knowledge", which means that no matter how much data/information that is made readily available on the open market, the consultants have their own set of heuristics and knowledge of how to facilitate groups, handle organizational politics, stakeholders, etc. This also provides management consultants with the advantage of being able to swiftly assess any given situation based on their own experiences and know-how, while identifying solutions that will work well within a given particular context.

This is not to belittle the future role of data scientists by any means. On the contrary, data scientists possess valuable knowledge of statistics as well as proficiency in how to best use and interpret the advanced analytics tools. To this end, digitalization may actually serve to prompt a more integrated, multidisciplinary arrangement of management consultants and data scientists working in tandem to solve complex organizational problems.

To this end, while the fourth stage, the implementation phase, is where the whole endeavor comes to fruition, it is important to stress that implementation is not always everything. A suggestion brought forth by a consultant that is not implemented is not necessarily tantamount to failure. Sometimes the chief gain from consultancy can be that one becomes aware of one's situation and having all possible scenarios and outcomes presented to oneself and being given a sense of agency to choose one's own direction going forward.

In regards to RQ 2, the role of the typical consultant may change inasmuch that there is an added need for consultants to at least familiarize themselves with the workings of digital tools and what they can accomplish. There will also be a need for consultants to learn to work in closer collaboration with other professions, chiefly data scientists, which will place greater emphasis on the consultants' ability to be "team players". Traditionally, business students have constituted the natural selection of management consultants (Curran and Greenwald, 2006). However, with the digital age emerging, students of more data-oriented and/or technological disciplines can be expected to make a foray into management consulting (Kubr, 2002; Wright and Kipping, 2012). Thus, the importance of multidisciplinary approaches and the ability to communicate across educational backgrounds will become even more important in the digital age.

As digital technology becomes an integrated part of organizational processes, management consultants may, to a larger extent, aid organizations in working with data, rather than trying to reduce latency in manual processes. While management

consultants with long-standing practical experience will continue to be a sought-after commodity even in the future, old consultants will eventually retire and new consultants will need to earn practical experience on fresh merits. Thus, in the future, it is likely that management consulting will not only be about being able to know one's way around people, but also (if not more) about knowing one's way around "4IR" technology.

Management consultants will need to work with new technologies in a new digital and innovation-driven economy where clients will want to know how their enterprise can benefit from such digital advancements as blockchain, smart contracts[3] and algorithms (Corrales, Fenwick and Haapio, 2019). Specifically, management consultants will need to offer value that exceeds what digital technology will soon purport itself to do of its own accord (Kelley, 2016; Martin, 2009). Clients will therefore need to enlist consultants that are knowledgeable in these types of technologies in order to provide strategic advice and those consultants who are not competent enough in this area may risk losing their customers to another consultancy. Hence, being tech-savvy will in a way become quintessential in securing the customers' "brand loyalty" to the consulting firm (Corrales, Fenwick and Haapio, 2019). For this reason, fluency in digital will be a central part of core consulting skills, just as integrating systems will be a natural part of organization design and process development. However, this is not to say that the future consultants should forgo their ability to interact with humans and only be hired on the basis of possessing the necessary technological expertise (Erikson and Markuson, 2001). Rather, complexity will increase as today's distinction between human and technology processes will become less obvious, and interfaces between humans and technology will become more sophisticated and less rigid. This will require management consultants to be comfortable in interacting with both people and technology in fast-paced business processes and offer clients contextual insights and proficiency that a mere algorithm cannot. This is yet another argument favoring collaboration between management consultants and data scientists along with other professions of a heavier-set technical background.

With clients wanting advice on how to benefit from digital advancements, one could easily envision a process in which the management consultant is initially hired in order to evaluate the business needs and suggest various technical solutions, such as algorithms for e.g., predictive maintenance, or other types of predictive analysis. Following this example, the management consultant would then engage data scientists or algorithm developers/programmers in order to implement the suggested actions. Following a close working relationship between the management consultants and the technical experts, the clients would have favorable odds of being able to implement cutting-edge technology and reap its rewards, while the management consultants would deepen their knowledge and insight of the technical possibilities without losing sight of their tacit knowledge as previously discussed.

Consequently, rather than launching large-scale business transformation programs involving prolonged change-management efforts, consulting will become more agile as the result and output of change efforts may be instantaneous,

making experimentation and iterative problem-solving in short time frames into the standard practice of management consulting. Management consultant profiles may gravitate toward skills within iterative experimental methods in order to fit with the agility of the digital business.

Most essential value-generating and business-operating factors have the potential to be enhanced or automated using digital technologies. However, in order to gain a competitive advantage, these factors need to be constantly attuned to the changes in the wants and needs of the clients, as well as to the market and the technological development. Moreover the digitalization of the consulting industry offers a number of economic advantages. One example is the scalability of virtual (remote) consulting services. Another example is the cost-savings and time-efficiency brought on by automatization of analytics as well as the decreased traveling activities. This, in turn, could open up new market shares and for a new type of client that was previously unable to afford the costly services rendered via conventional face-to-face consulting. Nevertheless, future consultants should take caution of the limitations of digitalization and take as many precautionary measures as necessary in order to preempt and counteract the risks associated with over reliance on digital technologies.

Of course, consultants who are early adopters of digital technology will likely continue to have a head start over those consultants who do not, especially the early adopters who are able to add value through their own creative input. The latter category entails that they have the ability to put their own touch on things and are able to infer unpredictable, but accurate conclusions in a way that induces the same Eureka effect that a machine cannot (Hull, 2002). In this sense, (and tying into the previously answered RQ 1), human consultants will continue to be indispensable to the consultancy profession even in a future where AI has advanced beyond the Turing test[4] (Christian, 2011).

Admittedly, many management consultants of today would already define their work style as "agile" and it is true that the word "agile" has become something of a buzzword that has permeated the consultancy industry for many years to describe a sense of being fashionable and up-to-date with how to implement processes, projects and products (Rigby, Sutherland and Takeuchi, 2016; Fuchs and Golenhofen, 2019; Consultancy.uk, 2018a). However, agile methods will become even more accentuated in a digitalized age and will in many cases form a building block of the consultants' work. This will in turn affect the scope of projects (end-to-end), the consultants' skills and/or team setup, as well as the cost-revenue-structure of the project controlling (Krüger and Teuteberg, 2018).

Nevertheless, the digital age may prompt the consultancy organizations to take on a more agile profile. This is in particular regard to those organizations that deal with large-scale and far-reaching transformations that have hitherto not had the capacity to conduct their work in a faster manner.

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Notes

1 The fourth industrial revolution (4IR) denotes a fusion of technologies that blurs the lines between the physical, digital and biological spheres via technological breakthroughs in different fields, such as robotization, automatization, Internet of Things (IoT), artificial intelligence, 3D printing, etc.
2 *Kanban* (Japanese: 看板) is a lean method to manage and improve work across human systems. A *Kanban board* is an agile project-management tool designed to help visualize work, limit work-in-progress and/or maximize efficiency or flow.
3 A smart contract consists of a computer protocol that seeks to digitally facilitate, verify or enforce the negotiation or performance of a contract. These types of contracts allow credible transactions to take place without the need of involving third parties as these types of transactions are trackable and irreversible.
4 The Turing test (named after English mathematician Alan Turing [1912–1954]) denotes a situation in which an AI is able to communicate with a human being via a text-based interface in a way that is indiscernible from another human being.

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16 Digitalization, circular economy and the future of labor

How circular economy and digital transformation can affect labor[1]

Anthony Larsson and Linn Lindfred

1. Introduction

Circular economy is an economic model that offers a way of producing and consuming goods while simultaneously allowing mankind to stay within the planetary bounds (European Commission, 2014; Stahel, 2016; Ellen MacArthur Foundation, 2015c). Notwithstanding, changing the global economic system means substantial implications in many, if not all, areas. Specifically, there will be a greater need for human employment in a circular economy and the growth will be based on human capital instead of the extraction of natural resources (Groothuis, 2015). However, the transition to a circular economy relies on tax shifts and reforms in legislation, which in turn also carries an impact on labor (Groothuis, 2015; Wijkman and Skånberg, 2015; Lewandowski, 2018).

While such tax shifts and legislation reforms may seem straightforward in principle, the transformation from a linear to a circular economy is laden with many other obstacles as well, and for that reason it is necessary to discuss the tools available to overcome them. Obstacles range from "hard values", such as policies and laws to such "soft values" as individual behavior, lack of knowledge and lack of data. Digital technology provides a tool that can overcome some of those barriers. In fact, an increasing number of researchers are now discussing the role of digital technology as a catalyst for achieving a more sustainable society and the necessity of using it in order to achieve circular economy (Antikainen, Uusitalo and Kivikytö-Reponen, 2018; Ellen MacArthur Foundation, 2015d; Stuchtey, Enkvist and Zumwinkel, 2016). Many researchers have addressed how digital technologies at-large affect society. Fewer are the numbers of researchers who have investigated how society in general and labor in particular is affected when digital technology is used to propel and enable circular processes and circular economies. Overall, there has been a lack of research in how social sustainability is affected by a circular transition (Schroeder, Anggraeni and Weber, 2019). Thus, this conceptual study seeks to draw upon available literature and research findings with the aim of answering how the labor conditions are affected when digitalization is used to achieve circular businesses in different ways.

