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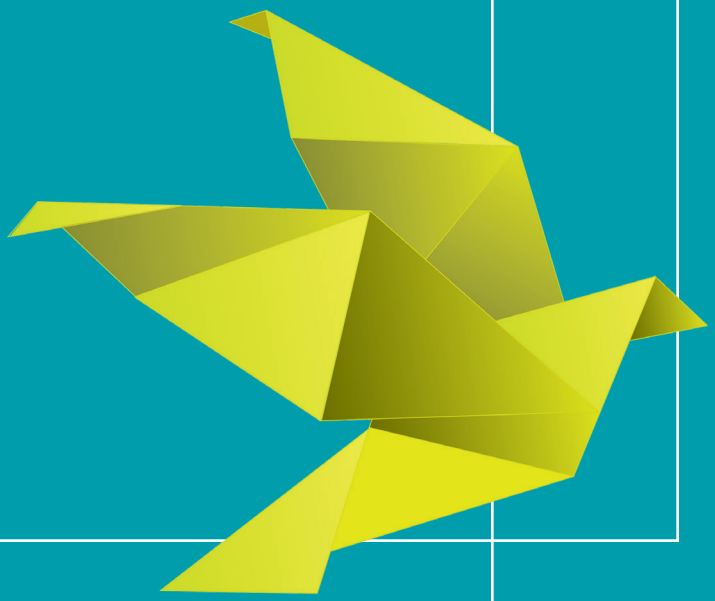

The Threat of Physical and Psychosocial Violence and Harassment in Digitalized Work

by Dr Phoebe V. Moore

ACTRAV
Bureau for Workers' Activities

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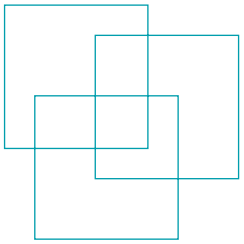

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Foreward

This working paper is a unique contribution to understanding how workers can and should be protected against the risks emerging in the newly digitalized world of work. The term "digitalization" covers many aspects of how new technologies and their processes affect offices, factories, warehouses and informal workplaces. Wearable self-tracking devices are increasingly seen in workplaces, for example since 2014–19, an increase of 13 million fitness devices are expected to become incorporated into workplaces. Work is not only tracked in the context of fitness but also to improve efficiency, accuracy and even possible workplace rationalization. Taxi drivers' work has been "uberized", crowdwork is widespread and office-based electronic performance monitoring is being introduced.

In October 2016, the Meeting of Experts on Violence against Women and Men in the World of Work was held at the International Labour Organization (ILO) headquarters in Geneva, which is where tripartite discussions about the risks to workers of psychosocial and physical violence and harassment began. The meeting was intended to specifically address this topic, with the aim to inform discussions that will take place during the International Labour Conference in Geneva in 2018.

While technologies themselves do not automatically create conditions that involve higher risks of psychosocial and physical violence and harassment, the way they are integrated and used along with other management methods is in need of examination. This working paper highlights the need for caution as enterprises increasingly introduce digitalization management processes. In both the Global South and North, the embrace of new technologies is well underway and is recognized in many cases as contributing to economic growth and prosperity. However, it is important that new hierarchies are not created where profit comes before people and the need for safe, decent working conditions.

Digitalization has significant crossovers with the formalization of informal work, since in many countries the sectors most influenced by digitalization have a high rate of informal workers. The ILO's Transition from the Informal to the Formal Economy Recommendation, 2015 (No. 204) is discussed in this context. Formalized sector trends are identified and reviewed. The Home Work Convention, 1996 (No. 177) and its links to digitalization is also examined, due to the rise in risks due to the absence of standard employment regulatory protections, particularly in the Global South.

The paper is designed to be cross-sectoral as well as international, and draws on case studies and research reports to present evidence of these emerging risks. Trade union, government, enterprise and academic responses and reflections include suggestions for and examples of best practice. Issues of data protection are also addressed, including work by the ILO (*Code of Practice on the Protection of Workers' Personal Data,* 1997) and the European Union (General Data Protection Regulation (GDPR), 2018). The ILO has been at the forefront of signalling caution and action in workplace digitalization, and this paper signifies the next steps that it will take to ensure that workers advance toward better protection against the related rising risks of violence and harassment.

Maria Helena ANDRE,
Director, ACTRAV

Executive Summary

Digitalization has begun to impact work on the streets, at home, in factories and warehouses, and in offices. The logic of algorithmic work acquisition and governance focuses on efficiency and profit making. However, it also potentially penalizes women, youth, migrant workers and disabled workers, leading to the "unequal life chances" which Galtung refers to as structural violence (1969, p. 171, also developed in Akhtar and Moore, 2016) and a significant rise in the risks of psychosocial and physical violence and harassment in the digitalized world of work.

Automation, surveillance and mechanization in factories and offices alike, are putting workers at risk of heightened stress and overwork, resulting in reduction in working time and significant job losses. Human resource and management practices involve new performance monitoring techniques and introduce the use of big data and people analytics to make judgements to eliminate the supposed "people problem". Irregular career patterns, time out of work for reproductive and domestic labour, maternity leave, physical illness and mental health issues can affect online and offline reputation development, upon which much digitalized work acquisition is based, and lead to discrimination and labour market exclusion.

The threats of psychosocial and physical violence and harassment in digitalized work are the focus of this working paper, because evidence is emerging that people are being increasingly exposed to a range of risks in these new worlds of work. This working paper outlines how new digitalized management methods are leading to potentially risky worker behaviours, where workers feel their every move is watched and judged and other forms of psychosocial violence such as cyberbullying and pressures of overwork or unreasonable deadlines.

These days, the "world of work", as clarified in the *Background paper for the Meeting of Experts on violence against women and men in the world of work* (ILO, 2016a) is no longer defined exclusively by a physical workplace. The new world of work also includes *technology* which connects a variety of actors across space and time and because of this, the new world of work "blurs the lines between workplaces, 'domestic' work places and public spaces" (ibid., p. 49). The report coming out of the ILO's 2016 Meeting of Experts thus emphasizes that a new instrument should "respond to the new challenges and risks which might lead to violence and harassment in the world of work, such as those arising from changing forms of work and technology" (ILO, 2016b, p. 41). The 2016 report puts emphasis on the importance of focusing on those workplaces and working conditions that engender or create risks of psychological, psychosocial and physical violence. The report lists conditions whereby risks are heightened and several of these are present in digitalized work, listed here in bold font (ibid., p. 40):

- **working in contact with the public;**
- working with people in distress;
- working with objects of value;
- **working in situations that are not, or not properly, covered or protected by labour law and social protection;**
- working in resource-constrained settings (inadequately equipped facilities or insufficient staffing can lead to long waits and frustration);
- **unsocial working hours (for instance, evening and night work);**
- **working alone or in relative isolation or in remote locations;**
- **working in intimate spaces and private homes;**
- the power to deny services which increases the risk of violence and harassment from third parties seeking those services; and
- working in conflict zones, especially providing public and emergency services; and high rates of unemployment.

On this basis, the current working paper outlines specifically where the risks of violence and harassment have increased in digitalized workplaces. Trades unions are acutely aware of the rising risks and their responses and actions are also outlined in this paper. In the factory, automation has removed a lot of the dark, dangerous and dirty work that people carried out historically, meaning that the immense physical strain and monotony that people dealt with has in many cases been transferred to machines. However, what choices do people have when their job is lost to a robot? Whose responsibility is it to invest in re-training or redeployment? Trade unions have indicated that they see little interest from companies and governments alike on this side of the bargain. Therefore, automation is creating conditions of work where people's very livelihoods are at stake, leading to stress and anxiety that inevitably emerges when people fear the lack of access to basic needs, including an income.

These risks are exacerbated when monitoring tools are integrated into the physical space of a worker, such as the patented Amazon wristband which contains haptic feedback capability, where workers are explicitly guided by a machine. When performance targets are raised alongside increasingly granular data acquisition by these new devices, workers feel there is no choice but to work faster and harder, leading to significant safety and health hazards. In human resources, performance monitoring and people analytics are making it much easier to make decisions about who to hire and fire in both the office and factories. However, how can workers be sure decisions are being made fairly, accurately and honestly, unless they have access to the data that is held and used by their employer? Or, in taxi driving and bicycle food and courier services, because apps and algorithms determine how management is conducted, people have been exposed to increased risks of violence without employer support and assurances. In home-based online gig work, women are exposed to risks that come about due to the lack of basic employment rights and risks of domestic violence – a double burden.

The characteristics of the informal economy and non-standard work are often seen in digitalized work, which creates significant obstacles for countries aiming to follow recommendations for formalization and to decrease the risks of violence. The ILO's Transition from the Informal to the Formal Economy Recommendation, 2015 (No. 204) notes that informal work involves "denial of rights at work, the absence of sufficient opportunities for quality employment, inadequate social protection and the absence of social dialogue". This is due to the fact that so much digitalized work:

- is not regulated;
- relies on unprotected employment relationships;
- does not guarantee minimum wage;
- does not offer income security;
- runs a high risk of discrimination;
- is not supported with lifelong learning/education protections; and
- is not scaffolded with occupational health/security standards.

Unskilled work is already largely carried out with informal classifications, and it is prevalent in informal and non-standard employment relationships. This is, in fact, the area of work at the highest risk of automation. Globally, governments are prioritizing automation which puts informal workers at great risk. The gig economy taps into a labour market with a high proportion of non-standard and informal workers who already experience "temporary employment; part-time and on-call work; temporary agency work and other multiparty employment relationships; as well as disguised employment and dependent self-employment" (ILO, 2018). Therefore, risks of violence are already high. Non-standard workers are greatly impacted by legislation against collective bargaining, freedom of association and the right to strike (De Stefano, 2016). The reduction in capacity for collective bargaining then can also lead to a rise in the likelihood that workplaces do not have safety and health committees or representatives, further raising the risks of PPVH.

Digitalized work happens in non-standard locations such as the home and includes relatively skilled work using a computer, or cleaning/care work usually performed by women. Because of this, and a

lack of social protection, online gig work is at risk of violating aspects of the ILO's Convention on Home Work, 1996 (No. 177). This Convention requires fair remuneration and social protection, which includes occupational health and safety regulations and maternity benefits, the right to organize, and freedom from discrimination. Article 1 of the Convention states:

The term home work means work carried out by a person, to be referred to as a homeworker, (i) in his or her home or in other premises of his or her choice, other than the workplace of the employer; (ii) for remuneration; (iii) which results in a product or service as specified by the employer, irrespective of who provides the equipment, materials or other inputs used.

The risks are thus clear. There are further issues of discrimination related to women's domestic responsibilities, such as reproductive and caring activities in a traditional context. As a method of governance, digitalizing non-standard work leads to the quantification of tasks in detail, meaning that it may be the case that only explicit contact time is paid. However this practice may not lead to formalization of a labour market in the ILO sense. In terms of working time, preparatory work in these areas is unpaid, and surveillance is normalized which has significant implications for social reproduction. These methods of management lead to intensified self-management and algorithmic reputation building, where customer satisfaction rankings are prioritized but can be used for such things as "deactivation" of taxi drivers, as is done by Uber, despite the paradox and fiction that algorithms are absent of "human bias" (Frey and Osborne, 2013, p. 18). Therefore, this working paper is designed to give explicit evidence where the risks of psychosocial and physical violence and harassment are on the rise. It has become clear that data is used to obfuscate and neutralize management decision-making on the surface. However, it is becoming increasingly evident that it is not only the workplace and the infrastructure that create risks, but also digitalized management methods which are creating situations where the risks are high. These involve practices to distribute and reduce work; (re)organise and identify locations of work; recruit, appraise and fire workers; accelerate standards and targets; and monitor and track productivity.

Digitalized management methods can be selective, predictive and prescriptive, with the use of monitoring, measuring and calculating techniques provided by both old and new technologies. The ILO explicitly indicates that the "inappropriate use of technology" can create risky conditions (ILO, 2016b, p. 39). Further, digitalized management methods themselves can be seen as forms of bullying or harassment when they facilitate, as well as worsen, the kinds of risky situations outlined in this paper.

Digitalized management methods include:

- the use of big data and algorithmic distribution of work;
- the use of people analytics and digitalized profiling to make decisions about hiring, firing and in performance appraisals;
- the use of "own-contract" or undeclared/clandestine self-employment contracts to disguise employment relationships while blocking workers from having basic rights such as holiday and sickness pay in gig work;
- tracking and monitoring productivity and using accumulated data to make human resource decisions;
- the normalization of interruptions and expansion of working time in offices; and
- the "always on" culture of work and boundary permeability, where workers are expected to be available by phone or email throughout the weekend and evenings, and related practices and expectations.

The various evidence of the risks of PPVH in digitalized work is presented in this working paper, looking at gig work, office work, and factory and warehouse work. Through extensive literature searches and fieldwork, the relevant and emerging digitalized management methods are emphasized. It is crucial that the international community takes note of these rising risks and addresses them with the appropriate regulation and instruments.

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Introduction

The workplace is changing rapidly due to the recent increase of new technologies. Digitalization is impacting management and organization of workplaces across the world, transforming how, how much, where, and under what conditions people work.

