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The impact of digitalisation on job quality in the electricity, hospital and public administrations sectors in eight EU countries

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DIGIQU@LPUB – Deliverable D3.2
Final Report

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SECTION 1. INTRODUCTION

The DIGIQU@LPUB project aimed to assess the impact of digitalisation on job quality in European public services, from a twofold perspective: workers' own perceptions of the impact of changes in their daily jobs but also trade unions' perceptions and practices in the social dialogue. The project was led by the European Social Observatory (OSE), ran from November 2021 to September 2023 and involved eleven European partners. A detailed presentation of the project, partners and outcomes is available on the website of the project[1].

This cross-cutting deliverable contains a review of the changes affecting the nature, content and implementation processes of jobs of public service workers, as well as the outcomes for the workers themselves. Digitalisation of work impacts the whole range of public service occupations, but to differing extents and in different ways. Another deliverable of DIGIQU@LPUB, which should be considered together with this, provides a cross-cutting overview of how the challenges and opportunities for job quality generated by digitalisation in public services are encompassed and addressed in the dynamics and practices of social dialogue at national and sectoral levels in selected EU Member States (Leonardi 2023)). The project covers eight countries (Denmark, Finland, France, Germany, Hungary, Italy, Poland and Spain) and considers workers' occupations in three public services/sectors[2]: electricity production and supply, public administrations (national, regional and local levels) and hospitals.

Examining the impact of digitalisation on job quality, the research questions included the following:

- What forms does digitalisation of work take?
- How has digitalisation changed the nature, content and implementation processes of the tasks involved in the jobs of public servants?
- What are the outcomes of these changes for the public service workers themselves?
- What are the challenges and opportunities brought about by the digitalisation of work in public services?
- Has the digitalisation of work in public services affected the quality of the public services provided to users?

A specific and original feature of DIGIQU@LPUB is the emphasis placed on the experience of workers themselves in assessing the changes that digitalisation has triggered in their daily work tasks and experience. The methodology of the project combined two complementary approaches. Firstly, a top-down perspective involved desktop research reviewing the academic literature and institutional

[1] http://www.digiqualpub.eu

[2] For the sake of readability, we will refer to the broad concept of 'sector' in this deliverable. However, it should be noted that, apart from public administrations, these are not sectors in the proper sense. As regards the production and distribution of electricity as well as hospitals and health, it should be borne in mind that the project considers the public providers of these services, which, depending on the country, are subject to varying degrees of co-provision with private sector operators.

documents related to the impact of digitalisation on job quality and occupational tasks. Secondly, a bottom-up approach was taken, to enrich the exploratory research with assessments by trade union representatives and workers themselves of the tangible outcomes of digitalisation for workers' jobs, and the challenges and practices adopted by trade unions to deal with the consequences of digitalisation. For this purpose, the eight country teams conducted semi-structured interviews with key resource persons in order to emphasize the role of the trade unions and social dialogue in the process of digital transformation of work. Beyond that, each country team organised focus groups with workers from each public sector, in order to optimally grasp workers' perceptions of the impact of digitalisation on their task and job content, and to highlight the opportunities and threats for workers brought about by these new changes. These focus groups made it possible to consult in a structured way a broader base of workers/unionists in the sectors and to compare their experiences of the changes resulting from digitalisation in the content of their daily work. In addition, workers' voices were enhanced by the organisation of an online survey among workers in the three public sectors/services in the eight Member States covered by the study (see Box 1). The web survey provided more quantitative information to the research strands of the project, both to the national case studies and the cross-country analysis.

Based on the eight national country reports, this cross-country analysis aims to highlight convergence and national specificities within the different public sectors/services covered, with regard to the changes brought about by digitalisation to the various dimensions of job quality and the related outcomes for workers.

This deliverable is structured as follows: after a short introduction (Section 1), the second section describes the context of this consideration of the quality of employment and digitalisation in public services. It discusses the EU's digitalisation strategy in general and Europe's digital performance, and more specifically the implementation of digitalisation in public services. Section 3 then looks at the dynamics and patterns of digitalisation in the eight countries, as well as the incidence and purposes of the digital tools. After a short literature review on changes resulting from digitalisation for public service workers (Section 4.1), Section 4.2 provides a detailed analysis of the impacts of digitalisation on job quality in the public sectors. In Section 5, we briefly review the various preventive actions implemented in the three public sectors under scrutiny, aimed at preventing and managing the potential harmful effects of the digitalisation of work. Conclusions are presented in Section 6.