2. Linear vs. circular economy

What defines a business model varies greatly and is indeed subject to much debate. However, in its most essential form, it can be said to describe how an organization creates and captures value (Kaplan, 2012). The feature of this model defines the organization's customer value proposition and pricing mechanism. This in turn indicates how the company organizes itself and how it structures its supply chain (Kavadias, Ladas and Loch, 2016; Lahti et al., 2018). An economic model, on the other hand, is a framework that is used to conceptualize a complex process in a comprehensible manner. Of course, there are many different types of economic models, but when discussing societies at large, the economic model that has characterized societies since the beginning of industrialization is called the "linear model" (World Economic Forum, 2014). The linear economic model is based on extracting resources, producing items/products, using them and ultimately disposing of them after their initial use (Stahel, 2016; Ellen MacArthur Foundation, 2015c; Ellen MacArthur Foundation, McKinsey & Co and Google, 2019).

The linear model maximizes throughput without considering the environmental and economic cost of the large quantities of waste, the environmental pollution, the depreciation of value and the depletion of new resources that follows with it (Ellen MacArthur Foundation, 2015d; Stahel, 2016; Wijkman and Skånberg, 2015). In fact, a decisive majority of products' original value today are lost after the first intended use (Wijkman and Skånberg, 2015; Wastling, Charnley and Moreno, 2018). In Europe alone, statistics show that 60% of the discarded materials in 2012 went to landfill or incineration whereas the remaining 40% were recycled or reused as materials (Ellen MacArthur Foundation, 2015c). This means that 95% of the material and energy value was lost after the products' initial use. Thus, only 5% of the raw material value was preserved in material recycling and waste-based energy recovery. Of particular concern is plastic packaging, as indicated in a report by the World Economic Forum (2016, p. 6):

> After a short first-use cycle, 95% of plastic packaging material value, or $80 billion to $120 billion annually, is lost to the economy. A staggering 32% of plastic packaging escapes collection systems, generating significant economic costs by reducing the productivity of vital natural systems such as the ocean and clogging urban infrastructure.

As a result of the production and consumption patterns in our world economies, the resources are increasingly scarce and the ecological footprint is growing continuously larger (Fu et al., 2015; Stuchtey, Enkvist and Zumwinkel, 2016; Ellen MacArthur Foundation, McKinsey & Co and Google, 2019). Thus far, 2018 has placed itself as the fourth hottest year in history with record high temperatures all over the globe, with only three other years having been hotter at various places across the globe: 2015, 2016 and 2017 (Levenson and Miller, 2018; NASA, 2018; Sengupta, 2018). The pattern of elevating temperatures

indicates that the threat of global warming is clear and present. The negative environmental externalities is foremost a result from handling materials in the linear economy (Maitre-Ekern, 2018; World Economic Forum, 2014; Horvath et al., 2018). More than half of all greenhouse gas emissions is a consequence of materials-management activities and the current trajectory implies that greenhouse-gas emissions related to materials management will more than double in 2060 (OECD, 2019).

At the same time as we are crossing the planet's boundaries for environmentally safe operations each day in order to supply the global consumption demand and keep our industries afloat, the global consuming middle class is expected to increase from 1.8 to 4.9 billion people by 2030, meaning that demand for all commodities will increase from 30% to 80% the same year (Batra, 2017; OECD, 2011a). Today, the use of resources has more than tripled since 1970, resulting in 90% bio-diversity loss and water stress (the lack of sufficient access to potable water), which in turn stems from how we extract resources and produce products (UN environment and International Resource Panel, 2018). Considering the implications that have already been incurred on the planet, there is a pressing need to find a new way to serve the emerging demand while staying within our planetary bounds. The linear economy is reaching the end of its physical limit and it does not proffer a solution to the equation of meeting a growing demand while at the same time lowering environmental pollution (Ellen MacArthur Foundation, 2015d; Bonciu, 2014).

In contrast, the circular business model was formed as a response, and solution, to the increasingly crucial problems and threats to future life on this planet (Murray, Skene and Haynes, 2017; Bettencourt, 2018). At bedrock, the circular business model should be viewed as a means of capturing value while aspiring to achieve an ideal state of resource usage (Lahti et al., 2018). The exact definition of circular economy is still subject to much debate, as the definitions range in the hundreds (Kirchherr, Reike and Hekkert, 2017). Nevertheless, one of the most elaborate and exhaustive definitions thus far has been articulated by the French Environment and Energy Management Agency [*Agence de l'environnement et de la maîtrise de l'énergie*] (ADEME) (Gallaud and Laperche, 2016). The agency defines circular economy as "a system of exchange and production which, at every stage of the product lifecycle (goods and services), is aimed at increasing the efficiency of use of resources and reducing the impact of production activities and consumption on the environment" (Gallaud and Laperche, 2016, p. 8).

Circular economy disrupts and rethinks the system as we know it. The circular economy is based on the mindset of keeping all material at its highest value at all times (Lahti et al., 2018; Hannon, Magnin and Rosenfield, 2016; Linder, 2017). The circular economy concept describes an economy where the products are reused for as long as possible where after they are recycled and taken care of when they can no longer be reused (Lahti et al., 2018; Stahel, 2016). In this way, it is possible to retain as much of the original value as possible for as long as possible and design out, and thus eliminate, waste. When the purpose is to increase the utility rate and the lifetime of the product, the product needs to be designed for

wear and tear and to hold the quality for longer. It thus means that the design of the product is central for a circular economy to function (Lund University et al., 2018). Product and concept designer Mäkilä means that in a circular economy it is necessary to design the product's life cycle and not only the product itself (SB Insight, 2019). The products and materials go through one of two life cycles, either the biocycle, where products and materials are returned to the biosphere and regenerated, or the technical cycle, where products and materials are recovered and restored (Ellen MacArthur Foundation, 2015d).

Table 16.1 illustrates that the different ways of capturing value and eliminating waste throughout the product lifecycle are plentiful and differ depending on the stakeholder, perspective and position in the value chain (Lund University et al., 2018).

In this context it should be noted that circular economy advocates performance and/or access over ownership, meaning that the customer does not necessarily need to own the asset in question, but purchases the right to use it. Done right, this leads to an increased utility rate of the asset, a reduction of total asset cost and a potential increase of the retailer's profitability and customer service (Ellen MacArthur Foundation, 2016). It is thus necessary to adopt a mindset that thinks

Table 16.1 Illustration of efforts required to increase circularity at different levels.

At the level of the consumer	*At the level of the product cycle*		*Between different product cycles*
Extending product lifetime *Products that hold the demanded qualities over a long time span.*	**Repair** *Correcting a fault to enable longer lifetime.*	**Material recovery** *Using industrial residues from same production chain.*	**Parts reuse** *Using parts of used products in other production chains.*
Dematerialization *Offering the value without selling a physical product. Using less or no material (i.e., streaming music).*	**Reuse/share** *The multiple use of a product in different time frames (reuse). Or common use of a product during a specific time frame (share).*	**Close the loop** *Valorization of materials after initial use in the same production chain.*	**End-of-life recycling** *Recycle the product, convert into reusable materials to use in other production chains.*
	Refurbish/ Remanufacture *Perform change to used product – to original specifications (remanufacturing) – to satisfactory working conditions (refurbishing).*	**Secondary raw materials** *Materials recycled from other production chains.*	**Recycling of industrial residues** *Using industrial production residues in other production chains.*

Source: Table adapted from "Circular Economy: Sustainable Materials Management" by Lund University et al. (2018).

beyond the conventional "take-make-dispose" model, and open one's mind to new business models that can solve the inherent wastefulness of linear economies. For instance, an electric drill is on average used between 12–20 minutes in a lifetime, and the average car in the Western world is usually used for three months during an average lifetime of 12 years, while some sources would have that the car is unused for approximately 22 hours a day (Lund University et al., 2018; Kessler, 2015; Botsman and Rogers, 2010). In the former case, this gives a utility rate of a car at 0.02%. Still, both the car and the electric drill are items that are presently commonplace possessions in many households.

The need of drilling could be solved in a much more efficient, environmentally friendly and economic way. Offering distribution and access of the drilling machine instead of selling it, would mean that less products are created, resulting in less extraction of new resources and ultimately a reduction of waste. While cars are in and of themselves not inherently environmentally friendly (save for, arguably, electric cars), cars cause a lot more waste and pollution than they need to. That is to say, the aforementioned example of the car could also benefit from adopting a circular practice, by ways of utilizing such examples as carpooling, car sharing and rental services to a much greater extent. In many cases, it is the service we need rather than the product in itself. A circular economy based on distribution and access will in this way create new patterns of interactions between people and necessitate a change in how we own, use, consume and interact with our products (Lund University et al., 2018; Markopolu et al., 2019). In short, this would entail radical changes to the way we currently live our lives. From a business perspective, leasing the electric drill would enable earning more from each product and potentially also offer the service of drilling, which would mean more man-hours and by extension, more job opportunities.

The examples of the electric drill and the car are but two of many that illustrate the inherent wastefulness of the linear economy. It would appear as though the linear economy has ultimately forgotten the purpose of why products are created in the first place i.e., to be used. To name a few more examples, manufacturers in the textile industry often produce two garments in order to be able to sell one of them. This means that one of two garments will end up either in landfill, get incinerate, or will be sold at a discount price due to fluctuating demands. On top of this, the clothes that are actually bought are oftentimes used sporadically at most, while some clothes are never even worn at all. In fact, in Great Britain, 30% of all clothes bought in households are never worn (Lund University et al., 2018). In a similar way, our current food system is wasteful (Ellen MacArthur Foundation, 2019a). In our global economy, 1.3 billion tons of food is wasted yearly, which means that one-third of all food produced globally is wasted (Food and Agriculture Organization of the United Nations, 2019). The Ellen MacArthur Foundation (2019a, p. 8) writes that "Overall, for every dollar spent on food, society pays two dollars in health, environmental and economic costs. Half these costs – totaling USD5.7 trillion each year globally – are due to the way food is produced".

