

# Health and safety in the workplace of the future

## KEY FINDINGS

The prevalence of the following health and safety risks attributable to new technologies and patterns of work are currently under-researched: (1) psychosocial risks in the workplace; (2) physical collisions in confined spaces where “collaborative” and “professional service” robots (known as “cobots”) and workers are engaged in shared tasks, i.e. “shared workplaces”; and (3) musculoskeletal disorders (“MSDs”). **As such, consideration should be given to commissioning extensive research on the prevalence of such risks.**

Technological processes driving new ways of organising and delivering work, such as the rise in bogus self-employment, “zero-hours”/non-guaranteed minimum hours (“NGMH”) work contracts, “gig” economy, “platform” work, “on-demand” work and telework in the EU are significant insofar as such workers are not always covered by existing European Union health and safety legislation (“H&S acquis”). Many of the 24 occupational health and safety (“OSH”) Directives and the Working Time Directive only cover “workers”, and exclude the bogus self-employed or individuals providing services and labour on the basis of other personal work contracts.

If scientific research were to indicate the need for legislation to address psychosocial risks in the workplace, the potential for physical collisions in “shared” workplaces and/or MSDs which are attributable to such new technologies and patterns of work, there ought to be further exploration of new legislation or alternatively, amendment of the H&S Framework Directive to clarify that the obligations of employers include the mitigation of these risks.

Consideration should be given to amending the H&S acquis to extend health and safety protection in the EU beyond the category of “worker” to the bogus self-employed, “zero-hours”/NGMH workers, “gig” economy, “platform” work and “on-demand” workers and teleworkers.

## Introduction: objectives of the briefing note

Health and safety at work is of paramount importance in the European Union, comprising one of the key principles of the European Pillar of Social Rights<sup>1</sup>. Drawing on recent academic research and reports by policy-makers, this note identifies future risks to the physical and mental health and safety of workers that are attributable to technology-driven changes in the workplace. The discussion divides technology-driven workplace changes that give rise to potential health and safety risks into the following three camps:

(1) Those that generate modifications to working conditions in the workplace:

- Automation with increasing use of robotics and digitalisation, for example, new types of working



- environments such as virtual reality (“VR”) and augmented reality (“AR”) (section B);
- Increasing recourse to algorithms in the workplace (section B); and
- The adoption of surveillance technologies to monitor worker conduct in the workplace (section B).

(2) Those giving rise to new patterns for the organisation and delivery of work:

- “Bogus self-employment”, including “zero-hours” and “NGMH” contracts (section C);
- “Gig” economy and “platform” working (section C); and
- Teleworking (section C).

(3) Other health and safety risks.

An initial explanation is provided of the above technological innovations producing transformations in working conditions (section B), before turning to discuss the novel patterns for the delivery and structure of working practices (section C). The analysis then engages in a “gap-identification” exercise by identifying the relevant gaps in the H&S acquis and whether/how they ought to be filled (section D).

## Summary of technology involved in changing working conditions

The principal kinds of technology having, and likely to have, a lasting effect on working conditions and that are causing, or likely to cause, issues for workplace health and safety are automation/digitalization and the use of robots in the workplace, which includes the increasing prevalence of algorithms in workplace decision-making, and workplace monitoring and surveillance. This feeds into “industry 4.0” and the “all-connected” working environment, with a new role for humans in automated workplaces (involving VR and AR). **It should be stressed that the health and safety risks of these new technologies are currently under-researched, so a key recommendation is that an expert assessment of the potential risks requires further exploration.**

### Automation

A great deal of the discussion concerning automation in the media, amongst NGOs, in the academic literature, and by the European Parliament itself, is/has been dedicated to debating whether existing jobs, trades and occupations will be automated out of existence<sup>2</sup>. However, comparatively less research has focused on the health and safety risks linked to the use of robots in, and the automation of, the workplace<sup>3</sup>. The modern workplace is also characterised by “fluidity” and digitalization whereby there is increasing use of technology such as robots, tablets, laptops and other devices outside the workplace and off the premises of employers, albeit the workers are performing their work duties. These “fluid” workplaces feed into the “always-on” phenomenon, whereby workers never disengage themselves from their work because such technology is never switched off, e.g. “industry 4.0” and the “all-connected” concept of the working environment. Moreover, substantial digital transformation through assistive technologies characterise new ways of working, enabling AR and VR to transform the workplace<sup>4</sup>.

### Use of robots in the workplace

In a 2017 resolution, the European Parliament recognised:

“... the great potential of robotics for the improvement of safety at work by transferring a number of hazardous and harmful tasks from humans to robots but at the same time, notes their potential for creating a set of new risks owing to the increasing number of human-robot interactions at the workplace; underlines in this regard the importance of applying strict and forward-looking rules for human-robot interactions in order to guarantee health, safety and the respect of fundamental rights

at the workplace”<sup>5</sup>.