Digitalization is occurring in areas of work that are often already informal, non-standard and insecure, where workers are involved in the "hustle" – for example, taxi driving and home-based work. In digitalized work, bogus self-employment is already common – where workers are working as much as regular contracted employees and with identical expectations from bosses, but are required to declare themselves as self-employed. Due to the precarious and insecure nature of this working environment, digitalization can contribute to increased risks of physical and psychosocial violence and harassment (PPVH), representing a significant threat to the standards for decent work as mandated by the International Labour Organization (ILO).

Workers experience increased pressures and risks of PPVH in digitalized work, in the streets and in homes, in the office, and in the factory. This takes place in the context of the emergence of data-driven decision-making; and the use of communications technologies such as e-mail, automation, and wearable software that tracks workers' movements. Resulting directly from this, there has been a notable rise in workplace risks and hazards of PPVH – in the Global North and South – which are particularly high for women, migrants and young people who are in especially vulnerable positions.

This working paper aims to inform the discussion around the standard-setting item at the 2018 International Labour Conference that will address the need for a "systematic approach to prevention and elimination of violence and harassment at work" (Pillinger, 2017, p. viii) and lead to a new international labour standard on violence and harassment against women and men in the world of work.

Section I examines evidence of increased risks of violence against women and men in the digitalized workplace, drawing on a series of case studies from both the Global North and South, other existing research, as well as new research conducted by the author, Phoebe V. Moore. **Section II** identifies examples from unions, enterprises and the international community (including academics), highlighting how they have responded to the risks of digitalized work and identifying good practice. **Section III** presents some existing codes of conduct and standards that address the risks of digitalization and clarifies how good practice can protect workers and mitigate risks. An Appendix contains a list of key interviewees.

Section I:
Definitions and new risks

The *Background paper for discussion at the Meeting of Experts on Violence against Women and Men in the World of Work* (ILO, 2016a) provides definitions of workplace violence and, while stating there is no single definition, identifies some of its essential components.

Psychological violence, also called emotional violence, "spans verbal and non-verbal abuse, psychological and sexual harassment, bullying, mobbing and threats" (Forastieri, as cited in ILO, 2016a, p. 3). The definition includes isolating people, manipulating reputations, withholding information, assigning tasks that do not match capabilities and assigning impossible goals and deadlines (ibid.).

Psychosocial hazards are specifically linked to "poor environmental and organizational structures at the workplace". These hazards are defined as deficiencies in the ways that workplaces and work are organized, as well as negative leadership behaviour (ibid., p. 11).

A recent ILO inception report for the Global Commission on the Future of Work describes digital labour as "a new form of 'invisible' work" taking place within the gig economy, involving crowdsourcing activities (2017a, p. 18). It is "invisible" work, the report emphasizes, because tasks obtained through websites and web applications are carried out by workers who have no dedicated location and where the employment relationship is usually not recognized. This working paper expands this definition and looks at the risks of PPVH that arise when working environments are unstable and have been digitalized in a variety of ways; where contracts and other working arrangements defining the employment relationship are unfavourable to workers; but also, where management methods facilitated by technology inculcate new risks.

Digitalized workplaces have incorporated technology in multiple ways. This involves the use of various platforms and algorithms which determine what work is made available and where data is used by management to make decisions that appear neutral, but exacerbate already unprotected working conditions. Digitalized workplaces additionally involve the incorporation of technologies into the infrastructures of work and the use of technologies for management decision-making, for example, online and offline gig work in public and private spheres. Performance and reputation monitoring are carried out by software embedded in computers, as well as through videos or wearable technologies in factories and offices. Furthermore, automation of tasks and even entire jobs is well underway as *Industrie 4.0* is rolled out in factories and tasks are increasingly done electronically in office and call centre settings.

All of these trends may lead to heightened risks of PPVH. Digitalized work is relatively new and thus there may be less direct evidence of systematic violence to date. However, this working paper outlines evidence that has already arisen, causing risks of psychological and physical violence which are due to the psychosocial hazards that digitalized work engenders. Imbalances in power relations are further intensified by poor labour contracts and lack of social protection which significantly increases the risks faced by vulnerable women workers.

Risks in the digitalized world of work

The "world of work", as clarified in the *Background paper for the Meeting of Experts on violence against women and men in the world of work* (ILO, 2016a) includes not only the physical workplace, but includes technology that connects world of work actors and "blurs the lines between workplaces, 'domestic' work places and public spaces" (ibid., p. 49). The final report of the 2016 meeting emphasizes that a new instrument to address the issues discussed should "respond to the new challenges and risks which might lead to violence and harassment in the world of work, such as those arising from changing forms of work and technology" (ILO, 2016b, p. 41). The final report further stresses the importance of focusing on those workplaces and working conditions that engender or create risks of psychological, psychosocial and physical violence. Some circumstances and conditions that create risks of PPVH are listed below, with those located in digitalized work listed in bold (ibid., p. 40):

- **working in contact with the public;**
- working with people in distress;
- working with objects of value;
- **working in situations that are not, or not properly, covered or protected by labour law and social protection;**
- working in resource-constrained settings (inadequately equipped facilities or insufficient staffing can lead to long waits and frustration);
- **unsocial working hours (for instance, evening and night work);**
- **working alone or in relative isolation or in remote locations;**
- **working in intimate spaces and private homes;**
- the power to deny services which increases the risk of violence and harassment from third parties seeking those services;
- working in conflict zones, especially providing public and emergency services; and
- high rates of unemployment.

The report also makes it clear that specific management practices further increase the risk of violence and harassment (ibid.). The practices listed in the report are:

- poor human resources management;
- poor organization of work, including lack of clear rules and responsibilities;
- inadequate assignment of tasks;
- unrealistic production targets;
- poor communication;
- poor labour relations; and
- discriminatory practices.

The final outcome report published in November 2016 emphasized that PPVH risks exist especially in cases where workers "cannot exercise their rights to freedom of association and collective bargaining due to the inappropriate use of contractual arrangements leading to decent work deficits, including the misuse of self-employment", which is increasingly prevalent in digitalized work (ILO, 2016c, p. 7). Furthermore, the report emphasizes that women are "disproportionately represented in low-wage jobs" (ibid.) which are widespread in digitalized work.

Delegates at the meeting of experts emphasized the risks not only for women, but also young people, men, and heterosexual, gay, lesbian, bisexual and transgender workers in all areas of work. As further demonstrated below, most gig work is low wage, precarious and women working in these contexts suffer a double burden. Furthermore, as offline gig work is often carried out in the home, "the risk of sexual harassment and other forms of violence and harassment might be increased because of workers' isolation and low incidence of labour inspectors entering non-traditional workplaces" (ILO, 2016b, p. 41). In

fact, temporary and part-time workers, which feature widely in digitalized workplaces, are at greater risk of sexual harassment and occupational violence than those with permanent or more secure contracts (ILO, 2016a, p. 10).

PPVH risks are greater in some sectors and occupations because of "negative power relations, discrimination based on the intersectionality of various factors (such as gender or race), circumstances and conditions of work (such as working alone or at night) and psychosocial hazards" (ILO, 2016b, p. 3). The ILO's report, *Ending violence and harassment against women and men in the world of work,* prepared for the 107th International Labour Conference emphasizes the necessity of "identifying specific needs and circumstances of members of such groups who may experience violence more frequently, or in unique ways" (ILO, 2017b, p. 97). Lippel notes that responses should not be gender neutral as "violence against men and violence against women are not identical phenomena" (2016, p. 59). Digitalized environmental and organizational structures in the workplace which are not regulated or protected lend themselves to appearing gender neutral. However, digitalized workplaces are already seeing cases of discrimination, harassment, cyberbullying, racism, physical and verbal abuse, and other forms that have significant impacts on women and men – risks which must be addressed with sensitivity.

Digitalized management methods (DMMs)

In the digitalized world of work, data itself has power (Page, 2017). Indeed, data is used in obscure ways that management may try to neutralize decision-making on the surface. There is growing evidence, however, that digitalized management methods (DMMs) themselves put people into situations where the risks of PPVH are high – as well as working environments and organizational structures where technologies are integrated. DMMs involve practices to distribute and reduce work; (re)organize and identify locations of work; recruit, appraise and fire workers; accelerate standards and targets; and monitor and track productivity (Moore and Joyce, 2018). In addition, DMMs can be selective, predictive and prescriptive, with the use of monitoring, measuring and calculating techniques provided by both old and new technologies. The ILO explicitly indicates that the "inappropriate use of technology" can create risky conditions for PPVH (ILO, 2016b, p. 39). Further, DMMs themselves can be seen as forms of bullying or harassment when they facilitate, as well as worsen, the kinds of risky situations outlined below.

Digitalized management methods (DMMs) include:

- the use of big data and algorithmic distribution of work;
- the use of people analytics and digitalized profiling to make decisions about hiring, firing and in performance appraisals;
- the use of "own-contract" or undeclared/clandestine self-employment contracts to disguise employment relationships while blocking workers from having basic rights such as holiday and sickness pay in gig work;
- tracking and monitoring productivity and using accumulated data to make human resource decisions;
- the normalization of interruptions and expansion of working time in offices; and
- the "always on" culture of work and boundary permeability, where workers are expected to be available by phone or email throughout the weekend and evenings, and related practices and expectations.

Risks of PPVH in digitalized work are presented below, with a focus on gig work, office work, and factory and warehouse work. The relevant and emerging DMMs are emphasized to demonstrate the risks of PPVH. Details are presented on how lack of regulations and specific types of DMMs pose risks for already vulnerable groups.

Gig work

Gig work is understood as work that is obtained via the use of online applications (apps) such as Uber, Upwork, or Amazon Mechanical Turks. The work can be performed *online* (obtained and carried out on computers), or *offline* (obtained online but carried out offline, such as in taxi driving or cleaning work).

DMMs are selective, predictive and prescriptive, in the context of algorithmic client-matching and reputation determination, They determine how work is obtained using location tracking and client rating systems that monitor, measure and allow judgements to be calculated. The following is a set of specific issues on the diverse aspects of gig work, citing related research.

- Academic and international organization research on gig work has focused mainly on *online gig work* in a global labour market rather than *offline gig work* (e.g. Berg, 2016; Brawley and Pury, 2016; Graham et al., 2017; Graham, Hjorth and Lehdonvirta, 2017; Hitlin, 2016).
- There is growing evidence of risks of PPVH in both on- and offline gig work due to the fact that much of the work is characterized by:
  - low pay and long hours (Berg, 2016; Berg and De Stefano, 2017; CIPD, 2017);
  - a lack of social protection (Capretta, 2016);
  - basic employment rights (Aloisi, 2015; Cherry, 2016; Cherry and Aloisi, 2016; De Stefano, 2016; Dokko, Mumford and Whitmore Schanzenbach, 2015; Harris and Krueger, 2015);
  - a lack of training (CIPD, 2017);
  - increased health and safety risks (Degryse, 2016; Huws, 2015); and
  - a high level of insecurity (Taylor, 2017; TUC, 2017; De Stefano, 2016; Field and Forsey, 2016).
- Research has shown that gig work results in heightened power imbalances (Calo and Rosenblat, 2017; Donovan, Bradley and Shimabukuro, 2016; Rosenblat and Stark, 2016) and discriminatory practices (Rosenblat et al., 2016).
- Jimenez (2016) warns that labour and occupational safety and health laws have not adapted to the emergence of digitalized work and other studies are beginning to make similar claims (Degryse, 2016).

Online gig work: Homes, cafés, libraries

Online gig work refers to computer-based tasks obtained via crowdwork (Berg, 2016) through platforms such as Amazon Mechanical Turks and Upwork, where workers link to clients and find "gigs" which can be micro tasks, shared projects, or larger blocks of work. On these platforms, jobs/gigs are uploaded by individuals and businesses (known as *Requesters*). Workers (known as *Providers)*, or in the case of Amazon Mechanical Turk's terms of service, known as *Turkers*, then browse and accept an online job in exchange for a monetary payment set by the employer. The types of work may include graphic design; web design, software and product development; programming; editing; translation, and so on.

Online gig work is carried out in a privately selected sphere, such as the home, cafés, libraries and other public places. The risks of working in homes corresponds with the risks of PPVH mentioned above, e.g. "working alone or in relative isolation or in remote locations" (ILO, 2016b, p. 40). As previously noted, these are potentially risky environments, in particular for women, who may be subject to domestic violence alongside the lack of legal protection provided in office-based work. Working in homes puts people at significant risk of PPVH because of widespread gaps in legislation (ILO, 2017b, p. 96). Indeed, "violence and harassment can occur … via technology that blurs the lines between workplaces, 'domestic' places and public spaces" (ibid., p. 97).