According to Wijkman and Skånberg (2015, p. 5) "Resource constraints as well as increasing volumes of waste and pollution are likely to impose increasing

threats to welfare and wellbeing and, from a business point of view, to competitiveness, profits and business continuity". An increasing number of corporations have seconded this statement and have begun acknowledging this present need for a new model. For instance, the CEO of Philips, Frans van Houten, already in 2015 stated that, "Two years ago, we decided to embed circular economy thinking in our strategic vision and mission, both as a competitive necessity and with the conviction that companies solving the problem of resource constraints will have an advantage" (Ellen MacArthur Foundation, 2015a, p. 3). Apple (2019, para.2) has stated, "Ultimately, we want to make products using only renewable resources or recycled material. And we want to return an equivalent amount of material to the market, to be used by us or others. Our ambition is that one day we'll extract nothing from the earth". Also, H&M incorporates circular economy in their long-term strategy by having a defined goal of becoming 100% circular and renewable by 2030 (H&M Group, 2018).

A report by Material Economics (2018) on the plastic, cement, aluminum and steel industry showed that should an ambitious circular-economy scenario be reached for these materials by 2050, their CO_2 emissions would be cut by 56%, saving 250 million tons of CO_2 emissions annually in the EU and 3.6 billion tons annually globally. A key takeaway from the report was that circular economy should have a prominent position in EU climate policy, since utilizing resources and products more efficiently will enable European industrial growth while decreasing industrial pollution.

3. Circular economy and job creation

Transitioning to a circular economy does not only imply a reduced environmental impact and a competitive advantage for businesses, it also generates economic growth and creates jobs (Morgan and Mitchell, 2015; Kalmykova, Sadagopan and Rosado, 2018; Stahel, 2016; Wijkman and Skånberg, 2015). In fact, according to Stahel (2016) the concept of a circular economy arose from the idea of substituting manpower for energy, as a solution to the increasingly high energy prices and high unemployment that characterized the early 1970s. The idea was based on the logic that it requires more labor and fewer resources when refurbishing goods and products than when creating new ones. When concepts such as "reuse", "recycling" and "extended product life" is the goal of the economy (circular economy), it is thus by definition more labor intensive than an economy where products are consumed and wasted (linear economy) (Wijkman and Skånberg, 2015; Stahel, 2016; Aurich, Fuchs and Wagenknecht, 2006). The process of taking care of goods and products (maintaining, remanufacturing and repairing) creates skilled jobs in local businesses. According to the Ellen MacArthur Foundation (2015c, p. 14), the new business services that would require skills and process know-how in ways that generate job opportunities in a circular economy are:

- Collection and reverse-logistics[2] firms that support end-of-life products being reintroduced into the system

- Product remarketers and sales platforms that facilitate longer lives or higher utilization of products
- Parts and component remanufacturing and product refurbishment offering specialized knowledge

The circular economy is thus more dependent on people being involved in the economy in different ways but not only because it involves more labor-intense processes but also because of the circular business models like sharing, renting and leasing. Such business models require more interactions between people since the number of touch points increase over the lifetime of a product (Stahel, 2016; Ellen MacArthur Foundation, 2015c). All the while as sharing economies becomes more widespread, they will affect the incumbent industries in different ways (Stuchtey, Enkvist and Zumwinkel, 2016). Two examples are the automotive and hotel industries. The sales of new cars and hotel nights will ultimately begin to decrease as more consumers will choose to access and share cars rather than owning one. Likewise, more people will opt to stay in lodgings provided by private citizens rather than in hostels or hotels. Increased utilization would also mean that offices would be used differently. Such a development would likely affect today's real-estate owners. Already now, coworking spaces are surfacing increasingly more often as alternate office spaces (Kojo and Nenonen, 2017). Some services, such as UK-based Airbnb-style website Vrumi, arranges for users to book a desk space in a stranger's apartment or home for a few hours during the day with average rental rates ranging between USD24 and USD366 per day (Roos, 2016). This does not necessarily mean that jobs will be lost, rather that the labor market will change and new jobs and business models will evolve (Stuchtey, Enkvist and Zumwinkel, 2016).

According to the Ellen MacArthur Foundation (2015c), circular economy implies an increased economic growth, net material cost savings, job creation and increased innovation. Their study shows that if one were to use digitalization as an enabler, the circular economy could increase the resource productivity up to three percent annually in Europe. This, in turn, would generate a primary resource benefit of €0.6 trillion (≈ USD671.9 billion) annually by 2030, with an additional €1.2 trillion (≈ USD1.35 trillion) in other benefits, such as non-resource and externality benefits (Ellen MacArthur Foundation, 2015c). This means that the annual total benefits in the coming years would be €1.8 trillion (≈ USD2 trillion) as opposed to what it is today.

The Ellen MacArthur Foundation (2015c, p. 14) conducted a review of 65 academic studies on circular economy and its impact on labor, concluding that "existing studies point to the positive employment effects occurring in the case that a circular economy is implemented". The report states that the result is both due to increased spending because of the overall expected lower prices and due to recycling and remanufacturing activities requiring human labor. However, the study also found that some companies would most likely not benefit from increased labor opportunities if they are too slow to adapt and act.

Wijkman and Skånberg (2015) investigated the social benefits of moving toward a circular economy using the Dutch, Finnish, French, Spanish and Swedish

economies as test cases. They found that the transition to a circular economy for the investigated countries would imply reductions in carbon emissions as well as new job formations. More specifically, the authors looked at three key steps to enabling a circular scenario. They were: (1) increasing energy efficiency; (2) increasing the percentage of renewable energy (by cutting fossil-fuel use in half and substituting it with renewable energy sources, as for example wind, solar and biofuels); and (3) increasing material efficiency (extending wealth, minimizing waste and maximizing the reuse and recycling of materials). The result showed that if all of the key steps previously listed were introduced in the investigated economies, carbon emissions in Spain would potentially be cut structurally by two-thirds or more (by almost 70%). The new job opportunities would increase to over 75,000 in Finland, 100,000 in Sweden, 200,000 in the Netherlands, 400,000 in Spain and 500,000 in France. As a result, the unemployment rates could be reduced by: a third (and possibly more) in Sweden and the Netherlands; 15–20% in Spain; a third in Finland and almost by a third in France. The trade-balance improvements were predicted to approximately 1.5% of GDP in all of the studied countries.

A report by the European Commission (2018a) investigated the impacts of circular economy policies on the labor market and found that it is possible to become more resource-efficient and increase employment at the same time since the circular economy will reduce negative environmental impacts and result in higher employment levels. The report studied trends within circular economy across sectors in Europe and found that taking steps toward a circular economy would result in an increase in GDP by approximately 0.5% by 2030, compared to the baseline case. It would also result in a 700,000 net increase in jobs compared to the baseline due to a higher labor demand from recycling plants and repair services.

Taking care of the product, i.e., repairing, maintaining, upgrading and remanufacturing, are all activities that require human labor. On the other hand, activities for mining and manufacturing products do not necessarily require human work but is nowadays often automatized (Wijkman and Skånberg, 2015). In this way, a tax shift is necessary in order to allow for a socially and ecologically sustainable society to evolve. As it were, taxation in the industrialized countries of today is, by and large, much too dominated by taxes on labor, when there is a need for taxes to rather be based on the extraction, use and waste of natural resources (Wijkman and Skånberg, 2015; Pomerleau, 2014; Mendoza, Razin and Tesar, 1993). Lowering taxes on labor and increasing taxes on the consumption of virgin materials would reduce the use of these resources and speed up the shift toward a circular economy (Wijkman and Skånberg, 2015).

Policy-making around resource productivity has been very rare while labor productivity has been the priority historically (Wijkman and Skånberg, 2015; Bin and Vassallo, 2016; OECD, 2011b). Wijkman and Skånberg (2015) argue that the focus should be on reducing energy and material throughput in society and that circular economy needs to be considered both as an environmental issue and as an integral part of jobs and competitiveness strategies. They further contend that the level of resource use is rarely considered in a society and they mean that the climate change mitigation strategies should be more holistic by having resource efficiency as the key instrument.

Repairing and recovering has not been a standard in the linear economy where oftentimes used products are seen as waste. In order for a circular economy to emerge it is thus necessary to create a market and a demand for the used materials and products. This means that new industries, prepared for using second hand products and spill materials to create something valuable and usable, will emerge. Taking a product and/or material and creating a new product that has equal or higher value than the original product is called up-cycling (Lund University et al., 2018). Up-cycling is a way of creatively finding new applications for traditional materials or products and in that way keep the value, and in some cases even extending the value of the product or material as far as possible. An example of this is the Finnish company Pure Waste (2019) that takes textile production spill and uses it to manufacture clothes. Up-cycling could thus be performed both through automatized processes but also through human labor. Nevertheless, the up-cycling industry could create new businesses and job opportunities. Hermann Erdmann, CEO of Redisa mentions that:

> On a planet of finite resources, the circular economy is not optional, it is inevitable. Its implementation will provide world economies with unprecedented opportunities, through the creation of reverse logistics networks, new processes, and new industries using the recovered resources. Resource efficiency will allow us to rethink the concept of urban mining. Countries will be able to create industries in fields that were previously not viable. Relatively simple changes to existing legislation can enable this shift in mindset on short timescales. Restructuring economies to become circular will moreover bring with it enormous environmental benefits.
>
> (Ellen MacArthur Foundation, 2015c, p. 8)

Several researchers argue that the new and more sustainable economy will need to be based on more local farming and manufacturing in order to supply the demand with fluctuating resource prices and scarce supply (Lund University et al., 2018; Dunbar, 2017; Faludi, Cline-Thomas and Agrawala, 2017; OECD, 1998; Ijomah et al., 2007). Using 3D-printing in order to manufacture spare parts and whole products will enable for small-scale local manufacturing, which, in turn, creates local job opportunities (Faludi, Cline-Thomas and Agrawala, 2017).