Box 1: The DIGIQU@LPUB web survey

The DIGIQU@LPUB web survey (DGQS) was conducted as a part of the primary data collection for the project, alongside a literature review and semi-structured interviews with key trade unionists, as well as dedicated sectoral focus groups of workers in the eight countries scrutinised in the research. The questionnaire consisted of 37 closed-ended questions and one open-ended question. The questions were divided into several categories, which cover the following topics: individual and job characteristics, incidence and use of digital tools, impact of digitalisation on various job quality dimensions, outcomes for public service workers, workplace practices and workers' rights.

The survey was launched in mid-April 2022 and closed in mid-September 2022. **A total of 5,267 workers from the three public services responded to the survey**: 1,217 from the electricity sector, 2,676 from the public administrations sector and 1,704 from the hospital sector[3].

The survey was distributed by the project partners in each of the respective countries, helped by the co-applicant with the OSE in this project – the European Federation of Public Service Unions (EPSU). The EPSU affiliates in the various public services of the eight countries concerned distributed the link to the survey through their own channels, enabling completion of the questionnaire among their national members. The survey was mainly distributed via targeted emailing of trade unions in the respective countries, with a short introduction, a web link to the DIGIQU@LPUB project and an anonymous link to the survey. Because of this means of collecting the information, the survey sample is what is known as a 'convenience sample'. As such, it is not intended to be representative of the population as a whole in the countries and sectors considered, but only of the population answering the survey. Caution should therefore be exercised when interpreting the results in general terms. The table below shows the distribution of the number of respondents for the whole DGQS survey, and between the three public sectors investigated. The use of italics for the number of respondents from specific countries/sectors indicates weak data sub-samples for which the results should be interpreted with care, given the low numbers of respondents.

	DK	**FI**	**FR**	**GE**	**PL**	**SP**	**HU**	**IT**	**Total**
Electricity	***3***	111	167	***26***	***32***	323	***92***	463	1217
Public administrations	***49***	1251	***91***	***43***	447	399	146	250	2676
Hospitals	133	809	380	***52***	***47***	79	***48***	156	1704
All sectors	185	2171	638	121	526	801	286	869	5597

The detailed results of the DGQS considered in this deliverable are available in a separate statistical annex attached to this deliverable (Deliverable D3.2). The first table of this annex presents the detailed individual and job characteristics of the respondents to the survey, by countries and sectors.

[3] It should be noted that the survey sample used in this cross-sectional report is slightly different from that used to compile the survey results in the national reports. A total of 7,621 responses were received. Respondents who gave incomplete answers to certain questions (country, sector of occupation) were treated as missing values and excluded from the calculations for this report.

SECTION 2. SETTING THE SCENE

2.1 EU strategy on digitalisation

Job quality is a cross-cutting concern which has been raised repeatedly by the European Union (EU) since 2003 in the context of the Lisbon Strategy and the European Employment Strategy (EES), aimed at promoting not only more but also better jobs. This cross-cutting objective, although with varying emphases and degrees of success, has persisted over time in the EU meta-strategies which have followed on from the Lisbon Strategy, since 2010.

In its EU 2020 plans, the European Commission identifies digitalisation as an explicit driver of growth for the European economy. Alongside the EU 2020 strategy, it has made digital services to the public one of the priorities of the European Digital Agenda, focusing on a European Digital Single Market (Kirov 2017). The main directions of European policy are set out in the European eGovernment Action Plan 2016-2020 (European Commission 2016). In this action plan we find four objectives to be achieved: empowering the citizen, facilitating the mobility of citizens in the European single market, increasing the effectiveness and efficiency of public services and reducing public administration (Lethbridge, 2015). These objectives are to be achieved in four services, grouped according to function: registration (e.g. birth, business, moving), services that generate public revenue (e.g. taxes), authorisations and licences (e.g. driving licence, passport, building permit) and so-called 'service returns' (e.g. healthcare, education, police) (Kirov 2017). In relation to these objectives, digital technologies should be used to make e-services standard, to automate services, to cross departmental and organisational boundaries, to create as many do-it-yourself services as possible and to increase the transparency of public services (European Commission 2016). The von der Leyen European Commission (EC) has included the 'shaping of Europe's digital future' among its key priorities for the period 2019–2024. Alongside measures linked to the smooth functioning of the single market (such as connectivity and networks, data protection, fluidity of businesses and innovation), new initiatives such as the Digital Action Plan and the reinforced Skills Agenda are being introduced to boost digital literacy and skills throughout society (European Commission 2020b). The consequences of the digital transition for the future of work are emphasised as a key underlying element of EU social and economic policies and European and national social dialogue (European Commission 2020a).