The majority of workers using online apps to obtain gigs do not have social protection nor the protection of employment law provided through secure contracts. Gig workers are expected to work under the

categories of "self-employed" or "independent contractor" (Means and Seiner, 2016; De Stefano, 2016). Work is often distributed as outsourced labour in a piecemeal fashion to various workers, further reducing accountability. Because online platforms often mediate the work that is obtained, communication between workers and clients is very limited (Bergvall-Kåreborn and Howcroft, 2014), making it difficult for workers to obtain exact instructions or to negotiate deadlines. This can also mean that workers do not always know precisely what completed work is being used for, introducing ethical questions. Online gig workers have little recourse to defend themselves if they are not clear about tasks, if they need extensions, or are not paid on time. Indeed, there is a significant problem with non-payment, since if a client decides the work is not what they wanted or not performed to an acceptable standard, the client can simply refuse to pay. Wage theft falls within the ILO's category of forced labour. Thus, the risks of possible PPVH is high with regard to bullying through posing unreasonable deadlines, discriminatory practices in arbitrary reductions in people's incomes, and the high chance of forced labour given the disposability of workers who fear their own replacement without notice or pronouncement, all of which has particular resonance for groups at higher risks of PPVH, such as women.

Indeed, Rani and Furrer show in a recent and extensive survey of online gig workers in the developing world that a higher percentage of women than men tend to "prefer to work at home" (2017, p. 14). Their sample shows that 32 per cent of female workers in African countries have small children, and 42 per cent in Latin America. This results in a double burden for women, who "spend about 25.8 hours working on platforms in a week, 20 hours of which is paid work and 5.8 hours considered unpaid work" (ibid., p.13). The Rani and Furrer survey shows that 51 per cent of women crowdworkers work during the night (10 pm to 5 am) and the evening (76 per cent work from 6 pm to 10 pm), which are "unsocial working hours" in the ILO PPVH risk categories (ILO, 2016b, p. 40).

Rani and Furrer further state that "the global outsourcing of work through platforms has effectively led to the development of a "twenty-four hour economy … eroding the fixed boundaries between home and work … [which further] puts a double burden on women, since responsibilities at home are unevenly distributed between sexes" (2017, p. 13).

Another pressure for online gig workers is that to attract clients, people must continuously carry out preparatory work which includes job seeking in a highly competitive labour market (De Stefano, 2016). To begin the process of reputation generation, workers must create a profile, related pitches and then continue to manage reputations. Rani and Furrer have shown that an average working week includes 33.5 hours of actual work on platforms, 26 hours of which is paid and 7.5 which is unpaid (involving seeking work and taking qualification tests) (2017, p. 13). Berg and De Stefano (2017) report that gig workers "averaged 18 minutes looking for work for every hour working".

Indeed, a necessary aspect of online gig work is constant reputation management (De Stefano, 2016; Barnes et al., 2015; Kneese, Rosenblat and Boyd, 2014; Aloisi, 2015; Risak and Warter, 2015). The chasing and utilizing of social capital to enhance and further careers and to find work and employment is not itself new, but the type of reputation formed that allows freelancers and the like to find work through online platforms is "based on algorithmic-based third party elaboration that translates the opinions of others into reputation proxy" (Gandini, Pais and Beraldo, 2016). This means that reputations are improved via the number of tasks a worker accepts and completes, and on the quality of customer ratings. A worker who is able to accept more jobs, or someone with few other responsibilities (such as childcare, usually carried out by women), will have a better reputation, leading to more work. Platform enterprises do not provide training for these activities. These features put workers under considerable strain which creates a working environment that fuels stress and creates risks for PPVH where unpaid but necessary work creates unmanageable workloads (ILO, 2016b, p. 40). The gig worker's profile is thus wholly individualized and reputations are not transferable across platforms, leading to possible PPVH risk due to income loss and stress. One member of the German trade union confederation, *ver.di*, shared her point of view on the risk of psychosocial violence that emerges in the context of reputation generation and management.

> [I]f I am ill, automatically my reputation breaks down. For me this would be a violence. Because if I am a normal freelancer, I can ask a colleague to do my job. For example, if I was working as a journalist and ill, I could ask my employer to ask another colleague to do my job. There is no chance in crowdwork if you lose your reputation. You can't take the reputation from one platform to another one.

D'Cruz and Noronha present a case study of online crowdworkers in India, and report on the ways in which "humans-as-a-service" (as articulated by Jeff Bezos, CEO of Amazon) is considered the kind of work that dehumanizes workers and devalues work, facilitates casualization and informalization of the economy and relies on non-standard forms of employment (ibid., p. 46). Online gig work opens possibilities of child labour, forced labour, and discrimination. There is also evidence of racism, where clients direct abusive and offensive comments on the platforms in covert ways. Inter-worker racist behaviour has also been noted, e.g. gig workers in the developed world blame Indian counterparts for undercutting prices (ibid.). Workers' basic rights, therefore, are at risk and as a result, freedom of association and collective bargaining agreements are of utmost importance in digitalized workplaces.

Offline gig work: Streets, construction sites, homes

Offline gig work is also on the rise. It is obtained by platforms like Uber or Deliveroo, where the organization of the labour process is digitalized (Tassinari and Maccarrone, 2017a) but is carried out physically, like taxi driving; bicycle and motor scooter delivery services of food and packages; construction; and repair work (De Stefano, 2016, p. 3; Huws, Spencer and Joyce, 2016, p. 2). Driving work sits within the category of transport workers, and these workers already regularly encounter violence and harassment, as is pointed out by the International Transport Workers' Federation (ITWF, 2017; see also Pillinger, 2017, p. 12).

Delivery drivers and cyclists have been tracked for many years, and the introduction of satellite technologies have allowed this tracking practice to become ever more intrusive. One UPS driver told Harper's magazine that the employer uses new metrics as a "mental whip", noting that "people get intimidated and work faster" (The Week, 2015; Kaplan, 2015). Risks of PPVH are exacerbated by the ways that apps intensify the rate of work through joining drivers with customers by algorithm, a prescriptive DMM. There are more women driving taxis with the Uber application (app) than in other taxi services (Harris and Krueger, 2016, p. 8), meaning they increasingly face risks alongside existing risks of sexual harassment and violence. Management by app/algorithm reduces drivers' abilities to make choices about work based on personal fatigue or concern for safety. Drivers are at risk of deactivation, or being temporarily or permanently laid off on the basis of customer ratings. There is less data-driven evidence of risks in offline gig work than there is in online gig work, potentially because access to the relevant groups is difficult – for example, cases where Uber drivers are explicitly forbidden from speaking negatively about the company according to signed contracts. Trade union and academic researchers have successfully accessed online gig workers by making contacts as "clients" via the platforms themselves.

A researcher at the Center for Labour Relations, National Research Council of Argentina, has actively motivated motor scooter delivery drivers to organize. He outlined the risks of PPVH faced by taxi and delivery driver gig workers.[1] Because DMMs in offline gig work impose very high targets and workers are only paid per delivery/passenger, people drive too quickly and put themselves at risk of accidents and fines. There is a high rate of psychological violence that arises from the inability of the drivers to earn enough money. Further, there have been issues with local police and cases of bribery.

Nastiti has carried out research with gig work taxi drivers in Indonesia. Her findings show that Go-Jek drivers experience high rates of "super-exploitation" (Marini, as cited in Nastiti, 2017a, p. 2). Drivers may have, in principle, free will to turn off the app used to locate clients. However, as soon as a driver turns the app on, they are controlled by it, where orders are assigned and acceptance expected. There is a minimum acceptance rate, meaning drivers are not actually in a position to turn down work if they have

1 Interview conducted by the author December 2017.

not met the quota. Furthermore, the driver rate, or USD 0.07 to USD 0.14 per kilometer for motorcycle taxis, is not enough for daily living expenses, drivers rely on the daily bonus that is only available if drivers have met minimum requirements.

Nastiti's research indicates that the narrative around obtaining taxi driving work in Indonesia focuses on formalization, emphasizing the importance of a lack of standards to explicitly address the finer details of this kind of work (2017a; 2017b). Uber drivers report that if they receive poor customer rankings they can be fired, despite some aspects of a journey having nothing to do with a driver's performance, such as heavy traffic, the loss of mobile data coverage, or passengers soiling the inside of the car. Drivers receive no help from the firm for related issues and often receive much less income than they were promised upon becoming drivers. Drivers' working lives are so dominated by the platform, and the pay so low, that Nastiti described their condition as "sweated labour" (2017b). While much remains to be done, research suggests that offline platform work shares many of the disadvantages of its online counterpart.

Another form of offline gig work is cleaning and care work carried out in homes, and obtained by online platforms. Hunt and Machingura's (2016) scoping study of domestic cleaners in South Africa and other developing economies finds evidence that, far from representing a move towards formal employment and the associated rights and protections it might bring, domestic cleaning platform work has entrenched non-employee status via explicit contractual stipulation. Furthermore, these domestic workers who are almost exclusively women and often migrants, both internal and international, commonly experience heightened power imbalances with the companies running such platforms. This occurs through conducting background and criminal record checks that apply only to cleaners, but not to customers – despite the fact that work is usually done in the employer's residence. Furthermore, one-sided, customer-only rating systems entrench discriminatory and even violent treatment of cleaners by clients.

Offline gig work is also carried out by cyclists and couriers who deliver food and parcels. An activist in the Independent Workers of Great Britain (IWGB) union, who is a same-day medical pushbike courier for CitySprint UK Ltd., indicated in an interview that there is a rise in the use of handheld computers (like Palm Pilots, XDA/PDA) and apps both in the courier industry and food delivery sectors. These technologies have digitalized what used to happen on paper and are now used for the collection of signatures to authorize pick up and collection of parcels. Companies are now using global positioning systems (GPS) to track all couriers and their movements in real time, as well as the live process of collection and delivery at every stage. This trade unionist stated that:

> Your every move and action are tracked in a digital audit trail. This is quite different from the days when couriers used to work off paper and rely solely on the use of the radio (wallow talkie) to receive jobs. Now that everything is digital there is much less freedom and much higher amount of control, thus meaning we are much less "independent", even though our contracts say we are totally free and independent.[2]

An interviewee from IWGB noted that requirements for people to work as independent contractors or subcontractors are very prevalent in this kind of work. As a broader comment, she indicated that digitalization, automation, and algorithmic management is on the rise, adding that "used in combination, they are toxic and are designed to strip millions of folks of basic rights". Indeed, this trade unionist also indicated that workers' rights are stripped in the context of gig work:

> The only bit of legislation that protects me would be the equality act, but that would only protect certain characteristics and would be hard to win anyway. Holiday pay, the national minimum wage, sick pay, pensions, parental leave, redundancy, tax and [social security] contributions … are removed via IC [independent contractor] contracts.

2 Drawn from a written interview conducted by the author, 2017.

In the above statement, the possible risks of PPVH are clear – workers who are already carrying out work with limited social protection, are becoming increasingly vulnerable to working excessive hours simply because it is impossible to earn enough for basic survival. There are no paid rest or sick days, which puts workers' health at risk, and can lead to discrimination due to identical requirements for all courier riders who may have varying physical strength and capability. This is further supported by interviews with *Freie Arbeiterinnen– und Arbeiter–Union Berlin* (FAUB) union riders summarized below, which describe significant exposure to violence and harassment for drivers who have little or no protection from the enterprise. While these risks may exist without platform technologies, the IWGB unionist insisted that these situations do not justify management methods that put workers at further significant risk.

The unequal effects of rating systems are another common source of grievance for offline gig workers. In a small US study (Raval and Dourish, 2016, p. 101), drivers for ride-hailing apps reported pressure to tolerate "rude behavior, racial slurs, [and] offensive remarks" from customers, for fear of the consequences of low ratings if they objected in any way. Rosenblat et al. (2017) and Rosenblat and Stark (2016) argue that, by redistributing the supervision of driver performance from trained managers to consumers (passengers), Uber's rating system is highly likely to reproduce existing social discrimination. There is a lack of access to aggregate data from the company, and reliable evidence is not presently available.

Lack of transparency in rating systems and allocation of work were also found to be causes of complaint among auto-rickshaw drivers in India, whose adoption of ride-hailing apps led to a loss of autonomy for no apparent gain in economic terms (Ahmed et al., 2016). Similarly, a small study in Namibia found that an algorithmically enforced Western model of taxi services (one taxi, one rider) reduced drivers' autonomy and control, as well as causing resentment at surveillance by the platform; again, for no economic advantage (Kasera, O'Neill and Bidwell, 2016). Data that is accumulated directly from the platform is used to calculate drivers' levels of work and is also used to make decisions about passenger payments in unprotected conditions.

The worst risks of PPVH that riders face, according to FAUB activists (interviewed by the author on 16 October 2017), are linked to the myriad platform management methods used to incentivize and pressure riders. The main aim of Deliveroo and Foodora is, according to one rider, "to pressure riders more". This was seen in the shift of recent policy whereby workers who had once gained a bonus for weekend work, were abruptly told that bonuses would only be given to the top 15 per cent of riders over weekends, meaning that only those with the fastest routes and most deliveries recorded would be eligible for a bonus. This competition-inducing system means that workers were incentivized to ride faster regardless of the weather and of their physical condition, to take orders even if their shifts were about to end and to potentially put themselves into dangerous conditions simply to try to gain a bonus that was once guaranteed. This is a pressured environment that increases risks of PPVH.

Offline gig workers also experience insecure conditions on the streets. FAUB activists shared a story about a rider working alone on a night shift who crashed into an opening car door and was thrown from her bike, resulting in her phone breaking. The driver of the vehicle shouted at her, would not help her, and the only recourse she had was to contact a team of dispatchers, who were not able to do anything immediately, other than direct her to go to the company offices, which were closed. There is effectively no protection from violence experienced by riders, despite the fact that they work alone, on bicycles, on streets and in offices and for the public (ILO, 2016b).