Some workplace processes are fully automated and “robotised”, whereas others entail a mixture of “collaborative” and “professional service” robots (known as “cobots”) and people engaged in shared tasks: these are referred to as “shared workplaces”<sup>6</sup>. New professions such as automation engineer, automation inspection engineer and software developers, etc. are emerging or becoming more sophisticated, which gives rise to new threats to health and safety, for example cognitive and emotional decline, high demands for human reliability, etc. On the one hand, increasingly sophisticated systems can be seen as de-skilling many tasks, leading to a loss of job satisfaction (an important psychosocial variable) and a decreased sense of personal worth. On the other hand (and to some extent contradictorily) the remaining jobs requiring human input are often those requiring a higher level of decision-making. This means that the consequences of such decisions have the potential to be much more far-reaching, leading to the imposition of greater responsibility and pressures on workers.

Although in the case of fully robotised and automated workplaces, this seems to be less of a problem, it should be stressed that maintenance, monitoring, decision and repair activities are more likely to be driven by humans. As for contexts where humans work with robots in open and shared spaces, the robots will be fully automated and ensuring optimal functioning in proximity with humans will require the processing of a huge amount of data, including personal data. Depending on the workplace, incomplete data may create risks to physical health and safety. There are also issues in connection with working with robots in confined spaces: violation procedures and safeguarding techniques are compulsory measures employers must take to protect maintenance and repair personnel and workers in shared workplaces, e.g. from collisions. However, human errors in working around robots and automated technologies can lead to production losses as well as health and safety hazards.

### Summary of potential health and safety risks of automation and the use of robots in the workplace

The potential health and safety risks of the above are (1) psychosocial harms, (2) MSDs and (3) potential collisions in “shared” workplaces. Each of these possible risks are now considered in turn.

- (1) On the wider use of robotics in the workplace and other forms of automation, including related issues such as “fluidity”, “shared workplaces”, the “always-on” phenomenon, digitalization, “industry 4.0” and the “all-connected” approach to the working environment, existing evidence suggests that **there is the potential for adverse psychosocial effects on workers**, tending to exacerbate the following factors:
  - a. Demands – poorly designed/managed workload, work scheduling, work organisation, job design and physical environment.
  - b. Control – lack of skill discretion and lack of authority.
  - c. Support – inappropriate proactive and reactive support, failure to match people’s skills with their job, failure to take account of other individual factors.
  - d. Relationships and poor workplace behaviour – poorly designed/managed procedures for eliminating damaging conflict at individual/team level (bullying, harassment or violence).
  - e. Role – role conflict, inappropriate levels of role ambiguity and responsibility.
  - f. Change – a lack of (i) planned, active strategy for change, (ii) appropriate consultation with employees over change and (iii) appropriate support for employees, and poorly designed/managed (iv) strategies for overcoming resistance and (v) new ways of working or new technology<sup>7</sup>.

Recently completed research has also found that, although the capability to access work communications such as emails outside working hours (a key feature of the “always on” culture) can be regarded as a positive characteristic, this only appears to apply when the individual freely chooses to do so and that any positive attributes are “lost” where such access is seen as a

requirement or obligation<sup>8</sup>. This could suggest that where employers block out of hours access, this might be counter-productive. **However, the current research is limited and further research ought to be commissioned to investigate whether automation technologies such as the use of robots in the workplace, etc. can have adverse psychosocial health effects on workers.**

- (2) MSDs, which are the most prominent cause of work-related absences<sup>9</sup>, remain a particular concern and the existing gaps in the H&S acquis relating to MSDs are well-documented<sup>10</sup>. The risk of MSDs arise from the application of force, repetitive activities and poor working postures. There is some initial evidence to the effect that it is possible that automation and “shared” workplaces in particular, may lead to an exacerbation of the risks of MSDs<sup>11</sup>. However, the full picture is incomplete and as such, **further research is needed on the negative effects on MSDs of (1) fully automated and “robotised” and (2) “shared” workplaces.**
- (3) In shared workplaces, there is the potential for physical health and safety concerns. The possibility of collisions between cobots and humans operating alongside them should not be discounted. As such, **further research is needed on the technological processes that may be put in place to enable cobots to predict collisions and reduce physical cobot-human interactions.**
- (4) There is widespread evidence that working with display screen equipment does not cause visually mediated ill-health, with no *a priori* grounds for assuming that the visual impact of AR or VR would be any different. However, **some research suggests that long and short term immersion in VR and AR can have detrimental consequences for the mental health of workers, based on the duration and/or the narrative**<sup>12</sup>. This feeds into (1) above regarding the potential for psychosocial risks.

### Algorithms in the workflow

Employers are increasingly resorting to algorithms in the workplace to mine data about their employees, monitor their performance and build up staff profiles. Technological improvements enable employers to harness algorithms in the workflow to make real-time predictions about the behaviour of workers as a means of enhancing their performance and taking decisions about broader workforce management. Algorithms can also be used to gather data about the online footprints of staff, by trailing their digital activity on their smartphones, checking their LinkedIn profiles, the content of their emails, the keystrokes of their desktop or laptop mouse, and their likes and posts on Facebook. As such, the behaviour of employees can be tracked, as well as their attitudes to work and general moods. The enhanced opportunities that algorithmic decision-making and data mining techniques provide for managerial surveillance and monitoring give rise to privacy concerns, as staff will no longer be able to keep their innermost thoughts and feelings private<sup>13</sup>.

