**The Future of Labor Unions in the Age of Automation and at the Dawn of AI**

**Gadi Nissim1,2, Tomer Simon1,3**

1 Both authors contributed equally to this work

2 Ruppin Academic Center, Israel

3 Tel Aviv University, Israel

**Abstract**

The COVID-19 crisis has accelerated an ongoing massive digitalization process of the economic production and services functions. Within weeks, taken for granted assumptions about how to run the economy have been shattered. The discussion about digitalization and the future of work has become more imperative. So far, labor unions have been the leading representing institution of employees. However, the rise of the digital economy put in question the feasibility of labor unions’ policies and undermines their traditional power sources, which depend on the membership of masses of paid workers and on their ability to stop production. In this context, this paper aims to discuss the challenges confronting unions in capitalist democracies. Most of labor relations scholarly literature has embraced the assumption that the digital revolution would eventually bring new and better jobs. We, on the contrary, suggest that adopting the alternative scenario, of digital revolution that causes mass replacement of human workers and to structural technological unemployment, might expand our point of view, particularly for designing public policy. Such a scenario may also be beneficial for trade unions, whose calling is to defend workers. We suggest that unions have a double crucial role: the first is to safeguard the rights and interests in the transition from an economy based on paid labor to an economy based on automated production; and second, to represent a more public-economic rationale of how to embed the advanced digital economy in a broader apparatus of social-economic rights for ordinary citizens."improve the relationship between digital economy led by vision of unions of how to position themselves as the jobless economy becomes a reality.

**Introduction**

The world has been traversing a global health crisis that has forced governments everywhere to take unprecedented actions in an attempt to stop the spread of the SARS-CoV-2 virus and its variants. These actions have included closing borders to ground and air travel, closing schools and universities, shopping malls, production and manufacturing facilities, and requiring people to practice social distancing, including quarantines and full lockdowns. Companies in numerous countries have been required to change their work procedures to safeguard the health of their employees, which has led to remote work and work from home. Although many hi-tech companies had previously allowed employees to work from home occasionally, it was extremely rare to find companies to operate fully and continuously in this mode.

Companies are not the only ones modifying how they operate; educational institutions have also closed their gates and shifted to remote learning. The entire global health sector had also changed as doctors and nurses were forced to protect themselves and to provide remote-healthcare services to quarantined and infected people. This abrupt change has obliged organizations to adapt and create ways for their employees and students to continue to work and learn. The coronavirus crisis has significantly accelerated the adoption of digital technologies to allow “remote life” en masse (i.e., working, learning, and interacting) so that people can continue to work, meet, communicate, collaborate, learn, and access information. Organizations are experiencing an extremely rapid digital transformation through the adoption and implementation of advanced technologies. The accelerated pace of implementing digital technologies and allowing different modes of work has also advanced the “future of work” more rapidly than anticipated, and these changes have attracted the attention of many scholars, analysts, and influencers. In this context, we focus herein on how labor unions are being affected by this accelerated transition in the workplace.

Zooming out on the multiple measures governments and employers have taken to cope with the COVID-19, four conclusions are quite clear. The first is that digital technology enables us doing much more things with less human labor. The second is that digital platforms may offer people the opportunity to work and earn money, but often do not provide them with material security, job security and the fulfillment that many regular jobs gave them. The third is that structural-technological mass unemployment is not a dystopian vision, but a reasonable one. The fourth is that governments will resume their crucial role in guaranteeing the material security of citizens, which means that we cannot solely rely on market logic but need to embed it with a social rationale.

In this context, we wish to discuss the role of unions. On the one hand, they were a key institutional player of the political-economic order that had ripen in the developed countries between the mid-1940s and the mid-1970s. Then, they represented large segments of the workforce and covered many workers by collective agreements. They provisioned welfare services and had a real impact on macro social-economic policy. In fact, they were part of the organization of capitalism (Lash & Urry, 1987). On the other hand, they have played just a minor role in the post-Fordist and neoliberal order since the later 1970s. Union density[[1]](#footnote-2) has dramatically declined in most countries (Cohen, Yitchak Haberfeld, Mundlak, & Saporta, 2003). Unions were constricted by business corporations and restricted by governmental policies. They were not relevant to emerging branches (as hi-tech and others). They also lost power and resources, therefore were not able to provide their members with benefits and services as before (Luce, 2014, pp. 6-13). But since the global economic crisis of 2008 and the rise of more sophisticated forms of employment, the question of unions rises again, particularly as the vulnerability of large populations of working people is more evident (Crouch, 2019, pp. 25-29).

The extensive scholarly writing on digital technology and the labor market in fields of labor studies, sociology, and labor law has focused on platform capitalism and how it is intertwined with the gig economy. Gig economy is perceived as the next evolution in the labor market and to be a transitional phase, or a type of “grace period,” from the current economy to a fully digitalized economy. However, the COVID-19 pandemic and the accompanying social distancing requirements heavily affected the gig economy (Thorbecke, 2020), which is based on the interpersonal interactions mediated by a digital platform. For example, ride-sharing platforms such as Uber and Lyft have experienced a drastic decrease in use (Hawkins, 2020). In some countries, ride-sharing platforms have ceased operations altogether to help stop the spread of the virus (Rapier, 2020), and, in other places, governments have banned ride sharing (Shahrigian & Guse, 2020). The COVID-19 crisis has highlighted the risks and insecurities for those who work via gig platforms and rely on them as their main source of income (Paul, 2020; Marshall & Barber, 2020). However, some gig economy platforms have been experiencing a significant increase in the demand for work and employees. For example, the social distancing measures and the mass closure of businesses have forced people to use delivery services on a massive scale (Cheng, 2020).

It would appear, then, that the prospects of the gig economy are more limited than what was heretofore assumed. However, the COVID-19 crisis has an additional and much more dramatic effect in the form of massive job loss, layoffs, and unpaid leaves for millions of people around the world (Associated Press, 2020). Retail, hotels and hospitality, airlines, travel and tourism, sporting events, restaurants, theaters, and concerts are all sectors that have been heavily affected (Kelly, 2020; Margit, 2020). The US has experienced the highest rates job loss and, 50% more than during the 2008 financial crisis (Cox, 2020; Congressional Research Service, 2021). These massive layoffs exerted enormous stress on governments, which was especially apparent in the unemployment and welfare agencies that had to handle unprecedented numbers of requests in a very short time (Rainey, 2020). Given the need to maintain strict social distancing, governments were also quickly adopting and implementing digital tools and solutions to be able to continue to function and support their citizens in times of crisis.

Major crises have long been powerful forces for change and have accelerated innovation and the creation and adoption of new technologies and ways to work. Following the 2008 financial crisis, the professional world experienced a resurgence of the gig economy driven globally by digital platforms such as Airbnb and Uber. The Coronavirus crisis may also be the harbinger of fast-paced changes that will affect all aspects of our lives, and that will be driven by digital technologies. The current mode of “remote living,” as we call it, may become the new norm for numerous organizations worldwide, even after the crisis has finished.

The combination of massive layoffs, the inability of workers to access their workplaces, and the augmentation and replacement of human labor by digital technologies, and especially artificial intelligence, imply that the current changes in the labor market may not be temporary but rather a prologue of a deeper transformation that might force masses of people to take up nonstandard jobs or face unemployment. The digital age has arrived faster than expected and is only accelerating, and the result will be the mass replacement of human labor by automated labor.