Digitalized office work

Office work has begun to feature new technologies and DMMs that monitor work, determine productivity as well as levels of fitness for work, and ironically are actually a form of automation or computerization that may result in the loss of jobs altogether. This section identifies research and evidence where PPVH risks are emerging through people analytics; electronic performance monitoring techniques, "always on" working conditions; and cyberbullying (also see Akhtar and Moore, 2016).

Office work 1: People analytics

Monitoring employee behaviour through office computer systems is a growing human resources (HR) practice. This can be manifest across two areas of HR responsibility: "personnel management" where payroll is managed, contracts are written and processed, and healthcare and other benefits provided; and "business execution" where HR is concerned with hiring the right people, and ensuring that new employees fit and contribute to the organization's goals and strategies.

The newest technique to carry out specific HR-related "business execution" responsibilities involves "people analytics" defined broadly as the use of big data and digital tools to "measure, report and understand employee performance, aspects of workforce planning, talent management and operational management" (Collins, Fineman and Tsuchida, 2017). Computerization, data gathering and monitoring tools, allow organizations to conduct "real-time analytics at the point of need in the business process … [and] allows for a deeper understanding of issues and actionable insights for the business" (ibid.). Their research showed that 71 per cent of international companies consider people analytics a high priority for their organizations (ibid.). Teach for America[3] is applauded for the most extensive use of people's data analytics for the purpose of decision-making in recruiting as well as making predictions about performance before hires. Currently, the use of people analytics involves only a small amount of human interaction with data subjects at the earliest stages. However, more human intervention in decision-making related to people analytics will soon be required under the imminent General Data Protection Regulation (GDPR) of the European Union, planned for adoption in 2018 (EU, 2016).

IBM (2017) claims that "from attracting top talent, to accurately forecasting future staffing needs or improving employee satisfaction, HR analytics tools empower organizations to align HR metrics with strategic business goals". Google (2017) has a website providing people analytics guidance, and advises that a data-driven approach to HR management is the best way to "inform your people practices, programs and processes … reporting and metrics to predictive analytics [to help] uncover new insights, solve *people problems* [italics added] and direct HR actions". It is not difficult to see what kinds of risks workers face as people analytics are introduced. "People problems" could, of course, mean "who to fire" or decisions on "who not to promote" and the like. In any case, without human intervention, these HR judgements become potentially very dubious when the qualitative dimensions of the workplace are eliminated, and could increase workers' stress.

One trade unionist of UNI Global Union (UNI) stressed the importance of establishing workers' data rights, explaining that as data is being collected at more intensified rates than ever before, workers risk being subject to unilateral data-informed management decisions on the basis of data that workers themselves cannot access. As it stands, workers have no voice in most decision-making processes and procedures around either the use of their data or the introduction of AI and machine learning in their workplaces. To avoid an institutionalized imbalance of power, it will be of utmost importance to establish workers' data rights (see the section Office work 2 below for UNI's principles on data ethics and protection).

Cherry (2016) researched the risks of discrimination emerging from the seemingly objective surveillance that people analytics techniques can introduce, where management's "search for new pools of quantitative data are correlated with business and employment success" and data is used to "make workplace decisions and to replace subjective decision-making by managers" (ibid., p. 7). At first glance, the use of big data may seem to provide possibilities to eliminate unconscious or implicit bias that might inform instinctual decision-making – biases which can account for institutionalized racism and the ongoing gender pay gap in most countries. However, the problematic issue in people analytics as a new digitalization tool is not only what is being counted, e.g. productive labour or other performance metrics, but what is *not* being counted, like preparatory work, domestic work and emotional labour, which is already unpaid and under-acknowledged and is often carried out only by women (Moore, 2018a).

3 For more information on this non-profit organization, see https://www.teachforamerica.org/.

Office work 2: Electronic performance monitoring and "always on"

A 2014 report in Fortune magazine reports that the "market for enterprise wearable devices, which includes industrial and healthcare wearables, [is] growing from USD 21 million in 2013 to USD 9.2 billion by 2020", which is a compound annual growth rate of 138 per cent (Nield, 2014). From 2014–19, more than 13 million wearable fitness tracking devices were predicted to be incorporated into workplaces (ibid.). In 2015, nearly a fifth (18 per cent) of workers in Europe had access to wearable technology at work (UK, 2015). In 2016, one in three companies provided wearable devices to track workers' physical activity, with the aim to save money and improve their health and happiness (Jiff, Inc. and Willis Towers Watson, 2016).

Wearable technologies facilitate monitoring DMMs, tracking worker performance in new ways that could be seen as management bullying and creating PPVH risks if they are used to place unreasonable demands on workers or in place of recognizing poor working conditions. As pointed out by *IG Metall* trade unionists in Section II, white collar workers are experiencing significantly increased levels of workplace stress linked to *Industrie 4.0* processes and new technological integration.

The "quantified workplace" corporate wellness experiment[4] was carried out by one company in the Netherlands. From 2015 to 2016, the employer provided professional employees, who worked as consultants and designers, with *FitBit* devices to monitor steps, heartrate and sleep; and *RescueTime*, which tracks productivity and other activities when working on a computer. Experiment participants were also asked to "lifelog", or to answer a workday email that asks about subjective productivity and stress levels. Over the course of one year, the author was funded by the British Academy/Leverhulme to interview and run surveys with employees to research their experiences of being tracked to such levels by the employer. Findings showed that participants, over the course of the year that the project ran, grew very sensitive to issues around privacy. Employees reported a rise in workloads, as they were experiencing a merge and acquisition with a smaller company into a larger one, and researchers linked this to the decision to integrate new DMMs (Moore, 2018a). The experiment's findings call into question whether the new tracking practices of corporate wellness programmes are actually being used to substitute or divert management attention away from the very risks these same technologies and working conditions create.

In an interview conducted on 16 October 2017, the author spoke with coordinators and leaders of the *IG Metall* Better Work 2020 project *(Bezirksleitung Nordrhein-Westfalen (NRW) Projekt Arbeit 2020)*. Trade unionists interviewed indicated that they are actively speaking to companies about the ways they are introducing *Industrie 4.0* technologies into workplaces. The introduction of robots and worker monitoring, cloud computing, machine-to-machine communications, and other systems, have prompted those running the *IG Metall* project to ask companies: What impact will these changes have on people's workloads? Is work going to be easier or harder? More stressful? Will there be more work?

So far the trade unionists' findings show that digitalization has had an impact on white collar working conditions, where work is becoming more stressful. There is a very high risk for burnout and depression due to the pressure to handle tasks more and more quickly, and always having to be online and never being able to "switch off". Work intensification (the increased pace and amount of work) is increasingly evident and workers face the loss of basic rights, especially in terms of the regulation of working hours and days. Employer associations are pushing for the expansion of working time and reduced time off from work explicitly because of the increased use of technology in the workplace. The trade unionists interviewed stressed that workers need these rights and need time to rest, especially in a permanently sped-up working environment that leads to significant risks of PPVH.

4 For more on the discussion surrounding the "quantified workplace", see the website available at: https://www.quantifiedworkplace.eu/ [accessed 4 June 2016]. See also Moore, Piwek and Roper (2018).

Cyberbullying and sexual harassment

The risk of cyberbullying is also prevalent in office and information technology (IT) work. Privitera and Campbell (2009) conducted a survey of cyberbullying in the manufacturing sector, gathering 145 responses to questionnaires from male members of the Australian Manufacturing Workers' Union (AMWU). These authors define cyberbullying as:

> A situation where one or several individuals persistently over a period of time perceive themselves to be on the receiving end of negative actions (whether in person, by email, by SMS and/or by phone), from one or several persons, in a situation where the target of bullying has difficulty in defending him or herself against these actions. We [do] not refer to a one-off incident as bullying (ibid., p. 397).

The study showed that 34 per cent of respondents were bullied face-to-face, with 10.7 per cent experiencing cyberbullying and all victims also experienced face-to-face bullying. Cyberbullying in 2009 was a relatively new form of bullying, but the fact that it is happening alongside more "traditional" forms of bullying led the authors to believe it is an area worth studying. Cyberbullying has also been called electronic bullying, e-bullying, SMS bullying, mobile bullying, online bullying, digital bullying and internet bullying. Bullying clearly puts workers at risk of psychosocial violence and harassment and has been demonstrated repeatedly to lead to low staff morale, reduced commitment and lowered job satisfaction. Privitera and Campbell recommend that employers recognize that cyberbullying exists and that codes of practice be updated to protect the welfare, health and safety of employees. D'Cruz and Noronha (forthcoming) have also written about cyberbullying in the context of communication technologies and note the ubiquitous dangers associated with these forms, since online bullying can transcend space and time and happen outside, as well as inside, work spaces. Bullies' inhibitions are reduced in the cyber environment, and may even be anonymous, meaning victims often cannot fight back.

Women carry out a significant amount of under-rewarded work online. The risks that women face in IT work has been researched by Paasonen, Jarrett and Light (forthcoming) who explore the ways that online harassment takes the form of flaming, cyberbullying and trolling. Online sexualized harassment against women has significant damaging effects to those being harassed. Their analysis provides examples of women who have been forced offline because of harassment and notes that women's careers have suffered as a result (ibid.). Crucially, digital communication devices are seen to have facilitated a "disturbing rise in sexual harassment claims" (Garrie, 2005).

Warehouse, factory and waste picking

Factories and warehouses: Automation

Perhaps the most widely publicized method of digitalization of work is automation, and this section looks at both this trend and intensified digitalized tracking of warehouse and factory workers. Automated working environments increase stress and reduce worker autonomy, according to an *IG Metall* trade unionist. Processes in machinery and automobile, or "metal" industries are increasingly automated, with low-skilled workers facing the highest levels of job displacement. However, advances in automation also pose risks to offices, services, construction, sales, administrative support and production workers (Frey and Osborne, 2013).

A 2017 PricewaterhouseCoopers (PwC) report shows that 30 per cent of UK jobs and 38 per cent of US jobs are at risk of automation. Over half of these jobs will be in wholesale and retail trade, manufacturing, administrative and support services, and transportation and storage (2017). In the UK, 2.25 million jobs are at high risk of automation due to the introduction of artificial intelligence (AI) in wholesale and retailing. More than 1.2 million jobs are under threat in manufacturing; 1.1 million in administrative and support services; and 950,000 in transport and storage (ibid.). Corlett (2016) at the Resolution Foundation

found that the highest probability of automation lies in legal and accounting work, forestry and logging, agriculture and livestock, hunting, fishing, and aquaculture. An IMF report by Berg, Buffie and Zanna (2016) explored what will happen to workers' wages, in particular low-skilled workers, in the wake of the inevitability of widespread automation. The report forecasts that wages will be driven down, as investors invest in robots rather than human employees, buildings or machinery.

A recent TUC discussion paper entitled *Shaping our digital future,* examined the issues of falling wages and loss of jobs (2017, p. 29).

> [T]he fall in the labour share, and rise in wage inequality experienced during the last period of technological change suggests that we should think not only about the impact of increased productivity on the number of jobs, but more widely about how the benefits of that increased productivity are shared.

The TUC reports that automation does not only refer to a robot taking an entire job from one person, but also refers to aspects of work that can now be done by computers (ibid.). This increases workers' stress as they are expected to make constant and rapid changes to working practices, often without training, in what is frequently called "agile" working environments (Moore, 2018a; Moore, 2018b). In 2012, the ImageNet Challenge[5] asked people to programme computers to recognize images. These "challenges", which are in fact annual contests coordinated by top researchers and corporations, became a measure of success in the field. These contests contributed to advancements in "deep learning" and a computer's ability to recognize images, which has now surpassed humans. This, and other experimentation, is bringing about the realization that tasks once considered the exclusive remit of humans are now at risk of automation, mechanization and digitalization.

Frey and Osborne (2013) argue that both repetitive and non-repetitive jobs have become susceptible to automation. Telemarketers, tax preparers, insurance underwriters and library technicians are at a high risk of automation, at .99 probability (1 = certain). Work in the professions such as health care and social work (.0035) and recreational therapy (.0028) are also under threat. A great deal of legal casework research can also now be done by computers using deep learning algorithms, as well as non-routine work such as driving and deciphering handwriting (ibid., p. 17).

Factories and warehouses: Wearables that track and monitor

Where jobs have not yet been automated, prescriptive and monitoring DMMs have been introduced to provide ever more precise and granular information about workers in factories and warehouses. The DMMs presented here create heightened stress environments for workers based on the feeling of being surveilled and the pressure to work faster and harder. A risk of PPVH arises when data is used to make seemingly neutral decisions about performance, and when targets are universalized and do not take into account, for example, physical differences between workers, some of whom may not be able to work faster for health reasons.

Amazon and Tesco warehouses monitor every minute that zero-hour contracted workers spend on the performance console using arm-mounted terminals. The wearable terminal is in effect a streamlined replacement for the clipboard, allowing workers to scan barcodes on packages from a small scanner worn on the finger. Location information is listed on the upper section of the terminal that is strapped to the forearm and operates on a local WiFi network, which can further adopt Bluetooth for syncing with other devices.

