WORKING PAPER

Coordination by platforms
Literature review

Automation, digitisation and platforms: implications for work and employment - Concept Paper

Contents

Introduction

In the last few years there has been an exponential growth of different kinds of companies offering online spaces for the exchange of goods and services based on platform like Uber[1], Airbnb[2], TaskRabbit[3] and numerous others. These platforms come in various shapes and sizes and continue to evolve at a very high pace, while estimates of the market size, as well as of the number of platforms, vary strongly depending on the concept or definition they refer to (Maselli, Lenaerts, & Beblavy, 2016). Usually the concept of the platform economy relates to the idea of exchanging and using (under-utilised) resources (that is, physical and financial capital or human capital and talent) primarily enabled and driven by the internet and platform technologies. A multitude of names aims to describe and conceptualise this new phenomenon; to give a few examples, the 'platform economy', the 'sharing economy', the 'collaborative economy', the 'on-demand economy', the 'gig-economy', the 'Uber-economy', 'crowd-based capitalism' and 'platform capitalism'. The terms are often used interchangeably, contributing to the confusion that surrounds this phenomenon.

In general, online platforms represent a new structure for organising all kinds of economic as well as social activities. They function in many different ways and cover a wide-ranging set of activities: as information intermediaries (such as Wikipedia) they help users find, share, compare and evaluate information; social networks (like Facebook) create new possibilities for communication; other platforms coordinate the sharing of specific content like music, movies, or news; they occur as marketplaces, search engines, creative content marketplaces, application distribution networks, payment systems, or crowd employment services (Schweitzer et al, 2016, p. 2). Crowd employment platforms are a type of marketplace for (micro-) tasks in various fields (Eurofound, 2015; Felstiner, 2011; Valenduc & Vendramin 2016): the phenomenon is spreading across a growing range of industries, including design, web- and software development, IT, writing, and the multitude of tasks spawned by the Internet, but also tasks such as childcare, dog walking, transport, tourism, or legal services (Valenduc and Vendramin, 2016). Very prominent examples for crowd employment platforms are PeoplePerHour[4], Upwork[5], Clickworker[6], Amazon Mechanical Turk (also called Mturk or AMT)[7],Uber, TaskRabbit, Deliveroo[8], or ListMinut[9] (Eurofound, 2015; Valenduc & Vendramin 2016; Green et al 2013; Stone et al 2016; Saxton et al 2013). At the same time, alternatives competing with the most known platforms are being created: platform cooperatives are 'collectively owned and governed by the workers who depend on, participate in, and, derive livelihoods from them' (Berg, 2016 - issue note 6, p. 4). According to Scholz (2017, p. 174), the technology of existing platforms can be used and adapted to the democratic principles and ownership model of cooperatives. There have been some recent experiments with platform cooperatives:

- Cooperatively owned labour broker and marketplaces, such as San Francisco's alternative to TaskRabbit, called Loconomics, or the online German marketplace Fairmondo; or Coopify , which builds cooperative platforms for cities. New Zealand's Enspiral Network has been mentioned as a highly successful experiment

[1] https://www.uber.com/

[2] https://www.airbnb.com/

[3] https://www.taskrabbit.com

[4] https://www.peopleperhour.com

[5] https://www.upwork.com

[6] https://www.clickworker.com

[7] https://www.mturk.com

[8] https://deliveroo.co.uk/

[9] https://listminut.be/fr

where hundreds of freelancers cooperatively finance and work on projects to attain certain social goals.
- City-owned platforms, for example to compete with Airbnb, organised in such a way that it is easier for the municipality to regulate (Scholz, 2017).

The reason why platforms are being studied by Eurofound is that one of its types, platform-intermediated work or 'crowd employment', could have quite a potential impact on the world of work (Valenduc and Vendramin, 2016, p. 33). As De Groen and Maselli (2016) assume, in general the way in which work is allocated and organisations structure their work has remained the same with the introduction of new technologies, but, as of 2017, platforms are changing the status quo:

> *Human interaction still plays an important role in allocating work and most people still work inside organisations. The ongoing digital revolution is now slowly also changing this side of work, with platforms intermediating work between individuals online without the intervention of people or organisations other than the platform involved* (De Groen and Maselli, 2016, p. 1)

This review looks at selected relevant literature dealing with platforms and their implications for labour market, job quality, social policy and industrial relations. It is based on desk research on academic papers, specialised journals on productivity management and engineering, and some references to newspaper articles given that the topic is very much contemporary and new articles are published on an ongoing basis. The geographic scope is EU Member States with comparison to developments in the United States where applicable. The review includes documents up to August 2017.

For the purpose of this literature review, the term platform indicates the use of digital platforms for coordinating economic activity, which refers to the use of digital networks to coordinate economic transactions in an algorithmic way (Fernández-Macías, 2017). However, the focus lies on platforms intermediating paid work (that is, crowd employment platforms), as opposed to voluntary work, finance, or accommodation. This literature review's starting point is change brought about by the introduction of new technologies; the aim is to understand their impact on the labour market, on working conditions and on social dialogue.

The section 'Definition and characteristics' discusses the mode of operation and technological drivers, providing some data about the scale and scope and the types of tasks which are most often intermediated on platforms. The subsequent sections deal with implications for the labour market and job quality. Finally, this review highlights effects on industrial relations and social policy. The conclusions will discuss the current findings and highlight possible research gaps.

For a wider overview of the implications of the digital age for work and employment, the reader can consult the concept paper on 'Automation, Digitisation and Platforms. Implications for work and employment' as well as the separate literature reviews on automation of work and digitisation of processes.

Definitions and characteristics

Collaborative economy

The EU Commission in the document 'A European agenda for the collaborative economy' defines collaborative economy as

> '*business models where activities are facilitated by collaborative platforms that create an open marketplace for the temporary usage of goods or services often provided by private individuals'*(EU Commission, 2016a).

The EU Commission identifies potential benefits of the collaborative economy such as better information services and exchanges between business and between individuals. It also identifies four main challenges, which can also be seen in other economies and not only in the EU single market: access to market and distinction between services provided by individuals or by professionals, protection of users of the service, taxation (who pays what and what tax rules have to be applied) and monitoring (mapping and surveys to gather information about platform activities).

Sharing economy?

Collaborative economy is also often referred to as sharing economy, but these two terms are not identical: sharing economy refers to non-commercial and commercial platforms or rather, as Belk (2014) emphasises, to the difference between the commercial and non-commercial process of distribution. Referring to the concept of sharing economy, he distinguishes between 'true sharing' and 'commercial pseudo-sharing'. On the one hand, there are platforms that intermediate 'true sharing':

> *'Rather than distinguishing what is mine and yours, sharing defines something as ours. [It is] the act and process of distributing what is ours to others for their use as well as the act and process of receiving something from others for our use [...]'* (Belk, 2007, p. 127).

Couchsurfing[10] would count as an example for true sharing, as it intermediates people having a spare room/couch in their homes with people in need for (short-term) accommodation mainly for free (although Couchsurfing itself is a for profit corporation). On the other hand, there is 'commercial pseudo-sharing', where platform-based corporations apply the criteria of marketplace exchange (Belk, 2014, p. 18), in simpler terms: a monetary transaction occurs. That is basically every platform provider that charges a commission from its users. Belk (2014) stresses out the importance of distinguishing those two types, because 'some of the different phenomena now flying under the banner of sharing are not sharing at all, but merely appropriations of this socially desirable term' (Belk, 2014, p. 7). It can be observed that there has been a considerable shift in language: terms once considered belonging to left wing theories such as 'sharing' and 'collaboration' have now being appropriated by neo-liberal companies distorting the once selfless meaning to, in most cases, using the term for a profit-generating activity.

According to Sundararajan (2016), platforms represent a new structure for organising economic and social activity and appear as a hybrid between a market and a hierarchy. He argues that, whereas many platforms are similar to markets that facilitate entrepreneurship, others appear more like hierarchies that employ contractors. Besides Airbnb, Etsy[11], and BlaBlaCar[12], labour platforms like Upwork[13] and Thumbtack[14], social dining platforms like VizEat[15] and Eatwith[16], the local tour guide exchange platform Vayable[17] resemble more a market (Sundararajan, 2016) , ridesharing platforms Lyft[18] and Uber fall somewhere between, and focused services or labour platforms like Luxe[19], Postmates[20], and Universal Avenue[21]

[10] https://www.couchsurfing.com/

[11] Etsy offers craftsmanship from jewelry to clothing and soft toys: https://www.etsy.com/

[12] BlaBlaCar is a carpooling platform: https://www.blablacar.com/

[13] https://www.upwork.com/

[14] https://www.thumbtack.com/

[15] https://www.vizeat.com/

[16] https://www.eatwith.com/

[17] https://www.vayable.com/

[18] https://www.lyft.com/

[19] http://luxe.com/

bear closer resemblance to hierarchies than the average sharing economy platform does. He further states that this is only one way to categorise platforms and suggests that it would also be possible to categorise them

> *'based on the service offered by platform's providers, the business model of the platforms, the kind of product whose consumption model is altered, the industries being disrupted, or some combination of these factors'* (Sundararajan, 2016, pp. 77–78).

The European Commission position is that the type of activities run by a platform can be subject to a case-by case assessment (European Commission, 2016a).

Platforms as markets

The economic theory of double-sided (or multi-sided) markets (Rochet and Tirole, 2003; Wauthy, 2008) can be applied to explain platforms. This theory explains how and why value is created by both users and providers, and accumulated by the platform owner. It explains how value generation and profit making rely on crossed network externalities: value on one side of the market depends on positive network externalities on the other side. In some cases, gratuity is the optimal price setting on one side of the market (for example: Facebook). It also explains the specific nature of unpaid digital labour, that is, users providing 'labour', in the case of Facebook, under the form of content creation, without receiving a monetary remuneration.

Box 1: Unpaid labour

Referring to the historical definition of work by authors such as Ricardo and Marx, a human activity producing economic value which is captured and accumulated by a capital owner has to be considered as work. Activities of consumers on one side of double-sided markets can be considered as (unpaid) labour, under three conditions: they generate value for business players; they rely on minimal contractual conditions (generally by consenting to the 'conditions of use' of the platform); they produce performance indicators: reputation, quality assessment, popularity. This kind of unpaid labour is sometimes named 'prosumer work' (producer-consumer) (Drahokoupil and Jepsen, 2017; Ritzer and Jurgenson, 2010; Valenduc and Vendramin, 2016).

Prosumer digital labour differs from traditional self-service activities (including online self-service, such as online banking), where consumers also realise some tasks formerly devoted to workers. In the self-service business model, only two players are involved: the service provider and the service user. Transfer of routine tasks from workers to consumers is usually compensated by an enlargement or improvement of the provision of services. Routine jobs are destroyed, but skilled service jobs are created. In the platform business model, three players are involved: the service provider/data user, the service consumer/data provider, and the platform itself. Value is not captured by the service provider, but by the platform. The platform itself creates very few jobs. It only fosters the development of 'gigs' (that is, small work assignments) on one side of the market, and of unpaid labour on the other side of the market.

Often platforms are defined as 'two-sided markets' (Rochet and Tirole, 2003) or 'multi-sided platforms'(Hagiu & Wright, 2015), referring to the specific aspect that there are at least two groups of users, whose interactions are being coordinated by platforms. At least one group (but generally all groups) have an advantage in case the number of users on the other side(s) is growing. Codagnone and Martens (2016) observe:

> *Platforms internalise these network externalities, by facilitating the matching between sides and reducing transaction costs. Matching can be search-based with fixed prices and still involve considerable search costs for consumers; or it can be a variable price auction mechanism (entailing lower search costs), or a variety of in-between mechanisms. The economics of MSPs [multi-sided platforms] provide important insights into the functioning of digital platforms and into the policy concerns that they raise. Digital platforms can generate strong network effects: the*

[20] https://postmates.com/

[21] https://www.universalavenue.com/

> *value of a platform and the number of transactions increases more than proportionally with the number of participants. The higher the number of participants already on the platform, the more others will want to join because it increases consumer choice and boosts markets for service suppliers.* (Codagnone and Martens, 2016, p. 8)

For this reason network effects also foster the rise of monopolies, or at least oligopolies, since it is advantageous to stick for example with one search engine, or one social network, or one online retailer resulting in an agglomeration of power in the hands of a small number of corporations (Schmidt, 2017, pp. 10–11; Schweitzer et al, 2016, pp. 4–5).