The main potentially negative health and safety risk of the growing use of algorithms on workers’ health and safety concerns psychosocial health as, in more serious cases, the sense of alienation that such monitoring and surveillance might generate may have adverse psychosocial consequences<sup>14</sup>. Although the link between algorithmic decision-making, data mining techniques, managerial surveillance and monitoring and psychosocial health is currently under-researched, initial indications suggest that such risks exist. **Overall, it is recommended that a deeper level of research analysis be undertaken with a view to identifying those risks.**

### Surveillance technologies

The deployment of algorithms in the workplace and data mining to build up staff profiles is only one amongst a range of surveillance technologies that may be adopted by employers to monitor the conduct of their workers. Other monitoring may involve harnessing tablets, laptops and other mobile and wearable

devices (e.g. microchip implants, fitness devices and haptic sensing bands) of workers inside and outside the boundaries of the workplace. Monitoring can now include the psychophysiology of the worker (e.g. brain signals, oximeter, temperature of the worker, and thus derive stress, fatigue and burnout rates). Current applications include monitoring for excessive physiological responses (heart rate, body temperature) in adverse thermal environments; and safety (motion) monitoring for isolated lone workers or workers at height. Although many such devices are worn for 'benign' reasons (such as part of corporate wellness campaigns), the devices often also have the functionality to collect information such as location, hours worked, rest breaks and activity levels that could be used for clandestine purposes.

The increasing sophistication of such techniques creates further potential for yet another threat to the psychosocial well-being of workers, as the "always on" phenomenon and "all-connected" concept of work provides ample and extended opportunities for employers to check up on their staff and thus cut into their work-life balance. This is of key importance to the EU, as it conflicts with the prioritisation of a good work-life balance and flexible forms of working in the existing Work-Life Balance Initiative<sup>15</sup>, and particularly recital 34 and article 9 of the Work-Life balance Directive<sup>16</sup>, which are deliverables emerging from the European Social Pillar of Rights<sup>17</sup>.

## Summary of new patterns for the organisation and delivery of work

Certain forms of technological change are (i) having, and likely to have, a lasting effect on patterns for the organization of and delivery of work in the workplace, and (ii) causing, or likely to cause, issues for workplace health and safety, as follows.

### Bogus self-employment

The prevalence and distribution of bogus self-employment and "zero-hours"/NGMH contracts has grown in recent years in the EU. The expression "bogus self-employment" is a reference to working individuals who are treated as self-employed for the purposes of tax, commercial and company law, but are subject to subordination and dependence at the hands of an employing entity with whom they contract<sup>18</sup>. As such, they look similar to employees or workers. Section 27A of the Employment Rights Act 1996 in the UK defines a zero-hours/NGMH worker as a worker who has no minimum hours of work guaranteed by the employing entity. There are no official EU research statistics clarifying the distribution and prevalence of bogus self-employment and "zero-hours"/NGMH contract workers in the EU, but recent research suggests that approximately 4.3 % to 5.3 % of workers in the EU are engaged in bogus self-employment<sup>19</sup>. These forms of irregular employment have become popular as employees seek more flexibility in patterns of work outside an employment relationship and employers seek to match spikes in market demands with adaptability of labour supply. Contracting with bogus self-employed and zero-hours/NGMH workers enables employers to offload labour when market demands drop or arrange short-term cover where staff take sickness, maternity, paternity, etc. leave.

There **are actual health and safety risks associated with the increase in bogus self-employment since many EU Directives in the H&S acquis do not cover the self-employed**. This is problematic as questions arise as to the identity of the duty-bearer in respect of health and safety obligations, e.g. in the case of Hermes couriers ostensibly acting as self-employed, who owes the obligations relating to manual handling risks under the Manual Handling Directive (90/269/EEC) – is it the courier or Hermes as the "employer"? As for potential health and safety risks, commentators have suggested the risk of heightened psychosocial harms<sup>20</sup>.

## Gig economy and platform work

Technological advances have enabled firms to remove labour market barriers by harnessing the power of algorithms to act as middlemen between (i) individuals or businesses seeking to hire labour for short-term engagements and (ii) larger pools of candidate workers each seeking a specific work “gig”. Companies such as Uber, Deliveroo and Foodora are classic illustrations of commercial operators who intermediate between (i) and (ii). Algorithms – which enable companies such as Uber, etc. to marshal technological intermediation – are central to the “gig” economy, “on-demand” and “platform” forms of working<sup>21</sup>. Unfortunately, there are no official EU research statistics clarifying the distribution and prevalence of such forms of work in the EU.

Leaving aside the vexed question of the employment status and protection of such “gig” economy, “on-demand” and “platform” workers, **there are potential health and safety risks**. As noted above, some of the EU Directives forming part of the H&S acquis do not cover individuals providing their labour who are not “workers”, which is problematic in the case of “gig” economy, “on-demand” and “platform” workers. Likewise, it has been suggested that the application of algorithms in these forms of work can increase the potential for psychosocial risks.

## Teleworking

The 2002 European Framework Agreement on Teleworking defined teleworking as “a form of organising and/or performing work, using [IT], in the context of an employment contract/relationship, where work, which could also be performed at the employer’s premises, is carried out away from those premises on a regular basis”<sup>22</sup>. Teleworking has become a prevalent form of working as employers seek to drive down costs of sales and production.