According to research presented by Lund University et al. (2018), the value created when transforming to a circular economy can be compiled into three areas:

- Securing global resource availability
- Preserving the ability of natural systems to deliver goods and services to society
- Spurring development of new technologies, new norms and new institutions that can support and stimulate society.

In other words, circular economy fosters socio-economic development and stimulates employment, economic growth, and flow-on[3] social benefits concerning

boosting of the recovery, recycling and upgrading of materials and creates new business models, while also securing more man-hours and more job opportunities.

4. Circular economy and digitalization

Transforming society and industry is not easy, and even though circular economy proposes a way to that, it implies difficulties, obstacles and uncertainties. However, one tool has been found to be an integral aspect to the acceleration of the circular economy; digitalization (Antikainen, Uusitalo and Kivikytö-Reponen, 2018).

We are currently in the midst of the fourth industrial revolution, or the fifth technological revolution, depending on how you categorize, called the age of Information Technology and Telecommunications (Perez, 2018). This means that digital technologies are cheaper to use and more wide spread than before. Today digital technology is being used by a majority of the western organizations and institutions (OECD, 2018b). Oftentimes, digitalizing companies means less manual work and more efficient working processes with the potential to transform processes and businesses and enable new ways of working. In many cases, digital technology has been used with the purpose of increasing efficiency in our current economy. Streamlining linear companies would most likely mean speeding up consumption, thereby increasing waste and increasing the extraction of new resources. This, in turn, perpetuates a vicious circle, as it only serves to expedite the development toward creating a society that is ultimately unsustainable.

According to various scholars, such as Rifkin (2011, 2014) this new industrial revolution is reshuffling our most fundamental system. This new revolution would present us with endless opportunities, had it only been that we had learned how to adjust and reap the benefits. The point of a new industrial revolution has been further reiterated by Klaus Schwab, the founder of the influential NGO *World Economic Forum* (WEF), in his 2018 guide, by drawing on contributions by more than 200 of the world's leading technology, economic and sociological experts (Schwab and Davis, 2018). Also, Perez (2018) elaborates on the current industrial revolution in her research about techno-economic paradigm shifts in society. She finds that each historical revolution shows the same pattern of development. Based on that pattern, we are currently in the right place to form the outcome of the Information Technology and Telecommunications (ICT)-revolution. She means that the time is right to use technology to reshape the future and enable a more sustainable and circular society that benefits business, people and the environment (Perez, 2018). However, Perez' research also shows that if we reach the maturity stage of the revolution without having used the technology in the right way, this opportunity will be lost.

In a commentary, the European Policy Center has stated that:

> In short, the transition towards a smarter use of resources will only make headway if Europeans make the most of digitalisation. This implies understanding the linkages and exploiting the synergies between the digital and the circular economy agendas. The EU must promote the smart use of data and

> digital solutions with a view to encouraging the transition towards a circular economy. If Europe does not move in this direction, opportunities to close material loops and improve processes will be missed.
>
> (Pardo, 2018, p. 2)

Presenting their digital roadmap for a circular economy, the European Policy Center adds that digitalization enables information transfer; sustainable business models; circular products, services and processes; as well as the ability for companies to scale up and profit from the circular economy (European Policy Center, 2019).

In addition, Stuchtey, Enkvist and Zumwinkel (2016, p. 31) contend that digital technology has enormous potential to help transform society into a more sustainable one, stating that, "We have the most powerful tool in history right at our fingertips". However, they also emphasize that the technology disruption will not foster a sustainable society on its own referring to "the technology disruption is a beast in need of taming" (Stuchtey, Enkvist and Zumwinkel, 2016, p. 199). Thus, realizing the value that digitalization can bring with in terms of positive environmental impact and using it to foster just that is of great essence.

Digital technology and sustainability overall, are two big and complex areas that are, in fact, interlinked. What we know about the environment today, and how we predict what it will look like in the future, is to a great extent thanks to measurements, smart sensors, open data and analytics. Digitalization has thus increased our knowledge and understanding, allowing for more informed decisions based on accurate data. Also, while digitalization of the industrial sector increases resource efficiency, digitalization may also help close the loop of material cycles and contribute to keeping goods/materials in use for a longer period of time (Wilts and Berg, 2018). For instance, intelligent solutions enable the reduction of energy consumption, while optimizing the logistics chains in addition to providing for a more efficient use of capacity (Marinescu, 2015). Moreover, through digitalization it is possible to acquire access to material-specific data and resource consumption (Austin, 2016; Woetzel et al., 2017). This, in turn, enables the optimization of product life cycles for circular-economy solutions. It is important to remember that circular economy is by and large based on distribution and access (Markopolu et al., 2019; Lund University et al., 2018). This means that digital technology is vital in order to keep track of the information flow, transactions, logistics and communication between all actors in the value chains.

To illustrate in more detail how digital technology could be used to catalyze a circular economy, the following section is divided into how digitalization in this way can facilitate the design phase, the use phase and the end-of-life phase of the product/service.

4.1. Design

In order for businesses to create more circular products fit for longer lifetimes and multiple life cycles, data is necessary. Secure data and increased transparency could potentially be provided with blockchain (Ellen MacArthur Foundation,

McKinsey & Co and Google, 2019). Further, several databases and digital material banks are being set up to provide the data necessary to enable finding the right information about a product or material. One such example is the EU Science Hub called Raw Materials Information System[4] set up by the European Commission (2019). In a similar way, the industries have developed various self-assessment standards for assessing environmental and social sustainability throughout the supply chain. These indexes are based on large quantities of data, which enable direct feedback in the form of a score/index of how sustainable a material or product is depending on selected parameters. One such example is the Higg Index from the Sustainable Apparel Coalition, which can measure and score a company's or product's sustainability performance in the textile industry (Sustainable Apparel Coalition, 2019). Data can also be gathered from the reverse logistics and the take-back of products which allow for capturing more information and feedback about the products. This feedback is valuable when designing the products. This is presented in more detail later on in the end-of-life section.

4.2. Use/reuse

In order to achieve a circular economy, it is important for the user to accept alternative means of consumption. Specifically, this entails renting and sharing products rather than buying and owning them. In order to foster and facilitate a change in behavior, digital solutions such as digital platforms or marketplaces could be of assistance. Digital technology has made sharing and virtualization much more attractive over the last decade and has resulted in a better utilization of products (Stuchtey, Enkvist and Zumwinkel, 2016). Already today, several sharing economy platforms such as Airbnb, Hygglo, Sunfleet, DriveNow as well as consignment platforms, such as VSP Consignment, and secondhand platforms such as Etsy, eBay, Craigslist, Thredup, The Real Real, Sellpy and Blocket, etc. constitute examples of how to effectively increase the utilization level of products through digital solutions. A prerequisite for sharing economies, consignment and secondhand platforms to function is also having matching algorithms and dynamic pricing (Ellen MacArthur Foundation, McKinsey & Co and Google, 2019).

In order to help the consumer use the product in a more sustainable way, and prolong the lifetime of the product, it is important to both provide the right information on how to do so, as well as to facilitate the process. Digital solutions could increase the communication between business and consumer. When the physical or non-physical product is connected to the cloud, it creates an opportunity for the business to enhance customer value through better communication and information sharing (Ellen MacArthur Foundation, 2016). Further, a digital tag/sensor could gather data of how the product is used and give feedback to the user on how to handle the product more sustainably. Researchers have been discussing the possibility of including digital tags in products that could function as a "material passport", allowing for tracking and tracing, while being able to identify the condition of the product at all times (Ellen MacArthur Foundation, 2016; Guldager Jensen and Sommer, 2016). To date, several companies have been investigating

the possibilities of incorporating these chips in different types of products (Ellen MacArthur Foundation, 2019b; Turntoo, 2019; Heinrich and Lang, 2019; C2C-Centre, 2019). Increased digital communication also fosters the ability to offer services to the user instead of merely selling products. Ultimately, this means that the interactions between business and consumer will increase.

Moreover, repair processes are today oftentimes optimized through the use of connected products and predictive maintenance (Ellen MacArthur Foundation, McKinsey & Co and Google, 2019; Ellen MacArthur Foundation, 2016). Connected products allow for proactively sending out automatic notifications if a product needs repair or if a product is beginning to break (Ellen MacArthur Foundation, McKinsey & Co and Google, 2019). Predictive maintenance can be enhanced by the use of artificial intelligence (AI) (Lund University et al., 2018; Ellen MacArthur Foundation, McKinsey & Co and Google, 2019). Also, new technologies such as 3D printing, allows for printing spare parts to facilitate repairs (Ellen MacArthur Foundation, McKinsey & Co and Google, 2019). In addition, repairing products by yourself have been made easier through digital communication tools (Lund University et al., 2018). Through platforms like YouTube, Fixperts and Instructables, knowledge and skills could be shared globally.

Dematerialization has been achieved and gained popularity through the use of online streaming services i.e., for streaming videos and music (Lund University et al., 2018). This has almost eliminated the need for producing CDs and DVDs. Famous examples are Spotify, YouTube, Viaplay and Netflix.