One undercover UK reporter (Bennett, 2013) took a position through an employment agency as a "picker" in the Amazon warehouse in Swansea. The wearable device he was given told him what to collect and gave him a requisite number of seconds within which to find the product. The device tracked his picker rate, equipped with a warning that he could be disciplined and which beeped if mistakes were made. As described by the reporter, during 11 hour shifts, workers "are machines, we are robots, we plug our

5 For more information on the ImageNet Challenge, see O. Russakovsky et al., 2015.

scanner in, we're holding it, but we might as well be plugging it into ourselves ... [workers are] literally working to the bone and there doesn't seem to be any reward or any let-up ... the pressure's unbelievable". Another worker stated that the conditions were like a "slave camp" (ibid.). Another interview with an Amazon warehouse worker emphasized that "the targets are in your face, literally, every second, of every minute, of every day" (Briken, Taylor and Newsome, 2016, p. 11). Working conditions have become so intolerable that Amazon offered unhappy employees up to USD 5,000 if they would like to leave their jobs (Cockburn, 2014). In 2018, Amazon patented a new armband that physically vibrates using a haptics feedback system to guide workers' arms to the correct location in warehouses.

Tracking technologies have actually contributed to decisions to reduce staff through increasing productivity, for example, in Tesco warehouses, where full-time staff was reduced by 18 per cent (Wilson, 2013). Indeed, Tesco tracked productivity as part of a USD 9 million dollar investment into wearables tracking devices adopted in 300 locations across the United Kingdom. At a distribution centre in Ireland, warehouse workers gather products from 87 aisles of three-story shelves. With the aim to free up time spent writing on a clipboard, workers now wear fairly large armbands that track goods, allocate jobs to the wearer, forecast a completion time, and quantifying movements among the area's 9.6 miles of shelving and 111 loading bays. A 2.8-inch display gives analytical feedback, verifying the order and otherwise "nudging a worker whose order is short" (ibid.). Employees receive a score of 100 if tasks are completed on time, and 200 if activities are finished in half the time required, raising questions about employee health and safety. A worker reported "the guys who made the scores were sweating buckets and throwing stuff all over the place" (Rawlinson, 2013). Warehouse workers are at risk of being penalized if they do not record toilet breaks on devices (ibid.). The threat of layoffs creates heightened stress situations for workers and could be linked to workers speeding up their work pace and putting themselves in risky situations. Worker tracking in warehouses has resulted in reports of heightened stress, physical burnout and thus increased risks of physical and psychosocial structural violence. Nonetheless, workers' health and safety usually comes secondary to lean logistics and speed of work in warehouse work (Mulholland and Stewart, 2013).

Confidential interviews carried out by the author revealed many examples of these kinds and other forms of tracking. In one case, a warehouse workfloor operative described being given hand-worn scanners for use on the floor, which workers were told upon distribution were meant to "prevent mistakes" and to "help workers perform better". Operatives were told that they would be provided with personalized meetings with management to discuss performance after the devices were introduced. An anonymous respondent told the author that the meetings were never offered. Instead, technologies were used to track mistakes and to record breaks as well as gain more precise and detailed evidence about how much time workers spent on the console. At a specific interval in the months that followed the devices' implementation, workers were told that some people would be fired within days, and it transpired that data from tracking devices were used to determine which employees would be dismissed. The operative was not clear how the data were interpreted, however, as seen in her response here.[6]

> Recently they sacked two or three people, and they decided this based upon who did the least work. Maybe it was in May, when things get a bit quieter at work. They sacked three people: one of them was lazy, so I understand why. But the other two were very good. A week before the sackings, the management said "everyone be careful, because we are going to fire someone from the temporary staff". So everybody speeded up.

The operative was concerned that the data tracking had been rigged. She and a co-worker tried to compare data that could have been used for firing the workers and found it surprising that the data cited as the reason for laying off some workers was actually not reflected in the data in the diagrams available to their direct supervisor. She and co-workers had already suspected that specific people were given easier tasks during this period of amplified monitoring, and examining the data confirmed their

6 Based on an interview conducted by the author.

suspicion. While warehouse operatives are technically permitted to join trade unions, the operative interviewed indicated that she is not part of a trade union and that she is not aware of any membership in her workplace. In any case, no consultation was held with relevant trade unions nor with workers before the technology was introduced. She explained that "we are aware that the tracking might be used to put pressure on us to work faster, and it might be used to sack people. But lots of us feel that we don't care anymore. Because physically we just can't do any more".

Factories and warehouses: Industrie 4.0

The first industrial revolution occurred because of mechanization. The second was made possible by mass production and the assembly line. The third, it is said, happened on the basis of computerization, automation, and lean management. Currently what is known as *Industrie 4.0* involves:

- *Big data*: Gathering more data can lead to savings and smarter decision-making. McKinsey and Company gave the example of an African gold mine which "found ways to capture more data from its sensors. New data showed some unsuspected fluctuations in oxygen levels during leaching, a key process. Fixing this increased yield by 3.7 per cent, worth up to USD 20 million annually".
- *Advanced analytics*: Stronger analysis can dramatically improve product development" and lead to savings and profit.
- *Human-machine interfaces*: This includes the use of augmented reality where "pickers" wear headsets that present vital information on a see-through display, helping them locate items more quickly and precisely. Headsets free up hands and lower rates of mistakes.
- *Digital-to-physical transfer*: This involves the use of 3-D printing and rapid prototyping to minimize ties to market (Local Motors, Vauxhall and GM involved).[7]

PwC conducted another survey in 2016, "Global Industry 4.0", involving over 2,000 participants from nine major industrial sectors in 26 countries. The survey was designed to identify how and in which contexts companies invested in 4.0 technologies. Findings showed that the majority of respondents expected to more than double their level of digitalization by 2020 (PwC, 2016, p. 11).

From warehouses to offices, taxis to homes, digitalization of work and DDMs hold significant risks of PPVH. The threat of automation has additionally impacted work in the Global South with potential social repercussions that will further impact unskilled work. Waste picking has been a survival strategy for the urban poor in India for some time and specifically for women and children, despite the grave health hazards associated with it. However, waste picking is also now under threat of automation, as revealed in Anagha Tambe and Swati Dyahadroy's research.[8] These two Pune University research professors noted that the state is intent on automating waste processing and disposal due to the concern for environmental sustainability on one hand and capitalist value making on the other (see also Gidwani and Corwin, 2017). This has particularly devastating repercussions for the Dalit communities for which waste picking has been a reliable source of income. Though workers often face violence, humiliation and harassment due to the degrading and dirty nature of "informal" waste picking, Dalit community leaders have argued that automation is not the answer to addressing these issues. Workers would like the state and unions to focus on eradicating stigmatization and psychosocial risks for Dalit workers and creating better conditions for lower caste communities, rather than allowing this work that has been customarily done by their communities to be eliminated altogether.

This section has outlined where and how digitalized workers face the risk of PPVH. The next section looks at social partner responses to these emerging areas of concern.

7 See Baur and Wee (2015).

8 Interviews and correspondence were exchanged between the author and Anagha Tambe and Swati Dyahadroy between September and November 2017 for the purpose of sharing their research and exchanging knowledge.

Section II:
Social partner and other initiatives

Trade unions, enterprises and governments, as well as academics, have taken action and carried out research in direct response to digitalization in the workplace. Several interviews were conducted (some of them already mentioned above) with staff in trade unions, and in the business sector at the Institute for Human Rights and Business (IHRB). This section presents the responses of trade unions and businesses, as well as reviewing some academic projects that are aimed to reveal and to mitigate the risks of PPVH in digitalized work and signal some ideas for best practice.

Trade Unions

The ILO Fundamental Principles and Rights at Work emphasize that no worker should be denied access to basic human rights, and that all countries that are ILO Members should uphold these principles, starting with freedom of association and the effective recognition of the right to collective bargaining.

Digitalized work has a range of characteristics that make it difficult for workers to organize in a traditional union context, as they are geographically widespread, are alone in taxis or on bikes and at home, and have limited communication with one another. Digital workers often do not enjoy the status of an "employee", making it difficult to bargain and negotiate for basic rights – a lack of representation and social protection that puts them at risk of PPVH. However, The first ever collective agreement for the platform economy has been signed in Denmark between *Hilfr*, a Danish platform for cleaning in private homes, and *Fagligt, Faelles, Forbung* (3F) (United Federation of Danish Workers), the largest Danish trade union.[9] The collective agreement was signed by the founders of *Hilfr* and Tina Møller Madsen, group chairman for 3F cleaning and services in Copenhagen. The new collective agreement will enter into force in August 2018 and will guarantee sick pay, holiday allowance and a pension contribution for people who work on the *Hilfr* platform. This ground-breaking agreement will run as a pilot agreement for the first 12 months, after which the parties have agreed to evaluate the agreement on the basis of gathered evidence.

There are several examples of union activities undertaken on behalf of digital workers, including campaigns and organizing, worker self-organizing and wildcat strikes. Even so, other than the *Hilfr*/3F pilot collective agreement, there are no other successful cases yet of collective bargaining in the digital workplace. There have been, however, cases of corporate attempts at trade union busting reported in digitalized workplaces (Dahlborn, 2017). In October 2016, a strike of self-organized gig workers occurred in Italy where 50 Foodora workers demanded decent working conditions. Two strike organizers were fired two days after the first protest for spurious reasons (Tassinari and Maccarrone, 2017b), demonstrating

9 For more information on *Hilfr*, see https://hilfr.dk/; and on *Fagligt, Faelles, Forbung* (3F), see https://www.3f.dk/ [accessed 10 Apr. 2018].

the intense pressures of harassment which workers face, as well as their difficulties in organizing.

Workers have not been able to build a large-scale or effective digital labour movement. Perhaps because workers fear they are too easily replaceable in the global labour market of crowdwork and other digitalized work (Graham et al., 2017, p. 155), unions are currently working in the following ways to mitigate the worst impacts of PPVH in digitalized work.

Vereinte Dienstleistungsgewerkschaft (ver.di)

German trade unions have been perhaps the most active in mitigating the risks of PPVH in the digitalized world of work. One trade unionist from the German trade union confederation, *ver.di*, participated in an interview and described the initiative called "mediafon".[10] Mediafon is a service the union offers for technically self-employed workers in the gig economy. The service is similar to a hotline, used mostly by media, culture, education and IT freelance workers, whereby *ver.di* members are linked to workers to help them over the phone with aspects of workplace issues such as contracts, social security, authors' rights, self-branding and marketing, and health and safety. While the service is available as part of *ver.di* membership, it can be accessed for a fee by other workers. The hope is, of course, that users will join the union. The service also provides a website with relevant news, a monthly newsletter and a "self-employed handbook" available online and in print.

IG Metall

IG Metall (German Metalworkers' Union), the *Arbeiterkammern Oberösterreich* (Austrian Chamber of Labour), the Österreichische Gewerkschaftsbund (Austrian Trade Union Confederation), and *Unionen* (a Swedish white-collar union) joined forces to create Fair Crowd Work. It provides a website that gathers information about issues that concern crowdwork, platform and app-based work from the perspectives of workers and unions. The site publishes ratings of working conditions on various labour platforms drawn from surveys carried out with workers.

IG Metall is also carrying out the Better Work 2020 project *(Bezirksleitung NRW, Projekt: Arbeit 2020 in NRW*). For this project, union representatives have met with 30 companies implementing *Industrie 4.0* locally, and they plan to meet with up to 50 more companies across Germany (as of October 2017). *IG Metall* North Rhine Westfalia has been working on this initiative with two other unions, *Gewerkschaft Nahrung-Genuss-Gaststätten Landesbezirk Nordrhein-Westfalen* (NGG NRW), *Industrie-gewerkschaft: Bergbau, Chemie, Energie* (IG BCE Nordrhein) and the umbrella union, *Datenschutzerklärung Deutscher Gewerkschaftsbund* (DGB NRW). Findings showed that workers and workers' councils have been largely left out of discussions leading to *Industrie 4.0* practices mentioned above.

One *IG Metall* trade unionist who is involved in implementing Better Work 2020 indicated that the operationalization of *Industrie 4.0* occurs in two dimensions: (1) inter-connectedness and level of integration; and (2) level of self-monitoring – whether technology itself gives specific rules to do work which is automized, or employees are free to make their own decisions.

This trade unionist and other union colleagues have identified risks of PPVH, especially in big companies, where technology has begun to "work for itself". Along the lines of the "internet of things" revolution, products communicate directly between themselves. The amount of influence that workers have has been reduced, he warned, putting people at significant risks where their decision-making and autonomy are limited.

While digital and ergonomic systems and products can provide support for workers, the full and precise impact that wearables such as the HoloLens or Google Glasses[11] will have on human beings is yet to be

10 Information on ver.di is available at: http://www.verdi.de/themen/digitalisierung (in German only).

11 For more information on these headsets, see L. Eadicicco (2017).

Telephone operators at the Advanced Info Service call centre. AIS provides some 15 million Thai customers with mobile phones, digital and cellular service, and other related services. Bangkok. Thailand.

fully realized. These new "assistants" have been introduced to assist workers in complex tasks, but can also create a high risk of workplace stress. *IG Metall* trade unionists expressed that companies must look at this closely and discuss it frankly with those who are designing and using these *Industrie 4.0* technologies. It is paramount to listen to what people have to say and to value the input workers can give. If a company asks people to adapt to new technologies quickly, they must give them space, time and money to do so. The Better Work 2020 project has revealed that many companies do not provide the time and space for new technologies to become integrated and for workers to adapt. At times, they added, companies invest in technologies but forget to invest in people.