Digitalisation of work concerns all the dimensions of job quality, and the European social partners are gradually introducing the need to address the challenges and opportunities raised by the digital transformation of work into their ongoing social dialogue. This is illustrated by the signing of a framework agreement on digitalisation by the EU cross-sector social partners (EU Social Partners 2020) and the Framework of Actions adopted by the European social partners in the electricity sector (EPSU 2020). Similar developments can be seen at the national level and in a variety of occupational sectors.

The Recovery and Resilience Facility[4] (RRF) is the core element of the EU's largest and most innovative financing instrument, Next Generation EU (European Commission 2022a), created to help the EU's economies and societies recover from the global pandemic. The facility is structured around six pillars[5] representing policy areas of European relevance, identified by the RRF Regulation as vital for strengthening the EU's resilience. The pillars define investment priorities and the scope of application of financing under the RRF. To use RRF resources, Member States have to prepare national recovery and resilience plans (NRRPs) which include a coherent package of investments and reforms. ember States are required to allocate at least 20 % of the RRF funds they are due to receive to digital investments and reforms contributing to the digital transition or to addressing the challenges resulting from it.

2.2 Europe's digital performance: the DESI Index

The Digital Economy and Society Index (DESI) is the instrument by which the European Commission has annually monitored the digital competitiveness of the Member States since 2014. The thematic chapters present an analysis at European level of broadband connectivity, digital skills, integration of digital technology and digital public services. Figure 1 below shows the 2022 DESI ranking of Member States. Finland and Denmark are among the countries which have the most advanced digital economies in the EU, followed by Spain, ranking 7th of 27 EU Member States. France and Germany rank 12th and 13th, scoring above the EU average, while Italy, ranking 18th, scores below the EU average. Hungary and Poland are among the countries with the lowest DESI scores, ranking 22nd and 24th respectively.

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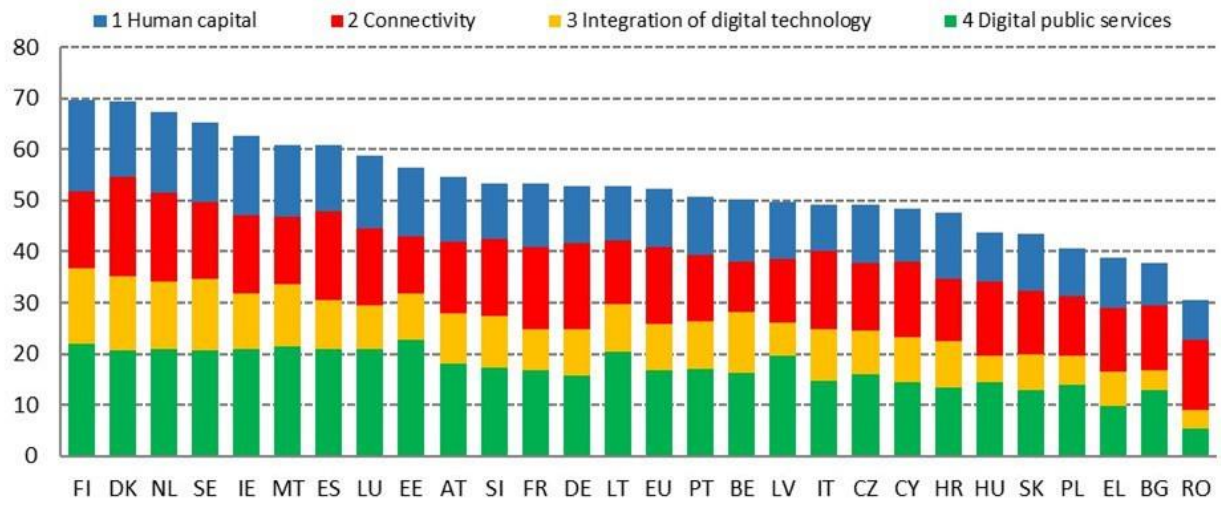
4 Regulation (EU) 2021/241 of the European Parliament and of the Council of 12 February 2021 establishing the Recovery and Resilience Facility, OJ L 57, 18.2.2021, p. 17–75.

