

Digital platform work and occupational safety and health: a review

European Risk Observatory

Report

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1 Introduction

The digitalisation of our economies has transformed and disrupted labour markets and business sectors across the European Union (EU), changing the nature, organisation and conditions of work. One of the central and most visible players in this transformation are the digital labour platforms that match the demand for and supply of labour, by connecting platform workers with clients (Eurofound, 2018a; European Commission, 2020).

Digital labour platforms have rapidly gained ground in Europe in the past decade (European Commission, 2020; ILO, 2021). However, lawmakers and social partners have struggled to fit these novel business practices and new forms of work into existing regulatory frameworks. These developments are also coupled with other labour market trends, such as the rise in non-standard work.

Platform work creates new work opportunities by lowering the barriers to labour market entry and by providing workers with options to earn an income through flexible work (Eurofound, 2018a; European Commission, 2020; ILO, 2021). Platform work, however, may also present challenges for workers, such as an ambiguous employment status, inadequate access to social protection, weak bargaining power, poor working conditions, and safety and health issues (EU-OSHA, 2017; European Commission, 2020).

This report provides an overview and assessment of the occupational safety and health (OSH) challenges and opportunities for platform workers. It builds on a thorough review of the recent academic and grey literature on the topic. Literature and empirical data on safety and health in platform work, however, are scarce. Despite the growing body of research on platform work, the issue of OSH, and especially those aspects relating to **platform workers' protection** and the **prevention and management of OSH risks**, have only recently become more prominent in the literature. To the best of our knowledge, statistics on the number of accidents, injuries or occupational diseases related to platform work are not systematically collected or publicly available.

Protecting workers' safety and health is a priority in EU policy, given its impact on workers, businesses and the European economy and society at large ⁽¹⁾. Having a healthy, safe and well-adapted work environment is one of the key principles of the **European Pillar of Social Rights** ⁽²⁾. Under this principle, workers have (i) the right to a high level of protection of their health and safety at work, (ii) the right to a working environment that is adapted to their professional needs and that enables them to prolong their participation in the labour market, and (iii) the right to have their personal data protected in the employment context.

In the case of platform work, concerns have been raised about all three of these rights. First, platform workers are faced with a range of physical and psychological safety and health risks, which depend on the type of work performed and how the work is organised. In addition, there are several challenges related to the prevention and management of these risks, first and foremost the fact that EU OSH legislation, as well as the OSH legislation of most Member States, does not apply outside the domain of 'dependent employment'; however, most platform workers are classified as self-employed. To date, there is little evidence on if and how safety and health issues are addressed for platform workers. Furthermore, recent overviews of platform work legislation and policies in place have revealed that few policies target OSH specifically (EU-OSHA, 2017; European Commission, 2020). This suggests that not only are OSH risks in platform work still poorly understood, but there are also significant gaps in the prevention and management of those risks. Finally, the issue of data protection is critical for platform work, precisely because digital platforms' business models heavily rely on the monetisation and exploitation of the data provided and generated by users (European Parliament, 2020). In addition, data protection in the context of platform work gives rise to concerns from an OSH perspective, as platform

⁽¹⁾ See Communication from the Commission to the European Parliament, the 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 (COM/2017/012 final). Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2017:012:FIN>

⁽²⁾ See Principle 10 Interinstitutional Proclamation 2017/C 428/09 on the European Pillar of Social Rights of 13 December 2017 (OJ C 428, 13.12.2017, p. 10–15). Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32017C1213%2801%29>

workers may not know what data of theirs are collected, how their data are used and by whom. This may cause anxiety.

Besides the right to a healthy, safe and well-adapted work environment (principle 10), the European Pillar of Social Rights contains several principles on working conditions and social protection relevant to platform work. These include the right to secure and adaptable employment (principle 5), the right to fair wages, which provide for a decent standard of living (principle 6), the right to information about employment conditions and protection in case of dismissals (principle 7), the right to social dialogue and workers' involvement in matters relevant to them (principle 8) and the right to a good work-life balance (principle 9), as well as all principles related to social protection and inclusion (principles 11-20).

The European Commission is undertaking several actions that are highly relevant to platform work to address the issues mentioned above. First, the Commission is preparing an initiative that **aims to improve working conditions in platform work**. The first-stage consultation among European social partners on this initiative was launched in February 2021, the second-stage consultation was launched in June 2021⁽³⁾. Platform workers' safety and health has been identified as a **core challenge** to be addressed by this initiative. The initiative, directly dedicated to platform work, complements previous initiatives that contribute to good working and employment conditions in platform work, including the **EU Directive on Transparent and Predictable Working Conditions** ⁽⁴⁾, as well as a number of EU directives that are currently under discussion, such as Directive 89/654/EEC on workplace requirements (laying down minimum safety and health requirements for the workplace) ⁽⁵⁾ and Directive 2003/88/EC on working time (the organisation of working time) ⁽⁶⁾. Another issue to highlight is the current debate on the need to introduce legislation on the 'right to disconnect'. The Commission also proposed the first legal framework on artificial intelligence (AI), which addresses the risks of certain 'AI systems used in employment, worker management and access to self-employment' ⁽⁷⁾. Last but not least, the European social partners' autonomous framework agreement on digitalisation ⁽⁸⁾ also covers platform workers in cases where an employment relationship exists.

In the domain of OSH, the European Commission has launched a new strategic framework, **the EU Strategic Framework on Health and Safety at Work 2021-2027** ⁽⁹⁾. Building on the 2014-2020 EU OSH Strategic Framework, the new framework aims to maintain and improve safety and health standards while accounting for a changing world of work. One of the three key objectives identified includes 'anticipating and managing change in the new world of work brought about by the green, digital and demographic transitions'. The new OSH Strategic Framework was adopted on 28 June 2021⁽¹⁰⁾. Directive 89/391/EEC (the **OSH Framework Directive**) lays down the main principles for encouraging improvements in the safety and health of workers. The OSH Framework Directive contains obligations for both employers and workers, although the workers' obligations do not affect the primary responsibility of the employer (Article 5(3) OSH Framework Directive). It is the employer's obligation to ensure the

⁽³⁾ See https://ec.europa.eu/commission/presscorner/detail/en/ip_21_2944

⁽⁴⁾ Directive (EU) 2019/1152 of the European Parliament and of the Council of 20 June 2019 on transparent and predictable working conditions in the European Union (OJ L 186, 11.7.2019, p. 105-121).

⁽⁵⁾ Council Directive 89/654/EEC of 30 November 1989 concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC) (OJ L 393, 30.12.1989, p. 1-12).

⁽⁶⁾ Directive 2003/88/EC of the European Parliament and of the Council of 4 November 2003 concerning certain aspects of the organisation of working time (OJ L 299, 18.11.2003, p. 9-19).

⁽⁷⁾ Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (artificial intelligence act) and amending certain union legislative acts (COM(2021) 206 final). Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0206>

⁽⁸⁾ With this framework agreement (ETUC, 2020a), the social partners aim to achieve a consensual transition by successfully integrating digital technologies in the workplace and by reaping the opportunities, as well as preventing and minimising the risks for workers and employers. This includes efforts to support continuous learning by workers and businesses, to ensure workers' safety and health, including in the context of working time and the right to disconnect, and to ensure the safe, fair and transparent use of digital surveillance and artificial intelligence following the 'human in control' principle.

⁽⁹⁾ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: EU Strategic Framework on Health and Safety at Work 2021-2027 — Occupational safety and health in a changing world of work (COM 2021(23) final). Available at: <https://ec.europa.eu/social/BlobServlet?docId=24122&langId=en>.

⁽¹⁰⁾ The legal basis for the OSH Strategic Framework lies in Article 153(2) of the Treaty on the Functioning of the European Union (TFEU), authorising the EU to adopt legislation on health and safety in order to support and complement the activities of its Member States.

safety and health of workers in every aspect related to work (Article 5(1) OSH Framework Directive). To that end, the OSH Framework Directive contains general principles concerning risk assessment, prevention and control measures, and the informing, consultation, balanced participation and training of workers and their representatives (Article 1(2) OSH Framework Directive). The EU Member States must ensure **adequate controls and supervision** in the implementation of these obligations, which is a role usually borne by labour inspectorates and/or OSH agencies (Article 4(2) OSH Framework Directive) ⁽¹¹⁾. The OSH Framework Directive is accompanied by single directives ('daughter directives') ⁽¹²⁾ that make the principles and instruments of the OSH Framework Directive more concrete regarding specific hazards at work, single tasks and different workplaces with elevated risks. However, as indicated above, the OSH Framework Directive and its daughter directives do not apply outside the domain of 'dependent employment'. Therefore, as most platform workers are classified as self-employed (EU-OSHA, 2017; European Commission, 2020), the vast majority of those working through digital labour platforms are excluded from the provisions laid down in these directives. Nevertheless, many platform workers, especially those engaged in relatively low-skilled on-location platform work, appear to have a relationship with the platform that has many characteristics in common with that of a dependent employment relationship, triggering court cases about their employment status in several EU Member States (De Stefano, 2021).

In recent years, issues related to platform work have received increased attention from national legislators and courts. A series of highly publicised decisions by courts throughout the EU demonstrates the inadequacies of the regulatory frameworks in grasping the peculiarities of digital platform work, including the classification of digital platform work arrangements and employment statuses, resulting in risks of precariousness (European Parliament, 2020; De Stefano, 2021). Most national legislation thus far has been aimed at ensuring fair competition in the sectors of personal transport services (e.g. Uber) and food delivery (e.g. Deliveroo) (European Commission, 2020). However, there seems to be an increased (albeit still limited) tendency of national legislators to encroach on other policy domains relating to digital platform work, such as taxation, employment status, working conditions and social protection (Lenaerts et al., 2018; European Commission, 2020). A case in point is the 'Riders' Law' in Spain, adopted in May 2021 (Real Decreto-ley 9/2021, de 11 de mayo) ⁽¹³⁾, providing a presumption of dependent employment status for digital platform workers active in the transportation sector and transparency rights regarding the algorithms that are central in the functioning of digital labour platforms (for all types of digital platform workers).

This report aims to contribute to a better understanding of safety and health in platform work by mapping OSH challenges and opportunities and exploring if and how these are tackled. This report builds on a review of the academic and grey literature on digital platform work. It is part of a larger project providing an 'overview of OSH policies, research and practices in the context of digital platform work, through review of existing data and information, fieldwork research and policy analysis in the European Union'. In addition to this literature review, this project aims to publish case studies on regulation and practices addressing OSH in platform work, as well as case studies highlighting OSH challenges and opportunities for specific types of platform work.

This report is structured as follows. Chapter 2 describes the current state of play regarding platform work and presents the definitions, concepts and taxonomy used in the study. Chapter 3 covers the challenges and opportunities regarding OSH for platform workers, and the prevention and management of these OSH risks, focusing on OSH management systems. Chapter 4 summarises the main findings of the report.

⁽¹¹⁾ Labour inspectorates play a central function in promoting safety and health at work and are increasingly focusing their attention on the anticipation, definition and prevention of emerging risks (Cockburn, 2009).

⁽¹²⁾ For example, Directive 1989/654/EEC on the minimum safety and health requirements for the workplace, Directive 2009/104/EC on the minimum safety and health requirements for the use of work equipment by workers at work, Directive 1989/656/EEC on the minimum health and safety requirements for the use by workers of personal protective equipment, Directive 1990/270/EEC on the minimum safety and health requirements for work with display screen equipment and Directive 1998/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

⁽¹³⁾ Available (in Spanish) at: <https://www.boe.es/boe/dias/2021/05/12/pdfs/BOE-A-2021-7840.pdf>

2 Context, definition and typology of platform work

2.1 Definition and typology of platform work

2.1.1 Defining platform work

The European Agency for Safety and Health at Work (EU-OSHA, 2017) defines online platform work as ‘all labour provided through, on or mediated by online platforms, and which features a wide array of standard and non-standard working arrangements/relationships ...’ Similarly, the European Commission (2020) defines platform work as ‘all labour provided through, on or mediated by online platforms in a wide range of sectors, where work can be of varied forms and is provided in exchange for payment’. Core features of platform work are (i) the **triangular relationship between platform, platform worker and client**, (ii) the **online intermediation of smaller tasks in which technology plays an important role** and (iii) the **provision of work on demand and on a temporary or piecemeal basis**. The European Parliament (2020) builds further on this definition, by making explicit that platform work relies on the ‘use of an app or technology owned by the platform ... to intermediate work but also in work allocation, organisation and evaluation and in the extensive collection and analysis of data provided or generated by the platform worker and the customer is a key determinant, distinguishing platform work from other forms of work.’

In turn, Eurofound (2018a, 2018b) defines platform work as ‘a form of employment that uses an online platform to enable organisations or individuals to access other organisations or individuals to solve problems or to provide services in exchange for payment.’ The main characteristics of platform work identified are the following: (i) paid work is organised through an online platform; (ii) three parties are involved, namely the online platform, the client and the worker; (iii) the aim is to carry out specific tasks or solve specific problems; (iv) the work is outsourced or contracted out; (v) jobs are broken down into tasks; and (vi) services are provided on demand.

The terminology and framework proposed by the European Commission in its already mentioned consultation in relation to its upcoming initiative on improving the working conditions in platform work has mirrored the main characteristics of platform work identified by Eurofound (see box below). The European Commission proposes using the term ‘people working through platforms’ rather than ‘platform worker’. This term is more neutral and it signals that those working through digital labour platforms can have different employment statuses. In that regard, according to the European Commission, ‘people working through platforms’ then refers to ‘individuals providing services intermediated with a greater or lesser extent of control via a digital labour platform, regardless of these people’s legal employment status (worker, self-employed or any third category status)’⁽¹⁴⁾.

A screening of other relevant academic literature makes clear that there is a consensus regarding the main conceptual building blocks of digital platform work. There are only minor differences in the platform work characteristics that are included and/or emphasised across definitions and typologies. The following recurring characteristics were identified from this literature review⁽¹⁵⁾:

- intermediation by a digital labour platform, matching labour supply and demand;
- triangular relationship;
- small tasks, short-lived assignments, piece-rate pay and temporary nature;
- the use of digital technologies, including algorithmic management and digital surveillance to replace (human) managerial control;

⁽¹⁴⁾ See Consultation document: first phase consultation of social partners under Article 154 TFEU on possible action addressing the challenges related to working conditions in platform work (C(2021) 1127 final). Available at: ec.europa.eu/social/BlobServlet?docId=23655&langId=en

⁽¹⁵⁾ Including from Drahokoupil and Fabo (2016), EU-OSHA (2017), Schmidt (2017), Howcroft and Bergvall-Kåreborn (2018), OECD (2018), Vandaele (2018), Eurofound (2018a, b, 2019), Garben (2019), Huws et al. (2019), Brancati et al. (2020), European Parliament (2020), Bérastégui (2021) and ILO (2021).

- non-standard working arrangements and self-employment (including dependent self-employment);
- shifting risks and responsibilities to the digital platform worker.

As a result, for the purpose of this study, the concepts and definitions outlined in the box below are used.

Definitions and main characteristics of digital platform work

Digital platform work: all paid labour provided through, on or mediated by an online platform.

The main characteristics of platform work are as follows:

- Paid labour is organised/coordinated through a digital labour platform.
- Specific tasks are performed or specific problems are solved.
- Algorithmic management ⁽¹⁶⁾, based on digital technologies, is used to allocate, monitor and evaluate the work performed and the platform workers' behaviour and performance, including reliance on customer rating mechanisms.
- Three parties are involved, namely a digital labour platform, a client and a digital platform worker.
- There is a prevalence of non-standard working arrangements, and digital labour platforms tend to classify digital platform workers as self-employed in their terms and conditions.
- The risks, liabilities and responsibilities, including in the area of safety and health, are shifted onto digital platform workers.

A **digital platform worker** (or 'a person working through a platform') is defined as an individual person providing labour intermediated with a greater or lesser extent of control via a digital labour platform, regardless of that person's legal employment status.

(Platform workers can have the status of employee, self-employed or any third-category status.)

A **digital labour platform** is defined as an online facility or marketplace operating on digital technologies (including the use of mobile apps) that are owned and/or operated by an undertaking, facilitating the matching between the demand for and supply of labour provided by a platform worker.

(Platforms matching the demand for and supply of goods are excluded (e.g. Airbnb, eBay), as are platforms whereby services are exchanged without remuneration. Furthermore, labour provided directly to the platforms as employers (i.e. working *for* a platform), or in related satellite activities, do not fall under this definition.)