**The risks to worker health and safety are principally psychosocial** insofar as absences from the employer’s premises and social interactions with colleagues may generate a sense of isolation. Moreover, long-range managerial monitoring, demands for constant availability and blurred boundaries between private life and work may give rise to psychosocial health and safety concerns<sup>23</sup>. **A recent review of the health effects of telework concluded that, although in general there was a positive association between such work and worker health, there could be negative impacts such as stress and depression**<sup>24</sup>.

## Summary of health and safety risks

The nature of the health and safety risks which potentially or actually arise from new technologies in the workplace and patterns for the organisation and delivery of work are set out in Table 1.

Table 1: New Work Trends and Health & Safety Risks

New Work Trends	Potential Health and Safety Risks	Actual Health and Safety Risks
Automation, digitalization, “fluid” & “shared” workplaces and the “always-on” culture	(1) Psychosocial harms & (2) Physical collisions in confined spaces in “shared” workplaces & (3) MSDs	
Use of algorithms in the workplace	(1) Psychosocial harms & (2) Physical collisions in confined spaces in “shared” workplaces	
Surveillance technologies	Psychosocial harms	

Bogus self-employment, etc.	Psychosocial harms	H&S acquis does not cover these forms of working
“Gig economy”, “on-demand” and “platform” forms of working	Psychosocial harms	H&S acquis does not cover these forms of working
Teleworking	Psychosocial harms	

Source: Author’s own compilation

## European health and safety legislation and technology-driven gaps

### Overview of occupational health and safety regulation

The existing H&S acquis can be divided into 24 occupational safety and health (“OSH”) Directives and the Working Time Directive (“WTD”). Some of these OSH Directives are (i) general in nature in the sense of laying down a framework or “umbrella” (“General Directives”), whereas others (ii) are specific to particular kinds of workers (“Type-of-Worker Directives”), (iii) relate to certain sectors of the economy (“Sector-specific Directives”), or (iv) address specific physical or chemical workplace hazards (“Chemical or Physical hazards Directives”). See Table 2 below.

Table 2: Health and Safety Acquis

Nature of Directive	Title of Directive
General	(1) <b>H&amp;S Framework Directive</b> (89/391/EEC) (2) <b>Workplace Directive</b> (89/654/EEC) (3) <b>Work Equipment Directive</b> (2009/104/EC) (4) <b>Use of Personal Protective Equipment Directive</b> (89/656/EEC) & (5) <b>Occupational Safety and Health Signs Directive</b> (92/58/EEC)
Type-of-Worker	(1) <b>Temporary workers Directive</b> (91/383/EEC) (2) <b>Pregnant/breastfeeding workers Directive</b> (92/85/EEC) & (3) <b>Young Workers’ Directive</b> (94/33/EC)
Sector-specific	(1) <b>Construction Directive</b> (92/57/EEC) (2) <b>Mines and Quarries Directive</b> (92/104/EEC) (3) <b>Drilling Directive</b> (92/91/EEC) (4) <b>Medical treatment on board vessels Directive</b> (92/29/EEC) & (5) <b>Fishing Vessels Directive</b> (93/103/EC)
Chemical or Physical hazards	(1) <b>Vibration Directive</b> (2002/44/EC) (2) <b>Noise Directive</b> (2003/10/EC) (3) <b>Electromagnetic Fields Directive</b> (2004/40/EC) (4) <b>Artificial Optical Radiation Directive</b> (2006/25/EC) (5) <b>Safety and Health Protection of Workers potentially at Risk from Explosive Atmospheres Directive</b> (1999/92/EC) (6) <b>Carcinogens or Mutagens Directive</b> (“CMD”) (2004/37/EC) and <b>amending Directives 2017/2398/EU and 2019/130/EU</b> (7) <b>Chemical Agents Directive</b> (98/24/EC) (“CAD”) (8) <b>Asbestos Directive</b> (2009/148/EC) (9) <b>Biological Agents Directive</b> (2000/54/EC) (10) <b>Manual Handling Directive</b> (90/269/EEC) & (11) <b>Display Screen Equipment Directive</b> (90/270/EEC) (“DSE Directive”)
Social/Labour-related	<b>Working Time Directive</b> (WTD) (2003/88/EC)

Source: Author’s own compilation

The H&S Framework Directive imposes an obligation on employers to produce six **common processes and mechanisms (“CPMs”)** in relation to health and safety risks in the workplace, namely the requirement to **conduct risk assessments**; to put in place and use **preventive and protective services**; to **supply information** to workers about health and safety; to engage in the **training of workers** on health and safety; to engage in **consultation with workers**; and to undertake **health monitoring and surveillance**. These

CPMs also feature in each of the remaining 23 OSH Directives, which place requirements on employers that are specific to certain hazards or chemicals, types of workers, or particular workplaces, depending on whether the Directive is a Type-of-Worker Directive, Sector-specific Directive or Chemical or Physical hazards Directive.