5 1) Green transition; 2) digital transformation; 3) economic cohesion, productivity and competitiveness; 4) social and territorial cohesion; 5) health, economic, social and institutional resilience; 6) policies for the next generation.

Figure 1: Digital Economy and Society Index, 2022



Source: European Commission 2022b.

In recent years, the evolution of the DESI Index results shows that while most of the Member States are making progress in their digital transformation, adoption by businesses of key digital technologies, such as artificial intelligence and big data, remains low, even among the EU frontrunners. Insufficient levels of digital skills hamper the prospects for future growth, deepen the digital divide and increase risks of digital exclusion as more and more services, including essential ones, are shifted online. Finland and Denmark (along with the Netherlands and Sweden) continue to be the EU frontrunners. The other Member States are moving forward and there is an overall upward convergence trend in the EU. The EU as a whole continues to improve its level of digitalisation, and, in particular, those Member States that started from lower levels are gradually catching up, by growing at a faster rate. Amongst the Member States that lagged behind, Italy and Poland have improved their DESI scores substantially over the past five years and implemented sustained investments, with a reinforced political focus on digital technology, supported by European funding (European Commission 2022b).

More specifically, DESI monitors *online public services*, by scoring Member States on whether or not it is possible to complete each step of key services fully online. The Digital public services dimension[6] describes the demand and supply of e-government as well as open data policies. The Digital public services for citizens and businesses indicators assess targets of the Digital Decade Compass. Among the countries under scrutiny, Finland, Spain and Denmark score above the EU average for all indicators, ranking 2nd, 5th and 8th respectively among EU countries, while Hungary and Poland have the lowest scores, ranking respectively 21st and 22nd. France ranks 15th in the EU on digital public

6 The indicators include e-government users; pre-filled forms; digital public services for citizens; public digital services for companies; open data.

services, slightly above the EU average, while Germany (18th) and Italy (19th) underperform in this area (European Commission 2022c).

2.3 Digital transition, job quality and public services in the EU

'Digitalisation' encompasses several diverse and sometimes disruptive technological developments that are permanently changing the work and life of individuals. These developments make up the so-called Fourth Industrial Revolution and have generated a lively debate on the challenges and opportunities they bring (Schwab 2016).

Digitalisation is a catch-all term referring to different concepts, processes and components. In the world of work, the development of an increased interdependence between real and virtual modes has accelerated in recent years through a growing synergy between several physical and/or digital technological developments[7], producers and consumers of goods and services (Larsson and Teigland 2020; Valenduc 2018). For public services, digitalisation refers to the consequences of the interaction between digital technology, service providers and service users (Voss and Rego 2019; Kirov 2017).

The digitalisation of public services is not a recent phenomenon. In the 1990s, digitalisation was mainly focused on digitising and managing (classifying, centralising, archiving and sharing) the mass of analogue (paper) information generated by the operation of public services. Digitalisation thus contributed to the improvement of administrative supervision, which would enhance the operational performance of public services and optimise, or at least keep track of, the costs of running these services (Liu and Yuan 2015). The new millennium has accelerated the digitalisation of public services, with a greater emphasis on external services to citizens and businesses (e-government). The shortening of deadlines, the increase in transparency and the improvement of information exchange between departments and services should lead to a more efficient and effective provision of public services. The quality of public services is expected to be improved by digitalisation, which should facilitate a personalised, user-friendly and fully digital public service (Vereycken et al. 2020).