Another *IG Metall* member said that "you can't simply create a new technology without creating new circumstances, i.e. reorganization and developing employee qualifications. It is necessary that people take part in what is going on" (drawn from interviews with the author). Another issue mentioned was the requirement to use several types of systems with little support for doing so. In fact, the interviews revealed the workers were not sure what the longer-term impact of these technologies will be, and the signs of emerging risks of PPVH are worrying. As a result of the lack of focus on workers, technological developments and investments have caused significant stress. If a company wants a working environment where employees can say, "we have to face the future", they should provide time to learn about the new processes which would reduce stress and the fear of change. *IG Metall* colleagues further stated that no time was ever made available for understanding new technologies, and as far as employers are concerned "time does not just fall from heaven".

Effective union representation is also under pressure by new forms of digitalized work, and as a result, collective bargaining coverage is also under pressure. In response to these issues, two years ago *IG Metall* decided to open up the union for categories of digitalized workers who are crowdworkers and freelancers, in order to allow their organization under the *IG Metall* umbrella. The union is now negotiating on behalf of workers who use online platforms to settle ways in which social security can be paid by providers of contracts. Indeed, the *IG Metall* trade unionists stated that getting crowdworkers into the social security system is one of their biggest difficulties.

Silberman (a trade unionist at *IG Metall*) and Irani (an academic based at the University of California, San Diego) designed and wrote about "Turkopticon", which is a database application that allows Turkers or gig workers using Mechanical Turks to review and publish information about requesters (Silberman and Irani, 2016). The application makes requests available to other Turkers, thus explicitly intervening in what the authors call "interface-mediated labour politics" (ibid., p. 526). Indeed, most Turkers appear to use Turkopticon, as well as several other online platforms such as Turker Nation, MTurk Crowd, MTurk Grind, MTurk, HITsWorthTurkingFor, subreddits, and MTurk Forum to share information about their experiences (ibid., p. 520).

Federatie Nederlandse Vakbeweging (FNV)

In 2016, the author visited an automobile factory in the Netherlands and spoke to unionized workers who had witnessed a high rate of automation of production over several decades. FNV[12] (Federation of Dutch Trade Unions) and local Works Council representatives first observed in the context of ergonomics, robots can provide a healthy work environment as they can do work that is dangerous or difficult for people. The cost of production can be reduced significantly as well as the time taken to produce units. They also noted that robots can help humans feel challenged, learn to work better and additionally can open up opportunities to workers with disabilities. Automation makes administration tasks easier, as robots just do their programmed tasks, do not complain, call in sick or make mistakes.

However, the Works Council representatives also noted that automation has created significant risks of PPVH – stress and overwork – that arose from heightened expectations for production at a faster rate. Workers mentioned that there is no need for timing devices in their factory to make sure people are working quickly enough, because there is no choice. On the assembly line, a car appears every few minutes. People are required to keep pace with robots, which is part of the primary incentive and method to time work pace. Manufacturing targets are set which humans and robots must work together to meet. In reality, however, when there is a problem on the line, only people can compensate for the interruption, whether the problem is caused electronically, a part has not been delivered, or for any other reason. Therefore, workers are forced to work unreasonably faster.

The introduction of robots, FNV trade unionists stated, has led to a significant loss of jobs and lower pay. Additionally, introducing robotization and automation should be accompanied by preparation and training strategies, a concern expressed by the FNV representative. FNV also emphasized that companies are currently not adequately preparing and training workers for automation which is a clear part of the future for factories and other workplaces. The question is: Will companies invest in people or only focus on (short-term) profit margins? When new systems are introduced, older workers suffer the most because in many cases, they are out of practice with learning. If older workers cannot keep up, chances are high that companies will side-line them and any commitment to lifelong learning.

The FNV has responded to these issues at a specific factory near Maastricht by engaging with the local Works Council and Engineering Club, and pressuring for the training of workers whose jobs are at risk because of automation. Furthermore, in May 2017, the FNV released the following statement, demonstrating its interest in a basic income, which is often discussed in the context of job automation (Barnhoorn, 2017).

12 For more information on the FNV, see their website at https://www.fnv.nl/.

> The basic income is an interesting option, especially in the way it is formulated by FNV Sector Beneficiaries. The FNV therefore proposes to start investigations and experiments in a practice-oriented manner based on the recommendations of FNV Sector Beneficiaries. As a result of this, FNV will decide whether a basic income can become one of the instruments that can equally share work, income and capital.

Independent Workers Union of Great Britain (IWGB)

Another significant response to digitalized work in the gig economy can be seen in the emergence of new branches within unions, including the example of the Independent Workers Union of Great Britain (IWGB). To fight against diminishing workers' rights evidenced in gig work, one activist rider and her colleagues have built a branch within the IWGB union.[13]

> This is the mechanism we have found most effective for creating change - as it helps consolidate a fragmented community and gives people hope and strength in numbers and through collective fights. So far, we have won three major pay rises of 20 to 30 per cent at London's big three courier companies; City Sprint, Ecourier and Absolutely Couriers. We also won at Gophr, a small app company, but they recently backed out of the agreement. We are also in the process of challenging our independent contractor status in the courts at four of the big courier companies. We've also had limited success with the Deliveroo strike in August. Although we didn't manage to stop the new pay structure coming in, we helped the workers escalate their strike, created loads of positive publicity and helped to shine a big light on the gig economy and exposed the contradictions inherent in it - which are all present in the courier industry as well.

This same IWGB member stated that it is very difficult to unionize the offline gig economy workers because they are on the move constantly and work is scattered across large areas. She noted that "if we can't get legislation to force companies to let unions in from the off, which is highly likely, then unions need to try harder". Unions can often have negative attitudes which serve to prevent action, she indicated, and also shared that she often hears big unions complaining about anti-trade union legislation, the lack of participation, and blaming the government for why they are not winning. In her mind,

> This is the wrong attitude and is a recipe for inaction and is defeatist. If this is the attitude, of course nothing will happen and you won't convince anyone to take action. What was great about the Deliveroo strike was that it was autonomous: the drivers did it by themselves, we merely assisted once it got going. It exposed the failings of government, business, and the unions! Now slowly, the big guys are waking up and gearing up, but I doubt much will happen. As ever, we will rely on workers to have the courage themselves to take action and force change and that is where the real power lies.

Freie Arbeiterinnen– und Arbeiter–Union Berlin (FAUB)

FAUB has been the most active in organizing food delivery cyclists, called "riders", in Berlin. Activists have used both campaigning and organizing strategies and are now in the phase of formalizing their demands for the two main companies hiring riders, Deliveroo and Foodora. Meeting with FAUB members on 16 November, the author interviewed two trade union activists, one of whom was a rider ("Anna") for Foodora. Anna shared the ways in which Foodora's management techniques intentionally removed accountability and support systems for riders. The company, for example, has computerized many management practices by using email to disseminate changes to company policy. Riders also have contact with a "rider captain" who is responsible for zones of workers. The captain organizes Whatsapp

13 Information gathered through a written interview conducted by the author in 2017.

groups and uses this to remind riders of policy changes, but also actively organizes social activities as a kind of team building. The captain, however, has no other authority or explicit management responsibility outside these activities. Some rider captains have become politicized and have organized meetings and protests against company policy also using Whatsapp, which has in turn facilitated Anna's work with campaigning and organizing.

In terms of campaigning work, FAUB has taken direct action against delivery companies including organizing protests outside headquarters that involved stacking broken bicycle parts outside the entrance. FAUB also maintains strong links to the media who have publicized some of the worst practices of these companies and which has proven to impact corporate reputations. Some successes have been recorded, including forcing Delivery Hero to take Foodora off the stock market by organizing protests in front of the headquarters the day before an investors meeting. Investors are potentially put off by the possibility of bad reputations caused by such protests.

UNI Global Union (UNI)

UNI is doing extensive work on data rights protection and the emergence of AI and machine learning at work in order to advise unions on how to mitigate emerging risks. One leading UNI member stated that unions should take steps to ensure that (a) data is not used in a discriminatory way for workplace decision-making, taking into account gender, race and health status, and keeping checks and balances on ethical practice; and (b) workers are able to gain access to their own personal data, and are also provided with an explanation of how that data is used for any decisions made about themselves.[14]

UNI released a document in December 2017 entitled *Top 10 Principles for Workers' Data Privacy and Protection* (2017). These principles emphasize that "workers and their union representatives must have the right to access, influence, edit and delete data that is collected on them and via their work processes". The principles focus on: workers' access to data; "data minimalization" where data is used in a precise and focused way; assurances that workers have the right to a "full explanation" for how data is used about them; and restrictions on the use of biometric and location data. Importantly, this document calls for the principles and practices of collective agreements to be implemented and protected in this regard. UNI's document lists ten action points, summarized here (ibid.):

1. ***Workers must have access to, and influence over, data collected on them***
    - **a.** Consent cannot and should not be the legal basis of data processing at work.
    - **b.** Workers should be able to obtain personal data relating to him/her.
    - **c.** Workers must have the right of data portability.
    - **d.** Personal data may be communicated to workers' representatives but only if data will allow ends that are beneficial for workers.
2. ***Implementing sustainable data processing safeguards***
    - **a.** Employers must fully inform workers of introduction of monitoring systems.
    - **b.** Privacy impact assessments must be run before implementing new data processing systems and workers fully informed.
    - **c.** Consult workers if any infringement of right to privacy and dignity is suspected.
3. ***Data minimalization principles must be applied***

    Employers may only collect data and only the right data for the right purposes and only the right purposes, to be used by the right people and only the right people, and for the appropriate amount of time and only the appropriate amount of time.
4. ***Data processing must be transparent***
    - **a.** Any information with personal data held by employers must be brought to workers' notice.

14 Based on interviews conducted by the author with UNI Global Union staff, 15 Nov. 2017.

   b. Employers must provide workers with all details about data processing.
   c. A complete description must be provided of categories of personal data that can be collected by all ICTs, including video surveillance and possible usage.
   d. Information should be provided in an accessible format.

5. ***Privacy laws and fundamental rights must be respected throughout the company***

   This includes respect for global and regional conventions on human rights including the UN Universal Declaration of Human Rights and the ILO 1997 *Protection of Workers' Personal Data: An ILO Code of Practice*.

   a. Show respect for human dignity and privacy and allow free development of employee's personality and relationships in the workplace.
   b. Guarantee communication is lawful and does not include defamatory or libellous statements.
   c. Ensure enterprise communication facilities are not used to sexually harassing or spreading offensive comments.

6. ***Workers must have a full right of explanation when data is used***

   This principle refers to decisions taken by management that include the sourcing of data from within as well as outside the company. For example, in internal and external recruitment processes, workers must have the right to know on what basis a decision has been made. This is to safeguard workers against discriminative decisions based on data predictions, not least regarding health.

7. ***Biometric data and Personally Identifiable Information (PII) must be exempt***

   The collection and further processing of biometric data should only be undertaken if no other less intrusive means are available and only if accompanied by appropriate safeguards, including the additional safeguards provided for in principle 2. The processing of biometric data and other PII must be based on scientifically recognized methods and should be subject to the requirements of strict security and proportionality.

8. ***Equipment revealing employees' location***

   Equipment revealing workers' location can only be introduced if it proves necessary to achieve the legitimate purpose pursued by employers; their use must not lead to continuous monitoring of workers. Notably, monitoring cannot be the purpose, but only an indirect consequence of an action needed to protect production, health and safety or to ensure the efficient running of an organisation. Given the potential to violate the rights and freedoms of persons concerned by the use of these devices, employers must ensure all necessary safeguards for the workers' right to privacy and protection of personal data, including the safeguards provided for in principle 2.

9. ***A multi-disciplinary, inter-company data governance body should be established***

   A multi-disciplinary inter-company data governance body should be established to govern data formation, storage, handling and security issues. This includes provisions that all representatives on the body, including shop stewards, receive appropriate data training to be equipped to work with companies in upholding and withholding a sustainable data protection policy.

10. ***All of*** the above should be implemented in a collective agreement

    The above principles should be implemented and enforced through company or sectoral collective bargaining. In the absence of said bargaining, the employer should establish a governance body in accordance with principle 9.

Union activity in the Global South

In the Global South, academic researchers report that there is less interest in collective action, such as in the Indian crowdsourcing context. There is a "general apathy towards unions evident in the subcontinent … driven by status-conscious considerations, Indians articulate negative attitudes towards

collectivization which they typically associate with blue-collar workers" (D'Cruz and Noronha, 2016, p. 60). Crowdsourcing using online platforms can even be seen as a manifestation of neo-colonialism where impediments to collectivization are part and parcel to other Western cultural influences such as the narrative of entrepreneurialism that goes along with crowdwork. Informal work is already very common in India, which may further explain the low levels of union participation and organizing in gig work. Other research by Nastiti (2017a) notes that Go-Jek drivers in 15 Indonesian cities have "engaged in sustained resistances against the middleman firm". Collective activities include the formation of informal unions, protests and strike organizing, and media and press support.