The above definitions and concepts are rooted in the academic literature and in particular build on earlier publications by EU-OSHA (2017), Eurofound (2018a, 2018b, 2019), the European Commission (2020) and the European Parliament (2020), which themselves rely on in-depth literature reviews, as well as the potential initiative by the European Commission regarding platform work (2021)¹⁷. It appears that a common understanding of the conceptualisation of digital platforms in Europe has now been reached, albeit with slight differences in which characteristics differentiate platform work from other forms of work. To ensure consistency, it does not seem appropriate to completely disrupt this common understanding for the purposes of this study. At the same time, the objective of this literature review is grounded in the OSH implications of digital platform work. For that reason, particular focus in the definition was put on

⁽¹⁶⁾ Algorithmic management is defined as 'oversight, governance and control practices conducted by software algorithms over many remote workers' (Möhlmann and Zalmanson, 2017, p. 4).

⁽¹⁷⁾ As announced by Commission President von der Leyen's Political Guidelines and in the Commission's 2021 work programme, "To ensure dignified, transparent and predictable working conditions, a legislative proposal to improve the working conditions of people providing services through platforms will be presented with a view to ensuring fair working conditions and adequate social protection." (adopted work programme, p. 5)

those characteristics of digital platform work that are the main underlying drivers of or the main aggravating factors for OSH risks and challenges for OSH management in relation to digital platform work.

In contrast with the main characteristics highlighted by the recent initiative of the European Commission, the use of **algorithmic management** as a means to allocate, monitor and evaluate work performed is explicitly included in the definition proposed above (see box). This is not only because it is the most distinguishing feature in comparison with other (traditional) forms of work, but also because research clearly indicates that algorithmic management is one of the main underlying drivers of (exacerbating) OSH risks in digital platform work. In addition, in the definition (see box), emphasis is put on the prevalence of working arrangements resembling traditional **non-standard forms of work** (e.g. telework, temporary work, temporary agency work, part-time work, on-demand work, casual work) and the classification of **digital platform workers as self-employed** in platforms' terms and conditions. All of these can affect potential risks and the way these risks are managed in practice. In particular, the classification as self-employed is crucial in this regard, because the 'employee' status still functions as the main gateway to employment protection in most Member States (as well as in EU law), including in the OSH legislative framework.

2.1.2 Platform work taxonomy

A review of the literature has identified an extensive array of taxonomies developed in the context of digital platform work. The taxonomies proposed are useful heuristic devices for reflecting the wide heterogeneity of digital platform work, capturing key features distinguishing between different digital platforms, including their impact on OSH considerations. Nonetheless, it must be stressed that, although every digital platform can be classified as a certain type, in reality, digital platforms within those types each have their own particular characteristics and features.

The most developed taxonomy for digital platform work can be found in the research of Eurofound (2018a) (also see Florisson and Mandl; 2018). Eurofound has identified 10 types of digital platforms, which have reached a certain 'critical mass' in terms of the numbers of digital platforms and digital platform workers. Initially ⁽¹⁸⁾, a total of 27 distinguishing features were identified, grouped into those related to structural characteristics (e.g. size of platform, geographical scope of the platform), the business model of the digital platforms (e.g. realisation of payments, type of contract), the eligibility/accessibility to digital platform work (e.g. profile client, accessibility of platform) and finally the tasks commissioned (e.g. type of activity, complexity of tasks). Five distinguishing features of digital labour platforms are considered key in the typology (see Eurofound, 2018a): (i) the scale of the tasks (micro-tasks vs larger tasks); (ii) the format of service provision (on-location vs online); (iii) the level of skills required (low vs high); (iv) the actor allocating the work (client, digital platform worker or digital platform); and (v) the matching process (offer vs contest structure).

Studies carried out by both the European Commission (2020) and the European Parliament (2020) have built further on the taxonomy proposed by Eurofound, identifying those characteristics that are especially important in relation to the working and employment conditions of digital platform workers. The three determinants identified as key in this regard are (i) the format of service provision (on-location vs online); (ii) the skill level required (low vs high); and (iii) the actor allocating the tasks (client, digital platform worker or digital platform). Four types of digital platform work can be distinguished based on the combination of these determinants: relatively low-skilled on-location work (type 1), relatively high-skilled on-location work (type 2), relatively low-skilled online work (type 3) and relatively high-skilled online work (type 4). Further distinctions within these types are contingent on the actor allocating the work. On the basis of the COLLEEM I survey, Pesole et al. (2018) identify three categories of digital labour platforms: (i) online freelancing platforms; (ii) microwork; and (iii) digital platforms that mediate physical services. A similar logic is also found by Brancati et al. (2020), as part of the COLLEEM II survey, who combined the location of service provision (online vs on-location), skill level (professional vs non-professional) and scale (large- vs small-scale tasks) to arrive at 10 types of tasks that are prevalent in digital platform work: (i) online clerical and data-entry tasks; (ii) online professional services; (iii) online creative and

⁽¹⁸⁾ <https://www.eurofound.europa.eu/sites/default/files/wpef18004.pdf>

multimedia work; (iv) online sales and marketing support work; (v) online software development and technology work; (vi) online writing and translation work; (vii) online micro-tasks; (viii) interactive services; (ix) transportation and delivery services; and (x) on-location services.

Overall, most research and policy papers seem to distinguish mainly between two types of digital platforms, predominantly based on the location where the service is provided. This is also the approach of the European Commission in its upcoming potential initiative on platform work, in which a basic distinction is made between on-location labour platforms and online labour platforms (European Commission, 2021).

The International Labour Organisation (ILO, 2021) also differentiates between online web-based platforms, where tasks are performed online by digital platform workers, and location-based platforms, where tasks are completed at a physical location. Equally, the Organisation for Economic Co-operation and Development (OECD, 2018) concludes that the key element of differentiation between the various types of platform work type is whether the service is provided physically or online. Furthermore, the way in which workers are matched to clients can be distinguished, with some digital platforms relying on automated algorithms and others allowing for more complex procedures (e.g. job interviews), especially to cover non-routine task-intensive services (e.g. graphic design). Schmidt (2017) also makes a distinction between web-based digital labour ('cloudwork') and location-based labour ('gig work'). Following that logic, he identified six basic types of digital platform work: (i) freelance marketplace work ('cloudwork'); (ii) micro-tasking crowdwork ('cloudwork'); (iii) contest-based creative work ('cloudwork'); (iv) accommodation services work ('gig work'); (v) transportation and delivery services work ('gig work'); and (vi) household and personal services work ('gig work'). De Stefano and Aloisi (2018) also divides digital platforms into two main models: crowd-sourcing and work on-demand via a platform or an app, which in turn can be split into transport services and household services. At the same time, he emphasised that digital platforms can be further classified by taking into account several characteristics, such as (i) the dimension of digital platforms (global vs local); (ii) the content of the 'gigs' (creative, routine or manual tasks); (iii) the services offered (task specific vs generalist); (iv) the level of skill required (low vs high); (v) the way of adjudication (contest vs procurement); and (vi) the system of payment (free bid vs fixed rate). Bérastégui (2021) similarly categorised digital platforms into those corresponding to 'tangible activities performed in the physical world' and 'digital platforms dedicated to various virtual services performed and completed online'. In that sense, three primary categories were identified⁽¹⁹⁾ in his recent contribution: (i) on-demand physical services, (ii) online freelancing and (iii) microwork.

The taxonomy proposed by Howcroft and Bergvall-Kåreborn (2018) is based on a slightly different approach, dividing digital platforms between the payment type and the initiating-actor type. The payment type aims to differentiate between digital platforms where the digital platform worker can anticipate receipt of an agreed fee when completing a task ('paid payment type') and digital platforms where remuneration in the future is uncertain, despite the completion of a task ('non-paid or speculative payment type'). Within the initiating-actor type, the authors distinguish between 'requesters' and 'workers'. Requesters may be private companies or individual consumers who initiate transactions by posting requests online ('requester-initiated' tasks). On the other hand, digital platform workers can also initiate the transaction by offering products, services or skills ('worker-initiated' tasks). The initiating-actor type is intended to reflect different levels of control by digital platforms and the corresponding levels of autonomy that digital platform workers enjoy.

The platform work taxonomy used in this literature review will build further on the taxonomies identified in the literature as laid out above. Nonetheless, for the purposes of this study, it is imperative to capture those dimensions influencing the OSH risks that platform workers are exposed to, as well as providing insight into potential challenges with regard to OSH prevention and OSH management.

It must be stressed again that not every dimension shaping the complexity of digital platform work can be captured by this taxonomy. The more dimensions that are included in the taxonomy, the more fragmented the picture becomes, ultimately leading to the identification of single, unique digital

⁽¹⁹⁾ The author also classified these three primary categories in relation to task division (e.g. micro-tasks vs larger projects) and task complexity (i.e. skill level required).

platforms, each with their own characteristics ⁽²⁰⁾. Such an approach would stand in the way of a systematic analysis of the available literature on OSH-related challenges and opportunities in digital platform work. In that sense, although the taxonomy presented here is quite basic, it reflects the wide heterogeneity in platform work and captures key aspects influencing platform workers' safety and health.

On a final note, although the employment status of platform workers has been identified as the core issue affecting the working and employment conditions of platform work — which includes the area of OSH and related responsibilities — this dimension is rarely considered in platform work taxonomies. This is because the same platform work activities can be carried out under different statuses (as is the case with work outside the platform economy). Depending on the applicable labour legislation at national level, some platforms allow different options in terms of employment status (e.g. working as self-employed or under 'peer-to-peer' status, as in the case of Deliveroo in Belgium) and so the actual status may be difficult to determine, whereas in some cases the status may be set by the legal framework in place ⁽²¹⁾.

For the purpose of this study, and based on the review of the existing literature, we have developed the taxonomy described in Table 1, which relies on three key dimensions, resulting in four distinct types of digital platform work.

Table 1: Taxonomy of digital platform work

Key dimension	Type 1 (e.g. Uber)	Type 2 (e.g. ListMinut)	Type 3 (e.g. AMT)	Type 4 (e.g. 99designs)
Format of labour provision	On-location	On-location	Online	Online
Skill level required	Lower	Higher	Lower	Higher
Level of control	High	Moderate	High	Low

Source: Authors' own elaboration.

▪ The format of labour provision

Online platform work refers to tasks that are matched with workers online and are performed only or mostly virtually on an electronic device at any location, although the most common location is the home of the platform worker (referred to in the literature as online web-based platforms, online labour, web-based labour, crowdsourcing, etc.). Although the process of matching tasks with workers still happens online, **on-location platform work** refers to tasks that are performed only or mostly in the physical world, either on-site in public areas, on the road or at the client's premises (referred to in the literature as location-based platforms, location-based labour, gig work, on-demand work, etc.). From an OSH perspective, the physical environment in which digital platform work takes place determines to a large extent (but not exhaustively) which risks digital platform workers are exposed to (Huws, 2015), and the

⁽²⁰⁾ This also explains why several papers published in the past 2-3 years deviate from the very detailed Eurofound (2018) taxonomy and instead propose a much simpler one, looking for example at only the location where work is provided (European Commission, 2021, ILO, 2020, OECD, 2018), or distinguishing between a few main types of platform work only (Bérestégui, 2021).

⁽²¹⁾ For instance, in Belgium in 2018 a new taxation regime (Loi De Croo) was introduced for occasional work (including for those working on (registered) digital platforms). When the income exceeds the annual ceiling, the digital platform worker is obliged to register as self-employed. Another example is the newly introduced Riders' Law in Spain, where a presumption of dependent employment is set for digital platform workers in the transportation sector.

particular difficulties in managing these OSH risks in practice. The remainder of this report will systematically take this dimension into account when analysing the available evidence.

- **The skill level required**

Skill level serves as a proxy for the nature, scale and complexity of the task in question. Thus, it determines whether or not a task can be allocated to anyone active on the platform ('the crowd'; see Schmidt, 2017, who makes a distinction between local micro-tasking, online micro-tasking and online content-based creative crowdwork) or a selected individual. The concept 'crowd' refers to the idea that it is open to anyone, without prior qualifications. In particular, in online micro-tasking, very small-scale tasks that are distributed across a large and unspecified group of workers who self-assign to tasks are assumed to generally require unskilled workers who are interchangeable (Schmidt, 2017). Online content-based creative crowdwork can also involve more complex tasks, however. In this case, clients launch a contest and select the winner. Importantly, the level of skill required to execute a task does not reveal anything about the general skills that a digital platform worker needs (e.g. in strategies to find work) or has (e.g. education level). In fact, previous research on platform work suggests that many platform workers are faced with a skills mismatch (Cedefop, 2020). Many food delivery riders, for example, are highly educated students on the verge of obtaining a university degree. Interviews with such workers have revealed that many feel overqualified and frustrated, and do not see platform work as a way to develop their skills or as a step towards a possible future career (Eurofound, 2018a; Cedefop, 2020). Moreover, some of these workers tend to accept whatever conditions the platform imposes, as platform work is only a temporary 'job' that fits within their current life (Eurofound, 2018a). At the same time, platform workers may lack the skills necessary to perform the task in question, leading to anxiety. The scale of such tasks ranges from micro-tasks, e.g. click work, in which a single task takes only a few seconds, to medium-scale tasks, e.g. parcel delivery, which require a few minutes or hours of work, to larger scale tasks, e.g. fully fledged projects that could take several weeks or months to complete, such as website design. Platform work is diverse not only in terms of the scale of the tasks, but also in terms of the activities themselves and the skills required to execute them (Cedefop, 2020). This heterogeneity in the tasks performed, as well as in the skills mismatch, has important implications for digital platform workers' safety and health.

- **The level of control exercised by the platform**

The 'level of control' is an umbrella term encapsulating several dimensions within which to classify digital platforms. It serves as an indicator of the extent of the hierarchical power and managerial prerogatives that a digital labour platform deploys in its relationship with digital platform workers; more specifically, it relates to (unilateral) decisions on work allocation, work organisation and work evaluation. The dimension of 'level of control' already features in existing typologies through a wide array of variables, which indirectly determine the level of control existing in a particular digital platform work type (e.g. the matching process, initiator, payment type, price-setting powers, employment status, algorithmic control and techniques).

Eurofound (2019) looks at this dimension in an alternative way: digital platforms can be placed along a spectrum that distinguishes between markets (i.e. spaces where supply and demand meet) on one side and hierarchy (i.e. structures of command applied within firms) on the other. On the (extreme) market side of the spectrum are those digital platforms that can be classified as purely online information society services — they simply act as a (digital) tool that allows the matching of clients with digital platform workers — with limited interference in the actual service provision. On the other extreme, the digital platform assumes (far-reaching) managerial prerogatives towards its digital platform workforce, through (unilateral) decisions on work allocation, work organisation and work evaluation, offsetting the autonomy of digital platform workers completely. Clearly, these two extreme forms of digital platforms are not operational in their ideal forms in practice (see also Stark and Pais, 2021). Nonetheless, based on this dimension, we can distinguish between digital platforms deploying a higher or lower level of control over digital platform workers (Table 2).

Table 2: Platforms by level of control in various dimensions

Type	Work allocation	Work organisation	Work evaluation	Level of control by platform
1	High	High	High	High
2	Low	Moderate	Moderate	Moderate
3	High	Moderate	High	High
4	Low	Low	Moderate	Low

Source: Authors' own elaboration.

The 'level of control' dimension is particularly relevant from an OSH perspective. In reality, the platform's intermediation can range from minimal to very significant. This is important given that the level of control serves as an important proxy for the notion of subordination, which in most Member States still remains the **key legal criterion in the determination of employment status**. In that sense, the status of employee serves as the main determinant in the application of employment regulations, including OSH regulation. However, in practice, most digital platforms classify their platform workers as self-employed, despite a rising number of European courts deciding otherwise (albeit predominantly in the personal transport and (food) delivery sector).

At the same time, this dimension is strongly interrelated to the reliance of most digital platforms on **algorithmic management (and digital monitoring and surveillance)** and the way that it shapes working conditions in digital platform work. Two characteristics of digital platform work are key in this regard. First, digital platforms have to manage a workforce that is out of the direct sight of (human) supervisors (Ivanova et al., 2018; ILO, 2021). Second, many digital platform workers have a high level of flexibility in deciding when, where and how to work (Ivanova et al., 2018; European Commission, 2020; ILO, 2021). In this situation, a digital platform controls the labour process to maximise the number of tasks completed on time and with good quality (Ivanova et al., 2018; Bérastégui, 2021). What is unique in digital platform work is that decisions on managing the workforce in the areas of work allocation, work organisation and work evaluation are made on the basis of metrics and ratings (e.g. customer rating mechanisms), which are part of the algorithmic management process through which work is also monitored (ILO, 2021). Although there is no uniform practice among digital platforms in terms of the pervasiveness in the deployment of such management techniques, initial indications suggest that there is a clear link between the degree of algorithmic control and the rise and/or exacerbation of occupational risks, in particular regarding the psychosocial well-being and mental health of digital platform workers (see European Parliament, 2019; Bérastégui, 2021).