In recent decades, and particularly since the more recent economic crisis-related austerity policies, public services in EU countries have been under constant and often contradictory pressure: they have been asked to modernise, in order to increase their efficiency, while significantly reducing their expenditure and staffing levels. The job quality of public sector workers has deteriorated across Europe (Keune et al. 2020). The quality of public services in themselves is being questioned. Digitalisation added another layer to this situation by significantly changing the ways in which public services are organised, mediated and provided to citizens. The COVID-19 crisis exacerbated the

[7] Internet, smartphones, robotics, 3D technology, GPS, drones, artificial intelligence (AI) applications, data collection and storage techniques (Cloud, Blockchains), data processing applications and processes (Big Data, Predictive Analytics) and machine learning.

pressure on public services. Public service workers were indeed at the forefront of the response to the COVID-19 crisis, in that they contributed to the smooth and uninterrupted operation of core essential services while risking their own personal safety and well-being. This is obviously the case for public health workers, but also for other workers in public services essential to the functioning of our societies, who were teleworking or continuing with their daily tasks at their workplace. With the outbreak of the COVID-19 pandemic, digital tools gained a prominent place in the daily life of European citizens and workers. The pandemic crisis has also highlighted and promoted the crucial role of digitalisation in the functioning of European societies and labour markets and their workers, including public service workers.

SECTION 3. DYNAMICS, PATTERNS AND INCIDENCE OF DIGITALISATION IN THE PUBLIC SECTORS

3.1 Dynamics and patterns of digitalisation in the public sectors

As shown in the eight case studies, if the digitalisation of the three sectors is a proven fact in all the countries considered, the digitalisation process began at different times and at different paces both in the countries and in the sectors depending on the national context.

Digitalisation takes many forms, some of these forms being common to the three sectors. In the hospital and health sector, these forms include electronic health records, watches or sensors for real-time monitoring of health parameters, robots that operate on patients (e-surgery), health services offered via digital platforms or interactive websites for the training and retraining of medical staff. Digitalisation in public administrations includes the digital management of documentation and workflow; the use of communication tools, the set-up of platforms for collaboration, telework, videoconferencing tools, 'chat' tools for officials and users, online training, corporate software, digital time and attendance systems. In the electricity sector, digitalisation takes different forms such as workflow management on mobile devices, Linky meters to measure electricity consumption on customers' premises, email and instant messaging applications, online discussion tools, drones and smart glasses for maintenance activities, specific applications for smartphones, and teleworking.

The following sections describe the dynamics and patterns of digitalisation in the public sectors in the eight countries in more details.

3.1.1 Electricity production and supply sector

3.1.1.1 Development of digitalisation

In **Spain**, digitalisation has taken place gradually, with some acceleration in the last decade. In parallel to the acquisition of ENDESA by ENEL, digital implementation was accelerated together with changes in the business strategy. The company has introduced various digitalised systems, to ensure interoperability and integration of the different areas: production, distribution and marketing. Digitalisation has impacted customer management, contracting, billing, control of networks and plants, data collection and remote repair of digitalised electricity meters by means of telematic mechanisms, as well as implementation of a teleworking system (Martínez Poza and Cruces Aguilera 2023).

The electricity sector faces numerous challenges in **France**. One of them is the climate emergency and the resulting energy transition. The integration of renewable energies into the electrical grid, to

tackle global warming, has disrupted the architecture of the system because most of these energies are intermittent and located all over the French territory. Thus, the increased number of electrical production points decentralises the electricity system. In addition, new uses are emerging as well as some important new market developments (electrification of the economy, e-mobility, smart cities, etc.). These features make it more complicated to manage the balance between electricity supply and demand. In response to this new complexity, to ensure a balance between production and consumption, but also to modernise the network (optimise the allocation of electricity and improve the efficiency of steering), electrical networks are becoming 'intelligent'. 'Smart grids' are being developed, Linky meters, artificial intelligence (AI), robotics, drones, are being implemented. Energy is becoming '4.0' (du Castel 2018, cited by Fleury et al 2023). The implementation of Linky meters has greatly accelerated the digitalisation of the sector thanks to the real-time digital data they provide. According to interviewees (INT6 and INT10), technicians at ENEDIS have experienced the rising importance of digitalisation and especially of data for several years now. They both describe how 'digital work orders', in line with the increasingly data-driven digitalisation of the sector, have become an increasingly important part of technicians' daily lives (Fleury et al. 2023).