Traditionally, unions have been the main institutions that represented workers. How can unions stay relevant in this new context? What can they contribute in this new era, which may be characterized by a continuous reduction of their membership? These are the main questions addressed herein.

**Goals and underlying assumptions**

Before developing the discussion there is a need to state our assumptions and point of departure for this work:

* The goal of the present paper is to discuss the next two significant challenges to confront unions in capitalist democracies and post-industrial societies: first, the role of unions in the transition from an economy based on paid labor to an economy based on automated production and, second, the new vision of unions of how to position themselves as the jobless economy becomes a reality.
* The labor market scenario we present here is the most radical and remains under debate. However, we believe that unions must be prepared for it. Scholars do not necessarily agree about the extent of the future transformation of work, but a broad consensus exists that the change will be transformative (Frey & Osborne, 2013).[[2]](#footnote-3)
* Artificial Intelligence is unlike previous technological breakthroughs. It introduces autonomy and autonomous capabilities in both hardware and software that were not possible before.

**The prolonged discussion about technological progress and its social implications**

Any discussion about the implications of automation and artificial intelligence (AI) for production and service processes must begin with a broader discussion about the impact of technological innovations on economic progress, and why the implications of the current breakthroughs are revolutionary.

The debate about the future implications of technological innovation on the labor market is old and recurring. Early in 1930, the notable economist John Maynard Keynes wrote about the economic and social conditions a century ahead of his time, and the road to get there. Keynes claimed that since the eighteenth century was accompanied by pessimistic visions of the future. The fear of grave consequences of economic development had led to two radical movements. The reactionaries wished to halt progress by avoiding any active measures to improve the economy; the revolutionaries, saw no alternative but violent action to transform society. Unlike these voices, Keynes envisioned an optimistic yet realistic future. He saw the economic and social problems of his times not as pathologies but as “growing pains of over-rapid changes” (Keynes, 1932 [1930], p. 358). Keynes stated that capital accumulation and technical leaps would enable a level of production high above the growing population could consume. He also predicted that advanced technology would make part of the human workforce redundant. However, that would not be a problem. New system of resource allocation and a new moral standard would emerge, financial wealth would cease to be a goal in itself; people would work fewer hours and it would be for the sake of their well-being, and not for their material security.

The debate on technological leaps and the future of society resumed in the 1960s. Once again, growing automation led to optimistic views of new possibilities that freed workers from their routine jobs, but concerns were also raised regarding workers' health, structural unemployment, and other issues. One possible solution was automation funds, which were to be jointly administered by unions and employers to support workers during this transition (Kennedy & Plaut, 1962). David Ben Gurion, the founding father of the modern State of Israel, wrote the following in December 1969 (translated from the Hebrew): “… advanced technologies … will enable only one worker that is using cutting-edge technological tools to perform the work that now requires ten workers or more. And in my opinion, it demands a complete revolution in all occupations, and it depends on the government” (Ben Gurion Archives, 1969).

Following the literature and data that we covered, we claim that the dramatic technological advancement of the present times will necessarily lead to an extensive change. This change will be accompanied by two kinds of strains – temporary ones which characterize the transition phase from the current economy into a completely digital economy, and structural ones which refer to the endemic, permanent, social problems that the digital economy will probably bring. Each type requires different interventions.

**What is a job and how can it be automated?**

Understanding the scope of the new revolution and the interventions we suggest require an in-depth account of job automation. A common approach to this issue is first to understand the types of tasks people do for each job and to divide them into a sequence of actions, and second to estimate the level of automation that could be applied to each task (Decker, Fischer, & Ott, 2017). Usually, a person’s job combines different types of tasks, so, as Gibbs (2017) stated, “the effect of technology on job design rests on a substitute-complement continuum.” Therefore, the concept of automation may be applied to an entire job or only to specific tasks within that job, whether at home or at work (Brandes & Wattenhofer, 2016; Yeates, 2013).

An unprecedented number of jobs are under threat by substitution, including many skilled and non-manual jobs that were previously considered to be immune (Cameron, 2017). Tasks include both routine and nonroutine activities[[3]](#footnote-5) (Figure 1). Routine tasks (physical or cognitive) are more easily automated and therefore have been those in which human labor has been usually replaced so far. Bur recently, nonroutine tasks (social and abstract), which have heretofore been perceived as harder to automate, have started to see human labor replaced as AI technology advances rapidly (Sorgner, 2017; Gibbs, 2017; Berg, Buffie, & Zanna, 2018).

Graphical user interface, diagram

Description automatically generated

Figure 1 - Types of tasks in a job.

Today, the evidence more strongly supports the replacement thesis. It enables the replacement of humans in activities and tasks so as to accomplish them with minimal human intervention or supervision (Yeates, 2013).

The major driver of automation is the rise of new computer hardware that allows the treatment of enormous amounts of data, which opened the gates to AI and machine learning algorithms (Brandes & Wattenhofer, 2016). Today, AI-enabled robotics hardware allows robots to have more delicate interactions with humans and to be much safer when operating side-by-side with them (Decker, Fischer, & Ott, 2017).Hospitals around the world have started deploying and using robots to provide remote care and treatment to coronavirus patients, which enabled continuity of care while protecting the medical and public health staff (Okyere, Forson, & Essel‐Gaisey, 2020).Or, in the words of Autor and Salomon (2018), the new automation technologies are “labor displacing” because they “reduce labor’s share of aggregate output.”

**Understanding the revolutionary transformation**

Advanced economies are currently undergoing a massive wave of technological change that may be ushered by deep social implications. Today’s economy is experiencing what is known as the fourth industrial revolution, which began in 2013. This revolution is characterized by the use of advanced technologies involving AI, robotics, and the internet of things to automate tasks and jobs. The machines (hardware and/or software based) are getting, for the first time, autonomous and self-learning.

Prior to 2013 and contrary to previous waves of technological innovation where technology was envisioned to augment people, the aim of technology this time is to replace people (Decker, Fischer, & Ott, 2017). Following 2013, the newest technologies have brought new capabilities —that humans may not have, and some already refer to them as even superhuman capabilities —to improve productivity, efficiency, and flexibility (Decker, Fischer, & Ott, 2017; Grau, Indri, Bello, & Sauter, 2018; McIlroy-Young, Sen, Kleinberg, & Anderson, 2020). The conclusion is that more human workers are replaceable, and hence we are facing much more than the challenge of retraining the workforce to adapt to new production processes. We are facing a massive structural technological unemployment: “this time new emerging jobs might not be able to compensate jobs endangered by the new technology” (Brandes & Wattenhofer, 2016).

Some recent papers reject the scenario of massive job displacement by automation and claim that augmentation is much more likely (Bessen, 2017; Autor & Salomons, 2018). However, we should be skeptical about these studies because their data were acquired prior to 2007, an era in which AI technology was not available for industrial use and robots were much simpler than today (Bryson, 2019).[[4]](#footnote-7)

**Job-automation predictions**

So far, we have overviewed two opposing predictions regarding the effect of automation on jobs. One was substitution and the other was augmentation. The substitution thesis directs to a broader prediction of “the collapse of the ‘full employment’ norm to which all developed economies have become accustomed” (Cameron, 2017, p. 12). The augmentation thesis directs to a more moderate prediction: “we are likely to face substantial turbulence as careers and industries are disrupted all across the economy before the hoped-for ‘new jobs’ emerge in sufficient numbers” (p. 11).