Schmidt (2016, p. 10) highlights the important role of the platform provider by suggesting a three-sided platform architecture: platform operators intermediate as infrastructure provider and intermediary between supply and demand. Commercial platforms are online spaces which instead of the traditional supply and demand side also include the platform provider itself. Software, which constitutes the virtual architecture for these online spaces, runs in rented data centres (that is the 'cloud'). The two opposing groups of users for supply and demand see different and very limited front-ends of the platform, that is small parts of the data and the processes of the system. The providers of the platforms, however, can access the back-end that gives them a complete big-data overview of all the interactions between the two user groups. Moreover, platform providers can influence the exchange between the other two (potentially in real-time), since they can 'control who sees what and when, what interactions between the other two are possible and under what conditions, and they wield this control technically, legally and via the design of the interface' (Schmidt, 2017, p. 10). This is a further aspect causing a systemic power asymmetry but also information asymmetry in favour of the platform providers (see also section 'Information asymmetry and data protection'). The three-sided structure of the intermediating platform is also important for the providers, since it enables a way to shift entrepreneurial risks, legal liabilities, the cost of labour and the means of production to the other two parties. Furthermore, the intermediating platform is a non-material software product able to potentially scale exponentially, but the providers do not have to spend proportionally more on staff or other costs of production (Schmidt, 2017, p. 10).

Crowd employment

This literature review refers to crowd employment as an employment form which

> *'uses an online platform to enable organisations or individuals to access an indefinite and unknown group of other organisations or individuals to solve specific problems or to provide specific services or products in exchange for payment'. Crowd employment is also known as crowd sourcing or crowd work, and aims to organise the outsourcing of tasks to a large pool of online workers rather than to a single employee. Technology is essential in this new employment form, as the matching of client and worker, as well as task execution and submission, is mostly carried out online.* (Eurofound, 2015)

Crowd employment becomes more and more heterogeneous, with different types emerging, prompting researchers to do some classification attempts, one of which is the location of service provision. Thereby, distinction is made in terms of whether the services provided are electronically transmittable or require physical and localised delivery. This distinction is also reflected in different understandings of the concept of crowd employment. While some speak of crowd employment (or crowd work) referring to paid work that is intermediated and organised by an online platform regardless of the location of provision (online or local) (Huws et al, 2016; Schmidt 2016; Drahokoupil & Fabo, 2016; Codagnone et al, 2016a), others define crowd work only as work that is intermediated and carried out remotely (for example, Flecker et al, 2017; Leimeister et al, 2015; Leimeister et al, 2016). This differentiation of whether the services are electronically transmittable or require physical and localised delivery implies that the former are theoretically global markets and the latter local

markets (which, however, not necessarily means that clients and workers have to be at the same spot, for example tasks like Tripadvisor labelling). Platforms coordinating local services – so-called mobile labour markets (MLM) according to Codagnone et al (2016) – include taxi services, household services, home repair, pet-sitting services, legal services, etc. (Codagnone et al, 2016a; De Groen and Maselli, 2016). On platforms intermediating online services, so-called online labour markets (OLM) according to Codagnone et al (2016), jobs are divided up into projects, tasks or even smaller tasks (called 'micro tasks' or Human Intelligence Tasks 'HIT's' as named on Amazon Mechanical Turk). Micro tasks are performed independently and often autonomously by the crowd workers and afterwards, in a process of reintegration, assembled in order to create a specific output. In case of logo or website designing or drafting slogans, mostly entire projects or segments of projects are intermediated through the platform. This concept of OLMs is theoretically resulting in a kind of global division of tasks[22] (Eurofound, 2015; Codagnone et al, 2016; Felstiner, 2011). The distinction between online and physical tasks has been recently disambiguated by Alkhatib, Bernstein & Levi (2017) as crowd work (online, not location bound) and gig work (physical, local tasks). There are several other characteristics defining different crowd employment platforms, like the character of tasks involved (such as manual or non-manual, routine or non-routine), and the skills necessary to provide them; whether the tasks are outsourced to an unknown and undefined crowd or assigned to a specific person; whether the interaction is supply or demand initiated; whether the access is open to everybody or restricted to eligible participants (for further characteristics see Eurofound, 2015; Leimeister et al, 2016).

A shared feature of all platforms is that they allow or simplify interaction between market participants. In their communication on online platforms the European Commission (2016a) argues that platforms 'have the ability to create and shape new markets, to challenge traditional ones, and to organise new forms of participation or conducting business based on collecting, processing, and editing large amounts of data' (European Commission, 2016a). In terms of crowd employment platforms, work is organised and/or carried out through online platforms. This allows organisations or individuals to gain access via the Internet to an undefined and/or unknown group of other organisations or individuals prepared to solve specific problems or supply specific services or products in exchange for payment (Eurofound, 2015). Crowd employment platforms enable, in some cases, the emergence of a very specific kind of micro-outsourcing of activities: rather than entering into a contract with one specific vendor to provide something, an actor (for example a company or a costumer) needs, alternatively this actor could outsource to a crowd, posting a set of tasks or requirements on a digital platform, capturing the ideas which the crowd develops, and bringing them into its production process (Sundararajan, 2016, p. 75). The outsourcing platforms link the demand for labour with its supply; they provide a matching service, which is driven by algorithms. The next section focuses on the mode of operation of crowd employment platforms.

Intermediation, asymmetry of information and control: mode of operation of crowd employment platforms

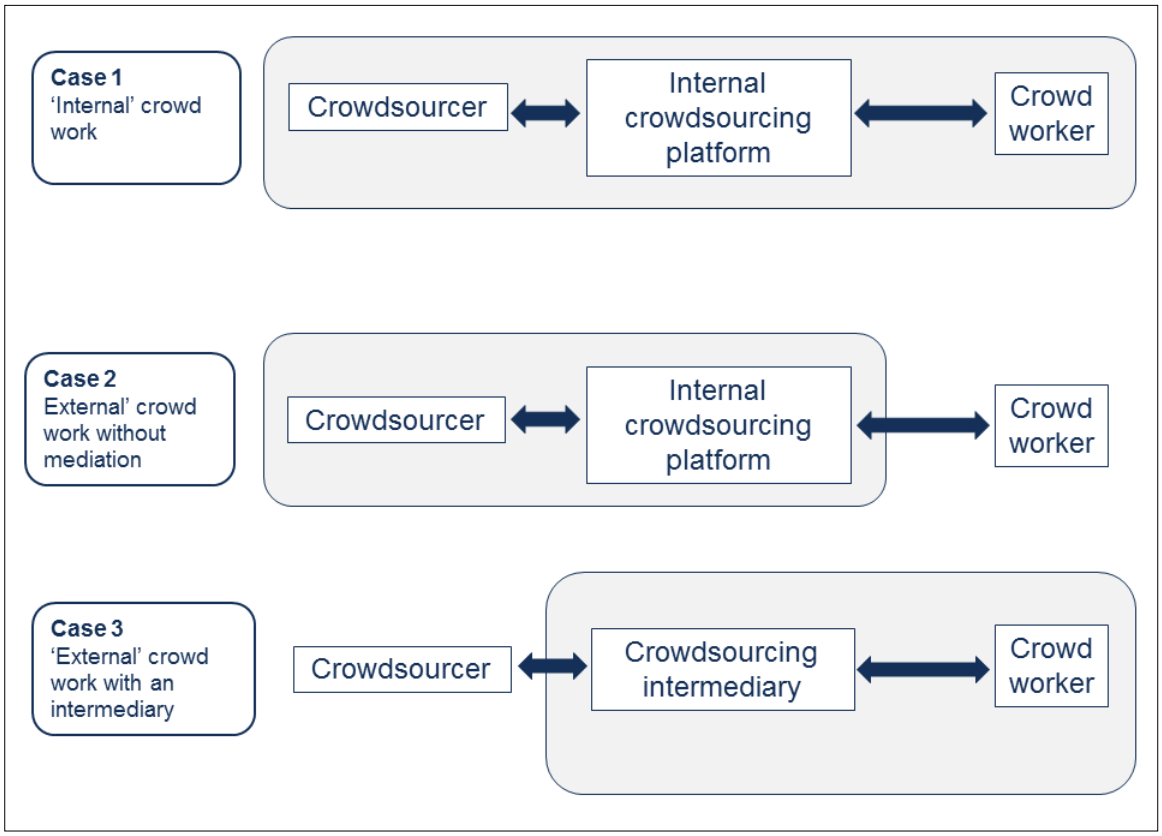
Platforms shape a particular relationship between the ones requesting a service, mostly called clients, crowdsourcers or matching requesters (but also known as 'system owner' (Doan et al, 2011), or 'designated agent' (Howe, 2006)), and crowd workers, also called crowdsourcee, provider, seller (Valenduc and Vendramin, 2016). According to the literature, intermediaries are given a key role. They provide access to a large pool of resources for individuals, companies or other organisations, and ways for companies to balance deficiencies in skills and resources by helping them find the right partner with suitable skills and abilities as well as by connecting them. Intermediating platforms deal on the one hand with clients in order to define task descriptions and requirements for completing tasks or projects, which enables the

[22] See also section 'implications for the labour market'.

crowd workers to perform these tasks. On the other hand, some platform intermediaries are responsible for managing and assisting the crowd workers with a range of support services. However, not all platforms do so, some are just offering a matching service. According to Leimeister et al (2016) crowdsourcing[23] intermediaries can therefore be seen as 'brokers'. (Eurofound, 2015; Leimeister, Zogaj, et al, 2016; Zogaj et al, 2014)

From an organisational perspective, crowd employment is usually based on individual tasks or projects rather than on a continuous employment relationship (Eurofound, 2015). It includes the conversion of permanent jobs into a flexible resource pool in which crowd workers carry out tasks in a project-based manner. In line with this 'increasing erosion of corporate boundaries as well as the resulting closer linkage of internal and external business processes' (Durward et al, 2016, p. 2), Durward et al (2016) differentiate varieties of crowd work according to the type of participating crowd workers. According to Zogaj et al (2014, p.8) there are three possible cases: in case I, the company's internal workforce acts as a crowd. As a consequence, every employee of this specific company can be assigned to a tasks posted on the corporate platform and can be described as crowd worker. In case of external crowd work, the crowd includes individuals who do not have to have a relation to the client. These are all people from outside the company boundaries, and thus in principle every individual with internet access can participate as crowd worker. Here, the platform will either be operated directly by a crowdsourcer (as in case II) or provided by a crowdsourcing intermediary (case III).

Figure 1: Varieties of crowd work



Source: Zogaj et al, 2014 ,p.8

Activities that are intermediated on platforms can vary strongly, including tasks such as web development, design, software development, photo/video image recognition, data replication, translation, audio transcription, data-based research, logo designing, and drafting slogans.

[23] Leimeister uses the term crowdsourcing and notes that it not only refers to platforms intermediating paid labour, but incudes also unpaid contributions by its users.

Other examples of tasks often intermediated through crowd employment are database building and cleaning, classifying web pages, reviewing documents, checking websites for specific content, validating search results, dog walking, child caring, cleaning, assembling furniture, food delivery and so on(Eurofound, 2015; Felstiner, 2011; Valenduc & Vendramin, 2016; Drahokoupil & Fabo, 2016). These examples indicate again a key way to differentiate among crowd employment platforms, namely the format of service provision, that means whether the services are electronically transmittable or require physical and localised delivery.

Technological drivers

The internet and P2P[24] technology made possible to use the internet as a powerful communication tool. One of the direct applications of better communication was the use of the internet as a matching tool for various types of supply and demand, such as for labour, products, finance, short-term accommodation, unpaid service provision etc.. Whereas the web was originally used as a bulletin for job advertising, the actual role of the internet lies far beyond this now. Online platforms have changed the use of the internet from its notion of bulletin board (a location where jobs where posted) and turned it into a tool to organise work (jobs are posted and assigned through the web). Drahokoupil and Fabo (2016, p. 1) note:

> *'To put it simply, an Uber driver or Upwork web designer are not even likely to know where the organization they work for is physically located. What is important for them is the virtual platform, which assigns work and manages the payment of earnings.'* Drahokoupil and Fabo (2016, p. 1)

The main technological building blocks of platform-based business models are cloud computing, API (Application Programming Interface) strategy and architecture for building application software, and Internet of things[25] (IOT) (Accenture, 2016, p. 37). Cloud computing 'is a form of outsourced shared-resource computing in which computing is pooled in large external data-centres and accessed by a range of customers through the internet' (Venters and Whitley, 2012, p. 2). Cloud computing enables some of the most currently impactful technologies like mobile internet or the Internet of Things. Apps often rely on cloud resources (Manyika et al, 2013, p. 61). Cloud technology allows on-demand access to shared resources like networks, servers, storage, and applications via the internet. Applications, on the other hand, 'are extended to be accessible through the internet, thus using the large data–centres and powerful servers to host them.' (Venters and Whitley, 2012, p. 5). In principle, anyone can access such applications via an internet connection. This stresses also the importance of access devices like PCs and laptops, tablets, smartphones and other forms of mobile computing (Venters and Whitley, 2012, p. 5).