4.3. End-of-life

Digitalization has shown to be crucial for all activities concerning the take-back of products and valorizing them after initial use. The take-back of products means that the coordination of information flow and materials/products are vital to the circular economy (Masi et al., 2017; Ellen MacArthur Foundation, 2016). That is to say, the information regarding the quality and quantity of products, and the raw materials the products contain, must be efficiently gathered, stored and used. To this end, it is essential that this can be done in a reliable and transparent manner (Collot d'Escury, 2015). If not, a closed-loop system, where the value of the product and material is recovered, would not be possible. Thus, when looping the product in different or the same life cycle multiple times, circular-economy systems with interconnected cycles generally contain large quantities of data (Earley and Goldsworthy, 2018; Bressanelli et al., 2018; Pagoropoulos, 2017). In this way, digitalization provides for new means of collecting and using the data in real time (OECD/Eurostat, 2018).

Internet of Things (IoT) can keep track of valuable products and materials at a much lower cost than in the past, thus increasing recovery opportunities (Ellen MacArthur Foundation, 2015c). The digital material passport previously mentioned could be used to read information also in the end-of-life phase. The information and feedback gathered when taking back products can be utilized whenever there is a need to reach various decisions about the different phases of

a particular product's life cycle, logistical arrangements, reuse of waste materials and/or the operators required in the value network (Ellen MacArthur Foundation, 2016). The data and feedback gathered from the recovered products also allow for analyzing and optimizing the design and composition of the product (Ellen MacArthur Foundation, 2016; Ellen MacArthur Foundation, McKinsey & Co and Google, 2019). As the use of big data and IoT is expected to increase, Cukier contends that "The internet of things could become the 'soul' that animates objects in the circular economy" (Ellen MacArthur Foundation, 2016, p. 21).

It is however important to add that using large amounts of data in order to design circular products and components could prove very advanced for the human mind to handle alone, as it entails processing very large quantities of information from the products as well as from the consumers. AI could enable decision-making designers on how to design for disassembly-capabilities, reuse, easier repair and longevity based on the complex data and feedback gathered in the take-back phase (Ellen MacArthur Foundation, McKinsey & Co and Google, 2019). As an example, an agile, continuous feedback process where designers test and refine AI-generated design suggestions based on collected data would potentially lead to more optimized design outcomes faster, than if not using AI (Ellen MacArthur Foundation, McKinsey & Co and Google, 2019). In addition, AI could also analyze new materials fast; its composition, structure, quality and other properties. Ultimately, AI could enable for circular products to remain fit for longer lifetimes through repair, reuse and multiple life cycles. According to Ellen MacArthur Foundation, McKinsey & Co and Google, (2019), 30% of plastic packaging is in need of a complete redesign; an innovation process to which AI could provide a powerful tool. A pressing issue since, as previously mentioned, plastic packaging is of particular concern today due to the fact that 95% of plastic packaging material value is lost and 32% is not recollected (World Economic Forum, 2016).

In fact, AI has already demonstrated some of its main benefits in how it can create value in realizing circular material flows and in enabling enhanced valorization of materials and products (Ellen MacArthur Foundation, McKinsey & Co and Google, 2019; Selvan Ramadoss, Alam and Seeram, 2018; Pagoropoulos, 2017). AI can be used when sorting post-consumer mixed material streams using visual-recognition techniques. For instance, the company ZenRobotics (2019) deals in robotic waste separation, where robots scan the waste stream, after which it analyzes the data in real time and then finally determines (autonomously) how to sort the waste. These robots are controlled by an AI (based on imagery input) and they can reportedly reach an accuracy level of 98% in sorting myriad material streams, from plastic packaging to construction waste (Ellen MacArthur Foundation, McKinsey & Co and Google, 2019).

Looping products and materials in the same or different life cycles ultimately results in more complex supply chains than if the products would have only one life cycle as is generally the case today. As stated previously, the complexity increases as the supply chain needs to cover larger information flows. However, adding to this complexity is the increased amount of transactions necessary when

looping products and materials. Ensuring secure transactions is thus also prioritized in a circular economy. To this extent, blockchain technology may offer a practical solution for ensuring both reliable data and secure transactions (Abeyratne and Monfared, 2016; Herzberg, 2015). As a concrete example, the company Bext360 (2019) uses blockchain to provide reliable data and secure transactions in the supply chains of for instance coffee, cotton and palm oil. Bext360 describes it like physical assets in the supply chain are represented as tokens which are stored in the blockchain to facilitate payments, yield smart contracts and track assets through the whole supply chain.

Digital technology thus helps us manage products more sustainably, it helps us reuse, repair and share as well as take back the products and close the loop of the business. However, it is also necessary to investigate how digitalization and circular economy can create value together on a wider level in order for a societal shift to circular economy to occur. It is estimated that roughly two people move into cities every second, or approximately 180,000 people every day (Ellen MacArthur Foundation, 2016; Hollis, 2013). This means there is a pressing need to find new ways of enabling more people to live on less physical space with a lower overall impact on the environment. Smart circular cities with smart streetlights, optimized route planning, autonomous vehicles and urban farming are some topics currently investigated by many as solutions to this problem (Ellen MacArthur Foundation, 2016; City of Amsterdam, 2016; Ellen MacArthur Foundation and Arup, 2019).

Given that the threat to our future existence on this planet is so clear and present, it is crucial that we ensure that we ascertain the right information to make the right decisions on how to steer the situation in a different direction. This means we need to understand the consequences of our actions and predict the long-term impact they carry. These decisions need to be made both on a small scale in human's everyday lives, as well as in everyday business. Still, and maybe even more importantly so, we need to understand the larger-scale ramifications of our actions. Our whole ecosystems and biodiversity have been severely impacted in a negative way due to our actions in our industries. It is thus important to both measure the actions we have taken in order to determine if they were fruitful, and also to predict what actions will have the most impact and are of most benefit to our entire ecosystem for future use. Digitalization and the digital transformation provide the tools for doing exactly that.

In March 2019, more than 30 Swedish digitalization consultancies and *Fossil Free Sweden* [Swe: Fossilfritt Sverige] submitted a roadmap to the Swedish government as a first step to highlight the potential for digitalization to act as a catalyst for sustainability (Fossil Free Sweden, 2019). Among other things, this proposal called for the government to launch an inquiry to review collected data on global sustainability in order to investigate predictions and assessments on the different sustainability initiatives available. One company that tries to facilitate sustainability work to this extent is ClimateView, who has developed a digital tool for visualizing factors such as emissions, potentials and policies within different areas. By using open data, ClimateView (2019) operates with the intention of

securing the development toward CO_2 reduction. Another example is developed by the Gothenburg Region (GR) [Swe: Göteborgs Regionen] and IVL Swedish Environmental Research Institute [Swe: IVL Svenska Miljöinstitutet] who have created a digital tool for calculating the expected CO_2 emissions for a specific residential area (Gothenburg Region, 2019). There are also digital tools for managing land areas, its current condition and how they are changing (Sanborn, 2019).

Today, we can also simulate large-scale ecosystems and use machine learning and data analytics in order to understand and predict the impacts of our actions, something that was not possible a few years ago (Xprize, 2017). In this way, digitalization can help us think in systems and understand the complex contexts that we as humans function in. As Webster describes it, "The circular economy uses understanding the system to give a better overall result" (Waldegrave, 2017, para.5). Webster means that we need to understand a larger context over longer time periods to see patterns and gain insights and in that way understand the causalities of our actions when conducting business in the contemporary world, as well as in the future world. Also Steffen et al., (2018) argue that we need to see the earth as one system and carefully treat it as our life-support system. The authors argue that, "The Stabilized Earth trajectory requires deliberate management of humanity's relationship with the rest of the Earth System if the world is to avoid crossing a planetary threshold" (Steffen et al., 2018, para.51). Seeing patterns through the large quantities of data that these systems entails is what AI and machine learning can enable us to do (Sas, 2019).

Other important factors of digital technology that can facilitate favorable sustainability work are the methods used when working with digital solutions. When designing digital solutions, service design and demand-driven design is often used and when creating digital solutions, the process is agile, with continuous feedback loops, iterations and incremental changes to the existing product. This is to ascertain that the solution always is feasible, desirable and viable, while answering to the demand of the user. In this way, this design process opens up for new and different ways of answering to the same demand – as a circular economy aims to do (Maslin and Shayler, 2016; Ideo and Ellen MacArthur Foundation, 2019). Design thinking and service design also carries the potential to design entire product life cycles and not only the product in itself (Maslin and Shayler, 2016; Ideo and Ellen MacArthur Foundation, 2019). In this way, service design could be seen as crucial in order for a circular economy to evolve since, as previously mentioned, it is necessary to design entire life cycles, flows and processes in a circular economy (SB Insight, 2019).

In the same way, the aforementioned roadmap by Fossil Free Sweden, urged companies and governments to form strategies and structures that evolves from the user-demand rather than from strategies following a conventional way of delivering solutions (Fossilfree Sweden, 2019). The report stated that we need a shift toward demand-driven structures and strategies in order to find solutions to the negative environmental impact caused by our industries. Furthermore, it emphasized the need for establishing zones for quickly testing digital solutions for a fossil-free society i.e., testing new innovations, business models, technology,

cooperation and regulation. In this way, sustainable innovation would evolve from agile working methods.

However, oftentimes today, "circular" initiatives stem from the sustainability department of the business, which tends to favor long-term projects and long-term goals. These "circular" initiatives neither work in an agile manner nor with design-thinking processes. The innovative nature of circular economy is often neglected or overlooked when in fact circular economy ought to signify the very essence of an innovation inasmuch that it fundamentally transforms current processes and rethinks the way businesses have traditionally been run. Thus, design thinking and agile working methods could facilitate, enable and spur circular solutions. Many of the new popular solutions on the market today (especially smaller innovative start-ups) have merged digitalization, sustainability (circular economy or sharing economy) and agile ways of working and have in this way managed to solve the demand of the users through sustainable innovation. Thus, the incumbent firms could benefit from using service design and design thinking in their sustainability work, to keep up with the competitors and disruptors and find new ways of operating within the planetary bounds.