These opposing predictions prompt abundant research that estimates the probability of human replacement or augmentation by automation. These studies refer to the entire labor market, or specific branches or occupations within. In 2013, Frey and Osborne published the first comprehensive report on the potential and probability of the automation of more than 700 different jobs (Frey & Osborne, 2013). Brandes and Wattenhofer (2016) extended their work by analyzing the tasks that comprise each job and calculating the probability of automation of each.[[5]](#footnote-8) By using O\*Net historical data for the period 2001–2015, researchers showed that jobs with a high probability of automation already started showing a decrease in demand for employment during this time (Brandes & Wattenhofer, 2016; McLean, 2015). This was also validated on a national level, albeit with local variabilities (Berrebi, Shraberman, & Yarin, 2017; Arntzi, Gregoryi, & Zierahni, 2016).

Whereas these two reports provide a high-level overview of the potential of automation, other studies have focused on specific domains and industries. Mass production industries are obviously the most inclined to be automated, and their workers are more likely to be replaced by AI driven industrial robots (Acemoglu & Restrepo, 2018). The oil and gas industry have started adopting advanced automation technologies that reduce the need for human labor on ocean rigs (Devold & Fjellheim, 2019). Occupations, such as knowledge workers, that require enormous amounts of information to perform have also a high potential for improved efficiency by using AI, which would allow the automation of major routine processes (Naik & Bhide, 2014). In the medical and clinical domains, for instance, AI and robotics may automate the diagnosis, screening, and even counseling procedures. The US FDA has already provided approvals for more than 64 AI technologies to augment physicians (Benjamens, Dhunnoo, & Mesk, 2020). In the medical imaging domain, numerous tasks and tests could be automated by using AI for image recognition (e.g., for pathological tests) (Naik & Bhide, 2014). As the COVID-19 pandemic spread, AI technologies have been used to assist and augment the work of public health professionals and medical doctors for screening and diagnosis (Schuller, et al., 2020; Wang, et al., 2020; Biswas & Sen, 2020).

Automation and AI will also transform other fields, one of which is the function of governance in organizations, particularly human resources, where AI and robotics may make the regular management supervision and guidance of humans redundant and eliminate the need for the traditional recruiting functions of human resources (Stiglitz, 2014). Another domain is the banking industry, which could leverage AI and robotics in various occupations and roles, starting from the contact-center and extending to front-desk tellers (Dirican, 2015), with predictions stating that 70% of front-office jobs (tellers, loan officers, customer service etc.) will be substituted by AI until 2030 (Crosman, 2018).

It appears, then, that automation and AI are certain to have a large impact of vast scope on multiple sectors. They will likely penetrate deeply into domains that were heretofore considered immune and will challenge the employment prospects of entire populations.

**The (ir)relevance of education and training for automation**

A common belief is that education, training, and upskilling are a panacea against the threat of job loss caused by technological advancements. The assumption is that a higher level of education and training correlates with a lower probability of long-term unemployment. According to this view, unskilled workers in industrial factories are at a higher risk of automation because the routine tasks they perform are the easiest to program and automate by software or robotics (Decker, Fischer, & Ott, 2017). In addition, jobs requiring high-level skills are more complex to automate than jobs requiring middle-level skills (Gibbs, 2017). Therefore, those likely to be replaced are those whose jobs require middle-level skills (such as knowledge workers and service sector workers) (OECD, 2019). Other research showed that skill level correlates directly with the level of education required for a job but negatively with the probability of its automation. For example, jobs that require pre-training (e.g., an apprenticeship) have a lower likelihood of automation than jobs that require on-the-job training (Brandes & Wattenhofer, 2016).

The relevance of training also regards the types of workers and their skills, not just the type of jobs. Sorgner (2017) showed that people who work in higher-risk jobs, or even lower-risk jobs, are more likely to acquire new skills and training than those working in medium-risk jobs. The former group takes these steps as a self-preservation action to reduce the likelihood of them being replaced by automation. Workers with low-risk jobs possess the soft skills that are harder to automate and more important for innovation (e.g., creativity, abstract thinking; see Figure 2). Furthermore, they are likely to try self-employment and the entrepreneurial model as well.

To sum up, we still do not know what type of education or training would be best to reduce the risk of replacement by automation[[6]](#footnote-10) (Sorgner (2017). However, we can conclude that jobs with the lowest risk of automation are those that require skills such as “deductive reasoning, originality, communication, training, problem-solving, and reading and writing” (Gibbs, 2017). Nevertheless, education for itself will probably cease to be the best investment and the key to our social mobility as it was in the twentieth century (Susskind, 2020, pp. 153-168).

Structural technological unemployment is a permanent condition of a labor market that does not provide enough jobs to meet the demand, due to advanced technology that turns human work redundant (Susskind, 2020, pp.112-131). It might undermine advanced societies since work has been a key institution of modern society from the outset. Not only has work provided for material subsistence but it has also defined the modern human psyche (Costea, Crump, & Amiridis, 2008, pp. 677-680). According to the deprivation theory, employment is not only essential as a source of income and subsistence but also for its psychological and social functions, such as a sense of purpose, identity, and social status and for maintaining social relationships (Budd, 2011; Jahoda, Lazarsfeld, & Zeisel, 1974 [1933]; Jahoda, 1981). Jahoda (1981) articulated the five functions jobs serve for our social existence: “First, employment imposes a time structure on the waking day; second, employment implies regularly shared experiences and contacts with people outside the nuclear family; third, employment links individuals to goals and purposes that transcend their own; fourth, employment defines aspects of personal status and identity; and finally, employment enforces activity” (Jahoda, 1981, p. 188).

Hence, mass loss of jobs might have various effects on individuals as well as on the entire society. First and foremost, automation might push social mobility mainly downward, meaning that people would either be demoted in their current workplace or moved to lower-level jobs in a different industry (Figure 2) (Sorgner, 2017). Moreover, displaced workers may find that retraining, re-skilling, and re-educating themselves to enter new industries require time and money, which might prove too costly for them (Stiglitz, 2014). The risk of job loss may also cause increased physical and mental health issues (Patel, Devaraj, Hicks, & Wornell, 2018), as well as degraded family relationships and even family breakups (Doiron & Mendolia, 2012; Kalil, 2005). People who lose their job due to technological advancement might also experience difficulties in maintaining their social status and their self-value as their assets and finances decline (Stiglitz, 2014). Furthermore, the hope that they will find alternative livelihoods is discounted by Sorgner (2017), who finds a significant rise in self-employment, which may be the result of people replaced by automation starting new enterprises. However, these businesses are not growth-focused and bring little value in terms of employment, innovation, or market value (Sorgner, 2017).

Figure 2 - Implications of automation for human jobs.

The effects of automation and AI differ for different demographical groups and therefore might intensify the social unrest. Generally, technological innovation contributes to an increase in inequality because it usually displaces the less-skilled workers and decreases the demand for their services (Stiglitz, 2014; DeCanio, 2016; Berg, Buffie, & Zanna, 2018). One outcome of the rising unemployment rates among the middle and lower classes is growing social and political unrest, which has already manifested itself in the 2016 elections in the U.S. and in Brexit in the United Kingdom (Mosco, 2017, p. 205; Judis, 2016).

Recently, a group of researchers from the International Monetary Fund stated that the “arguments for technological optimism do not work,” meaning that the current wave of automation technologies will destroy more jobs than it will create (Berg, Buffie, & Zanna, 2018). Therefore, we expect very high rates of structural technological unemployment, which differs significantly from the familiar short-term frictional or cyclical unemployment (Janoski, Luke, & Oliver, 2014, pp. 4-8). This threat is already felt throughout the world: it raises fear, suspicion, and frustration as the risk of workers losing their jobs to automation increases (Thomas, 2017).