In **Germany**, Flögel and Beckamp (2020, cited by Öz and Hamburg 2023) identify two stages in the past development of digitalisation. The first stage of digital transformation involved increasing and extensive use of digital technologies and solutions in the sector. In the 1970s, power utilities were digital pioneers, using IT to facilitate management and operation of the grid control, e.g., for process data compressing, compensation of measurement errors as well as voltage loss optimisation. Furthermore, power plant control and communication with the energy markets were digitalised. The second stage of digital transition has been the rise of digital and technology-enabled business model innovation and is associated with new competitors (start-ups, tech companies) in the energy sector. The main features of the second digital transformation can be summarised as follows: increasing importance of data; algorithmic solutions for grid control and especially energy trading, developed as a highly digitalised part of the energy sector; market entrances by external players (originating in other fields, especially the ICT sector) and new energy start-ups as 'energy techs'; various companies and start-ups are capitalising on the potential brought by digital technologies to offer energy related services; aggregators, operating virtual power plants, have arisen in the last decade and operate various markets, such as energy exchanges and ancillary service markets; development of cooperative, service-oriented provision as a reaction to the changing role of customers, with specific offers such as contracting models; more recently the introduction of smart meters, a technology allowing real-time metering of decentralised energy consumption. The two stages are not sequential in the digitalisation process. The first digital transformation of the energy sector is not yet completed, as especially the lower tier grids operate in a fairly analogue way (Öz and Hamburg 2023).

In Italy, digitalisation in the electricity sector has to date aimed at improving energy efficiency, productivity and the sustainability of the system. However, while the implementation of digital processes in the Italian electricity sector has been widely publicised by companies, actual implementation stalled prior to the COVID-19 pandemic. The pandemic led to a fast and in-depth transformation process towards more widespread digitalisation. The most important technological developments in the sector are the so called 'Smart Grid', big data analytics, blockchain technologies to guarantee traceability along the value chain and IoT instruments for automated maintenance of networks. Big data analytics allow so-called 'predictive maintenance', as the analyses of previous interruptions in supply allow firms to foresee and locate possible new malfunctions (Freddi et al. 2023).

Refslund and Borello (2023) underline two major aspects of digitalisation in the electricity sector in **Denmark**. First, while much of the work in the electricity production and distribution services remains mainly manual (e.g. maintenance, installation), there has been an increase in the use of digital tools over the last decade for administering workflow on laptops, tablets, and mobile phones (including apps). Second, the electricity sector has been chosen as a priority area for implementing AI to optimise energy consumption and reduce carbon footprint and improving energy and environmental technologies, due to the sector's already strong digital infrastructure.

In **Finland**, electricity production dates back to the 1870s and developed strongly throughout the country after the Second World War. Activities were initially focused on the production of electricity, the construction and maintenance of the electricity network, and the transmission of electricity to customers. The equipment, tools, and work processes were mechanical. Gradually, the whole process has become more complex and digitalised, with significant consequences for the workers in the sector in terms of skills. Whereas previously the supply of electricity was from the company to the customer, digitalisation now makes it possible to use 'virtual power plants' and to load additional electricity produced by the customer's solar panels onto the main grid or to sell excess electricity to other users. Kangas (2023) notes that these innovations have changed the job characteristics across the electricity sector and raised skill requirements[8].

In Hungary, although digitalisation started about 15 years ago in the energy sector, this process has accelerated only in the last few years to manage the flow of information, data collection and analysis (Dura et al 2023). In Poland, the electricity sector is one of the most digitalised sectors in the country. Digitalisation processes had already started in the early 1990s and developed in line with technological advances in the area (Owczarek and Pankow 2023).

[8] One example is the expansion of IoT into property maintenance technology (prop-tech), i.e. technology that provides applications and information systems to property markets to manage and control various functions, including heating and electricity consumption. Such developments require new IoT skills (Kangas 2023).