The Quadruple Helix Model is an initiative that uses agile thinking to tackle complex ideas and focus on sharing innovation and data among many stakeholders, calling it Open Innovation 2.0 (Edwards, 2018). It is discussed as an important part of the research that investigates climate action, health and well-being (Edwards, 2018; Selada, 2017). The European Commission identifies The Quadruple Helix Model as an important part of their Digital Single Market Policy, stating:

> Open Innovation 2.0 (OI2) is a new paradigm based on a Quadruple Helix Model where government, industry, academia and civil participants work together to co-create the future and drive structural changes far beyond the scope of what any one organization or person could do alone. This model encompasses also user-oriented innovation models to take full advantage of ideas' cross-fertilisation leading to experimentation and prototyping in real world setting.
>
> (European Commission, 2018b, para.2)

In short, circular economy should not only be part of the "sustainability work", but should also be seen as an innovation that encompasses all parts of business and society. However, it needs optimal working methods in order to realize its potential. Suitable methods for fulfilling the potential of innovative solutions are commonly used in the context of designing digital solutions. This, in turn, would support the argument of merging the two megatrends of digitalization and circular economy.

5. Moving forward with the circular economy and digitalization

Even though circular economy has gained some political traction internationally in its endeavors to resolve the increasing threats to the planet, a 2019 report

showed that only 9% of the world was indeed circular in 2017 and 2018 (De Wit et al., 2019). In fact, 2018 indicated an increased negative impact on the climate as opposed to the preceding year. Even so, circular economy is now present on the agenda more than ever before, as it frequently occurs in discussions covering both enterprise and policy. It is evident that the shift is difficult in many ways and even though digitalization provides ways of facilitating the transformation to a circular economy, several other aspects and requirements need to be in place in order to successfully carry out the shift from linear to circular. It is also necessary to account for the potential obstacles that arise when using digital technology, which in turn, makes it relevant to also consider other aids that may facilitate such a transformation.

To begin, one of the foremost greatest challenges toward implementing a circular economy on a wider level is the fact that it lacks standardization and official strategic guidelines, indicators and/or certifications (such as ISO etc.) (Ivanovic, 2018). Thus, the application of the circular model varies immensely depending on the market and assets, which in itself is a vicious circle as it makes any form of generalization, standardization or even harmonization, imprecise at best (Ivanovic, 2018; Kirchherr, Reike and Hekkert, 2017). Research and innovation at all levels (social, technological and commercial) are thus necessary to enable the transformation (Stahel, 2016).

Policies, laws and legislations are rooted in the linear economy and waste policies, which oftentimes means that circular initiatives are systemically obstructed, making them infeasible to implement. In this way, it would be paradoxical for an economy that seeks to eliminate waste to have legislations based on waste management, as in such a system, waste is not regarded as a resource, but rather as a matter that has no further value. By extension, the new job opportunities that a circular economy could bring, brought forth by ways of digitalization, may also be scuttled if not properly supported by political establishment. OECD (2019) has claimed that, in the absence of policy change, global material use will more than double by the year 2060, due to the cumulated effects of economic growth, structural change and technological change. If world leaders decided to shift toward a more circular economy, managing the transition would have to be a top priority (Ellen MacArthur Foundation, 2015b).

According to the OECD Deputy Director of the Environment Directorate, Anthony Cox, the organization recently initiated a new policy experiment (Cox, 2019). The experiment was to impose a material tax, while redistributing the revenue from that material tax into subsidies for recycling and enabling lower labor taxes. In this way, it was a budget-neutral policy experiment. The anticipated results for 2040 indicate a dramatic impact on the use of resources, such as aluminum, copper, iron and steel, non-ferrous metals (i.e., not containing iron) and non-metallic minerals. The impact was driven through efficiency gains, i.e., scaling up or down production. Impact was to a large extent also propelled by trade. The conclusion drawn from this experiment was that international trade can contribute to less material being used. Cox described it as though trade is the "glue" that will make circular economy feasible and that trade policies will

need to be amended as to work in favor of a circular economy rather than (as the case is now) counteracting it. The international trade flows will be affected by a transition to circular economy as it will result in an increase in areas such as trade-in services, secondhand goods, goods left for refurbishment or remanufacturing, waste for recovery and in secondary raw materials. To this end, the importance of digitalization was stressed upon in order to enable and facilitate the transition.

In 2018, the European Commission presented their implementation steps from their previously presented, Circular Economy Action Plan (European Commission and switch2green, 2018). The Action Plan contains actions promoting a closed-loop production, consumption and waste management as well as creating a secondhand market for recycled/reused materials. The report describes legislative proposals on waste with targets for recycling, measures for reducing landfill, how to promote reuse and stimulate industrial symbiosis, as well as the economic incentives for producers to put greener products on the market. The Action Plan should be fully implemented by 2019 (European Commission and switch2green, 2018).

An example of a policy that promotes circular economy and is already implemented in the EU is the Waste Electrical and Electronic Equipment Directive (WEEE), which stipulates that all producers of phones need to accommodate for a take-back system (Lund University et al., 2018). One example of a phone producer working more circular and sustainable is Fairphone. Fairphone is a social enterprise company seeking to develop smartphones designed and produced with minimal environmental impact by having modular, upgradeable phones and take-back programs (Fairphone, 2019). Fairphone's Resource Efficiency Manager, Miguel Ballester, stated that the new policy developments are evolving in the right direction for them but not fast enough (Lund University et al., 2018). Ballester further suggested that an efficient way to change behavior is through taxation. At the same time, he expressed some skepticism as to whether or not the politicians would actually dare to propose taking such a course of action. Additional laws and regulations that have been discussed in terms of them having a positive impact on circular processes are discussed by Lund University et al. (2018) to be:

- Circular product design guidelines
- Lower VAT on repair service
- Acquiring available spare parts
- Recycled content mandates
- Banning planned obsolescence
- Higher tax on material and less tax on labor

In fact, France has already in 2015 pressed a law that bans planned obsolescence in order to promote longer lifetimes of products and move away from the take-make-dispose model (SGS Offices & Labs, 2015). In 2016, France became the first country in the world to ban supermarkets from disposing or destroying unsold food, forcing these businesses to donate the food to charity instead (Chrisafis, 2016). Following its approval by the French Parliament in July 2019, the same

legislation aims to also include non-food items such as clothes, electronics and plastic products, making it illegal for supermarkets to throw away unsold items starting in 2021 or 2023 (depending on the sector) (Samuel, 2019).

Important to add though is that, when discussing environmental policies, it is necessary to address the potential impact those policies might have on the labor market (OECD, 2016). In an empirical analysis from 2014, OECD concluded that increasing stringency in environmental policies will not be harmful to productivity levels (Albrizio et al., 2014). In order to make this conclusion, OECD collected data on selected environmental policies over countries and time allowing for creating a proxy of environmental policy stringency[5] (EPS) and to analyze its effect on economic performance. Another report that analyzed the relationships between environmental policy stringency, productivity and innovation also concluded that "the stringency of environmental policies can be increased without harming economy-wide productivity" (De Santis and Jona-Lasinio, 2015, p. 20). The findings also indicated that a tighter environmental regulation will channel innovation and productivity.

As previously discussed in Section 3, circular business models might acquire additional skilled employees, leading to higher cost when processes such as reuse, repair, refurbishment and remanufacturing are necessary. A consequence of the high-level taxation on labor today is that firms may dismiss a circular transition as financially unviable. Added expenditures associated with product take-back could also make firms reluctant, given the fact that virgin materials are often cheaper than non-virgin materials (Lund University et al., 2018; Koren and Bisesi, 2003; Wijkman and Skånberg, 2015).

Additional challenges include securing an organized collaboration between different partners, and pooling different areas of competence, the latter of which carries its own challenge, as there are still many organizations that lack the sufficient expertise in regards to the basic concepts of the circular economy (Cumming, 2018; Ivanovic, 2018). To enable the circular economy, a network of information flows and knowledge sharing as well as cooperation between a wide range of actors on many levels are necessary (Stahel, 2016). A circular economy requires more dependencies across borders, as an example, it is necessary to share resources amongst businesses so that one business's waste can become another business's resource.

In order to use digitalization to catalyze circular economies, the knowledge about how to use it is crucial. Ellen MacArthur Foundation, McKinsey and Company and Google (2019) discuss this matter by contending that the use of AI is meaningless if people cannot reach an overall consensus of what defines relevant output and input variables. Another important factor when using digitalization in this way is to set the supporting structures for doing so. Government support that could favor this purpose were investigated in a report by Fossil Free Sweden (2019) and include examples such as: appointing a digital transformation commission, clarifying responsibilities for digitalization and sustainability in every department and/or increasing the knowledge nationally around the aforementioned issues.

Stuchtey, Enkvist and Zumwinkel (2016) argue that for technology disruption to be developed and used as a foundation for circular economies, direction and support is crucial. They explain that innovation is to a large extent the result of combining existing technologies and business models in new ways to meet a customer need. They contend that disruption and innovation is sprung from the process of adding together technology building blocks, allowing that technology to ripen and evolve to a point at which it is able to meet an existing, specific customer need, thus bringing innovation to fruition. In that way, the authors believe that the technology development can, to a large extent, be controlled or at least steered. Specifically, they state "setting direction for the technology disruption is one of the most crucial tasks for environmental and business policy makers in the next decade" (Stuchtey, Enkvist and Zumwinkel, 2016, p. 212). They continue saying, "If we want a circular material bank or high productivity delivery systems, we need to identify the required technologies to get us there, and the building blocks of those technologies in turn, and make sure there is momentum in developing those technologies" (Stuchtey, Enkvist and Zumwinkel, 2016, p. 207).