Another technological driver that is being discussed, as of September2017, which might have disruptive impact not only for the platform economy, is the blockchain technology. In a TED talk Tapscott (2016) indicates that most of the platform-based companies are not sharing at the moment (in the sense that was mentioned by Belk earlier in this section), but he argues that with the blockchain technology this might change. Blockchain is a type of distributed ledger keeping track of digital transactions. There is no central administrator (like a bank), but cryptography, security and restricted access are all characteristics still present in this

[24] In a P2P network the 'peers' are computer systems which are connected to each other via the Internet. P2P is the mode of communication amongst users, since files can be shared directly between systems on the network without the need of a central server. An early famous example of usage of a peer to peer network was Napster in the late 1990s, building basically the beginning of P2P networks being used in 2017 (Ding, Nutanong, & Buyya, 2005 (also for different forms of P2P networks).

[25] For a definition of IoT please see the Peruffo et al (2017).

technology[26] (Thompson, 2016). According to Tapscott (2016), the blockchain is likely to have the greatest impact in the next few decades (more than big data or robotics), as it records all interactions by means of a code and as a result provides a way to overcome relying on intermediaries, not only intermediaries like banks but even platform providers. The blockchain establishes trust which does not depend on the role of a watchdog institution, but on cryptography and code rules. Sundararajan (2016) also mentions the possibility of blockchain technologies making intermediaries obsolete, and that platforms themselves might be replaced by virtual peer-to-peer interactions (Sundararajan, 2016, p. 95). But for now, estimates indicate that platform-based companies seem to grow rapidly. The following section provides some estimates about the size of the platform economy.

Scale and scope

Companies using the platform business model do not derive their success from products or services, but precisely from their platform-based business models. Platform-based companies are attracting a high level of capital investment, because of the 'value-creating power of their platform ecosystems and digital assets. […] Platform ecosystems are nothing less than the foundation for new value creation in the digital economy.' (Accenture, 2016, pp. 37–38). Sundararajan (2016) reports that between 2010 and 2015 platform-based companies have raised a large amount of venture capital; Uber raised € 7.30 billion, Didi Kuaidi (now Didi Chuxing)[27] €3.7 billion, Airbnb €2.02 billion, Thumbtack €231 million, to name but a few (Sundararajan, 2016, p. 6). According to a report by Accenture (2016), the 15 highest ranked platform-based companies already represent €2.2 trillion in market capitalisation worldwide, and there are more than 140 'unicorns' (start-ups with valuations of nearly €1 billion or more) with a total valuation of more than € 424 billion (Accenture, 2016, p. 38). Findings of a global survey on platform-based companies indicate an even higher market value stating that worldwide platform companies have a market value of more than €3.6 trillion. The study identified 176 platform companies worldwide with a market valuation of $1 billion (€ 0.84 billion) or more (Evans and Gawer, 2016).

Apart from estimates about the market value of platform-based companies, there is only limited information about the size of the platform economy. One reason is the ill-defined concept of the platform economy and the very different methodologies used to estimate its scale. Another reason refers to the point that the market and the platforms themselves are changing very quickly. Providing figures about the number of existing platforms is therefore very difficult. Leimeister et al (2016, p. 9) referring to crowdsourcing platforms, estimate the existence of around 2,300 crowdsourcing platforms worldwide. Huws et al (2016, p. 3) who are referring to a source that cannot be found anymore (that is, from crowdsourcing.org) mention '2,967 crowdsourcing and crowd funding sites', including 135 in the category 'cloud labour', mainly in the USA but some in the UK' (Huws et al, 2016, p. 3).

The number of users on a platform is a rather an unreliable indicator, since many platforms might have a great number of registered users but only a few active users. Based on different sources the following table by Smith and Leberstein (2015, p.3) provides some estimates of registered workers on selected platforms:.Crowdsource (8 million), Care.com (6 million), Crowdflower (5 million) have the most registered workers.

A study by Katz and Krueger (2016) estimates that, in the US, workers providing services through online intermediaries such as Uber or Task Rabbit, account for 0.5% of all workers in 2015. Huws et al (2016) point out that since these workers are a sub-category of a larger category of workers ('workers with alternative work arrangements'; that is temporary help

[26] When a digital transaction is carried out, it is grouped together in a cryptographically protected block with other transactions that have occurred in the last 10 minutes and sent out to the entire network. Miners (members in the network with high levels of computing power) then compete to validate the transactions by solving complex coded problems. The first miner to solve the problems and validate the block receives a reward. (Thompson, 2016)

[27] Didi Chuxing is seen as Uber's Chinese competitor. (http://www.xiaojukeji.com/en/index.html)

worker, on-call worker, contract company workers or independent contractor or freelancer), it is not clear to what extent there is overlap between these categories. Katz and Krueger only look at people who said that work mediated via an online platform was their main job and those gaining income from online platforms in order to top up earnings from other sources are therefore not included. Huws argues that there is evidence that many crowd workers do crowd employment as a supplement to a main job (Huws et al, 2016, p. 6). It should also be noted that these results might make sense for the US labour market but are hardly directly applicable to European economies which have a rather different social welfare structure. Because of all these difficulties Huws et al (2016, p. 7) sum up: 'We must therefore conclude that, whilst there is clear evidence that crowd working exists on a significant scale, and is growing rapidly, there are currently no reliable estimates of its extent.'

The Oxford Internet Institute developed the Online Labour Index (OLI) in order to address these difficulties of measuring the scale and scope of platform work. The OLI is an economic indicator 'that provides the online gig economy equivalent on conventional labour market statistics. It measures the utilization of online labour across countries and occupations by tracking the number of projects and tasks posted on platforms in near-real time' (Kässi and Lehdonvirta, 2016, p. 1). An interactive chart showing changes by occupations and by different countries can be found on their website.[28]

Implications for the labour market

Information about the effect of platforms on the labour market is rather limited. This might be partly due to the difficulties in measuring the extent of work linked to platforms. For example, it could be argued that platforms matching supply and demand for short-term accommodation do not have any employment or labour market effects as the letting of premises is in the centre of the activities. However, anecdotal evidence hints toward the emergence of labour market effects as some of the providers of accommodation hire workers, for example for cleaning, on the 'traditional' labour market. Similarly, it could be assumed that other types of platforms have labour market implications, such as job creation (which could, at the same time, result in crowding out of jobs in the 'traditional' labour market) if staff are hired to work on the platform's core business (for example, identifying investors and matching them with those in search for funds). However, the potential strands of such direct or indirect labour market effects have not yet been explored, nor has their direction (positive or negative) and hence also not their extent.

Nevertheless, both in the limited research available and in policy debate, there is strong agreement that at least one part of the platform economy, namely crowd employment, has effects on the working conditions of the individual affected workers as well as on the labour market (see, for example, Eurofound, 2015). The discussion mainly involves the aspects of labour market access and fragmentation of tasks, the argument of a global division of labour, and the debate about reorganising employment relationships.

Labour market access

Eurofound (2015) reports that platforms may contribute to inclusive labour markets: in principle they provide opportunities for sources of income and social mobility in regions of the world with stagnant local economies, while mitigating the lack of experts in other areas. It is also seen as a potential instrument 'for economic development in rural areas and places damaged by war or natural disasters as it requires little capital investment and employee training, so making it a suitable source of workers for SMEs, NGOs, local governments and social entrepreneurs.' (Eurofound, 2015, p. 116). It is also reported that platforms can provide access to work opportunities for labour market entrants and early work experiences. It might be a way for workers with good skills but little work experience and for people outside conventional career paths to enhance their employability and it could even lead to continuous

[28] http://ilabour.oii.ox.ac.uk/online-labour-index/ [Accessed 26 April, 2017]

employment. That counts especially for high-skilled tasks such design and creative tasks or web development, although Eurofound (2015) also states that the argument of positive first work experiences resulting in continuous and stable employment does not seem to mirror reality (Eurofound, 2015, p. 116). Sundararajan (2016) claims that the labour market access through platforms intermediating all different kinds of tasks creates a range of opportunities for non-specialists and 'an interesting revival of the generalist' (Sundararajan, 2016, p. 171).

In contrast to the theory of creation of inclusive labour markets there are concerns about platforms' discriminatory practices as reported by Petropoulos (2017, p. 7) or Codagnone et al (2016). Some clients formulate the job advertisements in a way that excludes workers only because of their origin or gender. Moreover, a study by Edelman and Luca (2014) finds that rating systems used on platforms may also facilitate discrimination based on race, gender, age, or other aspects of appearance. Their findings suggest 'an important unintended consequence of a seemingly-routine mechanism for building trust.' (Edelman and Luca, 2014, p. 1).

Another aspect mentioned in Eurofound's report involves concerns about a 'race to the bottom' in quality and shifts from skilled work to unskilled work due to the process of fragmenting jobs into tasks and even microtasks implemented by some platforms (such as Amazon Mechanical Turk) (Eurofound, 2015, p. 117). The latter can also be linked to the debate about automation of jobs, since especially these fragmented unskilled tasks are or might become solvable by algorithms or machines (Schmidt, 2016, p. 15). If these assumptions were to happen, the availability of jobs on the labour market could be greatly reduced.

Global division of labour

Due the diversity among platforms in which labour is an important component, the effects on the labour market are reported as being equally varied, as Drahokoupil & Fabo (2016) note:

> *There are platforms which focus on reorganizing the matching of activities that are already organized on a self-employment basis, while remaining local (most notably Uber); there are those which actually offshore work that would be traditionally done in a local labour market by workers in employment relationships, to self-employed workers in low-cost locations.*(Drahokoupil and Fabo, 2016, p. 4)

Hence, the argument here is that platforms which ask workers to perform tasks online facilitate ways to provide services virtually and therefore ways to offshore work from local labour markets leading to a global division of labour (Huws, 2013). Horton (2010), who speaks of the 'flat world hypotheses', writes that online labour markets enable global matching, unlimited 'virtual labour migration', and international human capital specialisation. Similarly, Degryse (2016) delineates a form of 'virtual immigration' created through platforms:

> *'In virtual market one does not find on the one hand the workers from rich countries and on the other hand those from developing countries. There is no longer any great difference between the Canadian or British virtual assistant and the Filipino or Brazilian in search of a job.' (Degryse, 2016, p. 32).*

In this context Schmidt (2016) mentions the globalised competition in quality and price, fought on an individual level and reinforced by the practice of bidding and auctioning jobs (Schmidt, 2016, p. 14).

Nevertheless, evidence as of 2017 does not really suggest a global division of labour. Rather, findings indicate that it is still local for the majority of tasks (Eurofound, 2015). For example, in a study of CoContest (now Pillar), a platform on which high-skilled interior designers offer their services, Maselli et al (2016) describe that even if it is a virtual globalised market in

theory, two-thirds of the designers who participate in the contests on the website are Italian[29]. Likewise, half of the *turkers* (workers in Amazon Mechanical Turk) are from the US. They claim that

> *these findings are particularly valuable, because they challenge some of the assumptions that many researchers have traditionally held about production and value chains, outsourcing and globalisation. The case of CoContest challenges the idea that production takes place in the South for clients located in the North, and sheds new light on this novel form of globalised work which involves high-skilled tasks.* (Maselli et al, 2016, p. 5)

Reorganising employment relationships

Platforms might reorganise activities formerly organised in 'standard employment' relationships into forms of self-employment or precarious employment. According to Drahokoupil & Fabo (2016) this is the most radically transformative impact of platforms, although they note that up to now, successful platforms have mainly restructured sectors which had already depended on some forms of self-employment (Drahokoupil and Fabo, 2016, p. 4).