2.2 Context of platform work

2.2.1 The rise and development of the platform economy

Over the past decade, technological advances (e.g. broadband connectivity and cloud computing, along with innovations in information and communications technology (ICT)) have strongly facilitated the growth of the digital economy, permeating different sectors of the economy causing 'disruptive' changes in many traditional industries (EU-OSHA, 2017; Schmidt, 2017; ILO, 2021). Digital labour platforms are part of this broader digital economy, connecting workers with business and clients through the use of digital technologies.

Looking at the number of digital platform workers in European economies, data collection efforts at EU and national levels have yielded vastly different results, mainly due to differences in the definitions and

methodologies used to measure the number of platform workers and in the scopes of the studies (OECD, 2019; Piasna, 2020; Riso, 2019; European Parliament, 2020).

However, currently, platform work still accounts for a modest share of overall economic activity. Nonetheless, platform work has been growing in the EU in recent years and is predicted to continue developing at a fast pace (Eurofound, 2020). The most cited data are the two COLLEEM surveys, which indicate a small but clear increase in the prevalence of platform work (i.e. individuals who have 'ever' provided labour services via platforms), which for the EU (as a whole) increased from 9.5 % in 2017 to around 11 % in 2018 (Pesole et al., 2018; Brancati et al., 2020). Around 1.4 % of the working population is active in the platform economy in terms of it being a main form of employment (i.e. those who provide labour services via platforms at least monthly, and work on platforms at least 20 hours a week or get at least 50 % of their income via platforms), while another 10 % work on platforms at various levels of intensity and frequency in addition to having other forms of employment (Brancati et al., 2020; Eurofound, 2020).

The platform workforce is fragmented and highly heterogeneous in terms of platform workers' profiles. According to data from the two COLLEEM surveys, a typical European platform worker is a young male, educated to degree level, living in an urban environment with a family and children (Pesole et al., 2018; Brancati et al., 2020). Recent ILO (2021) research, taking a global perspective, confirms these results finding that most platform workers (i) are **young** (less than 35 years of age), with platform workers in the taxi and delivery sectors being younger on average than their non-platform counterparts in those sectors; (ii) are **male**, with female platform workers being under-represented in both on-location and online work; (iii) live in **urban or suburban areas**; and (iv) are **generally highly educated** (and this is disproportionately true for women in developing countries), even when they perform low-skilled tasks such as food delivery. Regardless of age, platform workers tend to have less labour market experience than the average worker (Brancati et al., 2020).

Digital platform work has created new opportunities for employees, the self-employed, customers and businesses. This includes the creation of jobs and income for workers who commonly face issues entering the labour market. The ILO (2021) study points out that platform work offers opportunities for migrant workers in both online and on-location work, and for workers with poor health or a disability. Examples include newcomers who do not speak the local language but could easily take up online work in their own language or on-location work that does not require extensive knowledge of the local language, such as parcel delivery. Research has also indicated that digital platform work presents opportunities for people with disabilities, as it (to some extent) allows them to independently control their work schedule and create individualised, disability-accessible work systems (Yamamoto et al., 2011; Berg, 2016; Hurple and Blanck, 2020). Berg (2016) also highlights the importance of online digital platform work for people with caregiving responsibilities for children or elderly family members, because of the flexibility it offers as to when, how and where to work. In this way, digital platform work also presents opportunities for women, who long have dominated caregiving responsibilities in the EU (Spasova et al., 2018; Zigante, 2018).

On the other hand, companies selling goods or services through a digital platform can be seen as beneficiaries of the opportunities provided by the digital platform economy. Digital platforms allow them to access global and local workforces, while benefiting from higher levels of workforce flexibility, thereby improving efficiency and enhancing productivity, and at the same time enjoying a wider market reach (ILO, 2021). From a digital platform workers' perspective, the ability to work from any place and at any time, combined with the (perceived) ability to choose the tasks to be performed are major factors contributing to the attractiveness of digital platform work (Berg, 2016; ILO, 2021). However, while flexibility and autonomy are often mentioned by platform workers as the main factors motivating them to do this type of work, a growing group of platform workers indicates they do platform work out of a lack of alternatives (e.g. struggle to find a job in the traditional labour market). Especially the group of workers for whom a lack of alternatives is an important reason for choosing platform work depends on the income gained through platform work, has limited labour market power and a weak bargaining position (Vandaele, 2018).

At the same time, it can be argued that digital platform work is part of an ongoing and wider process of making work more flexible and, in some cases, more precarious, replacing the protection offered by full-

time stable employment (De Stefano, 2016; European Parliament, 2020; Schor et al., 2020). Digital platform work poses significant challenges for existing regulatory frameworks, mainly due to the self-employed status of most digital platform workers (which implies that core legislation on working conditions and OSH is not applicable), which shifts risks, liabilities and responsibilities (including those in the area of OSH) from digital platforms to platform workers. For the purposes of this study, the main focus is on OSH.

2.2.2 The implications of the COVID-19 crisis on platform work

The COVID-19 pandemic has had a severe impact on platform work on several fronts (ETUI, 2020; Eurofound, 2020, 2021; Rani and Dhir, 2020; Roquelaure, 2021). According to the OECD (2020), persons working through online platforms are facing two major risks due to the COVID-19 crisis: (i) **exposure to coronavirus** and (ii) **income loss**. This puts platform workers among the groups that were hit hardest by the pandemic (Moulds, 2020). Regarding the first risk, on-location platform workers in particular run the risk of contracting the virus or of spreading it to others. As regards the second risk, this affects those platform workers who had their work disrupted because of a drop in the demand for labour.

In many ways, the COVID-19 crisis has substantiated the precarious conditions in which some platform workers work, especially the most vulnerable platform workers (ETUI, 2020; Eurofound, 2020; ILO, 2021). For example, platform workers in food delivery tend to be less employable (e.g. low-skilled migrant workers), often depend on this work to make a living, run a high risk of being wrongly classified as self-employed, and are faced with poor working conditions and high levels of control by the platform, but were also among those seen as 'essential' workers during the COVID-19 crisis and who kept working as countries went into lockdowns. Nevertheless, as explained in more detail below, the impact of the pandemic differs across different types of platform work (OECD, 2020; Eurofound, 2021).

First, the crisis has affected both the **demand for and supply of platform work** (Eurofound, 2020; ETUI, 2020; Stephany et al., 2020; ILO, 2021). In general, the pandemic has had severe economic and social effects, including on the labour market, which have influenced the growth of platform work. The COVID-19 crisis has disproportionately affected some workers, occupations and sectors (e.g. massive job losses in tourism and hospitality). Total employment in the EU has fallen sharply (Spasova et al., 2021), and (temporary) unemployment and underemployment have both increased. At the same time, the number of teleworkers skyrocketed as EU Member States announced lockdowns and working from home became obligatory for all those who were able to do so. Related to this, the COVID-19 pandemic has accelerated the transition towards the digital economy (Roquelaure, 2021). As a result, an increasing number of workers and businesses have become aware of the opportunities of the digital economy (e.g. e-commerce). This, in turn, may raise the demand for and the supply of online services. Roquelaure (2021), however, warns that these developments also have OSH implications, such as increasing the risk of psychological distress.

These dynamics in the economy and labour market also have an impact on platform work. With regard to **on-location platform work**, food delivery in particular saw a sharp increase in terms of both demand and supply (due to lockdowns, curfews and restrictions on citizens' mobility). However, other types of on-location work (e.g. personal care and household services) could no longer be carried out under the social distancing and other safety measures in force, and these types of platform workers experienced income losses because of the reduced demand for their labour. Being classified as self-employed, platform workers could often not fall back on financial relief that was made available to employees, or they could but only to a lesser degree. This is problematic, particularly for platform workers without access to social protection and/or other sources of income through work. For those working in food delivery, more opportunities became available in terms of access to work and income (Eurofound, 2021). This increased demand, however, does not appear to have been sustained as restrictions are relaxed and the pandemic slows down. As for **online platform work**, according to data from the Online Labour Index, some types of online work saw an increase in demand (e.g. information technology (IT) support, translation services), while other types witnessed a decline (e.g. data entry, clerical tasks, sales and marketing support) (Eurofound, 2021). At the same time, the number of individuals registering on platforms by setting up an account and start working has soared (Stephany et al., 2020). This may be in response to a loss of income from other sources (OECD, 2020).

Second, the pandemic again underscored several issues related to OSH and to social protection in the context of platform work, and in some cases aggravated already poor conditions (OECD, 2020; Eurofound, 2021; ILO, 2021). Some platform workers have continued to work during the COVID-19 crisis, either because they are considered 'essential' workers (e.g. food delivery riders during the lockdowns) or out of necessity, as they are dependent on the income gained from platform work. These individuals, however, run the risk of being exposed to coronavirus or passing it on to others with whom they come into contact. Platform workers may become ill, have to quarantine and be unable to work. However, platform workers generally have limited social protection, which includes unemployment or illness benefits (European Parliament, 2020). To continue operating, platforms needed to convince their clients, platform workers and the public authorities that the services they intermediate could be provided safely and in compliance with the government measures in place (e.g. lockdown measures). Food delivery platforms such as Deliveroo, for example, introduced 'contact-free' deliveries. Fairwork (2020) reported that contactless delivery is the most widespread policy in response to COVID-19. Belgian platform ListMinut, for example, urges its platform workers to respect the rules imposed by the government at all times, to perform tasks online whenever possible (e.g. tutoring), and to postpone or cancel tasks when they feel ill or if they are unsure that the rules can be respected.

Only 60 % of platforms claimed to provide personal protective equipment (PPE) (i.e. disinfectant or to a lesser extent masks and gloves) (Fairwork, 2020). Yet, even in those cases, digital platform workers reported limited, irregular provision of PPE, sometimes even after platforms promised such provision. The European Trade Union Confederation (ETUC) and the European Trade Union Institute (ETUI) also published reports highlighting the lack of provision of PPE to digital platform workers (ETUC, 2020b; ETUI, 2020). For instance, at the beginning of the crisis, Deliveroo France offered its riders EUR 25 for the purchase of PPE, instead of bearing the responsibility or providing PPE to riders itself. Moreover, digital platforms have introduced monitoring mechanisms to ensure workers' safety and health, ranging from temperature scans to requiring that their workers send selfies to the platform to prove that they have been wearing face masks (Ustek-Spilda et al., 2020). Nevertheless, on the whole, the measures reported seem to be targeted more towards the protection of consumers than of digital platform workers (Fairwork, 2020; Ustek-Spilda et al., 2020). For example, some digital platforms posted photos of digital platform workers — who were waiting to pick up orders in restaurants — to their customers to prove that they were following social distancing requirements (Ustek-Spilda et al., 2020).

A data collection exercise carried out by the OECD, in collaboration with the AppJobs Institute (OECD, 2020), also reveals that digital platforms performing on-location tasks have taken measures to protect the health of digital platform workers. More than half (58 %) of the digital platforms surveyed reported having taken measures to promote social distancing and the safe provision of services, such as contactless delivery, the removal of the obligation to obtain a signature on delivery and even the temporary suspension of high-risk services. Moreover, many digital platforms provided guidance to digital platform workers on how to stay safe during the pandemic, referring to World Health Organisation (WHO) or national guidelines, and in some instances tailored guidance specifically targeted at the type of task or service being offered. However, only 25 % of digital platforms reported providing PPE (hygiene products or masks) to digital platform workers, with some digital platform workers complaining about the quality and quantity of the PPE provided (e.g. the number of masks made available and their quality). This proportion is considerably lower than the 60 % value reported by Fairwork (2020). A complementary OECD survey of digital platform workers (both online and on-location) revealed that only 35 % of respondents said that their platform had taken measures to assist them during the COVID-19 crisis. Related to this, although platforms and governments have taken initiatives to address the impact of COVID-19 on platform workers, these measures are not comprehensive in tackling OSH challenges in platform work in general. For example, while platform workers may now receive PPE to keep them safe from COVID-19, previous research suggests that in general platform workers are responsible for their own equipment, tools and materials (Eurofound, 2018a).

3 OSH challenges and opportunities of platform work and how these are managed

This chapter presents the available evidence on the OSH implications of carrying out work through a digital labour platform for platform workers. It provides an account of the risks that platform workers are exposed to and describes the safety, health and well-being implications of these risks. The chapter also explains how these **safety and health risks are prevented and managed**, referring to key examples from the literature. An overview table (Table 3) of the key challenges of OSH management in digital platform work in relation to the OSH Framework Directive is included in Annex 2 and discussed in the following sections, bearing in mind that the directive is applicable only to dependent employment relationships.

In the academic and policy literature on platform work, the subject of worker safety and health is commonly discussed together with issues relating to working and employment conditions (see, for example, Florisson and Mandl, 2018; Eurofound, 2019; European Commission; 2020; ILO, 2021). In most studies, physical and psychological safety and health risks and their outcomes are either tackled in a dedicated section, as one dimension within an overarching job quality model, or they are discussed in different sections that each deal with specific working conditions (e.g. work-life balance and working time). The number of studies dealing solely with OSH issues in the context of platform work is relatively limited — with notable exceptions being previous EU-OSHA work on the topic (see Huws, 2015; EU-OSHA, 2017); however, there are a few publications that explicitly link this topic to the COVID-19 outbreak (e.g. ETUC, 2020b; ETUI, 2020; OECD, 2020). Similarly, platform work seems to be an under-researched topic in the OSH literature (e.g. Freni-Sterrantino and Salerno, 2021). When platform work is discussed, it is generally considered together with other forms of non-standard work or precarious work (e.g. Howard, 2017).

Based on a review of the literature covering OSH in platform work, it became clear that (i) most attention is paid to safety and health issues related to **food delivery services and passenger transport services** (not only in research but also in policy, e.g. Christie and Ward, 2019; Polkowska, 2021a, b) ⁽²²⁾; (ii) **few studies cover the EU or its Member States**, whereas there is more research on the situation in the United States, in the United Kingdom and at the global level (e.g. Bajwa et al., 2018); and (iii) **the prevention and management of OSH risks** is discussed less often than other topics. The sparse literature that is available mainly focuses on potential OSH risks present in digital platform work, with OSH risk prevention and management only superficially touched on. Examples of studies on OSH in platform work include Huws (2015), Wilde (2016), EU-OSHA (2017), Howard (2017), Huws et al. (2017), Tran and Sokas (2017), ILO (2018), Malenfer et al. (2018), Christie and Ward (2019), Samant (2019) and Bérastégui (2021) ⁽²³⁾.

Notwithstanding that the evidence on safety and health in platform work is quite scarce, the importance of this subject has been recognised in a multitude of academic and policy publications. The European Parliament study (2020), for example, argues that platform workers who provide services using global profit-oriented platforms face **high risks of precarious working conditions**, irrespective of their employment status. The risks identified in the study include (i) low, fragmented and unstable income, with insufficient fallback options during intermittence periods; (ii) low levels of protection of working conditions; (iii) exposure to safety and health risks typical of platform work; (iv) low levels of social protection for risks that are relevant to platform work (e.g. work accidents, unemployment, sickness); and (v) very low levels of collective labour rights and representation.

The main challenge in platform work is the uncertainty surrounding the employment status of platform workers, which has implications for rights and obligations in terms of the labour and social protection of

⁽²²⁾ This is because these types of platform work are widespread and highly visible, reporting higher shares of workers and platforms (than other types of platforms), and are under intense scrutiny by researchers, the media and politicians.