Enterprise responses

Codes of conduct

One group of German platform enterprises has been active in identifying ways to mitigate against the worst treatment of online gig workers by collaborating with social partners to create a code of conduct, entitled "*Crowdsourcing: Code of Conduct – Ground rules for paid crowdsourcing / crowdworking: Guidelines for a prosperous and fair cooperation between crowdsourcing companies and crowdworkers*" (Crowdsourcing, 2017). The first version of the Code was developed by Testbirds with support of the German Crowdsourcing Association (Deutscher Crowdsourcing Verband). Input from the IG Metall was integrated into the second version, which was signed by eight platform enterprises: Testbirds, clickworker, Streetspotr, content.de, Crowd Guru, AppJobber, ShopScout, and Bugfinders. The code of conduct acknowledges that "new employment models and innovative forms of collaboration have come into being, affecting and changing the working individual as well as employers and social institutions" (ibid., p. 2). In November 2017, the signatory platforms, the German Crowdsourcing Association, and IG Metall established an "Ombuds Council" or "Ombuds Office" (German: "Ombudsstelle") associated with the Code of Conduct. Workers on platforms who have signed the code can submit a complaint to the Council and the Council seeks to clarify the matter and reach a solution by consensus. The Council is composed of one platform workers, one trade union representative, one platform enterprise representative, and one representative of the German Crowdsourcing Association. The Council's neutral chair is held by Dr. Silke Kohlschitter, a labor judge in Frankfurt.

The document defines crowdworking as "the outsourcing of projects and tasks to an international community of internet users" which is a now a "firm component of the working world and society". Paid crowdworking can include a variety of tasks, from data processing and text creation to software testing and mobile crowdsourcing at the point of sale (POS), and is facilitated through various online platforms and mobile apps which act as intermediaries. Legally, this work largely falls within the area of freelance and self-employment, despite many of the characteristics of the employment relationship resembling regular work, such as taxi driving, where drivers are subject to standard practices like interviews and appraisals by multinational enterprises such as Uber. The code of conduct presents guidelines to generate corporate responsibility toward workers using these platforms. The following guidelines apply for signatories to the code of conduct (ibid.):

1. ***"Tasks in conformance with the law" –*** This is important because it ensures that workers are not inadvertently signing up to do work that is "illegal, discriminating, fraudulent, demagogic, violent or anti-constitutional". Since the crowdworker and client only have a virtual relationship, it has become clear that there is a risk that workers could be complicit to underhanded or illegal activity.

2. ***"Clarification on legal situations" –*** Undersigned platforms are committed to sharing legal and tax regulations of work mediated.

3. ***"Fair payment"*** **–** Payment conditions need to be transparent, fast and clearly communicated in advance. Workers must never be expected to pay to obtain work.

4. ***"Motivating and good work"*** **–** This requires companies to take steps to provide reward systems of some kind, such as experience points and prizes, as well as training possibilities.

5. ***"Respectful interaction"*** **–** Intermediaries must be sensitive to their responsibility to both clients and workers' needs and interests.

6. ***"Clear tasks and reasonable timing"*** **–** Workers will gain good descriptions of projects with clear and reasonable timelines.

7. ***"Freedom and flexibility"*** **–** Workers need to have the freedom to select tasks. Refusal to accept should not lead to negative consequences and pressure to do work should not be applied.

8. ***"Constructive feedback and open communication"*** **–** Crowdsourcing companies must be available for questions that arise and give good and rapid feedback.

9. ***"Regulated approval process and rework"*** **–** There are times when the work provided is not deemed up to standard and clients may have the option to not pay for work. Therefore, approval standards and timelines must be clear and the denial of work must be justified, based on pre-defined agreements.

10. ***"Data protection and privacy"*** **–** Protection and respect for crowdworkers' privacy is outlined in this section as important.

The significance of this crowdsourcing code of conduct is that it was initiated by enterprises, who recognize that to remain competitive with users, they will need to address the associated risks of platforms work. At present, the code is only undersigned by German platforms, but it can be considered best practice for all enterprises engaging crowdworkers.

The Institute for Human Rights and Business (IHRB)

The Institute for Human Rights and Business (IHRB) is currently scoping a multi-year programme of work focused on elaborating corporate human rights responsibilities regarding big data and AI applications.[15] The intention is to examine rights-based aspects related to applications and technologies in the workplace, market place and society at large. The project will consider and analyse how big data and AI technologies can create, increase or reduce risks and impacts for those affected by these technologies; and how particular individuals and groups are (or are not) afforded equal access to the benefits of new technologies. The project will explore a range of human rights angles and issues including privacy, non-discrimination, participation, agency and consent, realization of economic rights, and remedy.

To this end, the IHRB is currently engaging companies in diverse industry sectors (including but also beyond the tech industries) in order to involve them directly in building good practice and norms. The work will be anchored in the framework of the *Guiding principles on business and human rights* (UN, 2011), as well as other frameworks and experiences from the human rights and business fields. The programme's objective builds on past work conducted on "digital dangers" and will apply IHRB's skill set to convene diverse stakeholders and experts to align around good practice expectations, and move from principles and aspirations to clear, actionable steps that companies can implement. The project will likely launch in the second quarter of 2018.

15 Based on an interview conducted by the author with Mark Hodge of IHRB on 18 Nov. 2017. See also IHRB's website at https://www.ihrb.org/focus-areas/information-communication-technology/ [accessed 6 Dec. 2017].

Governments

European Union

At the European level, by 25 May 2018 all companies with over 250 employees across Europe will be required to comply with the General Data Protection Regulation (GDPR), which is a redrafting of the 1995 Data Protection Directive (DPD), or EU 95/46/EC (EU, 2016). In the first two pages of the GDPR draft text, the foundations for the new Regulations are set out and it is made clear that technological development is one of the reasons for updating and reform of Directive 95/46/EC. Some key points of the new draft Regulations are summarized below (draft article numbers are listed):

> (6) Rapid technological developments and globalisation have brought new challenges for the protection of personal data. The scale of the collection and sharing of personal data has increased significantly.

A significant feature of the digitalized workplace and digital management methods is that decisions are made via algorithms, people analytics and gig work. Draft Article 22(1) may have significant impact on these practices, such as:

> 22(1) [D]ata subject shall have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her.

The foundations for the new Regulations, listed in the first sections of the document, expands on this, making it abundantly clear that:

> (71) The data subject should have the right not to be subject to a decision, which may include a measure, evaluating personal aspects relating to him or her which is based solely on automated processing and which produces legal effects ... such as ... e-recruiting practices without any human intervention. Such processing includes 'profiling' that consists of any form of automated processing of personal data ... in particular to analyse or predict aspects concerning the data subject's performance at work, economic situation, health, personal preferences or interests, reliability or behaviour, or location or movements where it produces legal effects concerning him or her ... and such processing should be subject to suitable safeguards, which should include specific information to the data subject and the right to obtain human intervention, to express his or her point of view, to obtain an explanation of the decision reached after such assessment and to challenge the decision.

The new restrictions posed by the reforms will put significant pressure on any company relying on decision-making based solely on algorithmic data. This can potentially fully disrupt the Uber business model and operational practices. Uber taxi drivers gain work through the use of an app that directs customers purely based on algorithmic data; movements are entirely tracked, and judgements about working practices made accordingly. Drivers can even be deactivated if their client ranking systems are not high enough, or they have not accepted enough rides. It is difficult to see how these practices will not be fully overhauled when the new GDPR is adopted in 2018. Furthermore, the GDPR may slow the rise in the use of people analytics. This will impact all companies using big data to recruit workers, evaluate performance, provide better leadership, promote employees, influence and improve job design, make decisions on compensation, and improve collaboration without "human intervention", all of which will be required by the new GDPR.

These practices will be challenged in the wake of the new GDPR, for example, the use of wearable devices in factories and warehouses which track workers' movements, and store extensive data about their performance, toilet breaks and minutes spent on consoles (see examples of warehouse operatives at Amazon and Tesco above). In professional workplaces, devices are being used to store information about how long workers spend at desks using heat sensors, such as in the case of Occupeye, as was briefly used at The Telegraph (Dearden, 2016), as well as recording workers' tones of voice and gestures as experimented with Humanyze.[16] Under the GDPR, these activities will come under great scrutiny, as companies will need to: (a) make clear what data is being used and why; (b) verify the authenticity and reality of "human intervention" if decisions are made on the basis of data analytics; and (c) prove that they have obtained explicit consent from data subjects in the first instance.

Indeed, one of the key areas the GDPR emphasizes is *consent* in data protection. The definition of "consent" in the 1995 Data Protection Directive (DPD) (EU 95/46/EC) was "any freely given specific and informed indication of his[/her] wishes by which the data subject signifies his agreement to personal data relating to him[/her] being processed" (EU, 1995). The new GDPR definition adds detail regarding how consent is given and states in Article 4(11) that consent is: "any freely given, specific, informed and unambiguous indication of the data subject's wishes by which he or she, by a statement or by a clear affirmative action, signifies agreement to the processing of personal data relating to him or her" (EU, 2016).

Explicit reference to the implications of the GDPR for *worker consent* is far less detailed than for *consumers.* The UK Information Commissioners' Office (ICO) *Guide to the General Data Protection Regulation* warns that "public authorities and employers will find using consent difficult" and that "employers and other organizations in a position of power are likely to find it more difficult to get valid consent" (ICO, 2017). One UNI trade unionist also emphasized that consent is paramount in situations where workers are tracked and monitored (Wild, 2017). In the British Academy/Leverhulme project carried out by the author in 2015–17, the company which carried out the "quantified workplace" experiment involving *FitBits*, *RescueTime* and daily lifelogs for up to 50 employees, was queried by the *Autoriteit Persoonsgegevens* (Dutch Personal Data Protection Authority). While employees had consented to participation in the project, the Authority asked the company: "can there ever be a *consenting* relationship between an employee and employer?" (Moore, 2018b).

Employees, as data subjects, should gain significant rights around consent under the GDPR (ICO, 2017; Moore, 2017); a summary of which is provided below.

- The right to be informed, which encompasses the obligation on employers to provide transparency as to how personal data will be used;
- The right of access, similar to those rights under the Data Protection Act (DPA) and encompassing the ever-popular subject access request (United Kingdom, 1998);
- The right to rectification of data that is inaccurate or incomplete (similar to the DPA);
- The right to be forgotten under certain circumstances;
- The right to block or suppress processing of personal data (similar to the DPA); and
- The new right to data portability which allows employees to obtain and reuse their personal data for their own purposes across different services under certain circumstances.

16 Humanyze is a company that supplies employee ID badges with inbuilt biometric measuring capabilities, as well as embedded microphones that process vocal information including tone, volume and speed of speech and location tracking services.

Academia

University of Manchester, Centre for Development Informatics

Richard Heeks, an academic at Manchester University, has been working with "Development Implications of Digital Economies" a strategic research network funded by the UK's Economic and Social Research Council as part of the Global Challenges Research Fund initiative. Heeks extensive report, *Decent work and the digital gig economy: A developing country perspective on employment impacts and standards in online outsourcing* (2017) synthesizes his findings in table 1 below, presented as recommendations for treatment of crowdworkers, outlining suggested standards for various employment contexts.

Fairwork Foundation

Academic Mark Graham and colleagues at the Oxford Internet Institute (Graham et al., 2017) have established the Fairwork Foundation, which will undertake an extensive programme of comparative policy and relevant research designed to assess working conditions in digital labour platforms. The Foundation aims to draw attention to the "invisible" labour of digital workers across global supply chains and develop a new approach to researching digital work and workplaces. Ultimately, the Foundation's goal is to facilitate change in online platform processes and practices that will improve working conditions.[17]

In conclusion, all of these activities and projects are intended to mitigate against the worst impacts of PPVH for digitalized workers. The next section looks at ILO instruments and other standards available from the international community that can provide support and guidance for addressing these risks.

17 For more information on the Fairwork Foundation and the Oxford Internet Institute, see https://www.oii.ox.ac.uk/blog/introducing-a-fairwork-foundation/ [accessed 12 Oct. 2017].

Table 1: Decent digital work – Standards for the digital gig economy

	CODE COMPONENTS / STANDARDS
EMPLOYMENT CONTEXT	
Social security	• Provision of annual, sick and maternity leave • Provision of unemployment, disability and health insurance • Provision of liability insurance • Provision of pension contributions • Portable benefits • Shared contributions from workers, platforms and clients
Social dialogue, employers' and workers' representation	• Right to organise and negotiate collective agreements • Legal changes where collective negotiation is prevented for independent contractors • Enable (collective) communication between workers
Economic and social context for decent work	• Compliance with all relevant national laws in worker jurisdiction • Client responsibility for digital supply chain • Access for policy-makers to anonymised transactional platform data
EMPLOYMENT	
Employment opportunities	• Opportunity to access digital gig economy work • Provision of training opportunities • Worker-accessible, portable work history and reputation profiles
Stability and security of work	• Combination of stability and flexibility • Clarification / recategorization / development of new flexibility to choose employment status
Equal opportunity and treatment in employment	• No discrimination • Data protection and privacy for both clients and workers
Dignity and respect at work	• Respectful and prompt communications between clients, platforms and workers • Clear rules for work rejection and re-work, worker deactivation, worker ratings, and worker "levelling-up" • Human review of worker complaints • Neutral third-party dispute resolution mechanism
WORK CONDITIONS	
Adequate earnings and productive work	• At least minimum wage paid taking unpaid time and other costs into account • Clear information and communication about tasks • Clear information about payment, including schedule conditions and non-payment • General-terms details about client identity and task purpose • Rating system for both clients and workers
Decent working time	• Compliance with national working time directives and with ILO guidelines
Safe work environment	• Ensure potentially psychologically unsafe tasks are signalled, and support provided

Source: Heeks, 2017, p. 26.