So far, we have demonstrated how AI and robotics may have a major impact on the future of work and the well-being of future generations. In order to complete our analysis, we should address the two major forces that comprise the labor market – the employers and the unions.

**The interest of employers to automate jobs**

The automation of production and service processes may prevail because employers have an incentive to do it. Dirican (2015) argues that “companies could achieve more profitability and sustainability only by following two options: minimizing costs or maximizing value.” Employers’ ultimate objective is to reduce the cost of each task while increasing output (Autor & Salomons, 2018). As automation and AI becomes prevalent, this “either-or” dilemma may disappear because AI and robotics are expected to provide both cost reduction and increased output in parallel. For instance, the financial crisis of 2008 accelerated the adoption of new technologies because organizations were obliged to optimize and re-engineer their business processes to take part in the new digital transformation (Dirican, 2015). The outcome was demonstrated by Gutelius and Theodore (2017), who found that the growth of the U.S. economy after the Great Recession of the last decade skipped over the labor market.

Companies have three main incentives to minimize costs: The first is to reduce not only the demand for employees who do routine jobs but also the number of highly skilled employees who receive high wages (Stiglitz, 2014). The second incentive is the prospect of reducing costs involved with the employment cycle, such as searching for and recruiting new employees, or the shadow costs that stem from the fact that labor costs are much greater than the actual salary paid to employees (Stiglitz, 2014; Decker, Fischer, & Ott, 2017; Gibbs, 2017). The third incentive is to reduce costs due to the “malfunctions” and limitations of their human workers. Although machines may break down and incur a high cost of maintenance, they never go on strike nor require any managerial attention as do human employees (Stiglitz, 2014; Gibbs, 2017) - industrial robots are designed for reliability and durability so that they can work continuously 24 hours per day, 7 days per week (Grau, Indri, Bello, & Sauter, 2018).

Automation reduces differences in task execution that occurs with human workers, thereby removing almost all uncertainty and improving the final product (Gibbs, 2017). According to Qureshi and Syed (2014), the use of robots can save employers up to 65% in labor costs while keeping their businesses working continuously without the need to manage human shifts. They added that robotics plays a major and growing role in the service sector in fields such as health, where employees who work in unhealthy environments may be replaced by robots who can perform the same tasks without incurring the health risks.

We thus conclude that employers are highly motivated by multiple streams of logic to replace human labor by robotic labor and AI.

**Are unions an answer?**

Employers and employees do not share interests and “this relationship is necessarily adversarial” (Durrenberger, 2007, p. 75). The main guardians of workers’ rights, since the early days of the industrial society, were considered to unions. Workers have leveraged unionization to increase their power for negotiating with the employers. The unionizations’ chief goal “is to organize workers for concerted action in support of their interests to redress the power imbalance between those who provide labor and those who control the conditions of its use through their ownership or management of productive resources.” (Durrenberger, 2007, p. 75). This quote reveals three basic assumptions: (1) workers ought to organize to obtain a better bargaining position *vis-à-vis* the employer, (2) the unions’ role is reactive, and (3) workers cannot count solely on the employers to represent their interests but must do so independently.

Unions' basic calling is representing workers' economic interests and also to express workers' voice therefore contributing to the democratization of work and to allocative justice (Luce, 2014, pp. 35-57; Freeman, 2005, p. 646). With time, they have also expanded their engagements to include social services such as pensions (Ebbinghaus, 2011) and health care. Hence, their activity affects not only their own membership but also workers as a whole, as demonstrated by their contribution to the institutionalization of minimum wage (Lichtenstein, 2013, pp. 289-291). Unions', then, have been more than an instrumental tool to represent narrow economic interests of specific groups. They have also been a political movement and an institutional player that influence the entire economic system. Thus, they could play a major role in designing the coming new labor market.

Unions have also demonstrated their ability of responding to deep economic changes and providing answers for workers. They were strong as long as they kept pace with economic and institutional developments and provided solutions for their constituencies. They were especially successful from the 1930s to the 1970s, as a part of the bargaining tripartist mechanism together with employers’ associations, backed by the state. Unions were a key player of a “managed” or “organized” capitalism (Lash & Urry, 1987).

When unions lost their responsiveness they also lost their relevance. For example, since the 1970s, unions have failed to adjust to rapid developments such as globalization, the introduction of advanced technologies, the transformation of the labor market (Luce, 2014, pp. 81-93), or flexible employment arrangements (Ibsen & Tapia, 2017, pp. 175-177; Nissim & Vries, 2014; Luce, 2014) Bronfenbrenner *et al.*, 1998, pp. 3–6).

So, unions' survival depends on their ability adjust themselves to changes and challenges. Given the prolonged crisis they have been undergoing, they have been engaging in “revitalization” and “renewal” strategies since the 1990s.[[7]](#footnote-11) These strategies included strategies as recruiting new members,[[8]](#footnote-12) organizing workplaces, internal restructuring, building coalitions with other social movements, partnering with employers (Bennett, 2013; Mcllroy, 2008), and partaking in political action to influence the higher power centers (e.g., political parties, legislation, state institutions) (Frege & Kelly, 2003, p. 9).[[9]](#footnote-13)

Nevertheless, such revitalization and renewal strategies only designed to address the challenge of non-standard forms of employment and of the gig economy. Among them one can find the cultivation of common class consciousness among digital workers, the establishment of a transnational digital workers’ trade union, and using the workers’ presence on the internet to protest against the digital platforms or even disrupt their operation (Graham, Isis, & Lehdonvirta, 2017, pp. 155-156). Additional strategies are opening unions to self-employed workers (a definition that fits the legal status of those employed by platforms), establishing a union of self-employed workers,[[10]](#footnote-14) legal support for nonorganized workers, agenda-setting activities endorsing workers’ rights, and lobbying for standard and fair employment terms (de Groen, Kilhoffer, Lenaerts, & Mandl, 2018).

One may reasonably expect the scholarly literature to discuss the role of unions in the face of the possible ongoing and coming revolution, particularly given the threat of mass unemployment. In over fifty scientific articles dealing with automation and how it affects jobs, we neither found a mention of the role of unions in dealing with massive structural technological unemployment, nor we found a mention to the way unions cope with structural technological employment in specific branches or industries. Interestingly, there is literature about the effects automation had on labor relations in the 1950s. One case was of Ford Motor Company, which was driven to automate the production process to be less dependent on unionized workers who might strike. Another example was the demand of union workers to shorten the labor day's length from eight to six hours, due to the fear of extensive automation that reduce the need for human labor (Pietrykowski, 2019, pp. 112-113). Usually, unions see the effects of automation and AI as a case of harsh technological frictional unemployment (Susskind, 2020, pp. 112-131), a situation in which people remain out of work because they have not acquired the suitable training to re-enter the technologically changing labor market. According to this view, unemployment is temporary and can be solved by the right training policy and investment. The current literature about technology’s effect on unions extensively studies the growth of digital platforms and gig economy (Prassl, 2018; Srnicek, 2016; Woodcock & Graham, 2020; Crouch, 2019) and the challenge it set for the ability of unions to organize platforms workers (Gegenhuber, Schüßler, Reischauer, & Thäter, 2021; Unterschütz, 2021; Graham, Isis, & Lehdonvirta, 2017). The literature also discusses the way unions can utilize AI, for example using chatbots to reach marginalized workers (Flanagan & Walker, 2020). Finally, it covers workers' attempts to get organized in a big technology corporations. One of them is Amazon, especially its warehouses' workers who function under strict digital control and harsh labor conditions (Cattero & D’Onofrio, 2018). One possibility is ignored in the vast literature about unions' coming challenges - the likelihood that production and service processes will need a much smaller workforce.