⁽²³⁾ A number of these studies was presented at a workshop organised by EU-OSHA in May 2018: 'Protecting workers in the online platform economy'. Available at: <https://osha.europa.eu/en/tools-and-resources/seminars/workshop-protecting-workers-online-platform-economy>.

digital labour platforms and those working through digital labour platforms (discussed at length in, for example, EU-OSHA, 2017; Eurofound, 2019; European Commission, 2020, European Parliament, 2020). Platform work blurs the boundaries between employees and the self-employed. Digital platforms often state explicitly in their terms and conditions that no employer-employee relationship exists between them and the workers using their platform. Platform workers are thus categorised as self-employed almost by default, irrespective of the actual circumstances under which the work is allocated, performed, monitored and evaluated. Research has shown that, especially in the case of low-skilled on-location and online platform work, this is often a misclassification, as illustrated by a range of highly publicised national court decisions in recent years. In relation to OSH, the employment status of platform workers is critical for the prevention and management of risks, as **the self-employed are not covered by EU OSH directives or by national OSH legislation** in most Member States, and are often not among those who are targeted by prevention measures such as training. Another key issue relates to the **rapid changes** and **high heterogeneity** in platform work, which complicates the identification, prevention and management of OSH risks, as well as the application of OSH regulations. Indeed, regulating platform work has been described as trying to ‘hit a moving target’ (EU-OSHA, 2017; Eurofound, 2018a).

In the remainder of this chapter, we present the main findings emerging from the literature on OSH risks and their prevention and management, following a similar logic and structure as previous reports on this topic, notably Huws (2015) and EU-OSHA (2017). First, we identify those OSH challenges and risks directly related to the activities or tasks that are performed as platform work (section 3.1), and touch on how these are managed. Examples include the risk of being injured in an accident while being in traffic, ergonomic risks resulting from poor posture when performing desk-based work and exposure to chemicals or other dangerous substances when cleaning.

Next, we explain why these challenges and risks are increased in the case of platform work and examine the factors complicating the prevention and management of these risks (section 3.2).

The current body of research on safety and health in platform work has highlighted the impact of **precarious employment conditions**, including low income, irregular working times, unconventional workplaces, a lack of autonomy and control, job insecurity and a lack of collective representation, on the **physical and psychological health and well-being of platform workers** (Huws, 2015; Berg, 2016; EU-OSHA, 2017; Bajwa et al., 2018; Muntaner, 2018; European Parliament, 2020) ⁽²⁴⁾. Studies by Huws (2015) and EU-OSHA (2017) highlight that typical features of platform work, such as the uncertainty surrounding employment status and work arrangements, interact and reinforce each other, aggravating the risks that platform workers face. For example, while working as a delivery rider through an online platform or a traditional company may involve highly similar tasks and associated risks (e.g. accidents, fatigue), these risks are likely to be significantly higher for platform workers because of the working conditions (e.g. unpredictable working times and income, higher work intensity), combined with the need to be allocated more tasks, get good ratings, etc.

This approach allows us to pinpoint similarities and differences between platform work and other forms of work. As indicated in the literature, digital platform work resembles elements of a multitude of non-standard working arrangements, such as zero-hour contracts, on-demand contracts, part-time contracts, casual work, temporary agency contracts and temporary contracts. Traditionally, these have all challenged and diffused the responsibilities of OSH management for the providers of non-standard work, for the workers involved in these arrangements and for OSH professionals (Howard, 2017; Tran and Sokas, 2017; European Parliament, 2020).

3.1 OSH challenges and risks related to platform work activities

A first conclusion that emerges from the literature on OSH and platform work is that the tasks performed as platform work are **highly similar or identical to those carried out in the traditional labour market** (see Huws, 2015; EU-OSHA, 2017; Huws et al., 2017; Tran and Sokas, 2017; Samant, 2019; European

⁽²⁴⁾ Following Kalleberg and Vallas (2018), precarious work is understood as work that is uncertain, unstable and insecure, and in which workers bear the risks of the work (as opposed to businesses or the government) and receive limited social benefits and statutory protections. Also see European Parliament (2020).

Commission, 2020; European Parliament, 2020)⁽²⁵⁾. Considering the similarities in tasks, the consensus in the literature is, therefore, that in principle platform workers are exposed to similar OSH risks as other workers performing these tasks (Huws, 2015; EU-OSHA, 2017; Samant, 2019). However, and as will be elaborated on in the following sections, the risks are heightened because of the way in which platform work is organised and the conditions under which it is performed.

It is important to note here that platform work often involves work in occupations and sectors that are generally considered more dangerous, such as in the transport, cleaning and construction sectors (e.g. handiwork), which report higher incidence rates of (severe) occupational accidents, work-related injuries and illnesses. A similar issue has been noted for other forms of non-standard work, such as temporary agency work. Working in such sectors and occupations is already challenging for trained professionals; however, platform workers may lack the training, qualifications or certifications required to do certain activities (e.g. electrical repairs), putting them at higher risk. Furthermore, few platforms ask platform workers to provide formal evidence of their qualifications or skills when setting up a profile (e.g. require platform workers to upload a diploma or certificate to their profile) (European Commission, 2020). When platform workers feel pressured to work faster, to take on more tasks, etc., the risks become greater.

Another issue is that platform work typically involves **additional tasks and/or a different combination of tasks** from those associated with similar jobs in the traditional labour market. It typically involves **extra work**, that is, work that is not required in comparable jobs outside the platform economy. Setting up and maintaining an account, obtaining work and communicating with clients are all examples of tasks that are common in platform work but are not necessarily required by workers performing similar tasks in other settings. These tasks may call for a different set of skills. Cedefop (2020) research on skills use and skills development in platform work suggests that many platform workers develop communication and technical skills doing platform work, along with developing their personal attributes (e.g. independence, resilience), skills needed to obtain work and skills needed to become established as freelancers. Finally, such additional tasks may be associated with other OSH risks and health effects. For example, an individual working as a handyperson through digital labour platforms may spend many hours each day in front of a computer looking for work, managing appointments and updating their profile, which could cause eye soreness, back pain, etc., that they would not experience if they received assignments from an employer.

Looking at only the work activities, the **physical risks of platform work** depend on the precise task in question and whether it is performed on-location or online (Huws, 2015). Examples of physical risks include **safety risks**, **ergonomic risks**, and risks of exposure to **dangerous substances** (chemical or biological in nature) and **physical agents** (e.g. noise, vibration, pressure, radiation, electricity or thermal risks).

Platform workers engaged in on-location platform work face a **variety** of physical risks. Because of the heterogeneity in on-location platform work, it is impossible to provide an exhaustive list of risks. Common examples from the literature include cleaners being exposed to chemical products, ergonomic risks and safety risks such as slipping on wet floors; handypersons being exposed to physical agents (e.g. noise, dust and vibration when drilling holes) and dangerous substances (e.g. gas when fixing a boiler), or facing ergonomic risks; and delivery riders and taxi drivers facing risks of being in an accident due to fatigue, being distracted by their phone or violating traffic regulations. Some platform workers work with adults (e.g. aestheticians) or children (e.g. babysitters) and can be exposed to biological agents that may affect their health. Other platform workers work with animals (e.g. pet sitters). In general, on-location platform workers interact with clients and may face violence, harassment and crime. Other reported sources of stress for platform workers performing on-location tasks are the weather conditions and traffic congestion (European Commission, 2020). The OSH risks that platform workers are exposed to may be aggravated for various reasons, for example because platform workers work against tight deadlines and overlook basic safety principles to take shortcuts (Huws, 2015; EU-OSHA, 2017). Furthermore, platform workers usually bring their own materials and the tools and protective equipment necessary for the task, but these may not be appropriate (Huws, 2015; Eurofound, 2018a). Some of

⁽²⁵⁾ Only micro- or smaller-scale online tasks appear less common and are explicitly associated with the rise of platform work by some authors (ILO, 2018). Examples of these 'new' tasks include online content moderation, tagging images.

these jobs are otherwise often performed in the **grey economy**, and so platform work may provide opportunities for improved OSH and working conditions.

As discussed in section 2.2.2., the COVID-19 pandemic has particularly affected platform workers performing on-location tasks in public spaces or at clients' homes, such as food delivery, passenger transportation, professional or household services, etc. For some of these platform workers, all activities have ceased temporarily. Other workers could remain active, but run the risk of being infected or spreading the virus to others, for example, since they cannot always ensure social distancing and may not have access to PPE (ETUI, 2020; ILO, 2021). Recent research by the ILO (2021) reveals that most of these platform workers took personal measures to reduce the risk of being infected with coronavirus (e.g. buying face masks, hand sanitiser, gloves). In many cases, this was because platform workers were not satisfied with the quality and/or amount of PPE provided by the platform.

Online platform work, for example programming or online content review, **involves desk-based tasks that rely heavily on the use of a computer**. The physical risks associated with this type of work are similar to those of office workers, such as sedentary work; poor posture due to incorrect workstation set-up and working in a cramped space; prolonged sitting; working for long periods with a keyboard, mouse and other devices requiring frequent and repetitive arm, hand and wrist movements; using an inappropriate screen (e.g. size, flickering, glare, reflection, poor legibility); and working with poor lighting (EU-OSHA, 2017). Common health issues relate to **musculoskeletal disorders (MSDs)**, such as pain in the neck, back and upper limbs, headaches and tired, red or sore eyes, **cardiovascular diseases**, **diabetes** and **visual fatigue**, and related problems (Huws, 2015). During the COVID-19 pandemic, these issues could have become more severe, for example as a result of prolonged working hours, extended periods of online work and the blurring of boundaries between work and private life, which can result in stress and be especially detrimental for those individuals, often women, who have to deal with the double burden of working and caregiving responsibilities.

Turning to the **psychological risks** related to the tasks performed, the literature again points to a link with the nature of the task itself (e.g. tasks involving direct contact with clients in their homes) (see Huws, 2015; EU-OSHA, 2017), but also highlights that most platform workers **experience stress**. This is driven by the manner in which tasks are allocated, monitored and evaluated (algorithmic management and digital surveillance), the conditions in which platform workers operate (e.g. being available at short notice, lack of job control, professional isolation, blurring of work and private life, insecure income, lack of collective voice), and further aspects discussed in section 3.2 (see also Bérastégui (2021) for a detailed discussion). As platform workers often depend on having a good reputation and positive reviews to be assigned work, being in contact with (prospective) clients can be stressful (Huws, 2015). Out of fear that 'saying no' to a client or going against their wishes will result in a negative review, platform workers may accept work that they are not qualified for or have no experience with, or take unnecessary risks. Similarly, platforms rely on a range of nudges and incentives ('gamification')⁽²⁶⁾ that aim to encourage platform workers to be available for work for longer periods of time (e.g. Uber encouraging workers to stay online rather than logging off) or to work faster (e.g. workers being paid based on the number of deliveries made rather than the number of hours worked), etc. These elements are discussed in the following sections.

Some platform workers may also face violence, harassment and abuse, and be exposed to crime (Eurofound, 2018a; ILO, 2021). The literature suggests that these are concerns particularly for on-location platform workers working as **taxi drivers** or **delivery riders**. A survey by the ILO (2021) found that 50 % of platform workers working as taxi drivers and 41 % of those working as delivery riders fear being physically assaulted, while 33 % and 29 % of taxi drivers and delivery riders, respectively, feel stressed about being exposed to crime. In particular, women working as taxi drivers are concerned about physical and sexual assault (Huws et al., 2017; ILO, 2021). Online platform workers may experience cyberbullying and -harassment, although there is less literature covering this issue. **Online content reviewers** are one group of online platform workers that are vulnerable to stress, as they have

⁽²⁶⁾ Schmidt (2017, p. 2) describes gamification in the context of platform work as a technique that allows platform providers to reward favourable user behaviour by awarding virtual credit points and by ranking the users' performance on public leaderboards.

to look repeatedly at offensive content and images on the internet (Huws, 2015; EU-OSHA, 2017, European Commission, 2020). These workers monitor forums and check photos, videos and social media, etc., to filter out pornographic or violent images, hate speech, racism and xenophobia, etc. Platform workers performing these tasks may not have the training or support required to perform them. This may cause psychological harm to these platform workers.

In particular, on-location digital platform workers who are engaged in low-skilled work allocated by the digital platform tend to be less aware of potential risks and take fewer preventive and protective measures (EU-OSHA, 2017; Eurofound, 2018a, 2019). Digital platform workers performing high-skilled tasks tend to be more aware of potential risks and are more likely to take necessary measures to prevent OSH risks (EU-OSHA, 2017; Eurofound 2018a, 2019).

3.2 Factors aggravating OSH challenges and risks in platform work and complicating the management of those risks

Whereas the previous section focused on the tasks or activities executed in the platform economy and highlighted the OSH risks associated with them, this section will clarify why these risks are aggravated in platform work, what the main factors driving this are, what factors complicate the prevention and management of OSH risks in platform work, and related questions. Based on recent literature on this topic (notably Huws, 2015; EU-OSHA, 2017; European Commission, 2020; Bérastégui, 2021), this discussion is organised into four topics: (i) employment status and contractual arrangements; (ii) algorithmic management and digital surveillance; (iii) professional isolation, work-life balance and social support; and (iv) work transience and boundaryless careers. These topics largely correlate with the challenges identified by the European Commission to be addressed by its upcoming initiative, which aims to improve working conditions in platform work. Employment status and contractual arrangements are key in relation to the applicability of OSH regulations. The temporary and piecemeal nature of the working arrangements in digital platform work undermines to a certain extent effective labour inspection, representation and collective organisation.

3.2.1 Employment status and contractual arrangements

In the academic and policy literature on platform work, the **uncertainty regarding the employment status of platform workers** has been identified as the core challenge to be addressed (European Commission, 2020), including from the perspective of OSH (EU-OSHA, 2017; Tran and Sokas, 2017; Pesole et al., 2018). As platform work blurs the boundaries between the traditional concepts of employees and the self-employed, determining the status of platform workers is not a straightforward task.

Digital platform work is characterised by the **triangularity of the parties** involved. Typically, there are three parties involved (although in some cases additional parties are included): the digital platform, the digital platform worker and the client. Additional parties could be restaurants, for example, in the case of food delivery. Both the digital platform worker and the client can act in a private or professional capacity. In the latter case, the triangular relationship bears similarities to that of temporary work arrangements, for which research has identified worsened OSH experiences, including inadequate safety training, inadequate worker representation, poor-quality PPE and a lack of clarity of supervisory roles in OSH management (Hopkins, 2015; Countouris et al., 2016). That being said, temporary work agencies do hold responsibilities for the safety and health of their temporary workers, as an employer-employee relationship is identifiable; therefore, OSH regulations apply, including the implementation of collective technical measures and collective organisational measures if it is not deemed possible to eliminate or substitute potential risks (under the 'hierarchy of control').

In practice, platform workers are typically classified as self-employed (Prassl, 2018). This, however, has consequences for the labour and social protection rights and obligations of digital platforms and digital platform workers, and it determines the applicability of the OSH regulatory framework and its provisions. Digital platforms repeatedly contend that they provide purely online intermediation services and not the underlying services (e.g. passenger transport) (European Parliament, 2020), notwithstanding the extensive control exerted by digital labour platforms through algorithmic management regarding work

organisation, work allocation and pricing, which does not seem to reflect that assessment, especially for low-skilled on-location and online digital platform workers. Indeed, while the application of OSH obligations depends in most national contexts on a dependent employment relationship, available research has revealed that most digital platforms qualify their relationship with digital platform workers as being through contracts for services, and digital platform workers themselves as independent contractors ('self-employed') (Donovan et al., 2016; Eurofound, 2018a, 2019; Pesole et al., 2018; European Commission, 2020). Thus, the core issue in the application of the existing regulatory framework is the shifting of responsibility of the management of OSH risks to the individual digital platform workers. This is particularly problematic for platform workers engaged in relatively low-skilled on-location work, as these workers are more likely to be wrongly classified as self-employed (European Commission, 2020). It is important to highlight in this regard that especially those platform workers with weaker labour market profiles tend to be over-represented in types of platform work associated with more precarious employment conditions and more serious OSH risks. For example, new labour market entrants and workers with a migrant background are the dominant groups among platform workers working as delivery riders or taxi drivers. There are numerous accounts of near misses and of severe and deadly traffic accidents involving young delivery riders using bicycles or motorbikes (Bartel et al., 2019; Christie and Ward, 2019).

In **traditional employer-employee relationships**, the employer is required, under the OSH Framework Directive, to put forward an **overall safety and health policy**. This must include risk assessment, preventive and protective measures, worker participation (information, consultation), OSH training, etc. Workers, in turn, are required to correctly use their equipment and materials, to inform the employer of changes in the work situation, and to cooperate with their employer in fulfilling safety and health requirements. Conversely, the self-employed are **responsible for their own safety and health**. Platform workers may not know that they are responsible for safety and health, and may not be fully aware of either the OSH risks they face or the OSH standards and regulations in place.