Another challenge associated with digitalization is the potential pollution that comes from using digital technology. Training an AI model as well as validating transactions in the blockchain results in heavy carbon emissions (Hao, 2019; Sexton, 2019). Other challenges and costs associated to digitalization relate to data sharing, data ownership, data integration, collaboration, competence and business models (Antikainen, Uusitalo and Kivikytö-Reponen, 2018; Finger et al., 2016). As an example, the availability and ownership of data/assets is of crucial importance to circular economy since circular economy advocates performance over ownership (Ellen MacArthur Foundation, 2016). The question around ownership of data could thus potentially be problematic in a future circular scenario, enabled by digitalization (Stahel, 2016). Other challenges include the sharing of data between competitors, in addition to the protection of privacy, intellectual property rights and trust. It is also necessary to integrate the large quantities of data owned by various operators, as the management of data flows also constitutes a big challenge due to the magnitude of the responsibilities involved (Kelly et al., 2017).

Making a transition to a circular economy thus entails high transition costs, including research and development and asset investments, stranded investments, subsidy payments to promote market penetration of new products, and public expenditure for digital infrastructure (Ellen MacArthur Foundation, 2015b). It could thus be argued that the economic as well as political cost following a transition to a circular economy will be too high for some companies.

Though it should be stated, that even though circular economy is the way forward, this model in and of itself does not unequivocally entail that it presents itself as a more environmentally friendly alternative to any given instance. That is to say, there are possible rebound effects, such as there being less demand for secondhand market products due to them being perceived of having lower quality, reuse and/or recycling processes causing a high negative impact on the environment and reverse logistics requiring substantially more transportations and by extension, also more in the way of pollution (Lund University et al., 2018). In

addition, sharing economies might not always imply a reduced consumption and a higher utility rate, as in some cases they can in fact increase consumption. Thus, sharing economies does not imply circular systems/products in itself. Hence, if the material and products are not taken care of after they have been used to exhaustion, a circular system is not upheld. The same predicament arises when using digitalization as a tool. As mentioned, mining blockchain could have a substantial negative environmental impact due to the high energy use (Truby, 2018; De Vries, 2018).

Therefore, it is important to measure and compare the outcome of different alternatives in a circular economy. Traditionally, life-cycle analysis and cradle-to-cradle certifications have been used and could continue being used for this purpose. However, there is a lack of KPIs measuring success in a circular economy, which is why it can be difficult to measure and calculate the circularity of a product and its overall impact, both negative and positive (Franconi et al., 2016; Tuppen, 2016). Circular product indicators and measurements that could potentially give such indications/measurements/scores are currently being investigated, however, thus far only prototypes have surfaced (Franconi et al., 2016; Cayzer, Griffiths and Beghetto, 2017). Consequently, there is at present no universally accepted means of measuring the success of a business in undertaking the transformation from a linear to a circular practice (Ellen MacArthur Foundation, 2015a; Munholland, 2018).

6. Technological unemployment or more human jobs?

It is important to note that as digital technology advances and is increasingly used in business, there is a possibility of technology taking over certain human jobs. This is by many referred to as technological unemployment (Kim, Kim and Lee, 2017; Peters, 2017). However, while that might be true, many also argue that while in some cases technology replaces human labor, it will create new job opportunities elsewhere. On this topic, Brynjolfsson and McAfee (2014) argue that:

> Rapid and accelerating digitization is likely to bring economic rather than environmental disruption, stemming from the fact that as computers get more powerful, companies have less need for some kinds of workers. Technological progress is going to leave behind some people, perhaps even a lot of people, as it races ahead. As we'll demonstrate, there's never been a better time to be a worker with special skills or the right education, because these people can use technology to create and capture value. However, there's never been a worse time to be a worker with only 'ordinary' skills and abilities to offer, because computers, robots, and other digital technologies are acquiring these skills and abilities at an extraordinary rate.
>
> (Brynjolfsson and Mcafee, 2014, pp. 10–11)

Considering the findings of this chapter the previous comment could be analyzed to be both true and false. As investigated in this chapter, also Brynjolfsson and

McAfee agree that digital technology will spur a shift in the workforce where skilled labor will still be sought for, and the jobs required less-skilled workers could be automated. As exemplified in previous sections, activities for mining and manufacturing products do not necessarily require human work but is nowadays often automatized whereas repairing, maintaining, upgrading and remanufacturing are all activities that require human labor (Wijkman and Skånberg, 2015). However, when digitalization is used to catalyze circular economies it will not only bring an economic disruption in terms of new markets and job opportunities but also an environmental disruption. In this way, the first part of the statement by Brynjolfsson and McAfee would not hold true in regards to the findings of this chapter. Digitalization could indeed propel and enable an environmental disruption if it is used to lay the foundation for a circular economy, together with other tools and aids.

Stuchtey, Enkvist and Zumwinkel (2016, p. 202) argue that throughout history, the economic and technological revolutions have all brought with them a shift of workforce, rather than an "end of work". The authors however highlight that the scale and pace of change that defines the digital revolution might affect the labor market differently than what can be seen in historical contexts. If the change happens too fast, it might be detrimental to those who are affected by it, making the change more arduous, or at least (paradoxically so) slower to implement.

Perez (2018) explains that technological revolutions have traditionally been shown to cause destruction of jobs and skills – and in some cases whole regions. However, she argues that each revolution has brought about needs of new lifestyles that require new services and products, which in turn opens up for new employment. In the case of a transformation to a circular economy enabled by digitalization, the new lifestyles would mean new needs for not only new services and products, but also new business models, new consumption patterns, new behavior and new interactions. In conclusion, utilizing tech to drive the transformation of society into a circular economy would naturally automatize some processes, but it will foremost give way to new employments requiring human labor, elsewhere.

7. Beyond GDP – measuring growth, prosperity and well-being

When stating that circular economy can lead to an increased growth, job opportunities and development, it is important to also highlight the definition of growth since it is indeed subject to much debate. Ultimately this new circular economy proposes a more environmentally friendly society without impeding humans' social development and citizen's well-being since it also proffers new job opportunities and new ways of capturing value from resources. The circular economy thus proposes a new way of thinking in regards to industrial/human growth and human well-being, as it decouples economic growth from resource use (Lund University et al., 2018; Ellen MacArthur Foundation, 2015b).

Historically, Gross Domestic Product (GDP) has been used as a measurement of a country's welfare and as an index of the well-being and development of a society

(Tukker et al., 2014; Jackson, 2009). OECD (2018a, para.1) writes that GDP "at market prices is the expenditure on final goods and services minus imports: final consumption expenditures, gross capital formation, and exports less imports". The mean standard human growth and human social development has thus been closely linked to consumption. Even though, as previously discussed in this chapter, GDP is by many predicted to increase with a transition to a circular economy, the fact that growth is measured on the basis of consumption is disputed. As stated, the growth in a circular economy will be based on human capital instead of extraction of new resources (Groothuis, 2015). Among others, Stahel (2016) discusses the contradiction of using GDP as a measurement of growth in a circular economy. He means that GDP measures a financial flow over a period of time whereas circular economy preserves physical stocks. Stahel (2016) argues that wealth and well-being should be measured in stock instead of flow and in capital instead of sales since materials should be seen as assets to be preserved instead of continually consumed. He urges policymakers to use "resource-miser" indicators such as value-per-weight and labor-input-per-weight ratios rather than GDP.

It has further been debated whether GDP is an accurate measurement to use for measuring welfare and well-being in the context of high-income countries on the basis that consuming more products does not necessarily mean increased well-being when reaching a certain level of consumption (Tukker et al., 2014; Jackson, 2009). Tukker et al., (2014) argue that Human Social Development Index (HDI) would be a more accurate index to use. While instead measuring HDI, researchers find that the relation between well-being, human social development and resource usage is not linear since human social development stagnates after a certain level of resource usage (Tukker et al., 2014). When measuring the global resource footprint of nations, Tukker et al., (2014) found that Japan's legislations to reduce waste in the country resulted in the lowest material footprint observed for highly developed countries. In this way Japan set an example of the possibility of decoupling standards of living from environmental impacts and resource usage. Jackson (2009) discussed this matter already back in 2009, when he argued that well-being encompasses much more than material concerns and consumption:

> [Well-being] resides in the quality of our lives and in the health and happiness of our families. It is present in the strength of our relationships and our trust in the community. It is evidenced by our satisfaction at work and our sense of shared meaning and purpose. It hangs on our potential to participate fully in the life of society. Prosperity consists in our ability to flourish as human beings within the ecological limits of our planet. The challenge for our society is to create the conditions under which this is possible. It is the most urgent task of our times.
>
> (Jackson, 2009, p. 16)

New Zealand has promised to introduce a tool and framework in 2019, for how to measure its economic success through the well-being of its inhabitants, thus being the first country in the world to do so (Walters, 2018). The prime minister

stated that, "We want New Zealand to be the first place in the world where our budget is not presented simply under the umbrella of pure economic measures, and often inadequate ones at that, but one that demonstrates the overall wellbeing of our country and its people" (Walters, 2018, para.4). It should be noted however, that other countries have previously sought to implement alternate measurements to the GDP. For instance, Bhutan has implemented a Gross National Happiness (GNH) index, which is more of a philosophy that guides the national government in its aspiration to measure the collective happiness and well-being of its population (Kelly, 2012; Dorji, 2012). Regional/local variations of GNH exists in multiple places across the world (Chatterjee, 2011; Rattiwan, 2016).