**Unions in the transition to a jobless economy**

More than ever before, unions need to strengthen their “strategic capacity” and reinvent themselves as learning organizations if they want to remain relevant (Hyman, 2007). Real learning is the ability to destroy limiting patterns (Huzzard, 2001), so we suggest that unions should adopt a new paradigm and expand their calling beyond representing workers to representing the economic and social rights of all citizens. However, this shift can only materialize gradually.

We discuss two stages: the near future and the distant future. The first involves the transition period from the current reality to a future automated, digital economy. In this phase, digital platforms still relies on human labor for more sophisticated or routine assignments, and automation of other fields is getting more developed, however still not leaving human labor redundant. The second phase may be an era in which the economy is widely based on automation and AI, pushing human labor aside in many branches. Even though the vision of the second phase is still uncertain and under debate, we still suggest that union leaders adopt the most radical future scenario as their point of departure. This will force them to innovate by reevaluate their basic assumptions about who they represent, what are their goals, and which strategies they embrace.

In the near future, we recommend that unions adopt the following seven measures:

1. **Developing research**: This involves establishing or expanding specialized research units to study the accelerating changes in the economy and the course the economy is taking. In unions that already have research departments, we recommend that they adopt methodologies such as futurism and long-term planning, which are used today by numerous corporations around the world.
2. **Onboard technology experts**: To develop a deeper and broader understanding of the possibilities offered by new technologies, unions should recruit technology experts to their management teams and not be satisfied with general future scenarios. Recently, this gap in digital and technological knowledge in corporate boards was shown to diminish the success of the digital strategy of companies (Pearce, 2018).
3. **Support an augmented workforce**: Unions should empower workers where automation does not completely replace human labor. Unions should actively map industries and jobs that are likely to remain dominated by human labor, organize their workers (where they are currently not organized), strengthen worker status, and improve working conditions.
4. **Advocate for employee health, safety, and privacy in the age of AI**: Unions should represent workers’ rights regarding health, safety, and ethics at workplaces that are undergoing automation. Workers that use cutting-edge technologies in the workplace are expected to lose some, if not all, of their privacy during work because they will be tracked and monitored by numerous sensors that collect data to improve and further optimize their work (Gibbs, 2017). These complicated issues will be affected by the digital revolution, and workers cannot rely on employers or state regulations to safeguard their rights.
5. **Join AI consortiums**: To be connected to the main players in the AI field and remain up to date about developments as they occur and influence such developments, unions should join AI consortiums all over the world.
6. **Managing dignified retirement**: Unions must bargain for fair retirement conditions for employees in workplaces where human labor is certain to be replaced. In such cases, unions should channel their bargaining efforts away from hopeless struggles against dismissals to securing the best retirement compensations for workers and for their retraining to help them explore other career paths. This is called “outskilling” and is a new method that companies worldwide have recently started to offer to employees that “don’t have a future at [the] company” (Horn, 2020).
7. **Facilitate re-skilling and upskilling**: This involves cooperating with employers and governments to build upskilling and re-skilling programs for workers whose jobs are at risk of automation. The goal is to facilitate their re-assignment into industries and jobs with a lower risk of automation or to promote their conversion to other positions with the same employer.
8. **Join AI Ethics committees**

**The distant future**

In the more distant future, when a jobless society may become a reality, unions can sustain their relevance only by adopting a new vision. They should transform their primary calling from representing employees to representing the social rights of all citizens.

Thomas Marshall maintained that modern citizenship is based on three layers of rights: The first is civil rights, which are mainly legal and secure the freedom of individuals—the freedom of speech and religion, the right to own private property, and more. Political rights are next; these guarantee the ability to elect and be elected to sovereign institutions where major decisions are taken. Finally, social rights form the most advanced layer. These endow citizens with material security. Everyone is entitled to have access to appropriate nutrition, health care, education, transportation, etc. (Marshall, 1950). Historically, political and social rights, among others, have been achieved because of pressure applied by worker groups, consisting mainly of organized workers. In Scandinavian countries, for example, not only have unions played an active role entrenching these rights, but they have also provided welfare services such as pensions and unemployment insurance (Klausen, 1995; Lind, 2009). The end of mass employment may jeopardize these rights.

A jobless society might strip the working class of its structural power and turn former-workers into liabilities in the eyes of employers and into welfare costs in the eyes of governments. Governments are already pressured by corporations to cut their taxes, and the outcome might further reduce welfare budgets and widen the already huge inequality between the social classes (Morgan, 2014). In this context, the role of unions as the representatives of the material interests of lay people is crucial. They can organize and mobilize people to support essential solutions to the problem of material security for citizens. Without this, and with no other institutional protection, many jobless citizens will be exposed to the dangers of poverty. In this context, unions should consider shifting their main efforts from representing employees to representing broad social movements that champion the following agenda:

* Open unions not only to employees and the self-employed but also to those who are left out of the labor market.
* (Harvey, 2007; Crouch, 2019).
* (Collins, 2018, pp. 1-10).
* This trend worked well in the early days of the Israeli Histadrut (Preminger, 2018) and in the Ghent System in which unions operated the system of unemployment insurance (Lind, 2009). (Dray, 2011; Leser, 1976).
* Function as lobbyists and lead the way for UBI (Simms, 2019, pp. 35-37; Standing, 2017) or for other means that could secure the material needs of the citizenry. As elaborated above, UBI must still overcome numerous obstacles before it can have any hope of implementation. A prime impediment is the question of financing UBI once most people no longer work and thus would pay no income tax. Recently, researchers from the International Monetary Fund stated that taxing capital to pay the UBI of workers would be extremely challenging because it would negatively affect the high returns of corporations on automation technologies (Berg, Buffie, & Zanna, 2018).
* In addition to endorsing UBI, unions should consider amplifying other activities of universal benefit, some of which they have already engaged in, such as minimum wage, pensions, and public health. This need for benefits to be spread equitably throughout the entire society is also apparent in the current COVID-19 crisis, as demonstrated by the call of the International Trade Union Confederation and the OECD unions Advisory Committee for the G20 countries to support all workers regardless of their employment status, including those in the informal economy, in the following ways: “paid sick leave from day one; wage/income protection; managed reduction of hours where necessary, government support to maximize income security; mortgage, rent and loan relief; universal social protection and free access to healthcare; and childcare support for frontline workers in health, supermarkets, pharmacies and other vital areas” (ITUC, 2020). The return to activities pertaining to public policy and social rights may create an incentive for lay citizens to join unions, even if they are unemployed, self-employed, or temporarily employed.

Thus, at the dawn of the automation and AI revolution, unions have a new calling. They should stop playing the role of firefighters and, instead, embrace a proactive, strategic approach (Hyman, 2007, pp. 194-195). Further research is needed to develop each of the steps outlined herein, to analyze future scenarios in specific economic branches, and to analyze how these scenarios might affect employees and representative unions.

# References

Acemoglu, D., & Restrepo, P. (2018). *Demographics and Automation.* The National Bureau of Economic Research.