## Gaps in occupational health and safety regulation

### Arising from automation/digitalisation

There are no EU Directives which directly address automation and advances in the use of robotics in the workplace, including “fluid workplaces” and the attendant health and safety concerns. **If scientific research were to indicate the need for legislation to address psychosocial harms caused by automation, etc a case could be made for a detailed legislative solution with prescriptive obligations pertaining to psychosocial risks, i.e. a Chemical or Physical hazard-specific Directive.** This issue was discussed in the main report of the REFIT evaluation<sup>25</sup>. Such a Chemical or Physical hazard-specific Directive would replace the existing collective agreements concluded by Social Partners at the national level in some Member States<sup>26</sup> and the existing Commission Guidance Document<sup>27</sup> addressing psychosocial risks in the workplace more generally. Any such measure would need to take into account the growing number of Member States that have enacted national legislation to cover at least some psychosocial issues. **A less radical alternative to a new Chemical or Physical hazard-specific Directive would be simply to adjust article 5(1) of the H&S Framework Directive** (which imposes a general obligation on employers to ensure the health and safety of workers in the workplace) to clarify that this requirement includes the mitigation of psychosocial risks, which is extensive enough to cover such risks where they are attributable to automation, advances in the use of robotics, digitalization, “fluid” and “shared” workplaces, etc.

There are other relevant gaps in the H&S acquis related to actual health and safety risks attributable to automation, etc. The following are areas for further, rather than urgent, exploration and consideration:

- (1) The definition of “working time” in article 2(1) of the Working Time Directive (WTD) may require to be modified to cater for “fluid” workplaces, so that health and safety risks addressed by the WTD include those relevant to working time spent off-site;
- (2) The definition of “workplace” in article 2 of the Workplace Directive provides as follows:
 

“the place intended to house workstations on the premises of the undertaking and/or establishment and any other place within the area of the undertaking and/or establishment to which the worker has access in the course of his employment.”

The same definition is also found in many other OSH Directives. There is a concern it is narrow and unable to cater for new patterns of working, e.g. “fluid” workplaces. In such circumstances, the key problem is that when workers use technology at home or in another “fluid” workplace, it unclear who is responsible for OSH issues (such as the minimum requirements for a workplace under the Workplace Directive and for workstations under the DSE Directive), e.g. is it the worker working in the “fluid” workplace or the employer? In any future evaluation of the Workplace Directive, the definition of “workplace” in article 2 could be expanded to explicitly cover “fluid” workplaces; and
- (3) The definition of “work equipment” in article 2(a) of the Work Equipment Directive includes “any machine, apparatus, tool or installation used at work”. There is a concern that this fails to cover new technology or equipment used in the workplace, such as exoskeletons.

### Arising from algorithms in the workflow

Like automation, there are no EU Directives which directly address the health and safety risks of the use of algorithms in the workplace. Legislation is lacking, which makes answering certain legal questions difficult,



e.g. whose fault is it where a fully automated machine is responsible for an accident? If scientific research were to indicate the need for legislation to address psychosocial harms, as noted above in the discussion in this section concerning automation, this may **possibly be promulgated as a Chemical or Physical hazards Directive**. The more straightforward alternative would be to **amend article 5(1) of the H&S Framework Directive**, which imposes a general obligation on employers to ensure the health and safety of workers in the workplace, to clarify that this requirement includes the mitigation of psychosocial risks and that it is extensive enough to cover such risks where attributable to algorithms in the workflow, etc.

#### Arising from surveillance technologies

The gaps in existing research on the health and safety risks relating to the use of algorithms in the workplace are mirrored in the case of workplace monitoring and surveillance. As for the absence of health and safety legislation governing surveillance technologies in the workplace, there are also potential problems attributable to the narrowness of the definition of “workplace” in the Workplace Directive (see the discussion above), since certain surveillance technology may not be covered.

#### Arising from bogus self-employment

The EU has recently legislated for employers to provide notice to workers and information which indirectly confers some protection to workers engaged in bogus self-employment or on “zero-hours”/“NGMH” contracts. The Transparent and Predictable Working Conditions Directive<sup>28</sup>, which is a direct response to principle 5 of the EU Social Pillar of Rights, seeks to prevent certain abuses of such forms of working and contracts<sup>29</sup>. The EU Parliament has also passed a resolution relating to the social security protection of those engaged in bogus self-employment<sup>30</sup>.

There are gaps in the H&S acquis related to potential and existing health and safety risks attributable to bogus self-employment and “zero-hours”/“NGMH” contracts, as follows:

- (1) As noted above, there is no EU legislation addressing psychosocial risks. Again, if scientific evidence were strong enough to suggest a need for legislation to address psychosocial harms caused by bogus self-employment and “zero-hours”/NGMH contracts, there would be a case for either a new Chemical or Physical hazard-specific Directive devoted to psychosocial risks or alternatively, in any future review of the 24 OSH Directives and WTD, it could be clarified that the obligation in article 5(1) of the H&S Framework Directive (which imposes a general obligation on employers to ensure the health and safety of workers in the workplace) also includes the duty to mitigate psychosocial risks in the workplace that are caused by these forms of working.
- (2) The personal scope of the 24 OSH Directives and WTD ought to be expanded to “workers” to cover the bogus self-employed and “zero-hours”/“NGMH” contract workers. This would ensure that the employer is under an obligation to mitigate the health and safety risks which affect them. This could be addressed in any future review of these Directives, including the H&S Framework Directive.
- (3) Likewise, in any future evaluation of the Workplace Directive, the definition of “workplace” in article 2 could be expanded to explicitly cover the bogus self-employed and “zero-hours”/“NGMH” contract workers whose working environment is routinely off of the premises of their employer.