With work increasingly organised through platforms, Eichhorst et al (2016) assume that labour market trends that have been important in the recent past are likely to continue at an even faster pace. Hence, temporary work and service contracts, freelance work, and multiple jobs are getting more important. Firms will increasingly organise work as temporary project work within short term active networks and keep their core workforce to a minimum (Eichhorst et al, 2016, p. 2). They argue that the two main characteristics of tomorrow's working society involve increasing project work and network-based cooperation; these forms of employment will supplement (but not substitute) the traditional model of permanent full-time employment, a point they sustain by presenting data for Germany showing that the share of 'standard employment' has been steady since around 2000 (Eichhorst et al, 2016, p. 7). In contrast, Maselli et al (2016) argue that the fear of every job turning into a freelance activity is justified since platforms foster outsourcing. They find this validation also in the data, as the share of contingent workers (that is involuntary part-time, temporary and self-employed without employees) in the EU had been increasing slowly but continuously from 27.4% in 2002 to 32% in 2014. This increase does not seem to be affected by the recession signalling 'that these employment shifts are of a structural rather than a cyclical nature' (Maselli et al, 2016, p. 6). This observation should be taken with caution since one of the effects of the recession was to increase contingent workers according to other studies (Eurofound, 2014). In fact, De Groen and Maselli (2016) subsequently argue that platforms may potentially reinforce a wider trend of increasing flexibility; at the moment they are considered a serious competition and are setting the new industry standards (De Groen and Maselli, 2016, p. 16). Although online platform work is mostly seen as an additional earning opportunity (see also the following section) and estimates suggest that the share of workers offering their services through online platforms is still small, Eichhorst et al (2016) claim that companies' demand for crowd workers is rising, and so 'potentially more and more independent and individual suppliers offer their services via the digital route and therefore compete with traditional business models based on firms with dependent employees' (Eichhorst et al, 2016, p. 8).

The last aspect that should be mentioned here is that due to the decrease of entry barriers, the platform economy can also expand to formerly non-market or informal spheres, for example by making the assembling of flat-packed furniture or pet-sitting a paid job (Drahokoupil and Fabo, 2016, p. 2). In this respect, platforms may transfer activities that were probably conducted in the shadow economy to the formal sector (for example, cleaning or delivery

[29] The platform was set up in Italy which might be the reason behind over-representation of a Italian designers.

services). Platform operators can share their data with tax administrations and contribute to a formalisation of the informal sector (Maselli et al, 2016, p. 7).

Implications for job quality

The far-reaching implications of platforms in terms of job quality seem to be negative rather than positive (EU-OSHA, 2015; Eurofound, 2015). On the positive side, the literature mentions that they can offer a high level of flexibility and autonomy (in some cases), increased personal efficiency, enhanced ICT skills and a better work-life balance. Their disadvantages, however, include the erosion of employment status and stability, low income, and insecure payment. Moreover, workers might suffer from a lack of social protection, information asymmetry and an absence of reliable dispute resolution systems. Some crowd workers are also facing boredom due to the undemanding and monotonous nature of the tasks, as well as social isolation. Another aspect is increasing stress for being solely responsible for organising work and, finally, blurring boundaries between work and private life (Valenduc and Vendramin, 2016).

To illustrate the different dimensions of the implications for job quality, the job quality index classification by Eurofound (2013) is used, which includes the dimensions wage (here remuneration), work-life balance, intrinsic quality of work, health and safety, as well as employment quality.

Remuneration

In terms of remuneration there are several aspects affecting job quality mentioned in the literature. First of all, although crowd employment generally provides an easily accessible way to generate income, findings suggest that most crowd workers only top up other income with remuneration gained through platforms. According to findings of the survey on crowd work by FEPS, the University of Hertfordshire and Uni Europa (Huws et al, 2016), crowd employment represents generally a small supplement to total income. The largest group of crowd workers responds that it constitutes only 10% or less of all income (45% in average and varying from 58% in Austria to 33% in Sweden). However, there is a small minority (ranging from 3% in Austria and Germany to 11% in the Netherlands) for whom crowd work provides the only source of income. It constitutes more than half of all income for 2.5% of the sample across all five countries (Huws et al, 2016, pp. 43–44). One of the reasons might be the insufficient amount of work offered on crowd employment platforms, which is a major concern among crowd workers, as reported in the ILO survey of crowd workers (for the platforms Crowdflower and AMT). For example, 90% of the respondents (of both platforms) report that they would like to be doing more crowd work than they are doing now, whereas 60% of Crowdflower respondents said that there is not enough work available (Berg, 2016, p. 13).

An additional point reported in the literature, particularly for online services, is the uncertainty of remuneration. Not only the amount of work offered on platforms varies, but it is particularly problematic on platforms that assign work based on a contest. Only applications winning the contest, sometimes the top 3 participants get paid for their work while all participants delivered some service. Other participants do not receive a payment (some platforms compensate the unsuccessful participants with points in order to enrich their profiles). In case the client is not satisfied with any of the contributions, it can also happen that no one is selected as a winner and therefore no one is paid at all. Additionally, there are reports about cases of scams and abuse where clients do not pay at all for the work outsourced while taking advantage of the deliverable (Eurofound, 2015; Maselli et al, 2016, pp. 5–6). Schmidt (2017) adds that such contest-based platforms ‘have evolved into an industry that is systematically and continuously outsourcing work hitherto done by regularly paid professionals to a "standing army" of crowd workers, for whom it has made the possibility of fair payment into a gamble.’ (Schmidt, 2017, p. 17).

Another aspect to be mentioned is the level of remuneration, which is generally rather low (Eurofound, 2015, p. 115). Looking at the earnings on platforms where services are provided online, it can be said that unskilled virtual tasks, 'Human Intelligence Tasks' (HITs) such as tagging photos on websites, yield particularly low rates of remuneration. The first analysis of remuneration on Amazon Mechanical Turk in 2010 shows that 10% of the posted micro tasks on AMT were set at 2 cents or less, 50% above 10 cents, and only 15% of the HITs above $1. The potential hourly wage of workers on Amazon Mechanical Turk (turkers) was estimated at $5 per hour[30] (Ipeirotis, 2010). Recent findings of the ILO survey of crowd workers confirm the low level of income, although these findings show differences between countries and platforms. The reported average hourly wage for both Amazon Mechanical Turk and Crowdflower is between $1 and $5.5 per hour. While crowd workers earn between $1.77 per hour on Crowdflower and $5.55 on Amazon Mechanical Turk in the US, turkers in the US are better compensated than those in India, who earn $3.17 per hour. 10% of turkers (both in the US and India) report earning hourly wages above $10 (Berg, 2016, pp. 11–12). Berg (2016, p. 14) also claims that the above mentioned desire for more work is also an indication of insufficient pay, as many respondents (from Amazon Mechanical Turk and Crowdflower) point out that they work regularly at least six days per week (Berg, 2016, p. 14).

For Upwork, Codagnone et al (2016a, p. 36) refer to estimates showing that the average hourly wages are $16 for software, $8 for writing and translation, $4 for administrative support, and $5 for both customer support and sales and marketing (Codagnone et al, 2016, p. 36). Eurofound (2015) reports that for the Czech Topdesigner.cz[31] workers are paid €200 on average for tasks that are small in scale. For the German Clickworker, it is estimated that a worker can make €200–400 per month for around 30 hours of work. In contrast to this, the payments for contests launched through the Danish platform Boblr[32] are ranging from about €2,000 to €20,000, with an average of around €6,000 (Eurofound, 2015, p. 115).

The European Commission finds that, in contrast to offline markets and in case platforms operate internationally, the price varies between the rates charged on the national market of the participants. A study by Maselli and Fabo (2015) on CoContest (now Pillar) has shown that it makes only sense to participate in contests for designers in high-income countries like Italy if designers have little experience and the labour market entry barriers are high, or in case the flexibility is more important for them. That is because the average gross hourly pay of €5 does not allow reaching the Italian average income of €1,477 per month in an average eight-hour working day. On the other hand, for Serbian designers, it is easier to reach the average Serbian salary of € 334 per month (Maselli & Fabo, 2015, pp. 10–12).

Online intermediated but physically provided services have average rates that are comparable to those in the offline labour market. According to Hall and Krueger (2015, p. 23), Uber drivers in the US receive $6 per hour more than drivers of traditional taxis ($19 per hour versus $13 per hour). Codagnone et al (2016a, p. 37) name investigative journalistic reports taking into account idle times and running costs and estimating a net earning per hour hardly above the minimum wage. De Groen and Maselli (2016) report that gross earnings vary between €17.20 per hour for Uber-drivers and €15.40 for ListMinut[33] workers (with large differences in pay between the different types of services on ListMinut). They suggest that the higher earnings for Uber drivers may be a result of the high cost for providing the service: Uber drivers need a car, while lots of services performed though ListMinut require little or no expenses (De Groen and Maselli, 2016, p. 7). In addition, for ListMinut, more than 90% of

[30] This is below the federal minimum wage in the US of $7.25 per hour (see http://www.ncsl.org/research/labor-and-employment/state-minimum-wage-chart.aspx#1 last accessed 24 April 2017)

[31] http://www.topdesigner.cz/

[32] http://www.boblr.com/

[33] https://listminut.be/fr/; ListMinut intermediates all different kinds of jobs, like housework, home-maintenance, babysitting or transportation services.

the tasks yield hourly earnings above the minimum wage, with the exception of babysitting activities (De Groen and Maselli, 2016, p. 11).

There are also reports about platforms paying higher sums, for example the Berlin-based platform Jovoto[34], a contest-based platform intermediating creative work, which has about 80,000 registered designers. This platform is explicitly dedicated to fair pay including also the involvement of other crowd workers in the process of deciding about the winner (Schmidt, 2017, p. 18). Another example is TaskRabbit that has set a minimum hourly rate for workers in the US that is higher than any minimum wage in US states: $12.80 per hour (Codagnone et al, 2016, p. 49).

De Groen and Maselli (2016) point to differences in the level of remuneration between online and locally provided services concluding that

> *Remuneration seems to largely depend on the share of the labour (force) that could potentially perform the service. Hence, suppliers of physical/local services seem to earn more per hour than suppliers of virtual services and high-skilled performers earn more than performers of low-to-medium skilled services. The virtual platforms create a true globalisation of labour, where American workers compete with, for example, workers in India for the same micro tasks. This, inevitably, brings the equilibrium price down, especially for low-skilled tasks. The same dynamic applies much less to locally performed services.* (De Groen and Maselli, 2016, p. 6)

Although De Groen and Maselli (2016, p. 6), Degryse (2016, p. 38), or Aloisi (2015, p. 661) for example state that crowd workers have to compete for prices worldwide, others point out that outsourcing to lower-wage countries through platforms is not as common as could be expected. Codagnone et al (2016) indicate that OLMs do not bring as many advantages as expected for developing countries as a liability sitting outside national borders' […] limits the globalised trade of digital labour and the expected wage convergence' (Codagnone et al, 2016a, p. 7). In this context Schmidt (2017, p. 14) adds that the level of specialisation plays an important role, since the more specialised skills are the less they are in danger of a deterioration in prices caused by global competition.

Regardless of the format of service provision, the ILO survey of crowd workers finds that workers spend a good amount of time preparing and organising their work; time that remains unpaid: 'For every hour of paid work, workers spent 18 minutes searching and doing unpaid preparatory work.' (Berg, 2016, p. 11). Even though Codagnone et al (2016a, p. 36) note that working for different platforms could yield an income of $2,000-3,000 per month if a worker was able to work 12-15 hours a day, this seems rather difficult. Apart from the 'superstar effects' (20% of contractors – with good ratings – do 80% of the jobs) as well as the insufficient amount of work this is not possible for the majority of platform workers. In general, good ratings seem to have an effect on the level of income of crowd workers. The European Commission finds that workers with no previous experience on a specific platform have a lower probability of being hired for tasks on that platform due to missing trust-inducing ratings from previous jobs (Schmid-Drüner, 2016, p. 10).

To sum up, platforms provide an easily accessible way to generate income, although it represents generally only a small supplement to a person's main income. It is reported that the amount of work offered on platforms is not sufficient to generate a decent income and also that remuneration is very uncertain. Further, there seems to be a high proportion of unpaid preparatory work. Generally, the level of income is rather low, although it strongly varies depending on the type of task and it also seems that there are differences between online provided and physically provided services, explained partly by the global competition that online provided services in principle entail. Lastly, ratings have an effect on the level of remuneration, generating superstar effects and unequal remuneration among platform workers.