Finally, being classified as self-employed implies that platform workers are not, in the vast majority of cases, collectively organised or represented (EU-OSHA, 2018a; Eurofound, 2018a; Vandaele, 2018; Lenaerts et al., 2018; Aloisi, 2019; European Commission, 2020; European Parliament 2020). While the ILO and the Council of Europe include independent contractors within the scope of the right to association, competition law at EU and national levels have severely limited collective rights for independent contractors (Johnston and Land-Kazlauskas 2019; Lenaerts et al., 2018; ILO, 2021). In that sense, the European Commission's consideration of options to extend collective bargaining agreements under some instances for the solo self-employed is to be welcomed ⁽²⁷⁾. In addition, it must be recognised that the essential features of digital platform work are not conducive to representation structures. The triangular nature of the relationship, the 'virtualisation' of work, the high workforce turnover, the temporary nature of the working relationships, the solitary nature of digital platform work, the absence of a common workplace and the inherent competitiveness between digital platform workers all constitute major barriers to effective collective action (Nekhoda and Kuklina, 2020; European Commission, 2020; European Parliament, 2020). Finally, research has revealed that digital platform workers are often not aware of their collective rights as workers, with reports demonstrating digital platforms pushing back against efforts to unionisation (Lenaerts et al., 2018; Johnston, 2018; European Commission 2020).

Worker participation, however, is an essential component of an effective OSH management system. Article 6(3)(c) and Articles 10 and 11 of the OSH Framework Directive guarantee the right to information, consultation and participation of workers and their representatives in questions relating to safety and health and work. Representation and unionisation are indeed key to strengthening workers' labour situations and ensuring fair employment conditions (European Commission, 2020). In this regard, several studies have demonstrated that union-trained and union-backed safety representatives are

⁽²⁷⁾ See Inception Impact Assessment of 6 January 2021 on Collective bargaining agreements for self-employed – scope of application of article 101 TFEU. Available at: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=PI_COM%3AAres%282021%29102652. In the Inception Impact Assessment, explicit reference is made to the situation of digital platform workers, who often lack the individual bargaining power to negotiate their terms and conditions.

highly effective at improving OSH results (Walters and Nichols, 2007; Cox and Fletcher, 2014; Hall et al., 2016; EU-OSHA, 2018b). However, the OSH Framework Directive is applicable only to dependent employment relationships.

3.2.2 Algorithmic management and digital surveillance

A key issue identified in the literature relates to the use of algorithmic management and digital surveillance, that is, the use of an algorithm to allocate, monitor and evaluate tasks and workers' performance. Digital platforms are one of the main actors in the development of algorithmic management as a way of managing and controlling a dispersed workforce (Lee et al., 2015; Ivanova et al., 2018; De Stefano, 2019; Mateescu and Ngyuen, 2019; European Commission, 2020).

In the literature, algorithmic management is defined as '**oversight, governance and control practices conducted by software algorithms over many remote workers**' (Möhlmann and Zalmanson, 2017, p. 4). Algorithmic management is characterised by the use of algorithms to allocate, monitor and evaluate work tasks and/or to monitor and evaluate platform workers' behaviour and performance (EU-OSHA, 2017; Eurofound, 2018; Bérastégui, 2021) through digital technologies (i.e. digital surveillance), and the automatic implementation of decisions. These workers interact with a 'system' rather than humans, which reduces transparency and causes asymmetries in information and power between the parties involved. Workers often have no insight into the rules governing the algorithm (Möhlmann and Zalmanson, 2017), although the recently adopted Riders' Law in Spain defines the transparency obligations of all digital platforms towards their digital platform workers regarding the algorithms they use. Although algorithmic management heavily relies on data collected from workers, those workers are generally not compensated for their data or informed about how their data are used, despite the provisions laid down in the **General Data Protection Regulation (GDPR)** ⁽²⁸⁾.

The GDPR and platform work

The GDPR provides platform workers with a range of rights concerning their personal data (European Commission, 2020): the right to be informed if, how, why and by whom their data are being processed; the right to access and get a copy of their data; the right to have their data corrected or supplemented in cases of inaccuracies or incompleteness; the right to have their data deleted or erased; the right to limit or restrict how their data are being used; the right to data portability; the right to object to the processing of their data; the right not to be subject to automated decisions without human involvement, where it would produce legal effects or 'similarly significantly affecting' platform workers; and also the right to meaningful information about the logic, significance and envisaged consequences of the processing of their data. By using digital technologies, digital platforms gather a substantial volume of data on both the transactions that the platforms intermediate and their platform workers (clients are outside the scope here). This includes personal data on the platform workers, which are understood as any information through which workers can be identified directly or indirectly, e.g. their name, identification number, location data, and other factors related to their physical, psychological and economic identities. The scope of personal data is thus very broad and, from that perspective, the GDPR could help to restore the power balance between platforms and platform workers (European Commission, 2020). Of particular relevance for platform workers is the right not to be subjected to decisions based solely on automated processing, including profiling, which produces legal or similarly significant effects. A legal effect should be understood here as something that affects the worker's status or contractual rights, e.g. being prohibited from using the platform. This right does not apply if automated decision-making is 'necessary for entering into, or performance of a contract between the platform work and platform' (Article 22(2)(a) GDPR) or 'is based on the platform workers' explicit consent' (Article 22(2)(c) GDPR). In light of the power imbalances between platforms and platform workers, platform workers may feel that they have no choice but to consent to the processing of their data. Furthermore, platforms may assert that the volume of data that they

⁽²⁸⁾ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) (OJ L 119, 4.5.2016, p. 1-88).

process makes human involvement (nearly) impossible; however, in those cases, platforms must assess whether or not other methods could be used and establish appropriate safeguards (European Commission, 2020).

Furthermore, Articles 13, 14 and 15 of the GDPR all provide data subjects with the right to information, including 'the existence of automated decision-making, including profiling, referred to in Article 22(1) and (4) and, at least in those cases, meaningful information about the logic involved, as well as the significance and the envisaged consequences of such processing for the data subject'. In that respect, the GDPR does seem to support digital platform workers' right to an explanation for the use of their data. Digital platforms need to provide digital platform workers with (general) information that is useful for them for challenging a particular decision (European Commission, 2020). In line with the guidelines provided by the Article 29 Data Protection Working Party, digital platform workers will be able to challenge these decisions or express their views only if they fully understand how they have been made and on what basis ⁽²⁹⁾. Nonetheless, it remains to be seen how digital platforms will apply these rules in practice (European Commission, 2020).

The use of algorithmic management is one of the most distinguishing features of platform work (EU-OSHA, 2017; Eurofound, 2018a; ETUI, 2020; Bérastégui, 2021), and applies to all types of platform work, but to varying degrees. In particular, those platforms intermediating relatively low-skilled online or on-location platform work tend to have a higher level of control over their platform workers. Paradoxically, it seems that digital platform workers' perceived autonomy with regard to how and when to fulfil certain tasks may be offset by the far-reaching managerial control derived from algorithmic management (Möhlmann and Zalmanson, 2017; Ivanova et al., 2018; Malenfer et al., 2018; Prassl, 2018). In turn, this gives rise to the question of whether these practices amount to subordination or direction, which in many Member States still serves as the main legal indication regarding the classification of employment status (see section 3.2.1).

In the following sections, we elaborate on the core aspects of algorithmic management, placing it in the context of OSH and platform work.

Among the characteristics of algorithmic management identified by Möhlmann and Zalmanson (2017) are, first and foremost, the **continuous tracking of platform workers' behaviour** and the **continuous evaluation of their performance**. Both rely on data gathered using digital technologies.

Tracking is often done through the device that connects workers with the platform, e.g. the mobile phone on which the platform app is installed (Möhlmann and Zalmanson, 2017). Tracking of workers' behaviour undermines their autonomy and level of job control, and may cause anxiety and stress (Lee et al., 2015). Similarly, the performance of platform workers is constantly monitored on the basis of data collected using digital technologies, such as data on customer ratings, task rejection rates (e.g. how many times workers turned down a task assigned by the platform or have failed to complete tasks they accepted) and the speed or accuracy of task execution. Examples include tracking workers performing delivery tasks (e.g. Deliveroo) or passenger transport tasks (e.g. Uber) using the Global Positioning System (GPS), collecting data on their speed and route, and monitoring online workers by taking screenshots of their screen, and tracking mouse clicks and keystrokes when working (e.g. Upwork) (Schmidt, 2017; European Parliament, 2020; Bérastégui, 2021). Based on these data, platforms rank platform workers and can issue rewards or penalties (Möhlmann and Zalmanson, 2017). For example, platforms can give preference to high-ranking platform workers when allocating tasks or set up the platform so that clients can see the profiles of workers with the highest ratings only. For workers with lower ratings, it then may become difficult to be assigned (sufficient) tasks. Having to maintain a good rating at all times and in real time, and dealing with the consequences of having a poor rating, can be very stressful for platform workers (Möhlmann and Zalmanson, 2017).

⁽²⁹⁾ Article 29 Data Protection Working Party, Guidelines on automated individual decision-making and profiling for the purposes of Regulation 2016/679, 3 October 2017 (as last revised and adopted on 6 February 2018), p. 27.

Besides the continuous monitoring of platform workers' behaviour and performance, algorithmic management **involves (semi-)automated decisions made without human intervention** (Möhlmann and Zalmanson, 2017). As explained above, fully automated decisions related to performance evaluation are not permitted under the GDPR. Algorithmic management leads to a flattening of organisational structures with fewer middle-management posts, which were traditionally responsible for OSH management (IFA, 2016). Instead, this managerial role is replaced by algorithms that decide on work organisation and allocation with little to no human involvement (Simonite, 2015; Ivanova et al., 2018; European Commission, 2020). As such, algorithmic management determines the **power relations between all parties involved in platform work**: platforms, clients and platform workers (Bérestégui, 2021). More generally, the use of (opaque) algorithms in the decision-making process, the individualisation of work relationships and the lack of a collective voice, and the incidence of bogus self-employment all leave platform workers in weaker positions than their counterparts in traditional employment (Bérestégui, 2021).

Closely related to this, platform workers typically interact with a system and consequently **cannot negotiate or ask for feedback**. There are few opportunities for recourse or conflict resolution (Möhlmann and Zalmanson, 2017). In many cases, all communication is automated. To be able to work, platform workers need to set up an account or profile on the platform. In principle, platform workers are in charge of their account and can close it when they no longer want to work through the platform. Platform workers whose account has been suspended by the platform, however, often do not have any way to get it reinstated. Examples include workers whose rating drops below a specific minimum level and are consequently banned from the platform, or who have been suspended based on a complaint from a client, which may or may not have been justified (Eurofound, 2018a). Suspended platform workers lose access to the platform (temporarily or permanently). This is especially problematic in cases where the suspension is based on a mistake or deemed unfair by the worker (e.g. late delivery because the rider had to wait a long time at the restaurant), and for platform workers who depend on the platform to make a living (no fallback option) or who have incurred specific costs to enable them to use the platform (e.g. Uber drivers who have bought a new car or drivers who have invested in a taxi licence but are suspended after receiving poor ratings).

A final component of algorithmic management is a **lack of transparency concerning the functioning of algorithms** (Möhlmann and Zalmanson, 2017). Platforms are reluctant to share any information about how the algorithm works, arguing that it is part of their business model⁽³⁰⁾. As it stands now, opacity seems to be at the core of the algorithmic design ('black box of intermediation') (Burrell, 2016; Mateescu and Ngyuen, 2019; European Commission, 2020; European Parliament, 2020). However, the Spanish Riders' Law is a pioneer in this regard, as it introduced transparency obligations for digital platforms towards their digital platform workers with regard to the algorithms they use.

Reduction in worker job control and mechanisms used by platforms to control and influence platform workers' behaviour

Platforms use a range of techniques to control and influence platform workers' behaviour, to ensure that the clients' demand for service can be met as it emerges. Delivery or passenger transport platforms, for example, want to guarantee that sufficient numbers of platform workers are logged on and can be assigned tasks at lunchtime and in the evenings. Platforms intermediating online work, such as programming or content review, want to ensure that clients can communicate with platform workers in their own time zone (regardless of the time zone in which the worker resides). These mechanisms are used to encourage workers not only to work during specific time slots, but also to stay online or work longer, to refrain from taking breaks so as to remain available, to work faster, etc.

⁽³⁰⁾ Here, it is important to recall the new legislation introduced in Spain (Riders' Law), which contains provisions in relation to the transparency of algorithmic management.

This can, of course, be detrimental to platform workers' work-life balance, overall job and life satisfaction, and mental and physical health.

First, platforms impose strict rules that are implemented through a user interface. As a result, workers cannot deviate from the rules, as the platform's app or website will simply not allow deviations. This is described as **algorithmic bureaucracy** by Bérastégui (2021). Second, as described above, **rating systems** are common in platform work but may be unfair, arbitrary or inaccurate. At the same time, having a good rating is crucial for being assigned tasks. Platform workers report that it is difficult to get wrong or unfair ratings corrected, and that complaining about a review may lead to penalties (Eurofound, 2018a). The pressure to maintain high ratings can become a major source of stress and increases the emotional demands of digital platform work (Aloisi, 2017; EU-OSHA, 2017; European Commission, 2020). Rating systems put individual digital platform workers in direct competition with each other, leaving underperforming platform workers with fewer chances to be assigned tasks (in general or during their preferred working hours). In addition, rating mechanisms encourage a rapid pace of work, with digital platform workers continuously working to tight deadlines to maintain high ratings, which may increase the likelihood of accidents (EU-OSHA, 2017). Platforms also use techniques such as **surge pricing, nudging and gamification, and withhold information** to steer platform workers' behaviour (Huws, 2015; Rosenblat and Stark, 2016; European Commission, 2020; Pastuh and Geppert, 2020; ILO, 2021). These are all soft control mechanisms, signalling to platform workers that changing their behaviour could potentially lead to additional income (Bérastégui, 2021). Examples include platforms showing the number of hours active on the platform, performance thresholds to be met (e.g. number of assignments completed in a certain time slot) and surge prices that are applicable at specific times or in specific areas. This increases the level of competition among platform workers. What is notable here is that these techniques are often used when the platform worker is about to log off. However, this additional income may not necessarily materialise. For instance, platforms deliberately withhold information from platform workers, influencing them to make decisions that may not necessarily be in their best economic interest (e.g. on most transportation platforms, riders receive information about the location of a client only after accepting a task). This may cause workers active in the transport sector to feel pressured to move as quickly as possible (ILO, 2021), which creates both physical and mental safety and health risks (e.g. continuing to drive while tired, ignoring the traffic code).

Besides reshaping the power relationships between the parties involved, Bérastégui (2021) lists two key issues related to algorithmic management. The first issue is **occupational overload**, which can be split into 'quantitative overload' and 'qualitative overload' (Bérastégui, 2021). Quantitative overload means that worker performs a large amount of work in a given timeframe; qualitative overload refers to a worker performing assignments that are far above their abilities. As Bérastégui (2021) explains, digital labour platforms aim to maximise the number of completed tasks to ensure that all clients' demands are met on time with good quality. Algorithmic management is used to coordinate and maximise the workload to this end. As a result, platform workers may be assigned too many tasks or tasks that are not in line with their skills, thus generating frustration, stress and anxiety. Moreover, platform workers may experience overload due to an overflow of information that they cannot process. Coupled with the pressure to perform to maintain a good rating and with a lack of social support in the workplace, occupational overload, micromanagement through digital surveillance and overall continuous and real-time monitoring reduce workers' autonomy and cause exhaustion and stress, as well as physiological responses such as back pain and headaches, and cardiovascular disease (Bérastégui, 2021).

Second, algorithmic management is associated with a breakdown in the **trust** that platform workers have in the platform. Organisational trust can be understood as the confidence that workers have that the organisation will perform actions that are beneficial or at least not detrimental to them (Bérastégui, 2021). Organisational trust is associated with higher levels of job satisfaction and better mental and physical health. Organisational trust is closely linked to **organisational justice**, which involves three

key dimensions: (i) **distributive justice** (i.e. perceived fairness in the amount of compensation received for performing work); (ii) **procedural justice** (i.e. perceived fairness in the methods and processes used to determine compensation); and (iii) **interactional justice** (i.e. perceived fairness in interpersonal treatment). Platform work can be problematic in all three areas (Bérastégui, 2021) ⁽³¹⁾. Previous research, however, suggests that fostering organisational trust by ensuring organisational justice is critical, as perceived injustice may result in poorer physical and mental health and behavioural issues, such as stress, burnout, psychiatric disorders, increased susceptibility to illness, cardiovascular disease and aggressiveness.