Concerns about the scope of the individuals protected by the H&S acquis transcends bogus self-employment and “zero-hours”/“NGMH” contract workers, e.g. whether domestic workers and family members should also be included. Technology-driven trends involved in changing the nature of employment will clearly exacerbate this situation.

## Arising from the gig economy and platform work

Suggestions for reform of the H&S acquis in light of health and safety risks associated with “gig” economy, “platform” and “on-demand” work, and other considerations to take into account, are as follows:

- (1) Again, the potential psychosocial harms which may be caused by the sense of isolation and precariousness related to “gig” economy, “platform” and “on-demand” working have the potential to heighten the scope for such harms to emerge. Depending on the findings of future scientific research, there may be a case for a Chemical or Physical hazard-specific Directive or amendment to the existing H&S acquis to mitigate psychosocial risks in the workplace that are caused by “gig” economy, “platform” and “on-demand” working.
- (2) There are concerns about the lack of application of the H&S acquis to “gig” economy, “platform” and “on-demand” working. For example, if a well-known firm engaged in intermediation instructs notionally self-employed couriers or drivers to deliver parcels or passengers, who is legally responsible for compliance with European health and safety obligations (e.g. manual handling risks under the Manual Handling Directive, etc.)? Is it the “employer” or the “gig” economy worker? In any future evaluation of the 24 OSH Directives and WTD, including the H&S Framework Directive, an option would be to extend their personal scope to cover these working patterns.
- (3) Once again, as above, the definition of “workplace” in article 2 of the Workplace Directive perhaps ought to be extended to include “gig” economy, “platform” and “on-demand” workers.

## Arising from teleworking

Teleworking gives rise to health and safety risks which are the same as, or similar to, those applicable in the case of bogus self-employment, “zero-hours”/NGMH contracts and “gig” economy, “platform” and “on-demand” work, e.g. psychosocial risks, arising from the narrowness of the definition of the “workplace” in the Workplace Directive, etc. Rather than rehash each of the issues, reference is made to the points raised above.

## Other gaps in the H&S Acquis

Certain workplace practices generate a high risk of MSDs, which are not adequately addressed by the H&S acquis<sup>31</sup>. Some MSDs are dealt with by the Manual Handling Directive and the DSE (Display Screen Equipment) Directive, but the need for a more comprehensive legal instrument on MSDs was flagged by the European Parliament in its 2015 resolution on the EU Strategic Framework on Health and Safety at Work 2014-2020<sup>32</sup>. The issue of MSDs is also a prominent concern as a result of the EU’s ageing workforce. It should also be stressed that the REFIT evaluation identified the need to explore possible amendments to (or clarification of) the H&S acquis to cater for the emergence of new technologies and the new products and processes to which they lead<sup>33</sup>. Thus it could be suggested that the emergence of green technologies and alternative energy sources will lead to changes in working practices (e.g. increased lone working) and workplace exposures (e.g. electromagnetic fields) and consideration should be given to the extent to which the existing provisions of the H&S Framework Directive (and associated individual directives) apply or whether more explicit legislative provisions might be required. Finally, the REFIT evaluation identified specific concerns that the provisions of the CAD (Chemical agents directive) and the CMD (Carcinogens or Mutagens Directive) are insufficient to address the emerging health and safety risks caused by nanoparticles and nanomaterials in the workplace, which were not addressed by the amending Directives 2017/2398/EU and 2019/130/EU<sup>34</sup>. This view was also discussed in the in-depth report on the CAD published as part of the REFIT evaluation<sup>35</sup>. Although subsequent amendments to the CMD have added further specific substances, these amendments do not address these concerns.