Arntzi, M., Gregoryi, T., & Zierahni, U. (2016). *The Risk of Automation for Jobs in OECD Countries.* OECD Library.

Associated Press. (2020, March 19). *Layoffs Spike in US, Europe as Virus Shuts Businesses*. Retrieved March 21, 2020, from US News: https://www.usnews.com/news/business/articles/2020-03-19/layoffs-spike-in-us-europe-as-virus-shuts-businesses

Autor, D., & Salomons, A. (2018). *Is automation labor-displacing? Productivity growth, employment, and the labor share.* Brookings.

Ben Gurion Archives. (1969, December 13). *Letter from David Ben Gurion to Jospeh Yudelevitch.* Retrieved from Ben Gurion Archives.

Benjamens, S., Dhunnoo, P., & Mesk, B. (2020). The state of artificial intelligence-based FDA-approved medical devices and algorithms: an online database. *NPJ Digital Medicine, 3*.

Bennett, T. (2013). Do union-management learning partnerships reduce workplace conflict? *Employee Relations, 36*(1), 17-32.

Berg, A., Buffie, E., & Zanna, F. (2018). *Robots, growth, and inequality: Should we fear the robot revolution?(The correct answer is Yes).* Philadelphia: IMF.

Berrebi, C., Shraberman, K., & Yarin, S. (2017). *Trends in the Labor Market.* Taub Center for Social Policy studies in Israel.

Bessen, J. (2017). *Automation and Jobs: When technology boosts employment.* Boston: Boston Univ. School of Law, Law and Economics Research Paper No. 17-09.

Biswas, K., & Sen, P. (2020). Space-time dependence of corona virus (COVID-19) outbreak. *arXiv preprint*.

Brandes, P., & Wattenhofer, R. (2016). Opening the Frey/Osborne Black Box: Which Tasks of a Job are Susceptible to Computerization?

Bronfenbrenner, K., Friedman, S., Hurd, R. W., Oswald, R. A., & Seeber, R. L. (1998). Introduction. In *Organizing to Win: New Research on Union Strategies.* New York: Cornell University Press.

Bryson, J. J. (2019). The Past Decade and Future of AI’s Impact on Society. In M. Baddeley, *Towards a New Enlightenment? A Transcendent Decade.* Turner, Ediciones. Retrieved from OpenMind BBVA.

Budd, J. W. (2011). *The thought of work.* Ithaca and London: ILR Press, an imprint of Cornell University Press .

Cameron, N. (2017). *Will robots take your job?: a plea for consensus.* Cambridge: Polity press.

Castells, M. (2009). *The Power of Identity 2nd Edition.* West Sussex: Wiley-Blackwell.

Cattero, B., & D’Onofrio, M. (2018). Organizing and Collective Bargaining in the Digitized “Tertiary Factories” of Amazon: A Comparison Between Germany and Italy. *Working in Digital and Smart Organizations*, 141-164.

Cheng, M. (2020, March 18). *Gig jobs are suddenly looking more secure amid coronavirus*. Retrieved March 21, 2020, from Quartz: https://qz.com/1820467/companies-shift-to-hiring-more-delivery-workers-amid-coronavirus/

Cohen, Y., Yitchak Haberfeld, Mundlak, G., & Saporta, I. (2003). Unpacking Union Density: Membership and Coverage in the Transformation of the Israeli IR System. *Industrial Relations, 42*(4), 692-711.

Collins, H. (2018). *Artifictional Intelligence - Against Humanitie’s Surrender to Computers.* Cambridge: Polity Press.

Congressional Research Service. (2021). *Unemployment Rates During the COVID-19.* Washington, DC: US Congress.

Cooper, B. M. (1976). *Industrial relations: A study in conflict.* London: Heinemann.

Costea, B., Crump, N., & Amiridis, K. (2008). Managerialism, the therapeutic habitus and the self in contemporary organizing. *Human Relations, 61*(5), 661-685.

Cox, J. (2020, March 20). *The upcoming job losses will be unlike anything the US has ever seen*. Retrieved March 21, 2020, from CNBC: https://www.cnbc.com/2020/03/20/the-upcoming-job-losses-will-be-unlike-anything-the-us-has-ever-seen.html

Crosman, P. (2018). *How artificial intelligence is reshaping jobs in banking.* American Banker. Retrieved from http://files.parsintl.com/eprints/S060220.pdf

Crouch, C. (2019). *Will the gig economy prevail?* Cambridge: Polity.

de Groen, W. P., Kilhoffer, Z., Lenaerts, K., & Mandl, I. (2018). *Employment and working conditions of selected types of platform work.* Luxembourg: Publications Office of the European Union.

DeCanio, S. J. (2016). Robots and humans - complements or substitutes? *Journal of Macroeconomics, 49*, 280-291.

Decker, M., Fischer, M., & Ott, I. (2017). Service Robotics and Human Labor: A first technology assessment of substitution and cooperation. *Robotics and Autonomous Systems, 87*, 348-354.

Devold, H., & Fjellheim, R. (2019). Artificial Intelligence in Autonomous Operation of Oil and Gas Facilities. *Abu Dhabi International Petroleum Exhibition & Conference.* Abu Dhabi: Society of Petroleum Engineers.

Dirican, C. (2015). The Impacts of Robotics, Artificial Intelligence On Business and Economics. *Procedia Social and Behavioral Sciences, 195*, 564-573.

Doiron, D., & Mendolia, S. (2012). The impact of job loss on family dissolution. *Journal of Population Economics*, 367-398.

Dray, P. (2011). *There Is Power in a Union: The Epic Story of Labor in America.* New York: Anchor.

Durrenberger, E. P. (2007). The Anthropology of Organized Labor in the United States. *Annual Review of Anthropology, 36*, 73-88.

Ebbinghaus, B. (2011). The role of trade unions in European pension reforms: From ‘old’ to ‘new’ politics? *European Journal of Industrial Relations, 17*(4), 315-331.

Eden, M., & Gaggl, P. (2015). *On the Welfare Implications of Automation.* The World Back.

Flanagan, F., & Walker, M. (2020). How can unions use Artificial Intelligence to build power? The use of AI chatbots for labour organising in the US and Australia. *New Technology, Work and Employment*.

Freeman, R. B. (2005). What Do Unions Do ? The 2004 M-Brane Stringtwister Edition. *Journal of Labor Research, 26*, 641-668.

Frege, C. M., & Kelly, J. (2003). Union revitalization strategies in a comparative perspective. *European Journal of Industrial Relations, 9*(1), 7-24.

Frey, C. B., & Osborne, M. A. (2013). The Future of Employment: How Susceptible are Jobs to Computerisation?

Gegenhuber, T., Schüßler, E., Reischauer, G., & Thäter, L. (2021). Building Collective Institutional Infrastructures for Decent Platform Work: The Development of a Crowdwork Agreement in Germany. *Research in the Sociology of Organizations*.

Gibbs, M. (2017). How is new technology changing job design? *IZA World of Labor*.

Giddens, A. (1999). *The Third Way: The Renewal of Social Democracy.* Cambridge: Polity Press.

Gidron, B., Monnickendam-Givon, Y., Abbou, I., & Kaplan, O. (2018). *The New Social Economy in Israel (Hebrew).* Tel Aviv: Resling.

Graham, M., Isis, H., & Lehdonvirta, V. (2017). Digital labour and development: impacts of global digital labour platforms and the gig economy on worker livelihoods. *Transfer*, 135-162.