At the same time, an increased reliance on ICT-enabled technologies (ICT-ET), including algorithmic management, may also bring opportunities for managing OSH risks (Podgórski, 2017, 2021; Moore et al., 2018; Cockburn, 2021). For instance, digital platforms' algorithms could theoretically be adapted by integrating OSH prevention measures into their design, for example by aligning working-time obligations and implementing safety management programmes (e.g. fatigue assessment technology). Furthermore, the 'virtualisation' of digital platform work could also mean that workplace safety and health training moves online, through the use of safety and health apps and online training programmes (EU-OSHA, 2019). From the perspective of enforcement, 'smart' monitoring tools might increase the efficiency of labour inspections (Samant, 2019; Cockburn, 2021). For instance, this could allow tele-inspections based on real-time video feeds, which are particularly relevant for access to the workplace for online digital platform workers, who mostly operate from home (EU-OSHA, 2018a; Samant, 2019).

3.2.3 Professional isolation, work-life balance and social support

Platform work is characterised by an individualisation of work and by work-related physical and social isolation, also known as 'professional isolation' (Bérastégui, 2021). Digital platform work marks a radical shift away from formalised workplaces, as digital platform work is usually either home based (online digital platform work) or on the road/in public spaces and/or at the client's premises (on-location digital platform work), creating a **globally dispersed workforce** (EU-OSHA, 2017; Tran and Sokas, 2017; Garben, 2019; Bérastégui, 2021; ILO, 2021). In addition, platforms rely on algorithmic management and digital surveillance, automating many of the interactions that workers would usually have in a more traditional work setting. For example, in platform work, rating systems replace face-to-face performance appraisals, and hiring procedures are replaced by setting up an account (Bérastégui, 2021). Platform workers have few or no opportunities to directly engage with other platform workers, clients or even the platform (Graham et al., 2017; European Commission, 2020).

This gives rise to a range of OSH challenges, which may be difficult to prevent and/or manage (Huws, 2015; EU-OSHA, 2017; Tran and Sokas, 2017; European Commission, 2020; Bérastégui, 2021). Previous research highlights that such work-related professional and social isolation means that in platform work the protective effect of working in a conventional workplace together with others is lost (Quinlan, 2015; EU-OSHA, 2017; Tran and Sokas, 2017; Samant, 2019; Nekhoda and Kuklina, 2020).

Bérastégui (2021) identifies three main areas of concern in terms of psychosocial risks related to professional isolation: (i) professional identity, (ii) work-life balance and (iii) workplace social support. First, in both on-location and online platform work, activities are executed in **unconventional workplaces** (including the home), which, in the case of on-location platform work, may not be known to the platform workers before accepting a task (EU-OSHA, 2017). **Workplaces and work equipment are often not adapted** to the needs of platform workers (Huws, 2015; EU-OSHA, 2017). For example, platform workers working at home may not have a proper desk and may instead use their personal laptop, screen, keyboard and mouse, which may not meet ergonomic requirements for desk-based work. Another example relates to those platform workers working in clients' homes: these workers may have to work in confined and poorly lit spaces. In traditional employer-employee relationships, it is the

⁽³¹⁾ For example, the algorithm can be programmed such that all tasks have the same remuneration, without accounting for experience or effort. Another example is that algorithms may favour workers with specific human capital or assets (e.g. a specific type of car in the case of Uber). Turning to procedural justice, an example would be that platforms may not consistently apply the same procedure to all workers or cases, or may favour clients over workers. Finally, regarding interactional justice, the lack of conflict resolution mechanisms is seen by many platform workers as a signal that they are not respected. Bérastégui (2021) concludes that platforms do not live up to platform workers' expectations of distributive, procedural and interactional justice.

employer's responsibility to adapt workplaces and provide the work equipment required. Platform workers, being classified as self-employed, typically have to provide this themselves.

Second, in platform work, the **boundaries between work and home environments** are blurred. In turn, platform workers may face difficulties in achieving a good **work-life balance**, since the **boundaries between working and personal times and spaces are also blurred** (Bérastégui, 2021). To encourage platform workers to be available, work longer hours, etc., platforms use various types of incentives, which can worsen **work-life conflicts**. For example, platform workers may spend many hours online looking for work (i.e. time spent that is not remunerated) or executing tasks, workers may have unpredictable and unstable/irregular work schedules, and workers may have little or no control over their working time. These issues arise across all types of platform work, on-location and online. In particular, platform workers engaged in online work such as programming, data entry or translation work, may need to be available for extended periods of time or adapt to the time zone of their client (e.g. freelancers working anti-social hours or through the night to be available to respond to a client's requests). Although on-location platform work may appear to be less affected by long working hours, studies indicate that many engaged in passenger transport tend to work long hours, for example by combining platform work with a regular job to be able to make a living (e.g. taxi drivers active on the Uber platform) (Christie and Ward, 2019; Polkowska, 2021a). It should be noted that young men with a migrant background are over-represented in on-location platform work, such as delivery or passenger transport, which may indicate they are more flexible to work unpredictable schedules, long or anti-social hours, etc. (Brancati et al., 2020; European Commission, 2020). In such cases, however, platform workers run higher risks of being in an accident due to fatigue. This may imply that platform workers may have much less flexibility in choosing their own working times and in managing their work-life balance. In spite of being classified as self-employed, in practice, many platform workers (and especially those performing low-skilled on-location work such as food delivery) have to abide by working time patterns imposed by the platform (e.g. working during previously allocated shifts; see Eurofound, 2018a). In general, a poor work-life balance is associated with sleep problems, exhaustion, difficulties recuperating from work, stress, depression, burnout and an overall dissatisfaction with work and personal life (Bérastégui, 2021). However, several studies indicate that platform work can also contribute to improving platform workers' work-life balance, as it allows them to work when it fits in with their life, e.g. women working from home and combining platform work with caregiving tasks (Berg, 2016; Caracciolo di Torella and McLellan, 2018; Eurofound, 2018a; Advisory Committee on Equal Opportunities for Women and Men at Work, 2019). Nonetheless, there still exists an urgent need to define, measure and obtain reliable gender-segregated information on the extent and characteristics of digital platform work and its medium- and long-term impacts on women's economic independence, employment rights and well-being (Advisory Committee on Equal Opportunities for Women and Men at Work, 2019).

Third, digital platform workers are typically isolated when performing their tasks; they have **no support from colleagues or management** (which in the case of platform work may be replaced by an algorithm) (European Parliament, 2020; Bérastégui, 2021) and work on their own, often without direct contact with their clients. In addition, the high turnover of workers, the anonymity of platform work and the lack of a common workspace mean that platform workers in general have little or no contact with other platform workers. At the same time, platform workers continuously compete with other workers, who they might not even be able to identify or contact, for the same tasks. Finally, the use of algorithms to allocate, monitor and evaluate work means that platform workers often have no or very little direct contact with the platform either (e.g. perhaps only via a helpdesk accessed through a chat function on the platform app or automated messages). This is a source of stress for many platform workers, and it leaves little or no room for emotional support (Eurofound, 2018a, 2018b, 2019; Bérastégui, 2021). Workplace social support, in the form of coaching, career mentoring, task support or collegial support, however, is critical to job satisfaction and job tenure (Bérastégui, 2021). Many platform workers thus find themselves **without a network of social support**. This may also mean that platform workers will not have a role model shaping their attitudes and behaviour at work (Bérastégui, 2021). Platform workers may **lack a strong professional identity** and may **not find their work meaningful**. This point has emerged in several studies based on surveys and interviews with platform workers; for example, work by Eurofound (2018a, 2018b, 2019) suggests that workers in food delivery see platform work as a temporary gig that is unrelated to the work they want to do in the future, and often do not even mention this work on their CV or to their family and friends. Platform workers performing online micro-tasks may encounter similar

issues (Bérestégui, 2021). All this causes feelings of loneliness, stress, anxiety, depression and burnout (Graham et al., 2017).

Last, and of particular relevance to digital platform workers performing tasks online, is the **Framework Agreement on Telework** ⁽³²⁾, which does not apply to **teleworkers that are classified as self-employed**. According to Article 8 of the Framework Agreement on Telework, the employer remains responsible for the protection of the OSH of the teleworker, particularly regarding the company policy concerning visual display unit work, in accordance with Directive 90/270/EC ⁽³³⁾. The employer, workers' representatives and/or relevant authorities have access to the place of telework, within the limits of national legislation and collective requests, and with prior notification of the digital platform worker. Digital platform workers are also entitled to request inspection visits. However, from the available research it seems that digital platform workers performing tasks online are largely responsible for their own OSH, consistent with their classification as self-employed by digital platforms.

3.2.4 Work transience and boundaryless careers

Platform work is associated with **(chronic) job insecurity and income insecurity**, as platform workers depend on the tasks that they are assigned or choose to take up, and platform work is based on temporary, short-term assignments that do not guarantee any long-term work relationship. Job and income insecurity are major work-related stressors and have been associated with poor mental health, burnout, depression, anxiety and physical health issues such as fatigue and pain (Cottini and Lucifora, 2013; Huws, 2015; Mattila-Wirolahti et al., 2020; Bérestégui, 2021; ILO, 2021). Many types of platform work, especially relatively low-skilled online work, provide little or no opportunities for skills development through training or for career progression in the longer term (European Commission, 2020; Bérestégui, 2021). Being considered self-employed, platform workers are deemed responsible for their own training and career development.

In most cases, it is either the platform or the client who assigns tasks to platform workers, which means that **platform workers have little or no control over how much work they actually have to do**. Platform workers are thus faced with both objective and subjective job insecurity (Bérestégui, 2021). In only 1 out of the 10 most common types of platform work identified by Eurofound (2018a, 2018b) could the platform worker determine the work allocated to them. This leaves platform workers in a vulnerable position and may pressure them into being available on a near-continuous basis and to do as many tasks as possible. Many platform workers may fear being dismissed by the platform for refusing to take up certain tasks, even if they have little experience of the work required, which could lead to dangerous situations. This is particularly true of those engaged in low-skilled online and on-location work that does not require specific skills and can be done by anyone, as they often feel that they could be easily replaced (European Commission, 2020; Bérestégui, 2021). Finally, platform workers fear not only that they might find themselves without work, but also that the terms and conditions under which they work might be unilaterally changed/worsened (Graham et al., 2017; Bérestégui, 2021).

In addition, platform workers may not earn sufficient **pay per task** to make a living (or are not allocated a sufficient number of tasks to earn a living). There are some exceptions, for example high-skilled professionals performing on-location or online work who are contracted on the basis of their expertise ('specialists'). Eurofound (2018a, 2018b), for example, reports that some professionals (e.g. electricians) may charge higher prices doing platform work than through their own business or that of their employer, because they know that clients cannot find anyone else to perform the task. In general, however, the income earned through platform work tends to be unpredictable depending on a number of factors.

Because of the way platform work is organised, platform workers are faced with considerable **emotional demands**, which may be a source of stress especially when the power relationships between the platform/client and the platform worker are imbalanced (Bérestégui, 2021). To be assigned work and

⁽³²⁾ EU Social Partner's Framework Agreement on Telework of 16 July 2002. Available at: <https://www.etuc.org/en/framework-agreement-telework>

⁽³³⁾ Council Directive 90/270/EC of 29 May 1990 on the minimum safety and health requirements for work with display screen equipment (fifth individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC) (OJ L 156, 21.6.1990, p. 14–18).

maintain a good rating, both on-location and online platform workers may need to hide their feelings, be friendly and flexible, and be ready to answer any request (Rosenblat and Stark, 2016; Bajwa et al., 2018; Eurofound, 2018a, 2018b; European Commission, 2020). This is emotionally exhausting. Coupled with the high level of work transience and lack of career prospects, platform work is more emotionally demanding than similar jobs in the traditional labour market (Bérastégui, 2021).

4 Conclusions

Digital labour platforms that match the demand for and supply of services are rapidly gaining ground in the EU, introducing new forms of work and new business models. Based on recent academic and policy literature, this review focuses on the OSH risks facing platform workers and the challenges that emerge concerning the prevention and management of these risks. Although the body of research on platform work has grown significantly over the past year, only a few studies specifically cover OSH, or do so as part of a larger discussion on working and employment conditions and job quality. In particular, the literature on OSH management in platform work is scarce, which, coupled with an overall lack of a common definition of platform work and available data allowing the measurement of the size and proliferation, constitutes an important research gap.

With regard to the **OSH risks** identified in the literature, there is a consensus that the tasks performed in digital platform work are very similar to those carried out in the traditional economy. Leading studies on this topic, e.g. Huws (2015) and EU-OSHA (2017), therefore argue that the OSH risks related to the tasks performed are also similar. Digital platform workers, however, are often active in **sectors that are generally considered more dangerous**, with higher incidence rates of (severe) occupational accidents, injuries and illnesses. Moreover, platform work involves **additional tasks and/or a different combination of tasks** from those associated with similar jobs in the traditional labour market.

Furthermore, the literature identifies several factors inherent to the way that platform work is organised, which exacerbate those 'traditional risks' or give rise to new safety and health risks. These factors can be grouped into four categories, namely those related to (i) employment status and contractual arrangements; (ii) algorithmic management and digital surveillance; (iii) professional isolation, work-life balance and social support; and (iv) work transience and boundaryless careers. **The employment status of platform workers is the main challenge identified in the literature.** Platform workers are usually classified as self-employed, as stipulated by platforms in their terms and conditions and irrespective of the real circumstances under which they work. This, however, means that the EU and national OSH regulatory frameworks and provisions do not apply to the vast majority of platform workers, which has major consequences for OSH management. In addition, the use of **algorithmic management and digital surveillance** to allocate, monitor and evaluate tasks and to **steer platform workers' behaviour** (including through rating systems, nudging and gamification or surge pricing), **shifting the power balance** in favour of the platform, is one of the key features of platform work. This is associated with a lack of job control and a reduction in worker autonomy, occupational overload, performance pressure, strong competition among digital platform workers, a lack of organisational trust, a lack of a collective voice, etc. Research indicates that this, in turn, leads to exhaustion and stress, and physiological responses such as back pain and headaches, and cardiovascular diseases. In summary, it creates a myriad of physical and mental safety and health risks.

Platform work is also characterised by the **individualisation of work**, a **lack of social support** and **work-related physical and social isolation**, also known as 'professional isolation' (Bérastégui, 2021). Digital platform work marks a **radical shift away from formalised workplaces**, as digital platform work is usually either home-based (online digital platform work) or on the road/in public spaces and/or at the client's premises (on-location digital platform work). This has considerable consequences from an OSH perspective, such as the lack of adaption of work environment not being adapted to the needs of platform workers, the lack of provision of adequate and ergonomic work equipment, difficulties in achieving a good work-life balance, and a lack of support from colleagues and management. In addition, while in some cases being a platform worker may help to improve work-life balance, in other cases the blurred boundaries between work and private life are problematic. Finally, platform work is strongly associated with **(chronic) job insecurity and income insecurity**, as platform workers depend on the tasks they can take up and platform work is based on temporary, short-term assignments that do not guarantee any long-term work relationship. Job and income insecurity are major work-related stressors, which have been associated with poor mental health, burnout, depression and anxiety, but also physical health issues such as fatigue and pain (Cottini and Lucifora, 2013; Huws, 2015; Mattila-Wirolahti et al., 2020; Bérastégui, 2021; ILO, 2021).

Regarding OSH management in digital platform work, more research is clearly needed. The literature is underdeveloped in this area, with the literature that does touch on the issue often being limited to broad observations. Nonetheless, it is evident that digital platforms that misclassify their workers as self-employed are transferring responsibilities and obligations in the area of OSH, historically assumed by employers in a traditional employer-worker relationship, onto digital platform workers. For instance, digital platforms rarely carry out workplace risk assessments or implement collective technical and organisational measures aimed at minimising the effects of detrimental events to the safety and health of workers. Instead, available evidence shows that digital platforms (mainly those intermediating on-location services) often limit themselves to providing PPE to their workers. Maximal labour performance — where as many tasks are delivered on time and of good quality — seems paramount from the perspective of the digital platform, while OSH responsibilities are deferred to the digital platform worker. However, digital platform workers may not (i) know that they are responsible for safety and health; (ii) be fully aware of the OSH risks they face; or (iii) be fully aware of the OSH prevention principles and OSH standards.