[34] https://www.jovoto.com/

Flexibility and work-life balance

In general, crowd employment provides a high level of flexibility, which is partly enabled through a 'tayloristic breakdown of what were once occupations into their smallest possible components' (Schmidt, 2017, p. 13), since jobs are turned into projects, tasks or even micro tasks (Eurofound, 2015; Schmidt, 2016). Crowd employment offers flexibility in terms of selection of tasks, working time, work place, amount of work, and work organisation. This flexibility that platforms seem to provide is highly valued by its users. De Groen and Maselli (2016) as well as Berg (2016) suggest that the main motivation to join, besides the monetary compensation, is the combination of flexibility and personal control. This includes 'the possibility to set one's own schedule, select jobs and negotiate rates.' (De Groen and Maselli, 2016, p. 9). Another important motivation, which counts for platforms that intermediate online work, is that workers have the possibility to work from any place they choose. As the findings of the ILO survey on crowd workers show, the possibility to work from home is the second-most important reason for crowd workers participating in crowd employment (Berg, 2016, p. 9).

Schmidt (2017) claims that in return for crowd worker's flexibility in working

> *'whenever, however, for whomever and as much or little as they want, as long as there are enough suitable tasks available and there are not too many competitors trying to do the same jobs' crowd workers have to be available 'on-demand' as a 'contingent workforce' they are 'hired for specific tasks only and are dismissed as soon as the job is done'* (Schmidt, 2017, p. 13).

Moreover, workers might be required to work at very short notice and with tight deadlines. Some platform work also enforces a rapid pace of work without breaks:

> *'Online crowd workers may be working to tight deadlines (more skilled freelance workers) or on low piece-rates for micro-tasks (lower-skilled clerical workers) while offline workers are under pressure to complete fixed-fee jobs and move on to the next.'* (EU-OSHA, 2015, p. 14).

Additionally, algorithms used by the platforms are affecting the level of flexibility of crowd workers (which is discussed later in the section about 'autonomy and control'). The (supposedly) high level of flexibility is linked to the argument that this form of work could result in a better work–life balance and the opportunity to combine multiple jobs. This is often pointed out as the main advantage for workers, next to opportunities to make substantial gains in personal productivity, since it is possible to adapt the work to personal working patterns. Eurofound (2015) indicates that this, however, is not always a welcome feature since it is 'very subjective, and for some crowd workers these specific elements cause stress due to the need for self-organisation and the blurring of work and private life.' (Eurofound, 2015, p. 115).

Several authors refer to the blurring of lines between private and professional life. The blurring of work and non-work activities influences work-life balance, as workers might have difficulties in focusing either on work (for example, due to family-related interruptions) or on their free time, since there is pressure to be on 'stand-by' in order to not miss any potential upcoming tasks (Huws, 2016). It is not only working time, workload and location contributing to the blurring of private and professional life; the platform economy enhances self-promotion mechanisms of the world of work through the mechanism of online reputation (Drahokoupil and Fabo, 2016, p. 4), probably this applies mainly to contest -based platforms.

In any case it is debatable whether platforms do provide a better work-life balance and it does depend on what degree crowd workers are dependent on the income they gain through crowd employment. Codagnone et al (2016) report that crowd employment also involves dependent micro-earners next to flexible and autonomous freelancers. In case of the micro-earners, platforms provide limited flexibility or work-life balance and a very low probability of being able to gain sufficient income. (Codagnone et al, 2016,).

Intrinsic quality of work

Autonomy and control

Concerning crowd workers' working conditions, the aspects of workers' autonomy and control mechanisms established by platforms are discussed very often in the literature. Authors usually refer to mechanisms on specific platforms like Uber and Lyft or Upwork and AMT.

Depending on the platforms and the tasks crowd workers face varying levels of autonomy. Smith et al (2015, p. 6), for example, report that for some services there is no flexibility and autonomy, since the working hours are demand-dependent even if the work schedule is theoretically flexible. In theory, workers have

> *flexibility to work during non-profitable times and on non-profitable days, but they may earn significantly less if they do so. And many companies reward those who make themselves available and penalize those who are not. For example, court documents show that Uber may terminate drivers for having a "dispatch acceptance rate" that is "too low" and will look for accounts to deactivate when there are too many drivers or business is slow.*(Smith et al, 2015, p. 6)

Rosenblat and Stark (2015) add that Uber's algorithmical system of mediation and management creates new forms of surveillance and control resulting, in some cases, in asymmetries around information and power for the drivers (see also the next section). Passenger assignment, for example, seems to limit autonomy (and also flexibility) of drivers for two reasons (Lee et al, 2015; Rosenblat and Stark, 2015): next to the risk of being suspended or removed from the system both on Uber and Lyft if they are declining rides too often (Uber in San Francisco requires drivers to have cancellation rates below 5% and an acceptance rate of at least 90%), Uber uses predictive scheduling trying to influence drivers. Uber indicates that there is high demand in the area where drivers are situated in order to convince workers to keep working when they try to log off (Rosenblat and Stark, 2015, pp. 8–10).

Another mechanism is that Uber uses reviews and feedbacks from passengers in order to regulate whether drivers receive offers or not. When ratings are too low, the drivers' accounts might get deactivated. De Groen and Maselli (2016) conclude:

> *Overall, the ratings may on the one hand limit the possibility to participate in the collaborative economy and skew the earnings on platforms where the allocation of tasks is largely determined on the basis of scores to a small group of workers; on the other hand, they also extend to the platforms a form of monitoring needed to deliver a good service.*(De Groen and Maselli, 2016, p. 10)

Codagnone et al (2016) report that although analysis of management by algorithm as the primary focus was mainly found in studies of Uber, issues of control, surveillance, and standardisation also affect other platforms such as Upwork. Schmidt (2017) describes the surveillance mechanisms on Upwork. The platform uses a software application called 'Work Diary' which allows clients to virtually control crowd workers, since the software takes a screenshot of the workers' computer six times per hour and at random intervals. In this way clients should be ensured that workers keep working on the tasks, instead of checking other websites, for example. Moreover, the Work Diary also tracks the number of keystrokes and mouse clicks and makes webcam photos of the crowd workers. Although workers can refuse clients the permission to use the webcam photos, these surveillance mechanisms raise questions of privacy protection. For example, Upwork states in its terms of service: 'We will share information contained in Work Diaries with the relevant client and with any manager or administrator of any applicable Freelancer Agency'. Schmidt (2017) emphasises that this shows that crowd workers have little control over the data gathered about their work behaviour and he concludes that 'the extraordinary degree of freedom on digital labour platforms such as Upwork is accompanied by an extraordinary degree of control.' (Schmidt, 2017, p. 14).

Algorithmic control mechanisms are also a subject of discussion regarding Amazon Mechanical Turk. First of all, clients' evaluations influences workers' online reputation, consequently affecting the likelihood to be hired for future assignments: 'A worker's history on Mechanical Turk primarily measures the percentage of work that has been approved – not the amount of assignments finished' (Aloisi, 2015, p. 667) or, put differently:

> *'every worker's act [is]constantly traced, monitored and appraised under "the harsh light of customer satisfaction" as the supervisory power – a prerogative traditionally exclusive to the management – is partially delegated to users'* (Aloisi, 2015, p. 662).

In addition to the fact that ratings may influence workers' behaviour, Codagnone et al (2016a, p. 22) point out that ratings might not even be trustworthy, since they might be biased toward positive reviews, and could therefore not necessarily be a reliable measure of quality according to which workers are judged. The term 'data-Darwinism' refers to this issue, as it relates to how crowd workers are evaluated, and how these evaluations that are codified in data could provide access opportunities for this workforce (also called 'superstar effect'). Sundararajan (2016) notes: 'This is the Darwinist aspect of the rating systems based on user-generated data. They strong get stronger. The fittest survive. Even though these assessments of fitness might be rather noisy.' (Sundararajan, 2016, p. 201). Additionally, workers might not even know how these ratings are calculated, leading this analysis to the next important aspect concerning job quality, namely the asymmetry of information and power as well as data protection issues.

Information asymmetry and data protection

Another relevant point mentioned by several authors is the asymmetry of information between crowd workers, clients and platform providers, as well as power asymmetries in favour of platform providers (Codagnone et al, 2016; Eurofound, 2015; Felstiner, 2011; Schmid-Drüner, 2016; Schmidt, 2017). Often clients have access to significantly more information on workers and tasks than the other way around; for example, when clients are able to sort workers according to previous ratings or top ratings. It is also reported that sometimes tasks are not well described (Codagnone et al, 2016, p. 37; Eurofound, 2015, p. 115) and that it is very difficult and time-consuming for the workers to get into contact with clients in order to get more information about the tasks, which raises the risk of wrong execution of tasks and possible rejections (Schmid-Drüner, 2016, p. 15). One example given in the literature showing this information asymmetry is the Amazon Mechanical Turk platform. Its terms of agreement specify that the judicial rights over the task done by the workers pass to the clients, who can either accept the output, or not. Even if a client posts a task with inadequate instructions, and therefore the response they get might not be what they wanted, they can reject the work. Amazon Mechanical Turk tracks and maintains workers' acceptance rates so that clients can hire workers who have higher rates of task acceptance from previous clients. On the workers' side, there is no mechanism for workers to filter clients. Workers only see the name the client uses and only receive limited information about the tasks,[35] whereas clients can access the whole history of task assignments of workers (Codagnone et al, 2016, pp. 38–39). Creating a whole history of task assignments raises also concern about data protection. Schmidt (2016) argues that with these tracking methods (that is the continuous recording of data patterns) a fully automated biography of one's working life (on platforms) could be created. Hence, questions like the following have to be considered: Which data is collected and stored? Who is allowed to access this data? To whom can it be disseminated? Furthermore, workers do not have the option to transfer data record from one platform to the other. In this context it is questionable whether it would be an advantage for workers to take these records with them, in order to keep ratings and reputations in case they want to change the platform, or if that could become a disadvantage, 'in case platforms would

[35] As reported in Eurofound (2015), there are also other examples of platforms where platform providers guide the clients to give a good description and they might even refuse to publish tasks if the description is not clear enough.

require to obtain an extensive data record of the workers, even if it contains performance profiles generated by machines that cannot be objected?' (Schmidt, 2016, p. 12).

Some platforms intermediating locally provided services, Uber and Lyft are mostly mentioned as examples, use dynamic pricing in order to increase their efficiency. For example, Uber increases a driver's earnings in case there is more demand than supply to encourage drivers to provide their service. Moreover, Uber guides its drivers by sending messages about the availability of rides and peak-times as well as by providing maps indicating where the highest prices can be charged (De Groen and Maselli, 2016, p. 10). A quantitative study showing how the Uber surge price algorithm works finds that this algorithm is opaque and also manipulated, because it does not reflect the real situation of peak demand raising issues of fairness and transparency (Chen et al, 2015, p. 13). The fact that the algorithm is managed by the intermediary means that the factors and weights used to determine tasks are only known by the intermediary while workers and customers do not have access to this information.

Lee et al (2015) describe how drivers deal with and react to work intermediated by algorithms and how they share information and social tactics with each other in online forums on how to work around the restrictions introduced by the algorithmic control mechanisms. Their findings suggest that some drivers are not influenced by surge pricing, others try to outsmart the system by communicating directly with passengers or they avoid surge areas. Still others consider it as unfair, since it sometimes brings them into areas where they expect higher remunerations which later do not materialise. The findings also indicate that surge pricing changes too fast and unpredictably for drivers to use the information strategically to boost their incomes (Lee et al, 2015).

Some authors note that drivers also have limited control over how passengers and Uber use the rating system (Rosenblat and Stark, 2015, pp. 4, 11). Another asymmetry is represented by Uber's right to one-sidedly control the base rate charged by drivers and also the commission it takes from them, thus influencing the level of remuneration (Schmid-Drüner, 2016, p. 15). Schmidt (2017, p. 21) argues that

> *'even though Uber used to officially refer to its drivers as 'partners', it is obvious that they are not treated as equals. They have to negotiate from a position of weakness and are the only factor left in Uber's calculation where the company can cut costs to gain a financial advantage over its competitors.'*[36] (Schmidt, 2017, p. 21)

Social support and isolation

Another important aspect of job quality is the possibility to build relationships with other colleagues. In this respect, Irani (2013) examining Amazon Mechanical Turk criticises that the platform makes cheap labour invisible or rather 'helps ameliorate the contradictions of intensified labour hierarchies by obscuring workers behind code and spreadsheets' (Irani, 2013, p. 2). Turkers are lacking direct channels of communication with the client and other Turkers. This is seen as form of isolation and dehumanising of the 'invisible workers' (Sundararajan, 2016). Valenduc and Vendramin (2016) express concerns that certain workers engaged in these new forms of work are left with no opportunity for face-to-face or even shared activities, and this begs the question of how professional identities can be built and forms of collective organisation nurtured in such an unstructured environment (Valenduc and Vendramin, 2016, p. 40).