Grau, A., Indri, M., Bello, L. L., & Sauter, T. (2018). Industrial Robotics in Factory Automation: from the Early Stage to the Internet of Things. *IECON 2017: 43rd IEEE Annual Conference of the IEEE Industrial Electronics Society* (pp. 6159-6164). Beijing: IEEE.

Gutelius, Beth and Theodore, Nik. (2017). The future of work - urban economies in transition. In P. M. A., *Jobs and the labor force of tomorrow* (pp. 3-21). Chicago: The University of Illinois.

Harvey, D. (2007). *A Brief History of Neoliberalism.* New York: Oxford University Press.

Hawkins, A. J. (2020, March 19). *Uber is doing 70 percent fewer trips in cities hit hard by coronavirus*. Retrieved March 21, 2020, from The Verge: https://www.theverge.com/2020/3/19/21186865/uber-rides-decline-coronavirus-seattle-sf-la-nyc

Heywood, A. (2017). *Political Ideologies: An Introduction (6th edition).* Red Globe Press.

Horn, M. B. (2020). Education, Disrupted. *MIT Sloan Management Review*. Retrieved from https://sloanreview.mit.edu/article/education-disrupted/

Huzzard, T. (2001). Discourse for Normalizing What? The Learning Organization and the Workplace Trade Union Response. *Economic and Industrial Democracy, 22*, 407-431.

Hyman, R. (2007). How can trade unions act strategically? *Transfer: European Review of Labour and Research, 13*(2), 193-210.

Ibsen, C. L., & Tapia, M. (2017). Trade union revitalisation: Where are we now? Where to next? *Journal of Industrial Relations, 59*(2), 170-191.

ITUC. (2020, March 23). *G20 COVID: Trade Unions Call for Coordinated Action for Public Health, Jobs and Incomes*. Retrieved from The International Trade Union Confederation: https://www.ituc-csi.org/g20-covid-trade-unions-call-for?lang=en

Jahoda, M. (1981). Work, employment, and unemployment: values, theories, and approaches in social research. *American Psychologist, 36*(2), 184-191.

Jahoda, M., Lazarsfeld, P. E., & Zeisel, H. (1974 [1933]). *Marienthal - the sociography of an unemployed community.* London: Tavistock.

Janoski, T., Luke, D., & Oliver, C. (2014). *The causes of structural unemployment.* Cambridge, Uk and Malden, MA, USA: Polity Press.

Judis, J. (2016). *The populist explosion – how the great recession transformed American and European politics.* New York: Columbia Global Reports.

Kalil, A. (2005). Unemployment and job displacement: the impact on families and children. *Ivey Business Journal*.

Kalleberg, A. L. (2018). *Precarious lives - job insecurity and well-being in rich democracies.* Cambridge: Polity press.

Kelly, J. (2020, March 19). *The Coronavirus Effect: Here Are The Jobs That Will Be Added And Lost*. Retrieved March 21, 2020, from Forbes: https://www.forbes.com/sites/jackkelly/2020/03/19/the-coronavirus-effect-here-are-the-jobs-that-will-be-added-and-lost/#b018f0d2a1c8

Kennedy, T., & Plaut, F. D. (1962). *Automation funds and displaced workers.* Boston, USA: Harvard University.

Keynes, J. M. (1932 [1930]). Economic possibilities for our grandchildren. In J. M. Keynes, *Essays in persuation* (pp. 358-373). New York: Harcourt Brace.

Klausen, J. (1995). Social Rights Advocacy and State Building: T. H. Marshall in the Hands of Social Reformers. *World Politics, 47*(2), 244-267.

Klindt, M. P. (2017). Trade union renewal through local partnerships for skill formation. *Transfer: European Review of Labour and Research, 23*(4), 441-455.

Kristal, T. (2013). The capitalist machine: Computerization, workers’ power, and the decline in labor’s share within US industries. *American Sociological Review, 78*(3), 361-389.

Lash, S., & Urry, J. (1987). *The End of Organized Capitalism.* Cambridge: Polity press.

Leser, N. (1976). Austro-Marxism: A Reappraisal. *Journal of Contemporary History, 11*, 133-148.

Lichtenstein, N. (2013). *State of the Union – a Century of American labor (revised and expanded edition).* Princeton and Oxford: Princeton University Press.

Lind, J. (2009). The end of the Ghent system as trade union recruitment machinery? *Industrial Relations Journal, 40*(6), 510-523.

Luce, S. (2014). *Labor Movements: Global Perspectives.* Cambridge: Polity press.

Margit, M. (2020, March 12). *Massive Layoffs as Coronavirus Hits Businesses Hard*. Retrieved March 21, 2020, from The Medialine: https://themedialine.org/top-stories/massive-layoffs-in-israel-as-coronavirus-hits-businesses-hard/

Marshall, A., & Barber, G. (2020, March 11). *Coronavirus Exposes Workers to the Risks of the Gig Economy*. Retrieved March 21, 2020, from Wired: https://www.wired.com/story/coronavirus-exposes-workers-risks-gig-economy/

Marshall, T. (1950). *Citizenship and Social Class and Other Essays.* New York: Cambridge.

McIlroy, J. (2008). Ten Years of New Labour: Workplace Learning, Social Partnership and Union Revitalization in Britain. *International Journal of Employment Relations, 46*(2), 283-313.

McIlroy-Young, R., Sen, S., Kleinberg, J., & Anderson, A. (2020). Aligning Superhuman AI with Human Behavior: Chess as a Model System. *KDD '20: Proceedings of the 26th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining.* California: ACM.

McLean, C. A. (2015). *The Employment Impact of Automation in Canada.* Simon Fraser University.

Morgan, G. (2014). Financialization and the multinational corporation. *Transfer: European Review of Labour and Research, 20*(2), 183-197.

Mosco, V. (2017). *Becoming Digital - Towards a post-internet society.* Bingley, UK: Emerald Publishing.

Naik, G., & Bhide, S. S. (2014). Will the future of knowledge work automation transform personalized medicine? *Applied & Translational Genomics, 3*, 50-53.

Nissim, G., & Vries, D. D. (2014). Permanent liminality: The impact of non-standard forms of employment on workers' committees in Israel. *International Labour Review, 153*(3), 435-454.

OECD. (2019). *The Future Of Work OECD Employment Outlook 2019.* OECD.

Okyere, M. A., Forson, R., & Essel‐Gaisey, F. (2020). Positive externalities of an epidemic: The case of the coronavirus (COVID‐19) in China. *Journal of Medical Virology*.

Orihuela, R. (2020, April 6). *Spanish Government Aims to Roll Out Basic Income ‘Soon’*. Retrieved from Bloomberg: https://www.bloomberg.com/news/articles/2020-04-05/spanish-government-aims-to-roll-out-basic-income-soon

Patel, P. C., Devaraj, S., Hicks, M. J., & Wornell, E. J. (2018). County-level job automation risk and health: Evidence from the United States. *Social Science & Medicine, 202*, 54-60.

Paul, K. (2020, March 19). *Uber and Lyft drivers protest to demand more benefits during coronavirus crisis*. Retrieved from The Guardian: https://www.theguardian.com/us-news/2020/mar/19/uber-lyft-coronavirus-benefits-ab5

Pearce, G. (2018). Digital Transformation? Boards Are Not Ready for It! *ISACA Journal*.

Pietrykowski, B. (2019). *Work (What Is Political Economy?) - 1st edition.* Polity.