At the same time, it is certainly true that many of the essential features of digital platforms complicate the implementation of the fundamental components of OSH management with respect to risk assessment, preventive and protective measures, training, worker participation (information and consultation) and labour inspections. Indeed, the multi-party working relationships (involving the digital platform, the digital platform worker and the client), the ‘virtualisation’ of work (and the absence of a common workplace), the temporary and flexible natures of work, the high labour turnover, and the solitary nature of digital platform work hinder the establishment of a sound OSH framework. For instance, although there are a few exceptions (Johnston and Land-Kazlauskas, 2018; Vandaele, 2018), digital platform workers are rarely collectively organised, which stands in the way of realising effective worker participation (through information and consultation) in the development of an effective OSH management system. Although trade unions are starting to take up the issue, the relatively small contribution that digital platform work makes to the overall economy and the active resistance of some digital platforms to collective organisation have hampered that development (Johnston and Land-Kazlauskas, 2018; Vandaele, 2018).

5 References

- Advisory Committee on Equal Opportunities for Women and Men (2019), *Opinion on new challenges for gender equality in the changing world of work*. Available at: https://ec.europa.eu/info/publications/list-previous-opinions-advisory-committee-equal-opportunities-women-and-men_en
- Aloisi, A. (2019), *Negotiating the digital transformation of work: non-standard workers' voice, collective rights and mobilisation practices in the platform economy*. EUI Working Paper, MWP 2019/03. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3404990
- Bajwa, U., et al. (2018), 'The health of workers in the global gig economy'. *Globalization and Health*, Vol. 14, 124. <https://doi.org/10.1186/s12992-018-0444-8>
- Bartel, E., et al. (2019), 'Stressful by design: exploring health risks of ride-share work'. *Journal of Transport & Health*, Vol. 14, 100571. <https://doi.org/10.1016/j.jth.2019.100571>
- Bérestégui, P. (2021), *Exposure to psychosocial risk factors in the gig economy: a systematic review*. ETUI Report, European Trade Union Institute. Available at: <https://www.etui.org/sites/default/files/2021-01/Exposure%20to%20psychosocial%20risk%20factors%20in%20the%20gig%20economy-a%20systematic%20review-web-2021.pdf>
- Berg, J. (2016), 'Income security in the on-demand economy: findings and policy lessons from a survey of crowdworkers'. *Comparable Labor Law & Policy Journal*, Vol. 37, No 3. Available at: <https://papers.ssrn.com/abstract=2740940>
- Brancati, M., et al. (2020), *New evidence on platform workers in Europe: results from the second COLLEEM survey*. JRC Science for Policy Report, Publications Office of the European Union, Luxembourg. Available at: <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/new-evidence-platform-workers-europe>
- Burrell, J. (2016), 'How the machine "thinks": understanding opacity in machine learning algorithms'. *Big Data & Society*, Vol. 3, No 1. <https://doi.org/10.1177/2053951715622512>
- Caracciolo di Torella, E. and McLellan, B. (2018), *Gender equality and the collaborative economy*. Directorate-General for Justice and Consumers, European Commission, Brussels.
- Cedefop (2020), *Developing and matching skills in the online platform economy: findings on new forms of digital work and learning from Cedefop's CrowdLearn study*. Available at: <https://www.cedefop.europa.eu/en/publications-and-resources/publications/3085>
- Christie, N. and Ward, H. (2019), 'The health and safety risks for people who drive for work in the gig economy'. *Journal of Transport & Health*, Vol. 13, pp. 115-127. Available at: <https://www.sciencedirect.com/science/article/abs/pii/S2214140518305772>
- Cockburn, W. (2009), *Labour inspectorates' strategic planning on safety and health at work: results of a questionnaire survey to EU-OSHA's focal points*. European Risk Observatory Working Paper 10, European Agency for Safety and Health at Work. Available at: <https://osha.europa.eu/en/publications/report-labour-inspectorates-strategic-planning-safety-and-health-work>
- Cockburn, W. (2021), 'OSH in the future: where next?'. *European Journal of Workplace Innovation*, Vol. 6, pp. 84-97.
- Cottini, E. and Lucifora, C. (2013), 'Mental health and working conditions in Europe'. *ILR Review*, Vol. 66, No 4, pp. 958-988. Available at: <https://www.jstor.org/stable/24369560?seq=1>
- Countouris, N., et al. (2016), *Report on temporary employment agencies and temporary agency work*. International Labour Organisation. Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---ed_dialogue/msu/documents/publication/wcms_541655.pdf

- Cox, A. and Fletcher, L. (2014), *Scoping study for a foresight on new and emerging occupational safety and health (OSH) risks and challenges*. European Agency for Safety and Health at Work. Available at: <https://osha.europa.eu/en/publications/reports/scoping-study-for-a-foresight-on-new-and-emerging-osh-risks-and-challenges>
- De Stefano, V. (2016), *The rise of the 'just-in-time workforce': on-demand work, crowdwork, and labour protection in the 'gig economy'*. Conditions of Work and Employment Series No 71, International Labour Organisation. Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---travail/documents/publication/wcms_443267.pdf
- De Stefano, V. and Aloisi, A. (2018), *European legal framework for digital labour platforms*. European Commission, Luxembourg. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3281184
- De Stefano, V. (2019), 'Negotiating the algorithm: automation, artificial intelligence and labour protection'. *Comparative Labour and Policy Journal*, Vol. 41, No 1.
- De Stefano, V. (2021), *Platform work and the employment relationship*. ILO Working Paper 27, International Labour Organisation. Available at: https://www.ilo.org/global/publications/working-papers/WCMS_777866/lang--en/index.htm
- Donovan, S., et al. (2016), *What does the gig economy mean for workers?* Congressional Research Service, United States Congress. Available at: <https://fas.org/sqp/crs/misc/R44365.pdf>
- Drahokoupil, J. and Fabo, B. (2016), *The platform economy and the disruption of the employment relationship*. ETUI Policy Brief No 5/2016, European Trade Union Institute. Available at: <https://www.etui.org/publications/policy-briefs/european-economic-employment-and-social-policy/the-platform-economy-and-the-disruption-of-the-employment-relationship>
- ETUC (European Trade Union Confederation), 2020a, 'EU social partners agreement on digitalisation'. Available at: <https://www.etuc.org/en/document/eu-social-partners-agreement-digitalisation>
- ETUC (European Trade Union Confederation) (2020b), 'Red card for platform abuses in the COVID-19 crisis'. Available at: <https://etuc.org/en/document/red-card-platform-abuses-covid-19-crisis>
- ETUI (European Trade Union Institute) (2020), *COVID-19: a 'stress test' for workers' safety and health*. Available at: https://www.etui.org/sites/default/files/2020-12/Covid-19%20a%20stress%20test%20for%20workers%20safety%20and%20health_2020.pdf
- EU-OSHA (European Agency for Safety and Health at Work) (2017), *Protecting workers in the online platform economy: an overview of regulatory and policy developments in the EU*. Available at: <https://osha.europa.eu/en/publications/protecting-workers-online-platform-economy-overview-regulatory-and-policy-developments>
- EU-OSHA (European Agency for Safety and Health at Work) (2018a), *Foresight on new and emerging occupational safety and health risks associated with digitalisation by 2025*. Publications Office of the European Union, Luxembourg.
- EU-OSHA (European Agency for Safety and Health at Work) (2018b), *Safety and health in micro and small enterprises in the EU: final report from the SESAME project*. Available at: <https://osha.europa.eu/en/publications/safety-and-health-micro-and-small-enterprises-eu-final-report-3-year-sesame-project/view>
- EU-OSHA (European Agency for Safety and Health at Work) (2019), *OSH and the future of work: benefits and risks of artificial intelligence tools in workplaces*, Discussion Paper. Available at: <https://osha.europa.eu/en/publications/osh-and-future-work-benefits-and-risks-artificial-intelligence-tools-workplaces>
- Eurofound (2018a), *Employment and working conditions of selected types of platform work*. Available at: <https://www.eurofound.europa.eu/publications/report/2018/employment-and-working-conditions-of-selected-types-of-platform-work>

- Eurofound (2018b), *Overview of new forms of employment 2018 update*. Available at: https://www.eurofound.europa.eu/sites/default/files/ef_publication/field_ef_document/ef18050en.pdf
- Eurofound (2019), *Platform work: maximising the potential while safeguarding standards?* Available at: https://www.eurofound.europa.eu/sites/default/files/ef_publication/field_ef_document/ef19045en.pdf
- Eurofound (2020), *Back to the future: policy pointers from platform work scenarios*. Available at: <https://www.eurofound.europa.eu/publications/report/2020/back-to-the-future-policy-pointers-from-platform-work-scenarios>
- Eurofound (2021), 'Platform economy: developments in the COVID-19 crisis'. Available at: <https://www.eurofound.europa.eu/is/data/platform-economy/dossiers/developments-in-the-covid-19-crisis>
- European Commission (2020), *Study to gather evidence on the working conditions of platform workers*. Available at: <https://ec.europa.eu/social/main.jsp?catId=738&langId=en&pubId=8280>
- European Commission (2021), 'Questions and answers: first stage social partners consultation on improving the working conditions in platform work'. Available at: https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_656
- European Parliament (2019), *Health and safety in the workplace of the future*. Briefing requested by EMPL Committee. Available at: [https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/638434/IPOL_BRI\(2019\)638434_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/638434/IPOL_BRI(2019)638434_EN.pdf)
- European Parliament (2020), *The platform economy and precarious work*. Available at: [https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652734/IPOL_STU\(2020\)652734_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652734/IPOL_STU(2020)652734_EN.pdf)
- Fairwork (2020), *The gig economy and COVID-19: looking ahead*. Available at: <https://fair.work/wp-content/uploads/sites/97/2020/09/COVID-19-Report-September-2020.pdf>
- Florisson, R. and Mandl, I. (2018), *Platform work: types and implications for work and employment — Literature review*. Eurofound Working Paper, WPEF18004 Eurofound, Dublin, Available at: <https://www.eurofound.europa.eu/sites/default/files/wpef18004.pdf>.
- Freni-Sterrantino, A. and Salerno, V. (2021), 'A plea for the need to investigate the health effect of gig-economy'. *Frontiers in Public Health*, Vol. 9, 638767. Available at: <https://doi.org/10.3389/fpubh.2021.638767>
- Garben, S. (2019), 'The regulatory challenge of occupational safety and health in the online platform economy'. *International Social Security Review*, Vol. 72, No 3, pp. 95-112.
- Graham, M., et al. (2017), 'Digital labour and development: impacts of global digital labour platforms and the gig economy on worker livelihoods'. *Transfer: European Review of Labour and Research*, Vol. 23, No 2, pp. 135-162.
- Hopkins, B. (2015), 'Occupational health and safety of temporary agency workers'. *Economic and Industrial Democracy*, Vol. 38, No 4, pp. 609-628. <https://doi.org/10.1177%2F0143831X15581424>
- Howard, J. (2017), 'Nonstandard work arrangements and worker health and safety'. *American Journal of Industrial Medicine*, Vol. 60, No 1, pp. 1-10.
- Howcroft, D. and Bergvall-Kåreborn, B. (2018), 'A typology of crowdwork platforms'. *Work, Employment and Society*, Vol. 33, No 1, pp. 21-38. Available at: <https://journals.sagepub.com/doi/full/10.1177/0950017018760136>
- Hurpur, P. and Blanck, P. (2020), 'Gig workers with disabilities: opportunities, challenges, and regulatory response'. *Journal of Occupational Rehabilitation*, Vol. 30, pp. 511-520.

- Huws, U. (2015), 'A review on the future of work: online labour exchanges or crowdsourcing'. OSHwiki. Available at: https://oshwiki.eu/wiki/A_review_on_the_future_of_work:_online_labour_exchanges_or_crowdsourcing#cite_note-1
- Huws, U., et al. (2017), *Work in the European gig economy — research results from the UK, Sweden, Germany, Austria and the Netherlands*. Foundation for European Progressive Studies, Brussels. Available at: https://www.feps-europe.eu/Assets/Publications/PostFiles/579_1.pdf
- Huws, U., et al. (2019), *The platformisation of work in Europe — highlights from research in 13 European countries*. Foundation for European Progressive Studies. Available at: <https://www.feps-europe.eu/attachments/publications/platformisation%20of%20work%20report%20-%20highlights.pdf>
- IFA (Institute for Occupational Safety and Health of the German Social Accident Insurance) (2016), *It's all about people: priorities for tomorrow's occupational safety and health*. Available at https://www.dguv.de/medien/ifa/en/fac/arbeiten-40/dguy_risk_observatory_2016.pdf
- ILO (International Labour Organisation) (2018), *Job quality in the platform economy*, ILO Issue Briefs No. 5, 2018, Available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---cabinet/documents/publication/wcms_618167.pdf
- ILO (International Labour Organisation) (2021), *World employment and social outlook: the role of digital labour platforms in transforming the world of work*. ILO Flagship Report. Available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_771749.pdf
- Ivanova, M., et al. (2018), *The app as a boss? Control and autonomy in application-based management*. Work in progress interdisziplinärer Arbeitsforschung No 2. Available at: <https://cihr.eu/the-app-as-a-boss/>
- Johnston, H. and Land-Kazlauskas, C. (2019), *Organizing on-demand: representation, voice and collective bargaining in the gig economy*. Conditions of Work and Employment Series No 94, International Labour Organisation, Geneva.
- Kalleberg, A. L. and Vallas, S. P. (2018), 'Probing precarious work: theory, research and politics'. In Kalleberg, A. L. and Vallas, S. P. (eds), *Precarious work: 31 (Research in the Sociology of Work)*. Emerald Publishing Limited, Bingley.
- Lee, M., et al. (2015), 'Working with machines: the impact of algorithmic and data-driven management on human workers'. In *CHI' 15: Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*, Seoul, 18-23 April 2015. Association for Computing Machinery, New York, NY, pp. 1603-1612.
- Lenaerts, K., et al. (2018), 'Traditional and new forms of organisation and representation in the platform economy'. *Work Organisation, Labour & Globalisation*, Vol. 12, No 2, pp. 60-78.
- Malenfer, M., et al. (2018), '*Plateformisation*': *quelles conséquences en santé et sécurité au travail en 2027?* INRS, Veille et prospective. Available at: <https://www.inrs.fr/media.html?refINRS=VP%2019>
- Mateescu, A. and Nguyen, A. (2019), *Algorithmic management in the workplace*. Data & Society Research Institute. Available at: https://datasociety.net/wp-content/uploads/2019/02/DS_Algorithmic_Management_Explainer.pdf
- Mattila-Wirolahti, P., et al. (2020), *Work today and in the future: perspectives on occupational safety and health challenges and opportunities for the Nordic labour inspectorates*. Ministry of Social Affairs and Health, Helsinki. Available at: <https://julkaisut.valtioneuvosto.fi/handle/10024/162419>