On other platforms, such as creative design platforms, Schmidt (2017) observes that it is important for workers to create a personal connection to the client pointing out that working conditions are hence relatively emotional:

[36] Another interesting aspect that Schmidt (2017) mentions here is that 'according to Travis Kalanick, CEO of Uber, the workers are to be replaced as soon as possible by self-driving cars anyway. Together with Lyft and Google, Uber is part of the 'Self-Driving Coalition', a lobbying group for autonomous vehicles, and is already testing the technology in a research and development project based in Pittsburgh'. (Schmidt, 2017, p. 21)

> *All this leads to an interesting inversion with regard to the visibility of crowdworkers. In microtasking, they suffer from the fact that they are not perceived as individuals and practically remain invisible. In contest-based creative crowdwork, by contrast, they have to invest a lot of their personality in building a personal reputation and a public portfolio. The work they have done in previous contests is very visible and can easily be judged by clients and colleagues. This high visibility entices many to invest more time, effort and personality into the design projects than would be economically reasonable, given that the chances of eventually getting paid are slim.* (Schmidt, 2017, p. 17)

Physically provided services obviously provide more face-to-face communication, since workers usually meet the customers in person and often the platforms are more personal and some organise events and get-togethers for the workers (Schmidt, 2017, p. 19).

Skills development and work content

A positive aspect of this type of work is its potential to provide opportunities for skills development and learning by doing. Since the entry barriers are generally extremely low, it is seen a chance especially for labour market entrants and people outside conventional career paths to learn new skills (Eurofound, 2015; Schmidt, 2017).

But this opportunity for skills development strongly depends on the types of tasks that are involved. On platforms facilitating an increased fragmentation of jobs into smaller tasks the critique is that these microtasks are not very rewarding in work content nor leading to skills development, since they tend to be low skilled and trivial in nature (Eurofound, 2015; Irani, 2015). On the other hand, creative work commissioned through platforms such as 99designs or Jovoto are experienced as intrinsically rewarding by crowd workers according to Schmidt (2017) who concludes:

> *While the unskilled, piecemeal work of microtasking is reminiscent of labour on a conveyor belt, contest based creative work resembles unpaid or severely underpaid internships in the creative industries. Microtasking is not a profession and has no career to offer. Participation in contest based crowd work, however, is driven by the hope of entering a fulfilling line of work, of learning skills with value outside the platform. For each individual this possibility exists, but for the majority of the crowd it is unlikely. By definition, only a few can stand out from the crowd; everybody else is interchangeable.*

(Schmidt, 2017, p. 17)

Moreover, Eurofound reports that 'crowd workers do not get access to HR measures or to training, mentoring or coaching, but have to organise their further professional development themselves.' (Eurofound, 2015, p. 115).

Health and safety

A further dimension of the concept of job quality is health and safety. In this respect the discussion involves mainly two aspects, which are stress-related psychosocial risks that platform work could entail and concerns about increasing numbers of accidents for locally provided services, whereas the latter is often linked to liability issues.

Eichhorst (2017) emphasises psychosocial risks for the workers, who are left alone to manage their own work health and safety protection by claiming that:

> *While traditionally, accidents and occupational diseases resulted from physical hazards in sectors such as manufacturing, the highly flexible and productive world of work growing in developed economies exhibits new risks due to intense or even excessive psycho-social demands, resulting in mental health issues if the work environment is not supportive. If work is not organized in sustainable ways, negative side effects of work in terms of psycho-social disorders might become more prevalent in the future.*(Eichhorst, 2017, pp. 10–11)

Besides the contractual precariousness (see section about 'employment quality') the alternative reward schemes established by contest-based platforms like CoContest (now Pillar) may also cause stress or psychosocial disorders. The reason for this is seen in the particularity that most workers are not being sufficiently rewarded for their work. For Uber drivers, on the other hand, it is mentioned that since they have the pressure to accept passengers without knowing the level of pay and the destination in advance, it might happen that the pay is too low to cover all costs, but the driver has no real option to refuse unprofitable rides, as they risk being blocked on the platform (De Groen and Maselli, 2016, p. 11).

Schmidt (2017) highlights a difference between physically provided and online provided services, since in the physical world, there are a lot more personal risks involved than in online work, where occupational accidents, traffic accidents, theft and damage to property are of no real concern (Schmidt, 2017, p. 18). Moreover, liability in case of accidents is often unclear, as an example reported by Schmid-Drüner (2016) of bike couriers shows: in case couriers have an accident, they often do not have any accident insurance coverage. However, the risk of getting hurt in an accident is relatively high, since cyclists spend most of their working hours in traffic. Additionally, the pay-by-delivery format used by some platforms encourages driving carelessly in order to carry out as many deliveries as possible. It is the workers' responsibility to have health insurance, accident insurance and third party liability insurance, but it is reported that sometimes cyclists cut these costs at least partially and cycle at their own risk (Schmidt, 2017, p. 22).

Employment quality

The most prominent aspect discussed in literature and policy deabates is the unclear employment status of crowd workers. Since the platforms function in most cases only as intermediaries or agents, most workers are not employed by the platforms (De Groen and Maselli, 2016, p. 5). Hence, in terms of employment quality, the main argument is that platforms are developing a parallel labour market, where employment is not covered by any contract, as Degryse (2016) points out:

> *Within this form of employment there no longer exists either labour contract, or wage standards, or working time regulations or standards relating to working hours, workplace, training, access to trade unions, or collective action. The worker – or rather the 'partner' – belonging to this virtual community, is left to manage, on the basis of a contract of self-employment, his/her own social protection (unemployment, retirement pension, occupational sickness provision), work health and safety protection. Alternatively, s/he fails to declare this work, opting for informal labour status – 'in the black' – as a 'partner' who, should s/he for any reason prove no longer acceptable, may see her/his account suddenly deactivated by the platform managers, without any prior notification or other formality (in the absence of any kind of legal or regulatory support designed to defend the 'worker').*(Degryse, 2016, p. 35)

The term 'cybertariat' (Huws, 2009) is linked to this concept. Codagnone et al (2016) argue that the digital labour platforms analysed in their essay create contingent and precarious employment forms, and in this respect they may also be the source of some (or all) of the potential social risks/costs that precarious work entails. The concerns mentioned are first of all that temporary work can reduce social mobility because often precarious jobs become 'traps' instead of 'bridges' into secure work. Non-standard work is further associated with a wage penalty compared to standard work and therefore it is also associated with growing inequalities. Additionally, temporarily employed workers have a higher poverty risk than permanent workers (Codagnone et al, 2016, p. 29).

Berg (2016) observes that the crowd work labour market is not an unregulated market though; she speaks of a 'platform-regulated' market, as the platforms set the rules by deciding who

can work on a platform and the status they will have, how information is collected and to whom it is displayed, as well as whether or not to mediate disputes.

De Stefano (2016, p. 4) refers to a statement given by the CEO of Crowdflower in order to give an impression of the employment quality:

> *Before the Internet, it would be really difficult to find someone, sit them down for ten minutes and get them to work for you, and then fire them after those ten minutes. But with technology, you can actually find them, pay them the tiny amount of money, and then get rid of them when you don't need them anymore.*(quoted by Marvit, 2014 in De Stefano, 2016, p. 4)

On the other hand, Maselli et al (2016) add that it should be kept in mind that permanent contracts exist for a lot of good reasons. As it entails high transaction costs if someone gets hired only when he/she is needed, because of the selection process and the risks involved, it is more convenient to avoid those costs and risks whenever the demand for a good or service is expected to be stable (Maselli et al, 2016, pp. 6–7). This aspect can be illustrated with the example of platform-based household and personal services that Schmidt (2017) provides. He argues that people who do cleaning jobs intermediated through platforms are perceived to be less reliable and delivering lower quality, if left unsupervised, than clients and platform providers expect. Schmidt (2017) describes:

> *The platforms therefore try to monitor and control the way the work is done – the personal appearance of the gig workers, their clothes, their schedule. All of this makes the platforms for cleaning services particularly vulnerable to getting sued for misclassification of the workers. Both the legal pressure and the striving for quality assurance have already led several platforms in this sector, in Germany as well as in the United States, to switch back to conventional employment or at least to pay and train the workers better, and generally invest in a more reliable, stable staff. In 2014, Handy.com was sued for misclassification of employees as independent contractors. As so often, the legal case was referred to a court of arbitration, but the class action law suits remain a threat to the business.* (Schmidt, 2017, p. 22)

Implications for social policy

Platform workers, employee protection and access and financing of social benefits

Work on digital platforms and other practices such as contracting and outsourcing are blurring the lines between dependent employment and self-employment (Eurofound, 2013). This classification has an impact on the social security contributions of employers and social protection coverage of workers. Several authors alert of the consequences of the increase in self-employed workers, partly due to having unfair competition with providers that do not have to pay social contributions. These developments predate platforms, with their expansion increasing the number of workers with non-standard forms of employment. This increase could entail more reliance on tax funded basic social security and pensions, which could have a negative impact on the financial sustainability of social protection (San, Hotel, and Paul, 2017). Eichhorst et al (2016) also believe that the expansion of platforms that do not make employer contributions can undermine social security.

Eurofound (2017) and Stewart and Stanford (2017) see the following options to address this situation: confirm and enforce existing laws, clarify or expand definitions of employment; create a new category of 'independent worker'; create rights for workers who are not employees and reconsider the concept of an employer. Several southern and central European countries opted for the creation of a new 'hybrid' category. Other countries have instead opted for keeping the employee/self-employed binary classification, either using the economic dependence criteria to identify and combat bogus self-employment or establishing criteria to clearly distinguish employment from self-employment (Eurofound, 2017).

Table 2. Categorisation of the approaches used and applicable countries

Creating a third status		**Improving criteria**	
Hybrid status	Economically dependent worker status	Using criteria of economic dependence to combat and identify bogus self-employment	Establishing criteria to clearly distinguish employment from self-employment
Austria, Italy	Portugal, Slovakia, Slovenia, Spain	Germany, Latvia, Malta	Belgium, Ireland, Norway and Poland

Source: Eurofound (2017)

Overall, there is lack of certainty of how national and EU regulations can be applied to platforms, including tax and national insurance deductions, the type of social protection available to crowd workers, how eligibility can be established and how rights can be claimed (Huws, Spencer and Joyce 2016). This is linked to the lack of clarity about the role of platforms and the relationship between platforms, workers, and customers. Codagnone et al (2016) report that in the 1099 Economy Workforce Report 8% of drivers and 16% of delivery workers (all self-employed) are uninsured, with 30% having no health insurance. This data does not focus specifically on platform workers but the authors consider that it is 'an indirect way to imagine what is the social protection conditions of workers in digital labour markets is to look at the situation in traditional non-standard work where lack of any social protection and benefits such as unemployment benefits, eligibility for work injury benefits, as well as for sickness and maternity benefits is the norm' (Codagnone et al, 2016, pp. 37–38). According to De Stefano (2016), those providing 'work on-demand via apps' (that is, jobs related to traditional working activities delivered locally) are classified as independent contractors. Maintaining a level of coverage similar to that of employees has a significant impact on their income. De Stefano (2016) points out that even in those cases where they are classified as employees 'the intermittent nature of their activity could be an obstacle to accede to important employment or social rights, such as maternity leave, paid holidays, full unemployment benefits, when these rights are dependent upon a minimum length of service (De Stefano 2016, p.8)'. In the case of crowd workers, a survey of the ILO on the Amazon Mechanical Turk and the Crowdflower platforms shows that their financial security is related to their degree of dependence on crowd work. More than 80% of the respondents have another job and social protection coverage from this 'main' job. On the other hand, those who have crowd work as their main source of income lack social security coverage and their health insurance coverage is also lower (Berg, 2016)[37].

A mapping exercise carried out by the European Social Insurance Platform on the activity of the platforms providing online services found that workers were categorised as self-employed and covered by statutory pension insurance in most countries (see table 3) (ESIP 2017).

[37] There are also reports about platforms contributing to crowd workers' social insurance. For example, content.de, one of the better paying platforms in Germany, automatically contributes to the artists' social insurance body for all tasks commissioned through them.