Pocock, B. (1997). Gender, strife and unions. In B. Pocock, *Strife: sex and politics in labour unions.* St. leonards, NSW: Allen & Unwin.

Prassl, J. (2018). *Humans as a Service.* Oxford University Press.

Preminger, J. (2018). *Labor in Israel: Beyond Nationalism and Neoliberalism.* Ithaca and London: Cornell University Press.

Qureshi, M. O., & Syed, R. S. (2014). The Impact of Robotics on Employment and Motivation of Employees in the Service Sector, with Special Reference to Health Care. *Safety and Health at Work, 5*(4), 198-202.

Rainey, R. (2020, March 17). *Coronavirus layoffs surge across America, overwhelming unemployment offices*. Retrieved March 21, 2020, from Politico: https://www.politico.com/news/2020/03/17/coronavirus-layoffs-america-unemployment-134819

Rapier, G. (2020, March 17). *Uber and Lyft suspend shared rides to combat the spread of coronavirus*. Retrieved March 21, 2020, from Business Insider: https://www.businessinsider.com/coronavirus-uber-suspends-shared-rides-to-fight-spread-of-illness-2020-3

Sallaz, J. J. (2013). *Labor, Economy, and Society.* Polity press.

Schuller, B. W., Schuller, D. M., Qian, K., Liu, J., Zheng, H., & Li, X. (2020). COVID-19 and Computer Audition: An Overview on What Speech & Sound Analysis Could Contribute in the SARS-CoV-2 Corona Crisis. *arXiv preprint*.

Shahrigian, S., & Guse, C. (2020, March 17). *NYC bans pooled rides for Uber, Lyft, Via to limit coronavirus spread*. Retrieved March 21, 2020, from NY Daily News: https://www.nydailynews.com/coronavirus/ny-coronavirus-pooled-rides-uber-banned-20200317-rwyk5spsfnbrflqjcbv7lpw5ju-story.html

Simms, M. (2019). *What Do We Know and What Should We Do About the Future of Work?* London: Sage.

Sorgner, A. (2017). The Automation of Jobs: A Threat for Employment or a Source of New Entrepreneurial Opportunities? *Foresight and STI Governance, 11*(3), 37-48.

Srnicek, N. (2016). *Platform Capitalism.* Polity.

Standing, G. (2017). *Basic income: And how we can make it happen.* UK: Penguin Random House.

Stiglitz, J. E. (2014). *Unemployment and Innovation - Working Paper 20670.* Cambridge: National Bureau of Economic Research. Retrieved from http://www.nber.org/papers/w20670

Susskind, D. (2020). *A world without work: technology, automation, and how we should respond.* Metropolitan Books.

Taylor, M., & Rioux, S. (2017). *Global Labour Studies.* Cambridge: Polity press.

Thomas, M. K. (2017). The Rise of Technology and its Influence on Labor Market Outcomes. *Gettysburg Economic Review, 10*.

Thorbecke, C. (2020, March 20). *Coronavirus a 'public health disaster' for struggling rideshare drivers and gig economy, organizer says*. Retrieved March 21, 2020, from ABC News: https://abcnews.go.com/Business/coronavirus-public-health-disaster-struggling-rideshare-drivers-gig/story?id=69662621

Unterschütz, J. (2021). Come Together Now! New Technologies and Collective Representation of Platform Workers. *Acta Universitatis Lodziensis. Folia Iuridica, 95*, 61-69.

Wang, S., Kang, B., Ma, i., Zeng, X., Xiao, M., Guo, J., . . . Xu, B. (2020). A deep learning algorithm using CT images to screen for Corona Virus Disease (COVID-19). *medRxiv*.

Woodcock, J., & Graham, M. (2020). *The Gig Economy: A Critical Introduction.* Polity.

Wright, E. O. (2000). Working-Class Power, Capitalist-Class Interests, and Class Compromise. *American Journal of Sociology, 105*(4), 957-1002.

Yeates, A. (2013). The Effects of Automation on The Society. *12th Research Seminar Series Workshop* (pp. 145-149). Bradford: University of Bradford.

Zeballos-Roig, J. (2020, April 6). *Spain is moving to establish permanent basic income in the wake of the coronavirus pandemic*. Retrieved from Business Insider: https://www.businessinsider.com/spain-universal-basic-income-coronavirus-yang-ubi-permanent-first-europe-2020-4

**Gadi Nissim**, Ph.D., is a Sociologist and an Anthropologist, senior faculty member in the Department of Behavioral Sciences at Ruppin Academic Center, Emek Hefer, Israel. He is also a board member of the Industrial Relations Research Association of Israel. Gadi's fields of interest are industrial relations, moral economy and economic ideologies, organized labor, and the transformation of employment's arrangements.

**Tomer Simon**, Ph.D., is a Futurist and Strategist. Today, Tomer is the Chief Scientist of Microsoft R&D Center in Israel. Previously he was the National Technology Officer in Microsoft Israel, and before that the futurist and senior director of Academic Research and Innovation in Amdocs. Tomer brings with him more than 20 years of experience in the technology and IT worlds, including technology research, software development and managing and establishing large development centers. Tomer has deep expertise in designing and leading digital transformations, AI, automation and the future of work. Today, Tomer works with numerous executives from the defense and private sectors in building organizational and national level strategies. Tomer is a faculty member in the Department of Disaster and Emergency Management at the Tel Aviv university.

1. Union density is composed of the rate of workers of the total workforce who are registered members of a trade union as well as the total rate of workers who are covered by collective agreements signed by unions. [↑](#footnote-ref-2)
2. The debate on technological advancement and the future role of human labor is old. However, given the new developments in the field of AI and automation, we do not refer herein to literature about these technologies published prior to 2013, which is when the current debate about these issues was launched by Frey and Osborne (2013). [↑](#footnote-ref-3)
3. In this article we prefer discussing on a task level, addressing whether it is routine or nonroutine, rather than on a profession level as done by Eden and Gaggel (2015, p. 8). No profession is purely nonroutine or routine, so the discussion should be on the task level of professions. [↑](#footnote-ref-5)
4. Therefore, in this article we covered only papers relating to job and work automation that were published after 2013. [↑](#footnote-ref-7)
5. They did so by calculating the percentage of work each task does for a job (task share). They also used other properties (metadata) of specific jobs to calculate their probability of being automated. [↑](#footnote-ref-8)
6. Sorgner's contention about the uncertain prospects of education is also supported by the research of Berg, Buffie, and Zanna (2018). [↑](#footnote-ref-10)
7. “Revitalization” aims to organize previously ignored populations of workers and rebuild grass-roots social movements. “Renewal” refers to the ways in which unions creatively rely on their existing capacities and familiar channels to strengthen their workers' position in the new context of a globalized and more competitive economy (Klindt, 2017, p. 443). [↑](#footnote-ref-11)
8. “The American labor movement is at a watershed. For the first time since the early years of industrial unionism sixty years ago, there is near-universal agreement among union leaders that that the future of the movement depends on massive new organizing” (Bronfenbrenner, Friedman, Hurd, Oswald, & Seeber, 1998, p. 1). [↑](#footnote-ref-12)
9. An example of how unions have used their capacities to improve worker conditions is illustrated by Klindt (2017). Danish unions used their long-lasting partnership with employers and their role in the local governance networks to improve their workers employability in the context of an unstable global economy and a liberalization policy. [↑](#footnote-ref-13)
10. This occurred in France. [↑](#footnote-ref-14)