- Möhlmann, M. and Zalmanson, L. (2017), *Hands on the wheel: navigating algorithmic management and Uber drivers' autonomy*. Research Paper for the International Conference on Information Systems. Available at: https://www.researchgate.net/profile/Mareike-Moehlmann2/publication/319965259_Hands_on_the_wheel_Navigating_algorithmic_management_and_Uber_drivers%27_autonomy/links/59c3eaf845851590b13c8ec2/Hands-on-the-wheel-Navigating-algorithmic-management-and-Uber-drivers-autonomy.pdf
- Moore, P., et al. (2018), *Humans and machines at work: monitoring, surveillance and automation in contemporary capitalism*. Palgrave Macmillan, London.
- Moulds, J. (2020), 'Gig workers among the hardest hit by coronavirus pandemic'. World Economic Forum. Available at: <https://www.weforum.org/agenda/2020/04/gig-workers-hardest-hit-coronavirus-pandemic/>
- Mullins, G. (2018), 'Contingent workers and occupational health'. *Harvard Public Health Review*, Vol. 14, pp. 1-25.
- Muntaner, C. (2018), 'Digital platforms, gig economy, precarious employment, and the invisible hand of social class'. *International Journal of Health Services*, Vol. 48, No 4, pp. 597-600.
- Murray-Sheridan, M. (2019), 'Health and safety in the gig economy: who is responsible'. Available at: <https://brodies.com/insights/health-and-safety/health-and-safety-in-the-gig-economy-who-is-responsible/>
- Nekhoda, E. and Kuklina, T. (2020), 'Occupational safety and health in digital economy: challenges for government regulation'. Paper presented at 54th International Scientific Conference on Economic and Social Development, Novosibirsk, Russia, 21-22 May 2020. Varazdin Development and Entrepreneurship Agency, Croatia.
- OECD (Organisation for Economic Co-operation and Development) (2018), *Gig economy: boon or bane?* OECD Working Paper. Available at: [https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP\(2019\)19&docLanguage=En](https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP(2019)19&docLanguage=En)
- OECD (Organisation for Economic Co-operation and Development) (2019), *Measuring platform mediated workers*. OECD Digital Economy Paper No 282. Available at: <https://www.oecd-ilibrary.org/docserver/170a14d9-en.pdf?expires=1621954415&id=id&accname=guest&checksum=64BBD16F134C811AB78C3F5192555218>
- OECD (Organisation for Economic Co-operation and Development) (2020), *What have platforms done to protect workers during the coronavirus (COVID-19) crisis?* Available at: [https://read.oecd-ilibrary.org/view/?ref=136_136534-6kmopirex5&title=What-have-platforms-done-to-protect-workers-during-the-coronavirus-\(COVID-19\)-crisis%3F](https://read.oecd-ilibrary.org/view/?ref=136_136534-6kmopirex5&title=What-have-platforms-done-to-protect-workers-during-the-coronavirus-(COVID-19)-crisis%3F)
- Pastuh D. and Geppert M. (2020), 'A "circuits of power"-based perspective on algorithmic management and labour in the gig economy'. *Industrielle Beziehungen*, Vol. 27, No 2, pp. 179-204. Available at: <https://www.budrich-journals.de/index.php/indbez/article/view/35199>
- Piasna, A. (2020), *Counting gigs: how can we measure the scale of online platform work?*, Working Paper 2020.06, European Trade Union Institute. Available at: https://www.etui.org/sites/default/files/2020-09/Counting%20gigs_2020_web.pdf
- Pesole, A., et al. (2018), *Platform workers in Europe: evidence from the COLLEEM survey*. JRC Science for Policy Report. Publications Office of the European Union, Luxembourg. Available at: <http://publications.jrc.ec.europa.eu/repository/handle/111111111/52393>
- Podgórski, D. (2017), 'Towards a conceptual framework of OSH risk management in smart working environments based on smart PPE, ambient intelligence and the internet of things technologies'. *International Journal of Occupational Safety and Ergonomics*, Vol. 23, No 1, pp.1-20. Available at: <https://doi.org/10.1080/10803548.2016.1214431>

- Podgórski, D. (2021), *New opportunities and challenges in occupational safety and health management*. CRC Press, Boca Raton, FL.
- Polkowska, D. (2021a), 'Unionisation and mobilisation within platform work: towards precarisation — a case of Uber drivers in Poland'. *Industrial Relations Journal*, Vol. 52, No 1, pp. 25-39.
- Polkowska, D. (2021b), 'Platform work during COVID-19 pandemic: a case study of Glovo couriers in Poland'. *European Societies*, Vol. 23, Sup. 1, pp. S321-331. Available at: <https://doi.org/10.1080/14616696.2020.1826554>
- Prassl, J. (2018), *Humans as a service: the promise and perils of work in the gig economy*. Oxford University Press, Oxford, UK.
- Prassl, J. and Risak, M. (2016), 'Uber, TaskRabbit & Co: platforms as employers? Rethinking the legal analysis of crowdwork'. *Comparative Labor Law & Policy Journal*, Vol. 37, No 3.
- Quinlan, M. (2015), *The effect of non-standard forms of employment on worker health and safety*. Conditions of Work and Employment Series No 67, International Labour Organisation, Geneva. Available at: https://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---travail/documents/publication/wcms_443266.pdf
- Rani, U. and Dhir, R. K. (2020), 'Platform work and the COVID-19 pandemic'. *Indian Journal of Labour Economics*, Vol. 63, pp. 163-171. <https://doi.org/10.1007/s41027-020-00273-y>
- Riso, S., (2019), 'Mapping the contours of the platform economy', Eurofound Working Paper, Available at: <https://www.eurofound.europa.eu/sites/default/files/wpef19060.pdf>
- Rosenblat, A. and Stark, L. (2016), 'Algorithmic labor and information asymmetries: a case study of Uber's drivers'. *International Journal of Communication*, Vol. 10, No 1, pp. 3758-3784. Available at: <https://ijoc.org/index.php/ijoc/article/view/4892>
- Roquelaure, Y. (2021), 'Psychosocial risk factors at work in the occurrence and prevention of work-related MSDs in the context of new forms of work and digitalisation'. Presented at EU-OSHA webinar, 11 March 2021. Available at: <http://euosha.blumm.it/psychosocial-risks>
- Samant, Y. (2019), 'The promises and perils of the platform economy: occupational health and safety challenges and the opportunities for labour inspections'. International Labour Organisation. Available at: https://www.ilo.org/global/topics/safety-and-health-at-work/events-training/events-meetings/world-day-for-safety/33thinkpieces/WCMS_681619/lang--en/index.htm
- Schmidt, F. A. (2017), *Digital labour market in the platform economy: mapping the political challenges of crowd work and gig work*. Friedrich-Ebert-Stiftung. Available at: <http://library.fes.de/pdf-files/wiso/13164.pdf>
- Schor, J. B., et al. (2020), 'Dependence and precarity in the platform economy'. *Theory and Society*, Vol. 49, pp. 833-861. Available at: <https://link.springer.com/article/10.1007/s11186-020-09408-y>
- Simonite, T. (2015), 'When your boss is an Uber algorithm'. MIT Technology Review. Available at: <https://www.technologyreview.com/2015/12/01/247388/when-your-boss-is-an-uber-algorithm/>
- Spasova, S., et al. (2018), *Challenges in long-term care in Europe — a study of national policies 2018*. ESPN Report, European Social Policy Network, Directorate-General for Employment, Social Affairs and Inclusion, European Commission. Available at: <https://ec.europa.eu/social/main.jsp?catId=738&langId=en&pubId=8128&furtherPubs=yes>
- Spasova S., et al. (2021), *Non-standard workers and the self-employed in the EU: social protection during the COVID-19 pandemic*. European Trade Union Institute. Available at: <https://www.etui.org/publications/non-standard-workers-and-self-employed-eu>
- Stark, D. and Pais, I. (2021), 'Algorithmic management in the platform economy'. *Sociologica*, Vol. 14, No 3, pp. 47-72. Available at: <https://sociologica.unibo.it/article/view/12221/12281>

- Stephany, F., et al. (2020), 'Distancing bonus or downscaling loss? The changing livelihood of US online workers in times of COVID-19'. *Journal of Economic and Human Geography*, Vol. 111, No 3, pp. 561-573.
- Tran, M. and Sokas R. (2017), 'The gig economy and contingent work: an occupational health assessment'. *Journal of Occupational and Environmental Medicine*, Vol. 59, No 4, pp. 63-66.
- Ustek-Spilda, F., et al. (2020), 'COVID-19, the gig economy and the hunger for surveillance'. Ada Lovelace Institute. Available at: <https://www.adalovelaceinstitute.org/blog/covid-19-gig-economy-hunger-for-surveillance/>
- Vandaele, K. (2018), *Will trade unions survive in the platform economy? Emerging patterns of collective voice and representation in Europe*. ETUI Working Paper 2018.05, European Trade Union Institute, Brussels.
- Waas, B. and Van Voss, G.. (2017) *Restatement of labour law in Europe (Vol 1): the concept of employee*. Hart Publishing, Oxford and Portland, Oregon.
- Walters, D. and Nichols, T. (2007), *Worker representation and workplace health and safety*. Palgrave Macmillan, Basingstoke, UK.
- Wilde, J. (2016), 'Precarious gigs are a perfect storm for occupational health'. Health and Safety at Work. Available at: <http://www.lhc.org.uk/precariou-gigs-are-a-perfect-storm-for-occupational-health/>
- Yamamoto, S., et al. (2011), 'The viability of self-employment for individuals with disabilities in the United States: a synthesis of the empirical research literature'. *Journal of Vocational Rehabilitation*, Vol. 35, pp. 117-127.
- Zigante, V. (2018), *Informal care in Europe: exploring formalisation, availability and quality*. European Commission, Publications Office of the European Union, Luxembourg. Available at: <https://op.europa.eu/en/publication-detail/-/publication/96d27995-6dee-11e8-9483-01aa75ed71a1>

Annex 1 Literature review methodology

This literature review builds on academic (peer-reviewed) and grey literature. To find relevant publications, the team consulted a number of bibliographic electronic search databases with extensive and up-to-date resources from within and outside the academic literature. More specifically, the team used Web of Science, a database that provides access to various databases⁽³⁴⁾ and covers multiple scientific disciplines (science, social science, humanities and arts). Web of Science contains references to peer-reviewed articles published in academic journals, books, editorials, reviews, conference proceedings and similar scientific outputs. Literature from multiple scientific disciplines (including legal, sociology, medicine, management) was consulted to gain a broad perspective on OSH and platform work. As well as consulting the platform economy repository managed by Eurofound⁽³⁵⁾, which contains a significant number of grey literature references, the team used snowballing techniques to identify relevant studies from bibliographies of related papers. This list of publications was completed with materials proposed by EU-OSHA's national focal points, which were consulted in a survey.

The search strategy underpinning this work accounted for the keywords in the definitions and taxonomy outlined in this paper, as well as for concepts that can be derived from these keywords. The search was conducted between January and May 2021.

(General) employment and working conditions

("Precarious(ness)") OR ("Working conditions") OR ("Employment conditions") OR ("Contractual relations") OR ("Employment status") OR ("Employment relations") OR ("Platform as employer") OR ("Job security") OR ("Flexibility") OR ("Income") OR ("Earnings") OR ("Payment") OR ("Price-setting") OR ("Wage") OR ("Fee") OR ("Working time") OR ("Work intensity") OR ("Speed pressure") OR ("Tight deadlines") OR ("No breaks") OR ("Exhaustion") OR ("Repetitive work") OR ("Task autonomy") OR ("Algorithmic management") OR ("Non-conventional workplace") OR ("Work environment") OR ("Physical environment") OR ("Public space") OR ("Clients' homes") OR ("Telework") OR ("Home-based work") OR ("Career development") OR ("Career progression") OR ("Learning") OR ("Access to training") OR ("Participation") OR ("Worker voice") OR ("Worker participation") OR ("Consultation") OR ("Representation") OR ("Collective organisation") OR ("Collective bargaining") OR ("Collective rights") OR ("Collective agreements") OR ("Social protection") OR ("Social protection coverage") OR ("Social security") OR ("Income support measures") OR ("Income replacement benefits") OR ("Sickness benefits") OR ("Unemployment benefits") OR ("Decent work") OR ("Job satisfaction")

OSH risks and hazards and health outcomes

("Occupational health and safety") OR ("Health and safety") OR ("Risk") OR ("Hazard") OR ("Physical risk") OR ("Physical health") OR ("Psychosocial risk") OR ("Psychological risk") OR ("Psychosocial issues") OR ("Psychological health") OR ("Well-being") OR ("Wellbeing") OR ("Mental health") OR ("New and emerging risks") OR ("Dangerous substances") OR ("Physical agents") OR ("Ergonomics") OR ("Musculoskeletal (disorders)") OR ("Posture") OR ("Noisy workplace") or ("Dirty work") OR ("Visual strain") OR ("Use of materials") OR ("Use of tools") OR ("use of equipment") OR ("Health outcomes") OR ("COVID-19") OR ("Pandemic") OR ("Stress") OR ("Burn-out") OR ("Work accidents") OR ("Work-related injuries") OR ("Work-related illness") OR ("Lack of awareness") OR ("Lack of training") OR ("Lack of equipment") OR ("Poor quality equipment")

OSH management

("OSH management") OR ("OSH system") OR ("OSH programme") OR ("Risk assessment") OR ("Prevention and control measures") OR ("Prevention") OR ("Preventive measure") OR ("Protection

⁽³⁴⁾ Web of Science comprises multiple databases and thus provides access to articles, books, proceedings, etc., published by Springer, Sage, Taylor & Francis, etc.

⁽³⁵⁾ <https://www.eurofound.europa.eu/data/platform-economy>

measure”) OR (“Hierarchy of control”) OR (“Avoiding”) OR (“Elimination”) OR (“Substitution”) OR (“Collective protection measure”) OR (“Individual protection measure”) OR (“Collective technical measure”) OR (“Engineering controls”) OR (“Collective organisational measure”) OR (“Administrative controls”) OR (“Personal protective equipment”) OR (“Protective equipment”) OR (“Mitigation measure”) OR (“Information”) OR (“Risk awareness”) OR (“Training”) OR (“Worker participation”) OR (“Worker consultation”) OR (“Enforcement”) OR (“Sources of support”) OR (“COVID-19”) OR (“Pandemic”) OR (“Insurance”) OR (“Liability”)

Policies, strategies, initiatives and programmes

(“Policy”) OR (“Strategy”) OR (“Initiative”) OR (“Programme”) (“Action”) OR (“Guideline”) OR (“Regulation”) OR (“Law”) OR (“Legislation”) OR (“Court case”) OR (“Campaign”) OR (“Inspection”) OR (“Collective agreement”) OR (“Research project”)

Launched by

(“Government”) OR (“Public authority”) OR (“Agency”) OR (“EU level”) OR (“National level”) OR (“Regional level”) OR (“Local level”) OR (“Labour inspectorate”) OR (“Social affairs inspectorate”) OR (“OSH agency”) OR (“Social partners”) OR (“Trade union”) OR (“Employer organisation”) OR (“Grassroots organisation”) OR (“Platform workers organisation”) OR (“Platform”) OR (“Platform worker”) OR (“Insurance provider”) OR (“Training provider”) OR (“Prevention service”)

In combination with conceptualisations around digital platform work

(“digital platform work”) OR (“digital platform economy”) OR (“online platform work”) OR (“online platform economy”) OR (“platform economy”) OR (“platform work”) OR (“sharing economy”) OR (“peer economy”) OR (“gig economy”) OR (“gig-economy”) OR (“uber economy”) OR (“crowd economy”) OR (“collaborative economy”) OR (“participative economy”) OR (“on-demand economy”) OR (“gig work”) OR (“gig job”) OR (“crowdwork”) OR (“crowd work”) OR (crowdsourcing) OR (“work-on-demand”) OR (“work on demand”) OR (“work on-demand”) OR (“on-demand econ*”) OR (“just-in-time workforce”) OR (“micro-task”) OR (“precarial”)

The team used this strategy to examine the challenges (and opportunities) related to OSH in the context of platform work. This included the risks facing platform workers and also challenges regarding the management of these risks.

Annex 2 Overview of the challenges of OSH management in platform work

Table 3: Challenges of OSH management in digital platform work

Area of OSH management	Relevant articles of the OSH Framework Directive	Challenges of digital platform work
Conducting a risk assessment	Article 6(3) and Article 9(1)(a)	<p>Digital platforms defer responsibility of risk assessment to digital platform workers. Collective risk assessments are replaced by personalised, individual risk assessments.</p> <p>Virtualisation of work and a lack of a common protective workplace complicates risk assessments.</p> <p>Digital platform workers lack the necessary knowledge and training on how to properly conduct risk assessments.</p>
Implementing preventive and corrective measures	Article 6(1) and Article 6(2)	<p>Digital platforms defer responsibility of the implementation of preventive and protective measures to digital platform workers.</p> <p>The prevention dimension is often poorly taken into account, with compensation and efficiency of the tasks performed being prioritised.</p> <p>Collective measures are marginalised in digital platform work, with digital platforms intermediating on-location services often limiting themselves to the provision of PPE to digital platform workers.</p>
Providing information to workers	Article 10	<p>Although digital platforms are in constant contact with digital platform workers through algorithmic management, OSH issues are rarely communicated to digital platform workers.</p>
Consultation of workers	Article 6(3)(c) and Article 11	<p>Digital platform workers are not consulted on OSH issues, mainly because of the lack of representation and collective organisation.</p>
Training of workers	Article 12	<p>Digital platforms provide little or no training on safety and health.</p>
Adequate controls and supervision	Article 6(3)(c) and Article 11	<p>Blurred responsibilities between digital platforms, digital platform workers and clients complicate enforcement of OSH obligations.</p> <p>Triangular relationship, virtualisation of work, dispersed and diverse workforce and high turnover of labour complicate enforcement by labour inspectorates.</p>

The European Agency for Safety and Health at Work (EU-OSHA) contributes to making Europe a safer, healthier and more productive place to work. The Agency researches, develops, and distributes reliable, balanced, and impartial safety and health information and organises pan-European awareness raising campaigns. Set up by the European Union in 1994 and based in Bilbao, Spain, the Agency brings together representatives from the European Commission, Member State governments, employers' and workers' organisations, as well as leading experts in each of the EU Member States and beyond.

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