Table 3. Statutory pension insurance of digital platform workers

	Covered by pension statute		Thresholds (minimum/maximum)		Provider responsible for paying contributions		Percentage of income = basis
	Yes	No	Yes	No	Yes	No	
Austria	X		X		X		X
Belgium	X		X		X		X
Finland	X		X		X		X
France	X******		X		X		X********
Germany	X		(X)		(X)***		(X)
Hungary	X		X			X*********	
Luxembourg		X****	X		X		X
Netherlands	X*			X	X		X
Norway	X		X		X		X
Poland	X		X		X		X*****
Slovakia				-	-	-	-
Sweden	X******			X	X		X

* but only covered by the general scheme for citizens, without link between contributions and benefits

** mandatory only for artists and publicists, in other cases voluntary (but only possible for old age)

*** for artists and publicists: provider, employer and user are sharing the contributions; in other cases: the provider

**** not yet, but if, it would be mandatory

***** declared income

****** only on a voluntary basis

******* flat rate for micro-enterprises

******** the user is responsible

Source: ESIP (2017).

Entitlements and access to benefits for platform workers

There are diverging views regarding which benefits should be accessible to platform workers. Those in favour of introducing a new category of worker argue that platform workers do not fit in any of the traditional categories. The current social safety net is based on employees working full or part time, with other types of workers having no safety net or a more limited type. Having a new category would imply that employers make some contributions, but not all those required in the case of employees. Harris and Krueger (2015) propose an 'independent workers' category. Platforms or any other type of intermediary would provide these workers benefits where economies of scale allow purchasing them at a lower cost and with quality than if workers purchased them individually. This would include for example disability insurance and retirement products. It would also include other benefits normally provided by employers such as insurance and tax withholding services, thus reducing the administrative burden for workers. On the other hand, providing these benefits should not lead to considering the relationship between platforms and workers as employee relations, as it has been the case when health insurance has been provided.

De Stefano (2016) is in favour of expanding the forms of employment and categories of workers that are included in social security and frames this shift of risks to workers not as exclusive to the gig economy, but as part of a wider trend towards the casualisation of labour. As the problems arising from the classification as independent contractor go beyond the gig economy, gig economy workers should not become a separate category in the labour market, as this is an unnecessary subdivision. The gig economy should be rather addressed with policies protecting and regulating non-standard work.

Eichhorst et al (2016) believe that as the digitalisation process advances, the resulting social security system will probably have universal coverage, including all forms of work equally. Social insurance in the future will therefore have to stop relying on long term dependent employment and instead include all types of workers without the possibility of opting out of contributions:

> *'A contribution-based pension scheme for retirement as well as for occupational disability and unemployment regardless of formal employment status would close the gaps in insurance, ease changing forms of employment and reduce the competition over labour costs between dependent employees and those who are self-employed'* (Eichhorst et al, 2016, p. 13).

Contributions from self-employed workers could be supplemented with compulsory contributions from customers or the intermediaries/platforms.

On the other hand, ESIP concludes on the basis of their survey that rather than reinventing social security, it is necessary to exchange good practices between Member States regarding pensions to find solutions (ESIP 2017). Furthermore, the marketisation of work through platforms that is usually undeclared (for example, domestic tasks) would actually increase compliance with social security contributions (Eurofound, 2017).

Management and administration of benefits and their financing

In addition to the types of benefits that platform workers should have access to, there is the question of how to manage the financing of benefits if this is not done through employers. An option described by Donovan, Bradley and Shimabukuro (2016) is 'risk pooling'. Those workers who are not part of a group of employees could pool risks with other workers and thus purchase benefits like health insurance in a more efficient way (that is, saving in costs and administration) than individually (but more burdensome to manage for them than if this was done by an employer). There have also been cases in the US of platforms that have facilitated access to benefits. This is the case, for instance, of Lyft, which partnered with the Freelancers Union in 2014 to extend eligibility for the Freelancers Union health plan and other benefits to Lyft drivers. An initiative in several European countries called SMart[38] covers platform workers as well as other types of freelancers. A contract based on work intensity gives platform workers access to minimum wage, social protection and other employment rights (including guaranteed compensation for outstanding claims if one of the platforms with which they cooperated becomes insolvent).

Hill (2015) proposes a portable safety net in the form of an Individual Security Account system for all workers. This account is linked to each worker rather than to a single employer, with all employers (be it the platforms or the clients) making pro-rata contributions. Hill proposes that these accounts could be used in the US to pay for social security, health, unemployment, work related injuries and sick leave. This proposal has been supported by several platforms and NGOs[39] and is similar to a proposal made by the platform Etsy (2016) to the US federal government. The platform proposes that all benefits (retirement, health insurance, paid leave, tax-advantaged savings accounts, disability, etc.) are linked through a single account to individuals rather than jobs. Tax withholding would be used to fund

[38] http://smart-eu.org/

[39] http://www.yesmagazine.org/new-economy/can-workers-get-a-fair-deal-in-the-gig-economy-20160823

benefits, with all withheld pay and matching contributions going to the individual account. Combining all the existing tax-advantaged savings accounts (which include health and dependent care) into a single one would also help to manage income fluctuations.

Berg (2016) criticises Hill's proposal by highlighting the difficulties and legal confusion associated with having all workers using individual accounts to pay social security and other benefits to which all their employers contribute to, regardless of their employment arrangements. Whilst some types of crowd workers have a relation with platforms similar to regular employees, it would be difficult to justify employer contributions for other types of independent contractors (for example, a plumber fixing a pipe). Furthermore, some other types of benefits are not mandatory (for example, annual leave, paid family or sick leave in the US) and therefore workers in a casual employment relationship are less likely to benefit from them. The author advocates for the enforcement of compliance with labour standards instead of portable security accounts. In relation to this, Stewart and Standford (2017) point out that enforcement is hindered by the fact that the platform workforce works in isolated settings and is composed to a great extent by groups of the population with a limited knowledge about their rights and who are often the victims of the violation of labour laws. Consequently, more compliance entails not only more efforts by regulators, but also educating workers about their rights (Stewart and Standford 2017).

Social dialogue and industrial relations

The scholars' community and stakeholders have been paying much more attention to the dynamics between digital platforms and employment relations than to those related to automation or digitisation of processes. The 'Uberisation' of the employment relationships generated a large list of academia and institutional contributions mainly discussing the nature of the business model and the legal status of the drivers (EURWORK, 2016).

As already noted above, the implications of digital platforms for industrial relations and social dialogue are seen as more disruptive than the introduction of automation in plants.

Building up a parallel with the phenomena characterising the first industrial revolutions, Degryse suggests that digital platforms offering online outsourcing can be seen as a new form of digital neo-Taylorism. This set of new technologies has made possible to isolate each individual from what is really only a virtual 'crowd': the traditional brick and mortar factories are now being automated and, there are now 'virtual factories' where workforce numbers are substantial but workers are dispersed throughout the world (Degryse, 2017).

The business model behind the rising of digital platforms determines the employment relationships, both collective and individual, creating strong concerns particularly in the union movement. Breaches in the employment relationship, lack of collective agreements, low salaries, discretionary/arbitrary power exercised by contractors based on rather opaquely appraisal and lack of mechanisms for valuing skills are the main concerns for unions with regard to crowd employment. According to Fabo et al (2017), the current situation in the platform economy can be described as 'big promise but grim reality': while there is a promise of job creation, increased opportunities for disadvantaged and discouraged groups, as well as a more communal way of living, platform workers are presently poorly compensated, and no prospect of things changing is on the horizon.

On top of this, digital platforms entail the representation issue for trade unions, that is, how to recruit and represent platform workers taking into account their specific features is likely going to be the huge challenge for established trade unions as it is questioning their core business: to organise workers in companies and firms within the framework of employment relations.

The deconstruction of the traditional employment relationship

Classifying workers as contractors, employers can justify denying them collective representation through a union. Unions see the work allocated by the task on these platforms as a commodity sold at market price (ETUI-ETUC, 2016a). Degryse (2016) highlights

misclassification as a major concern for crowd workers. He writes that although more than 10 million workers provide their services through Upwork, for example, Upwork declines to state itself as an employer. Similarly Uber, refusing to regard itself as an employer, has become one of the largest transport services in the world, without owning any vehicles and without any contractual, legal or penal liabilities (Degryse, 2016, p. 34).

Deconstructing or even denying the traditional 'analogic' employment relationship implies the undermining of the industrial relations framework supporting it. While digital platforms have a huge potential to reduce transaction costs and information asymmetries, they simultaneously raise, among other challenges, a vivid discussion on the identity of the employment relationship. Inevitably, a multifaceted legal controversy appears. The criterion for the existence of a subordination link is one of the key elements to build up the employment relationship. Article 45 TFEU[40] with regard to freedom of movement provides the only concept of 'workers' available at EU level, based on the actual characteristics of the services rendered personally, on the control exercised by the receiver of the service and on the nature of the payment agreement (Donini et al, 2017). Interpreting recent trends in the European Court of Justice (ECJ), same authors state that the EU concept of 'worker' seems sufficiently wide as to include digital platform workers where they perform activities that require remuneration, have economic value and character and are not marginal or ancillary. To this extent, workers covered by the European Union's concept of 'subordination' are offered a minimum set of rights based on EU citizens' freedom of movement and connected with access to social security systems.

Within the legal field, many contributions reflected on whether the traditional legal concept of an 'employee' is still valid when it comes to be applied to this new range of workers developing their activity in the digital environment. This question is highly relevant as, among other considerations, the concept of employee – different from the worker one - is fully covered under the scope of labour law protection and social protection. The two main arguments are:

- the potential emergence of a new, intermediate category between employees and independent contractors, which would need a new type of legal protection to be defined in policy and law;
- the platform economy should not be conceived as a separate silo in the economy (De Stefano, 2016) and consequently, it will not be necessary to create a new type of 'e-worker'. Moving beyond the concepts of self-employed and of workers would risk creating legal confusion and undermining rights at work and social protection for all in the long run (European Commission, 2016b).

To this extent, the legal controversies and discrepancies in the so-called 'Uber case' are paradigmatic. In October 2016, a ruling in the UK stated that Uber drivers are not self-employed[41] and should benefit from the associated employment rights, including the right to be paid the National Minimum Wage, which would not only have major implications for Uber (there are around 40,000 drivers in the UK) but also for other platform providers (The Guardian, 2016), self-employed contractors who could choose where and when they worked. From a different perspective, there is a pending case where the ECJ is to rule about a case raised by a Spanish court[42] based on a claim for unfair competition since neither the owners nor the drivers of the vehicles concerned have the licences or authorisations required under the local taxi service regulations. Interestingly, the Advocate General's opinion issued in May 2017[43] qualifies Uber as a transport company and notes that the drivers exist solely on the

[40] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:12012E/TXT:en:PDF

[41] Aslam v. Uber, judgment of Oct. 28, 2016, case n. 2202550/2015

[42] Case C-434/15 Asociación Profesional Élite Taxi , a professional organization that represents drivers.

[43] Opinion of Advocate General Szpunar Delivered on 11 May 2017. Case C 434/15. Asociación Profesional Elite Taxi v Uber Systems Spain SL., 2017

basis of the platform as intermediary, without which the drivers' activity would have no sense. Supporting the same arguments as the UK ruling regarding the Uber control on the conditions upon drivers fulfil the service, he is qualifying them as 'employees'. As a consequence, Uber should not be considered as a simple intermediary acting between drivers and passengers but instead as providing a service in the field of transport and as such subject 'to the conditions under which non-resident carriers may operate transport services within the Member States'. The final ruling is still pending, although the ECJ usually follows the Advocate General's opinion.

In the USA, labour platforms have faced lawsuits over the application of minimum wage legislation and the status of individuals delivering work through the platforms. Following litigation, some platforms are beginning to reclassify their service providers as employees, while others have revised their terms of payment (TaskRabbit) (Codagnone et al, 2016a, p. 49). In California, an arbitrator established that an Uber driver in California is an independent contractor, not an employee (Weinberg, 2017).

EU initiatives and regulatory initiatives at national level

The European Commission has acknowledged the need to consider the best way forward to protect self-employed and workers in the collaborative economy by applying the existing EU social *acquis* as well as the social protection schemes under the European Pillar of Social Rights under development (European Commission, 2016c). There are also concerns regarding the application of EU working time and health and safety legislation, and over work-life balance (European Commission, 2016b).

ETUC has proposed an EU framework on crowdworking (ETUI-ETUC, 2016a) to ensure that national and European regulations and legislation effectively apply to crowd workers in online environments. However, there are different visions from both sides of the industry.

In terms of national legislation, limited evidence of operational consideration of crowd employment is available. On exemption is France which established the social responsibilities of digital platforms. If the platform determines the characteristics of the work and sets the remuneration, independent digital platform workers become entitled to certain guarantees usually applied to employees (Donini et al, 2017). Decree 2017 – 774, which comes into force at the start of 2018, sets a revenue threshold above which platforms must cover workplace accident contributions. The contributions paid must be at least 13% of the annual social security cap (which equates to around € 5,000). The decree also sets out conditions as regards reimbursing employees for fees paid to validate acquired experience. If the worker uses numerous platforms, the amount paid will be determined on a pro-rata basis.