Questioning the traditional measurements of growth, Stuchtey, Enkvist and Zumvinkel (2016) present Solow's theory around growth, explaining that Solow quantitatively described growth as the output of two input factors: (1) labor and (2) capital. Solow explained that labor accounts for 70% of growth and capital the remaining 30%, in most developed countries. Challenging this notion, the authors remarked that for the observed GDP growth rate over time, for many countries and during a longer time series, the empirical data on input and productivity development only accounted for half of that GDP. The remaining part of the growth, Solow referred to as a result of "technological progress and a synergy effect from combining better labor practices with more productive capital investments" (Stuchtey, Enkvist and Zumwinkel, 2016, p. 58). The authors conclude that, "To this date, there is little quantitative microeconomic understanding of this other half of growth and how it can be managed. More than half of our growth engine remains a black box" (Stuchtey, Enkvist and Zumwinkel, 2016, p. 58). Instead, Stuchtey, Enkvist and Zumvinkel (2016) propose that energy and resources play a crucial role in the equation of calculating growth and should be seen as inputs. They posit that when measuring economic growth, it is necessary to take into account how much energy and other resources are put into the economy and how productively they are used. In summary, the authors mean to say that resource productivity does indeed matter when measuring economic growth.

Perez (2018) states that most people believe growth is about mass production. Perez instead argues that growth could involve anything but products, such as intangibles and services. She calls it "smart green growth". She further contends that the smart green growth is built up by a new lifestyle based on an aspirational good life and new jobs to cater for it. Thus, she implies that both these things should determine the level of growth and job creation. Perez (2018, 00:14:26) states that a smart green growth is, "[a] constant increase in the proportion of intangibles in both GDP and lifestyles".

Taking the previous discussion in consideration, it could be concluded that we have reached a point where it is necessary to measure growth and well-being in a different way. It is yet unknown what measurement(s) will replace or complement GDP as a standard. However, it is evident that some sort of index for how productively resources are used is necessary, as well as to measure human development and well-being decoupled from resource use. Some of the primary findings in extant research on this topic is that the present economy needs to change

its guiding principle and allow it to be driven by something other than the classic market-based economic growth. Thus, there is a need for a new economy that can function within the planetary bounds without impeding economic growth. Mary Robinson, the former president of Ireland and United Nations high commissioner for human rights, captures this predicament by asking: "What does prosperity mean in a world of 9 billion people living under the threat of climate change and resource scarcity? One thing is absolutely clear. It cannot mean business as usual. It cannot mean more of the same" (Jackson, 2009, p. xvi). Also Steffen (2017) highlights this issue, saying:

> Particularly in the Anglo-Saxon world we have narrowed down so much of life and tried to stick it in a market-based economic system, that we are headed for failure if we don't realise that. We have to put limits on what is in an economic system and what we manage elsewhere, outside, based on fundamental principles and values. So, we have to understand that we have to manage ourselves in such a way that we take pressure off the Earth system.
>
> (Steffen, 2017, para.9)

8. Conclusion

In conclusion, circular economy is fundamentally reshuffling our current economic system. It will change how materials and resources are handled and consumed, what the labor market looks like and how growth and well-being are defined and measured. It will not stop at the business level but will affect all aspects of society, people, cities and the planet. It is a socioeconomic as well as a techno-economic paradigm shift that requires system changes on all levels.

The transformation to a circular economy will ultimately not only benefit the environment and our future lives on this planet, as it will also have positive impact on labor. With the shift follows increased jobs and new industries. A circular economy is more dependent on people overall, both due to the fact that skilled jobs in local businesses are needed and because users are invited to take part in the economic system of sharing, renting, lending and communicating with and influencing products and goods. However, there are several obstacles on the way toward a circular economy and the transformation specifically requires digital technology as an enabler; to handle complex information flows, enable new business models, provide and increase transparency, secure transactions and increase communication.

Digitalization (along with the digital transformation) has, in and of itself, already begun to fundamentally change all dimensions of society at large. Thus, it is predicted to have a disruptive effect on the labor market. Circular economy and digitalization are fully compatible with one another. That is to say, with the aid of other tools and methods, the union between circular economy and digitalization has the potential to facilitate the economic revolution that would bring about a financial and environmentally sustainable society. It is true that one may argue that there will be an increased threat of technological unemployment once the

digitalization process reaches its full effect. However, this chapter has concluded that if digitalization is used the right way, e.g., to help us derive, handle, analyze and understand data and complex information flows, it has the potential to both catalyze sustainable societies and circular economies while at the same time create new industries, new jobs and new innovations and opportunities. Specifically, fears of unemployment are unwarranted provided that digitalization is used to propel an economic system that relies on human skills and human labor (what signifies a true circular system).

That being said, digitalization should not be seen as the end-all and be-all solution to circular economy, as digitalization could never facilitate a circular economy in total seclusion. It should, however, be seen as one means among many in reaching that state. Several other enablers are needed for the transformation to emerge, such as changed mindsets, changed policies and legislations, changed measurements and indicators, changed supply chains, along with more research and innovation.

There are, indubitably, also potential risks of using digitalization to enable the shift to a circular economy, such as privacy and ownership issues. However, the fact that it is a key-enabler, if not even a prerequisite, for us to change to a more sustainable world should be enough of an argument for using it. If digital technology is instead used to bolster the linear economies, it will be much too late to transform our current economic system into one that can accommodate and function within the planetary bounds. The reason is that the way our businesses are run today cannot be optimized in terms of maximizing profit and sustainability, nor can it provide for the necessary sustenance of tomorrow. The potential risks then rather lie in the cost of not doing what we can to change the status quo.

As evidenced in this chapter, the transition cost of turning the current economic system as we know it into a circular system, will no doubt be considerable. However, each and every day we experience the constantly increasing opportunity costs of *not* transitioning, with global warming, with increasingly polluted oceans and air, with more animals becoming extinct, more icebergs melting and waste piles that keep growing. The linear businesses will ultimately have to pay more for conducting business in the traditional way as it is anticipated that the demand of goods and services will continue to increase all the while resources are becoming scarcer. When the circular transformation not only promises to deliver change on the aforementioned parameters, but also to revamp and provide prosperity to the labor market while fostering economic growth, the transition cost becomes substantially more affordable.

At the end of the day, there is a pressing need for a new economic system that has the ability to provide for human's modern way of life while at the same time respecting and accounting for the limitations of the earth's resources. With the advancement of new technology, the circular economy presents itself as a new economic model that can deliver on all of these accounts and provide society with a sustainable economic growth. It is thus necessary to put circular economy on the agenda in all aspects of business and society and treat it as the innovation and disruption it actually is. Circular economy should not only be a strategy for the sustainability department, but for the whole business, and the whole society. It is especially important to discuss circular economy and how it can be achieved in conjunction with the digital strategies of both businesses

and societies. It is crucial to provide the right supporting structures for the two revolutions (digital and circular) to be synergized. However, disruptive ideas are already now making use of technology. This paves the way for commitment to change, while also showing that we truly have the right tools and means to achieve a more durable society that embraces a new direction of growth. Ultimately, circular economy is not an activity for the sustainability department, it is a mindset, an innovation and a business strategy for competitiveness and survival. A circular economy can aid in accomplishing a society that decouples resource use and environmental impact from economic activity and human well-being and the digital transformation can help provide the means from turning this theory into practice.

Notes

1 The authors contributed equally to this work.
2 Reverse logistics signifies a process of recollecting goods after they have been used for the purpose of capturing as much value as possible. After they have been recollected, the products could for example get reintroduced to the market, remanufactured, refurbished or recycled.
3 Flow-on entails an increase in wage or another benefit that a group of people receive because a similar group receives it.
4 A web-based knowledge platform with information on non-fuel, non-agricultural raw materials from primary and secondary sources.
5 Stringency indicates a higher implicit or explicit price placed on the relevant environmental damage produced by firms or consumers.

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Part IV

Conclusion

17 Conclusion

The digital transformation of labor – where do we go from here?

Anthony Larsson

1. Introduction

The digitalization and digital transformation of labor is in many respects illustrated as a "disruptive" development inasmuch that it fundamentally alters the way in which people earn their upkeep, and indeed who gets to keep doing the job they were trained to do in the way they learned how. The convergence of digital technologies is reshaping the future of the workplace, workforce and work processes (Frost & Sullivan, 2019).

Digital transformation in business generally tends to be a complex and unwieldy process to implement fully. As technology evolves exceptionally quickly, organizations are pressured into keeping an even pace or risk falling by the wayside. Thus, organizations today are by and large faced with two main challenges when it comes to digital transformation. First, they must put digital transformation/digitalization on their roadmap. Second, they must ensure that they possess the agility to deploy new technologies before they are rendered irrelevant. Thus, there is no denying that digital technologies fundamentally transform organizations. In order to succeed and stay relevant on the market, organizations must have a coherent and viable strategy, employers must have a plan to reskill workers and citizens must keep themselves informed, motivated and prepared for swift changes. While other technological "revolutions" throughout history, such as the Industrial Revolution and the Agricultural Revolution, etc., have played out over a longer period of time, the digital transformation operates on a radically shorter time trajectory, which prompts businesses to take quick and decisive action. The digital transformation also affects governments inasmuch that they need to prepare their citizens for a digital future, while also dealing with potential inequalities, wage deflation or possibly even social unrest stemming from the digital transformation of society and its labor market.

A 2019 report released by the European Commission argued that the EU was on the "right path towards modernising our labour and social policies" (European Commission, 2019, para.2), while issuing recommendations to actors on the labor market "to reduce structural skill gaps, especially for women in science, technology, engineering and mathematics (STEM), workers at risk of automation and the low-skilled" (European Commission, 2019, para.3). By the same token, figures