- <sup>1</sup> See principle 10 at [https://ec.europa.eu/commission/priorities/deeper-and-fairer-economic-and-monetary-union/european-pillar-social-rights/european-pillar-social-rights-20-principles\\_en](https://ec.europa.eu/commission/priorities/deeper-and-fairer-economic-and-monetary-union/european-pillar-social-rights/european-pillar-social-rights-20-principles_en).
- <sup>2</sup> See The Guardian, 24 March 2017, "Millions of UK Workers at Risk of Being Replaced by Robots, Study Says", available at <https://www.theguardian.com/technology/2017/mar/24/millions-uk-workers-risk-replaced-robots-study-warns>; International Labour Organization, Work for a brighter future 43 (January 2019), available at [https://www.ilo.org/wcmsp5/groups/public/-/dgreports/-/cabinet/documents/publication/wcms\\_662410.pdf](https://www.ilo.org/wcmsp5/groups/public/-/dgreports/-/cabinet/documents/publication/wcms_662410.pdf); M. Arntz, T. Gregory and U. Zierahn (2016), "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis", OECD Social, Employment and Migration Working Papers, No. 189, OECD Publishing, Paris, available at <http://dx.doi.org/10.1787/5jlz9h56dvq7-en>; C. B. Frey and M. A. Osborne, "The Future of Employment: How Susceptible are Jobs to Computerization?", available at [https://www.oxfordmartin.ox.ac.uk/downloads/academic/The\\_Future\\_of\\_Employment.pdf](https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf); and Recital J of the European Parliament's Recommendations to the Commission on Civil Law Rules on Robotics, EUR. PARL. DOC. P8 TA(2017)0051 (2017), available at [http://www.europarl.europa.eu/doceo/document/TA-8-2017-0051\\_EN.html?redirect](http://www.europarl.europa.eu/doceo/document/TA-8-2017-0051_EN.html?redirect).
- <sup>3</sup> There is no autonomous EU legal definition of a "robot" or "robotics", but in the European Parliament's Recommendations to the Commission on Civil Law Rules on Robotics, (see above), principle 1 calls on the European Commission to promulgate such a definition taking into account each of the following characteristics of a smart robot: (1) (inter-connectivity); (2) self-learning from experience interaction (optional criterion); (3) at least a minor physical support; (4) the adaptation of its behaviour and actions to the environment; (5) absence of life in the biological sense.
- <sup>4</sup> See: <https://www.forbes.com/sites/bernardmarr/2019/07/17/the-important-risks-and-dangers-of-virtual-and-augmented-reality/#79b364223d50>.
- <sup>5</sup> Recommendations to the Commission on Civil Law Rules on Robotics, EUR. PARL. DOC. P8 TA(2017)0051 (2017) at para. [46]. See also F. Hendrickx, "From Digits to Robots: The Privacy Autonomy Nexus in New Labour Machinery" (2019) 40 *Comparative Labor Law & Policy Journal* p. 365, pp. 369-371.
- <sup>6</sup> See Safety and Health Magazine, 25 March 2018, "Robots in the Workplace", available at: <https://www.safetyandhealthmagazine.com/articles/16789-robots-in-the-workplace> (last visited 3 September 2019).
- <sup>7</sup> European Agency for Safety and Health at Work Discussion Paper (5 July 2019), "OSH and the Future of Work: Benefits and Risks of Artificial Intelligence Tools in the Workplaces" at pp. 2-3 and p. 6, available at <https://osha.europa.eu/en/tools-and-publications/publications/osh-and-future-work-benefits-and-risks-artificial-intelligence/view>.
- <sup>8</sup> Healthy Use of New Display Screen Equipment (HEADSE). Workplace Safety & Health Institute, Singapore. In press. Summary available at: <https://www.wsh-institute.sg/research-publications/research-reports>.
- <sup>9</sup> See F, G and 26 of the European Parliament's written resolution of 25 November 2015 on the EU Strategic Framework on Health and Safety at Work 2014-2020, available at [https://www.europarl.europa.eu/doceo/document/TA-8-2015-0411\\_EN.html](https://www.europarl.europa.eu/doceo/document/TA-8-2015-0411_EN.html).
- <sup>10</sup> Evaluation of the Practical Implementation of the EU Occupational Safety and Health (OSH) Directives in EU Member States: Executive Summary, November 2015, p. 5, available at <https://ec.europa.eu/social/main.jsp?catId=89&langId=en&newsId=2709&moreDocuments=yes&tableName=news> and Commission "Safer and Healthier Work for All – Modernisation of the EU Occupational Safety and Health Legislation and Policy" (SWD2017 9 final) at pp. 8-10, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2017:012:FIN>.
- <sup>11</sup> European Agency for Safety and Health at Work Discussion Paper (n. 7 above), p. 2.
- <sup>12</sup> See <https://www.frontiersin.org/articles/10.3389/frobt.2016.00003/full>: M. Madary and T. K. Metzinger "Real Virtuality: A Code of Ethical Conduct. Recommendations for Good Scientific Practice and the Consumers of VR-Technology" (2016) *Front. Robot. AI* 3:3. There is little evidence that computer screens in VR and AR technology cause "digital eye strain", including dry or painful eyes, headaches or blurred vision.
- <sup>13</sup> A. R. Barzilay, "Data Analytics at Work: A View from Israel on Employment Privacy and Equality in the Age of Data-Driven Employment Management" (2019) 40 *Comparative Labor Law & Policy Journal* p. 421, pp. 422-426.
- <sup>14</sup> M. Otto, "Workforce Analytics v Fundamental Rights Protection in the EU" (2019) 40 *Comparative Labor Law & Policy Journal* p. 389, pp. 392-393; E. Kaplan, "The Spy Who Fired Me: The Human Costs of Workplace Monitoring" *Harper's Magazine* (March 2015) pp. 31-40; European Agency for Safety and Health at Work Discussion Paper n 7 above) at pp. 3-4.
- <sup>15</sup> See <https://ec.europa.eu/social/main.jsp?catId=1311&langId=en>.
- <sup>16</sup> 2019/1158/EU (OJ 2019 L188/79). See <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L1158&from=EN>.
- <sup>17</sup> See principle 9 at [https://ec.europa.eu/commission/priorities/deeper-and-fairer-economic-and-monetary-union/european-pillar-social-rights/european-pillar-social-rights-20-principles\\_en](https://ec.europa.eu/commission/priorities/deeper-and-fairer-economic-and-monetary-union/european-pillar-social-rights/european-pillar-social-rights-20-principles_en).
- <sup>18</sup> See C. C. Williams and I. A. Horodnic, "Evaluating the prevalence and distribution of dependent self-employment: some lessons from the European Working Conditions Survey" (2018) 49 *Industrial Relations Journal* p. 109, pp. 110-111.
- <sup>19</sup> *Ibid*, p. 122.
- <sup>20</sup> European Agency for Safety and Health at Work Discussion Paper (n. 7 above) at p. 9.
- <sup>21</sup> See C. Schubert and M. Hutt, "Economy-on-demand and the Fairness of Algorithms" (2019) p. 10, *European Labour Law Journal* p. 3, pp. 5-10 for an explanation as to how algorithms enable the platform economy.
- <sup>22</sup> See <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Ac10131>.
- <sup>23</sup> See H. Paridon and M. Hupke, "Psychosocial Impact of Mobile Telework: Results from an Inline Survey" (2009) 1 *Europe's Journal of Psychology* p. 1.
- <sup>24</sup> A. I. Tavares "Telework and Health Effects Review" (2017) 3 *International Journal of Healthcare* pp. 30-36.
- <sup>25</sup> Evaluation of the practical implementation of the EU occupational safety and health (OSH) directives in EU Member States - Main report (2017) p. 197. available at: <https://ec.europa.eu/social/main.jsp?catId=148&langId=en&moreDocuments=yes>.
- <sup>26</sup> See the discussion in pp. 57-63 of "Psychosocial Risks in Europe: Prevalence and Strategies for Prevention", a joint report from the European Foundation for the Improvement of Living and Working Conditions and the European Agency for Safety and Health at Work, available at <https://osha.europa.eu/en/tools-and-publications/publications/reports/psychosocial-risks-eu-prevalence-strategies-prevention>. A collective agreement has contractual status (except in UK Law, unless otherwise specified) and can be invoked by trade unions to take legal proceedings against employers or employers' associations where they are in breach of its terms.