Trade unions challenges and strategies

Digital platforms pose huge challenges for trade union organisations as they are almost totally absent from these virtual workplaces. It is widely stated that unions should reframe their strategies and also adapt many of their traditional practices. This leads to the discussion of trade unions strategies to find ways to organise very different group of workers, even with different interests, from Europe and the rest of the world. As platforms enable firms to manage a decentralised workforce in a digital environment, union practices need to evolve and one starting point is to develop their own digital tools for representing a decentralised collective voice (Soderqvist, 2017).

Trade unions' strategies in the case of platforms are conditioned by the fact that there are almost as many business models as platforms (ETUI-ETUC, 2016b). It appears that they do not have the necessary instruments and means of action to organise and protect the dispersed crowd and challenge platforms to accept their role as employers. What benefits, in its broadest sense, and what structure unions evolve to best support these workers is a parallel question about the future of unions. An open question for the future role of the unions is how to cope with those issues.

Against this background, trade unions should look for innovative ways to show their usefulness to these new online workers as it is the only manner to recruit them into their ranks (ETUI-ETUC, 2016c) So far, the most effective tool for trade unions to tackle these problems was collective bargaining. However, collective agreements will be hardly achievable if workers are scattered and systematically placed in competition with each other, and it is hard to see a future for traditional work relationships in a world where digital platforms act as labour market intermediaries (Valenduc and Vendramin, 2016). In addition, many online workers classify themselves as entrepreneurs and freelancers - even though they 'are receiving the risks of entrepreneurship but not the rewards' (ETUI-ETUC, 2016c), which prevents them to collectively negotiate their working conditions.

The role of unions is considerably harder in the realm of global platforms, even in setting priorities to organise online workers. For example, traditional trade unions' claims regarding minimum wages or minimum standards are even more difficult to apply because of differences between countries' legal systems. Another important issue is the role of the unions in reconciling the representation needs of workers in 'traditional' jobs (for example, taxi drivers' jobs) and those of new platform workers (for example, Uber) who work in the same sector (ETUI-ETUC, 2016c).

It is claimed and recognised that trade unions need to develop new visions on the value of work and devise 'a new concept of work' (ETUI-ETUC, 2016c). To promote labour protection in the collaborative economy, the first thing that is needed is a strong advocacy to have jobs in this sector fully recognised as work. This is an essential step to counter the strong risk of commodification that these practices entail.

It seems clear that trade unions are confronted to assume new ways of national and arguably transnational organisation and it recalls the idea of 'network trade unionism' facing the cross-border platform capitalism (Degryse, 2017). Many national mainstream trade union confederations have so far failed to organise workers in these new types of work organisation. A predominantly young and migrant workforce, non-standard employment models, and largely absent channels for representation and collective bargaining have challenged their traditional organising strategies (Jacobin, 2017). If trade unions are not able to reinvent themselves and address the technological change in the world of work, 'it is more likely we're witnessing a painfully slow adjustment, one that will - eventually - give rise to new forms of post-industrial organisation that will usurp the old' (Kelly, 2017).

ICTs open up new opportunities for collective labour rights but they also are a source of emerging threats. On the one hand, ICTs can develop a role in the renewal of collective activism exceeding increasingly more flexible and dispersed production structures. Beyond corporations, social networks open new collaborative spaces to trade unions and other organisations - NGOs, consumers' organisations – enabling potential coordinated actions, transmitting information about the conflict, labour claims and calling for demonstrations, as a complement or instead of going on strike (Colàs Neila, 2013).

In the private sector, the Swedish union Unionen proposes to follow the Nordic social partner model tradition based on a two-sided self-regulation, instead of the establishment of unilateral self-regulation by the own platforms' owners. They propose to create a platform institution, owned by the relevant trade unions and platform firms who have signed collective agreements, tasked to create digital standards and guidelines for firms aimed at lowering the transaction costs for platform firms to comply with existing regulations, that is legislation, ordinances and collective agreements in the relevant market.

Trade union initiatives to organise workers in digital platforms

Some initiatives are taking shape in the form of new trade union models, both on- and offline, and alliances between workers with different statuses (Degryse, 2016). In the US, there is also a rapidly expanding Freelancers' Union offering services and support to the self-employed and - for campaigns at specific workplaces - platforms such as Coworker.org (Kelly, 2017).

Some authors are in favour of more 'platform cooperatives' run by workers who collaborate together, rather than competing with each other. For example, Pazaitis et al (2017) explore the potential of cooperative platforms, controlled by workers, to allow workers to organise their productive efforts so that they are able to have sustainable livelihoods. The key is getting cooperatives and unions together. Young people are a target in order to join and become part of the action: trade unions have to organise the youth who must know they cannot organise with the click of an app (ETUI-ETUC, 2016c).

In a global context, digital platforms represent a tangible benefit for an important number of workers who are now able to participate and to be incorporated into online global work. Drawing on a multi-year study with platform workers in Sub-Saharan Africa and South-east Asia (Graham, Lehdonvirta, et al, 2017), evidence suggests that there are also a range of risks and costs that unduly affect the livelihoods of digital workers. Four key concerns for workers are highlighted: bargaining power, economic inclusion, intermediated value chains, and upgrading. Building on those concerns, the authors conclude with a reflection on four broad strategies – certification schemes, organising digital workers, regulatory strategies and democratic control of online labour platforms – that could be employed to improve conditions for digital workers.

Another line of collective initiative is represented by the German union IG Metall by creating FairCrowdWork[44] Watch, an internet site enabling crowd workers to evaluate, in terms of working conditions and pay, the clients that use their services, to exchange views and experiences with one another. The exchange of critical information could be seen as the first step towards the development of collective action, as it happens with Turkopticon[45], a website enabling the crowd workers of Amazon Mechanical Turk to become organised. This site allows workers to learn from the assessments of the client ('requester') left by preceding workers, alerting them on those who do not pay (Degryse, 2017). Some authors have assessed initiatives like SMart and FairCrowdWork as 'soft union' initiatives which do not function exactly like unions, but rather as some sort of intermediaries between platform workers and unions (Kilhoffer et al, 2017).

A more classical approach has been adopted in Austria where the Foodora platform in Vienna has set up its first works council with riders[46]. The services union Vida supported the negotiation process, estimating the number of Foodora Riders at 300 with two-thirds being freelancers and one third on permanent employment contracts. This initiative should be the basis for negotiating a sector collective agreement, as Vida assesses that the platform owners would be interested in providing the sector with a set of rules to restrict unbridled competition (Planet Labor, 2017). In Germany, the NGG union in Cologne has started contacting Foodora riders - employing 2,500 - whilst in Berlin the small FAU-IAA, essentially an anarchist group, launched the #deliverunion campaign, with Deliveroo employing 1,000 riders.

Furthermore, a new union in France, UNSA SCP-VTC, was set up in October 2015 with the specific aim of covering drivers not affiliated with taxi companies, in particular Uber drivers (European Commission, 2016a). Another example cited is SMart in Belgium, a labour mutual which deals with 75,000 workers, offering them workspace and legal and financial support (ETUI-ETUC, 2016c).

The digitalisation of service work and how social partners define this phenomenon and their recent responses to digitalisation has been analysed in Denmark, Sweden and Germany, and particularly the social partner initiatives at the unilateral, tripartite and bipartite arena in various forms of neo-corporatist labour market regulation (Ilsøe, 2017). Union representatives and representatives from employers´ organisations in private services in the three countries agreed that digitalisation accelerates automation of work and creates work without jobs via

[44] http://www.faircrowdwork.org/

[45] https://turkopticon.info/

[46] Planet Labor. Article number 10268 of 22 June 2017 and Fair Crowd Work.org retrieved http://faircrowd.work/2017/04/28/deutsch-oesterreich-foodora-fahrer-gruenden-betriebsrat/

digital platforms. Nevertheless, they disagreed on the consequences of these processes: unions stressed that it is a labour market policy issue and fear job loss and a precarisation of wages and working conditions, whilst the representatives from the employers' organisations in the three countries mainly considered the consequences of digitalisation as a business policy issue and feared that excess regulation would lead to fewer jobs and less economic activity.

A new approach to social dialogue in digital platforms?

As an innovation in the sector, IG Metall supported the drafting of the first code of conduct set up in 2017 by a German federation of crowdsourcing companies. The code contains 10 principles aimed at clarifying the relationship and the mutual obligations between the platform that offers employment and the crowd workers. As of 2017, eight companies including a UK company have adhered to the code on a voluntary basis (Planet Labor, 2017).

Even though Kilhoffer et al (2017) did not find evidence indicating that platforms are organising into employers' associations or being incorporated into existing employers' associations, in Poland Uber has joined the employers' organisation Pracodawcy RP. In France, the employers' organisation MEDEF has asked the government to promote new forms of digital companies, arguing that 'it would be a mistake to force platforms to enter in an old social model that has to be reformed' (European Commission. (2016b). Legislation recently introduced (Decree 2017-774), coming into force in 2018, sets a revenue threshold above which platforms must cover workplace accident contributions. Furthermore, if the worker uses numerous platforms, the amount paid will be determined on a pro rata basis (Planet Labor, 2017).

Industrial action and disputes

Some trade unions have been more active taking legal action against digital platforms. It is the case of the GMB trade union in the UK with Uber or a new union, the Independent Workers' Union of Great Britain (IWGB), against four courier companies: Excel, City Sprint, eCourier and Addison Lee (Kelly, 2017).

In Italy**,** couriers working for Foodora in Turin mobilised against the German food delivery company. The protest received wide news coverage. Foodora riders planned their actions to raise awareness and attract public support. By inviting customers and restaurants to boycott the platform in solidarity using their own app to deliver messages, the striking workers have brought the tacit role of consumers to light (Maccarrone and Tassinari, 2017). The case shows that collective action is possible even with a fragmented workforce, although the fact that workers are physically present in the same urban space is vital in understanding this. While the absence of traditional trade unions made it difficult to sustain the mobilisation, this also poses a challenge to unions in the sense of how they should adapt their frame of reference and organisational models to the collaborative economy workforce, in tune with the closing of legal loopholes (Drahokoupil and Jepsen, 2017).

Conclusions

Maselli's study on the slow increase of workers involved in platform work points towards a structural change in the labour force while other studies such as Eichhorst's counteract by saying that the share of standard employment has been steady since 2000. Despite the uncertainty in data, with no official tools capturing platform work, there is a strong interest in the phenomenon, probably not only the share of workers employed in platforms, but also the fact that this new organisation of work supported by technology could have such a big disrupting impact on economies, on workers' lives and on consumers, is behind the fact that so many papers have been published about the topic.

It would also be interesting to look at the gender distribution of crowd workers, as of 2017, there are no reliable estimates. There is a research gap in these regard since, possibly, platforms' assignments could be convenient for certain cohorts of people more than others,

for example mothers of young children who are staying at home but would like to maintain some sort of income or, again as an hypothesis, to students who want to earn some money while studying (for example, working for deliveroo or Foodora).

Irrespective of whether the platform economy becomes a new standard way of working or stays on the fringe, it is important to define its contours and distinguish among the 'true sharing' and the commercial exploitation of the 'sharing' concept.

Governments and trade unions should be aware that for those who embark in full–time jobs on platforms, there is an imbalance of power given by the fact that the platforms control data access, can strongly influence workers' autonomy and their time management and, in some cases, it can lead to workers not being paid. This imbalance of power also triggers the question of workers' representation in a context where the workforce is fluid by definition. In addition to the shift on the organisation of work there is also a geographical shift. For those platform 'jobs' which do not require a physical presence the competing area is online, therefore at world level: workers from rich countries compete with workers from poor countries for the same type of job (Baldwin, 2016; Graham, Hjorth, et al, 2017). Remuneration also becomes a discriminant since a certain job might be well remunerated for workers residing in certain countries while it might be considered badly paid in others.

From the point of view of employers, the fragmentation of tasks into smaller and simpler tasks and the use of platforms could lead to a cheaper organisation of work, especially work which is required on demand; however, one of the challenges faced by platforms is the supply of a continuous stream of available labour and how to incentivise availability.

From the point of view of social policy more transparency in taxation and employment status would help governments to better programme their interventions. Surveys conducted so far are frequently based on one particular platform or on one particular country. A European overview would contribute to a better understanding of the phenomenon across EU Member States.

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