Section III:
ILO and United Nations (UN) standards and instruments

This section looks at the existing ILO and United Nations (UN) codes of practice and guidelines, labour standards and other instruments that are relevant for workers who face intensified risks due to digitalization. Additionally, these could be sourced to develop a new standard on violence and harassment against women and men in the world of work as applied to digital workplaces and workers.

Protection of workers' personal data: an ILO Code of Practice

The *Protection of workers' personal data: An ILO Code of Practice* (1997), while not binding and not intended to replace national law, does make recommendations to provide guidance in the development of legislation, collective agreements, policies and practice at enterprise level. The Code lays out clear guidelines for workers' data collection and protection, with the following general principles in place (ibid., p. 2):

General Principles

5.1. Personal data should be processed lawfully and fairly, and only for reasons directly relevant to the employment of the worker.

5.2. Personal data should, in principle, be used only for the purposes for which they were originally collected.

5.3. If personal data are to be processed for purposes other than those for which they were collected, the employer should ensure that they are not used in a manner incompatible with the original purpose, and should take the necessary measures to avoid any misinterpretations caused by a change of context.

5.4. Personal data collected in connection with technical or organizational measures to ensure the security and proper operation of automated information systems should not be used to control the behaviour of workers.

5.5. Decisions concerning a worker should not be based solely on the automated processing of that worker's personal data.

5.6. Personal data collected by electronic monitoring should not be the only factors in evaluating worker performance.

5.7. Employers should regularly assess their data processing practices:
(a) to reduce as far as possible the kind and amount of personal data collected; and
(b) to improve ways of protecting the privacy of workers.

5.8. Workers and their representatives should be kept informed of any data collection process, the rules that govern that process, and their rights.

5.9. Persons who process personal data should be regularly trained to ensure an understanding of the data collection process and their role in the application of the principles in this code.

5.10. The processing of personal data should not have the effect of unlawfully discriminating in employment or occupation.

5.11. Employers, workers and their representatives should cooperate in protecting personal data and in developing policies on workers' privacy consistent with the principles in this code.

5.12. All persons, including employers, workers' representatives, employment agencies and workers, who have access to personal data, should be bound to a rule of confidentiality consistent with the performance of their duties and the principles in this code.

5.13. Workers may not waive their privacy rights.

This code is one of the first to outline best practice in collecting and storing workers' data, at a time when computers were very new in the workplace. Emphasis is placed on workers' rights to access their data, assurances of transparency and consent, and the prevention of data usage for discrimination and other abuses.

Transition from the Informal to the Formal Economy Recommendation, 2015 (No. 204)

In addition to ILO's existing code of conduct advising on workers' data protection, other ILO standards reflect and can support initiatives to counter the risks of PPVH in digitalized work. Digitalized work shares many of the characteristics of other kinds of work that are dealt with in ILO standards and one such example is *informal work*. Recommendation 204 points out that informal work risks "the denial of rights at work, the absence of sufficient opportunities for quality employment, inadequate social protection and the absence of social dialogue" (2015). The informal economy refers to "all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements" (ibid.). Informal employment includes "those in the informal economy who own and operate economic units, including own-account workers, employers and members of cooperatives, and of social solidarity economic units … [also] workers in unrecognized or unregulated employment relationships" (ibid.). As defined in the ILO *Guidelines concerning a statistical definition of informal employment,* informal jobs are those in which the employment relationship is "in law or in practice, not subject to national labour legislation, income taxation, social protection or entitlement to certain employment benefits (advance notice of dismissal, severance, pay, paid annual or sick leave, etc.)" (2003, p. 2).

Digitalized aspects of informal economy and non-standard work

The characteristics of the informal economy and non-standard work are often seen in digitalized work, which creates significant obstacles for countries aiming to follow recommendations for formalization and to decrease the risks of PPVH. This is due to the fact that much digitalized work:

- is not regulated;
- relies on unprotected employment relationship;
- does not guarantee minimum wage;
- does not offer income security;
- runs a high risk of discrimination;

- is not supported with lifelong learning/education protections; and
- is not scaffolded with occupational health/security standards.

Across the world, unskilled work is largely carried out with informal classifications. Unskilled work is prevalent in informal and non-standard employment relationships and, as outlined above, is the area of work at the highest risk of automation. Governments are embracing automation, in many cases indiscriminately, putting informal workers at great risk. The gig economy also taps into a labour market that already uses a high proportion of non-standard and informal workers who are often in "temporary employment; part-time and on-call work; temporary agency work and other multiparty employment relationships; as well as disguised employment and dependent self-employment" (ILO, 2018).

De Stefano (2016) has outlined the ways in which non-standard workers are negatively impacted by legislation against collective bargaining, freedom of association and the right to strike. The reduction in capacity for collective bargaining also increases the likelihood that workplaces do not have safety and health committees or representatives (Quinlan, as cited in ILO, 2016a) which further heightens the risks of PPVH.

Formalization of digitalized work through the use of a triangular employment relationship via a third party "app" (such as in the case of Uber) is spurious, since such platforms avoid formal regulation and offer neither social protection nor a standard employment relationship or contract. Taxi drivers, delivery riders and, in fact, most online and offline gig workers are expected to be own-account workers or self-employed, despite expectations that these employment relationships should reflect regular employment, as has been shown in the recent Uber case in London.[18] Some local governments are clamping down on the worst company practices and DMMs, but this is a process that should be standardized. Without formalization, digital workers' rights are continuously at risk.

Convention on Home Work, 1996 (No. 177)

Much online gig work obtained through platforms occurs at home. This includes relatively skilled work using a computer, or cleaning/care work usually performed by women. Because of this, and a lack of social protection, online gig work risks violating aspects of the ILO Convention on Home Work, 1996 (No. 177). This Convention requires fair remuneration and social protection, which includes occupational health and safety regulations and maternity benefits, the right to organize, and freedom from discrimination. Article 1 of the Convention states:

> The term home work means work carried out by a person, to be referred to as a homeworker, (i) in his or her home or in other premises of his or her choice, other than the workplace of the employer; (ii) for remuneration; (iii) which results in a product or service as specified by the employer, irrespective of who provides the equipment, materials or other inputs used.

Further to these risks, issues of discrimination related to women's additional responsibilities, such as reproductive and caring activities, persist and reduce their ability to compete at the same level as others for work, good reputation and profile upkeep. As mentioned above, the lower number of jobs that women are able to accept due to other responsibilities means that their online reputations are not as high as others; they are at risk of domestic violence and gender discrimination; they have limited or no freedom to organize; and have no social protection due poor labour contracts associated with online gig work platforms (see also WIEGO, 2017).

18 For information on the Uber case see R. Davies, 2017.

Article 4 of Convention No. 177 (ILO, 1996) states that:

1. The national policy on home work shall promote, as far as possible, equality of treatment between homeworkers and other wage earners, taking into account the special characteristics of home work and, where appropriate, conditions applicable to the same or a similar type of work carried out in an enterprise.
2. Equality of treatment shall be promoted, in particular, in relation to:
    a) the homeworkers' right to establish or join organizations of their own choosing and to participate in the activities of such organizations;
    b) protection against discrimination in employment and occupation;
    c) protection in the field of occupational safety and health;
    d) remuneration;
    e) statutory social security protection;
    f) access to training;
    g) minimum age for admission to employment or work; and
    h) maternity protection.

The location of work, whether on the streets, in homes, offices or warehouses, is very important as this, along with the management methods applied, means that there are significant risks involved for workers of psychosocial and physical violence and harassment.

Other relevant ILO instruments

The following is a list of other ILO instruments that cover aspects of decent work that can be applied to the digitalized workforce:

- The ILO Multinational Enterprises and Social Policy (MNE) Declaration, Rev. 2017
- Social Protection Floors Recommendation, 2012 (No. 202)
- Declaration on Social Justice for a Fair Globalization, 2008
- Employment Relationship Recommendation, 2006 (No. 198)
- ILO Declaration on Fundamental Principles and Rights at Work, 1998
- Occupational Safety and Health Convention, 1981 (No. 155)
- Discrimination (Employment and Occupation) Convention, 1958 (No. 111)
- Social Security (Minimum Standards) Convention, 1952 (No. 102)
- Right to Organise and Collective Bargaining Convention, 1949, No. 98

One trade unionist of the UNI Global Union Professionals and Managers group proposed in an interview with the author that two further references could offer assistance in responding to the risks posed in digitalized workplaces:

- *Guiding principles on business and human rights: Implementing the United Nations "Protect, Respect and Remedy" Framework* (UN, 2011); and
- *Guidelines for multinational enterprises* (OECD, 2011).

Conclusion

Workers face significant risks in the emerging world of digitalized work. This paper has presented examples of those environments at most risk of PPVH caused by newly digitalized workplaces and the associated DMMs which have proven to increase risks. Governments, unions and enterprises should regulate the risks that are created in digitalized working environments and monitor how data and technologies are used for decision-making. DMMs and the use of tracking technologies in workplaces have created substantial risks of PPVH, particularly when data is used in a way that does not allow for fair or qualified judgements.

The European Parliament (Forde et al., 2017) commissioned the study *The social protection of workers in the platform economy,* which explores how and where social protections are reduced in platform digitalized work. It makes policy recommendations around data provision, employment law, social security, tax and wage reform, standard setting for platforms and collective representation. The study emphasized the following protections:

- health care
- sickness
- maternity
- disability
- old age
- survivors' benefit
- employment injuries/ accidents at work and occupational diseases
- family
- unemployment
- guaranteed minimum resources
- long-term care

What has not been sufficiently addressed in responses presented here is the issue of collective bargaining. With the exception of the Hilfr/3F pilot collective agreement mentioned in Section II, there have been no other formal collective bargaining victories yet for workers, despite significant campaigning and protests, such as examples from the IWGB in the United Kingdom and FAUB in Germany. Uber has been regulated in London and Buenos Aires due to employment tribunals, but the extent to which these regulations will be carried out and affect other cities where Uber operates, is still to be seen. Automation and *Industrie 4.0* practices are increasingly being implemented in factory environments across the world, but trade union responses are still at an early stage, with little trade union activity documented in the Global South. To achieve an effective response to the risks of PPVH in digitalized work environments the roles of social dialogue and collective bargaining should be strengthened, together with the introduction of robust labour legislation.

The harmful working conditions such as those covered in the ILO's report on *Violence and Harassment Against Women and Men in the World of Work* (2017c) are compounded in the digitalized workplace. This paper adds to the full scope of the emerging violence and harassment which workers face – the unfair distribution of work, psychosocial health risks, loss of data protection rights, lack of representation, discrimination and overwork. The rapidly emerging evidence of PPVH inherent in digitalized work calls for urgent responses from the social partners to find innovative means to protect workers and to issue a new international labour standard that covers the full range of violence and harassment faced by workers in the modern workplace. Recognition of these risks are paramount to strengthening ILO's mandate to uphold international labour standards, and thereby contribute to good economic policy, labour law, enterprise practice and trade union responses.

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Appendix

Interviews were held by Dr Phoebe V. Moore in 2017 with the following individuals for the purposes of this working paper.

- Maurizio Atzeni, Researcher at the Centre for Labour Relations, National Research Council of Argentina
- Petra Bolster, Team Leader, *Federatie Nederlandse Vakbeweging* (FNV) (Federation of Dutch Trade Unions), Netherlands
- Christina Colclough, Director of Platform and Agency Workers, Digitalization and Trade, UNI Global Union, Nyon, Switzerland.
- Mags Dewhurst, Vice President, Independent Workers Union of Great Britain (IWBG) London.
- Bernard Gero Preuhs, Media Division, *Freie Arbeiterinnen– und Arbeiter–Union Berlin* (FAUB), Germany.
- Mark Hodge, consultant for Institute for Human Rights and Business (IHRB), London.
- Patrick Loos, Organizer, *IG Metall Bezirksleitung NRW, Projekt Arbeit 2020 in NRW* (Better Work 2020), Düsseldorf, Germany.
- Veronika Mirschel, Head of Freelancer Department, *Vereinte Dienstleistungsgewerkschaft* (ver. di), Berlin, Germany.
- Gabi Schilling, Lead Coordinator, *IG Metall Bezirksleitung NRW, Projekt Arbeit 2020 in NRW* (Better Work 2020), Düsseldorf, Germany.
- Six Silberman, Projekt Secretary, *IG Metall* Frankfurt, Germany.
- Anagha Tambe, Director of Krantijyoti Savitribai Phule Women's Studies Centre, Savitriba Phule Pune University, Pune, India.

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