- <sup>27</sup> See pp. 23-27 of European Commission Staff Working Document, “Health and Safety at Work is Everybody’s Business: A Practical Guidance for Employers”, available at <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:52017SC0009>.
- <sup>28</sup> 2019/1152 (OJ L186/105).
- <sup>29</sup> See principle 5 at [https://ec.europa.eu/commission/priorities/deeper-and-fairer-economic-and-monetary-union/european-pillar-social-rights/european-pillar-social-rights-20-principles\\_en](https://ec.europa.eu/commission/priorities/deeper-and-fairer-economic-and-monetary-union/european-pillar-social-rights/european-pillar-social-rights-20-principles_en).
- <sup>30</sup> See European Parliament resolution of 14 January 2014 on social protection for all, including self-employed workers (2013/2111(INI)) (2016/C 482/07), available at <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014IP0014&from=GA> (OJ C 482/48).
- <sup>31</sup> Evaluation of the Practical Implementation of the EU Occupational Safety and Health (OSH) Directives in EU Member States: Executive Summary (n 10 above), p. 5, and Commission Communication to the European Parliament, Council, The European Economic and Social Committee and the Committee of the Regions: Safer and Healthier Work for All – Modernisation of the EU Occupational Safety and Health Legislation and Policy (SWD2017 9 final), pp. 8-10, available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2017:012:FIN>.
- <sup>32</sup> European Parliament resolution of 25 November 2015 on the EU Strategic Framework on Health and Safety at Work 2014-2020. available at: [https://www.europarl.europa.eu/doceo/document/TA-8-2015-0411\\_EN.html](https://www.europarl.europa.eu/doceo/document/TA-8-2015-0411_EN.html) (last visited 16 September 2019).
- <sup>33</sup> See Evaluation of the Practical Implementation of the EU Occupational Safety and Health (OSH) Directives in EU Member States: Executive Summary (n. 10 above) and Evaluation of the Practical Implementation of the EU Occupational Safety and Health (OSH) Directives in EU Member States: Main Report, November 2015, pp. 158-241, available at: <https://ec.europa.eu/social/main.jsp?catId=148&langId=en&moreDocuments=yes>.
- <sup>34</sup> See Evaluation of the Practical Implementation of the EU Occupational Safety and Health (OSH) Directives in EU Member States: Executive Summary (n. 10 above) and Evaluation of the Practical Implementation of the EU Occupational Safety and Health (OSH) Directives in EU Member States: Main Report, November 2015 at pages 158, 190-197, 200, 241 and 425, available at: <https://ec.europa.eu/social/main.jsp?catId=148&langId=en&moreDocuments=yes>.
- <sup>35</sup> Evaluation of the Practical Implementation of the EU Occupational Safety and Health (OSH) Directives in EU Member States - Directive on the protection of workers from the risks related to chemical agents at work, available at: <https://ec.europa.eu/social/keyDocuments.jsp?advSearchKey=COWIDirrep&mode=advancedSubmit&langId=en&search.x=10&search.y=11>.

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