3.1.1.2 Patterns of digitalisation

Across the countries under scrutiny, interviewees and focus group participants reported a multitude of digital tools, applications and programmes used by workers in their daily tasks in the electricity sector. Here are some selected examples:

- In **Spain,** new technologies have been fully implemented in the company in various areas related to the organisation of work, control of the working day and workplace management. The workforce has corporate mobile phones, most have laptops, and some have tablets. All staff use a unified management system and have a clocking application. They all make use of work software. In addition, there are specific software programs for each department or area. The staff have mobile applications that allow them to clock in, reserve their workplace in the office, receive alerts, messaging or GPS navigation to go to clients or check and manage the electricity network (Spain - INT10 and 12). Teleworking is a widespread practice (Martínez Poza and Cruces Aguilera 2023).
- Over the past five years, the digitalisation of the **French** electricity distribution sector has resulted in increased use of smartphones, computers and tablets: technicians receive digital work orders on their tablets on a daily basis and also use their tablets to remotely program a Linky meter. The most common applications and information systems include email applications, instant messaging applications (e.g Teams, Skype), online discussion tools (e.g. WhatsApp or Telegram) and organisational software (e.g. Outlook calendar). Some applications allow for scheduled/predictive maintenance at EDF: software available on the tablets of some project managers sends annual signals to launch major maintenance cycles. In addition to these standard applications common to all, there are many 'business applications' specific to each job or task: technicians use several applications during the day on their tablet to enter feedback data and consult documentation (Frace - INT6). Reception desk and call centre staff, since 2021, have been working with computer-integrated telephone applications such as interactive voice servers and telephone dispatchers. ENEDIS reception desk staff use workflow management software such as KIAMO and INJIXO. These tools (workflow management) calculate and anticipate the activity over the day and adjust the workforce according to the activity. Another example is *the use of virtual reality headsets during training* at EDF (France - INT9). Artificial intelligence (AI) and robotics are beginning to be used in several professions in the electricity distribution sector to distribute work demands (France - INT6 and INT10) and in the human resources (HR) department (EDF), where robotisation has replaced low value-added activities (checking pay slips on tables) (France - INT7). There is also a trend towards *digitisation of administrative files and automation of HR procedures*: employees who have a question about their administrative rights now have to make electronic requests on a portal (France - INT10, FG1). Both the electricity generation and distribution sectors have opened up to the practice of teleworking (Fleury et al. 2023).

- The most significant changes brought about by digitalisation and having an impact on work in **Italy** include electronic meters to measure electricity consumption on customers' premises, workforce management programs adopted in some of the largest companies in the sector, the use of drones and smart glasses for maintenance activities, specific applications for smartphones and the widespread use of teleworking. Workers in the field resolving network problems work with handheld computers to track all interventions on the network and analyse the work done. Smartphone use is also widespread among field workers. Workers are required to use some applications especially when working 'in the field'. These applications allow them to print documents (using a portable printer), remotely access relevant files and monitor their work. The applications are also used to guide workers who are repairing a fault in the electrical system (Freddi et al. 2023).
- In **Denmark**, the use of digital tools has increased over the last decade to manage workflow on laptops, tablets and mobile phones (Denmark - INT6; FG2). Other new technologies include app-based automatic task cards (e.g. maintenance of local power boxes), but also developments in power plants and reactors and the use of QR-codes for tasks. Some companies also use GPS tracking systems and laser printing at local level (Denmark - INT10; FG2). At a more experimental level, the introduction of virtual reality as a tool for on-site problem solving has been reported during the focus group: a support technician could remotely help the worker to resolve problems on site (Denmark - FG2). However, this is still in a trial phase (Refslund and Borello 2023).
- In **Poland**, electricians maintaining the electricity network use tablets connected to the network management system to receive orders, instructions and report on repairs. This allows them to work and invoice entirely remotely, without having to go to the office. Within Tauron, an intelligent network solution (AMI program) has been developed in recent years to enable fully digital communication with customers and remote management of electricians working on the network. General (non-sector specific) digital tools are also applied in companies, i.e. content management systems (CMS) or SAP software systems supporting human resources and management (covering leave, business travel, vehicle fleet management, etc.). The interviews show that all or almost all human resources (HR) issues are handled by digital software. Office workers also use advanced IT solutions (e.g. Office 365, including MS Teams, Onedrive, Sharepoint) (Owczarek and Pankow 2023).
- In **Hungary**, almost all websites, including those of energy companies, use a chatbot to help customers navigate the site and answer their questions (Hungary - INT7). The mobile application of energy sales companies makes it easy to record meter readings (even by taking a photo), view historical consumption data, view bills and pay the balance online, making it easy to keep track of all important service-related information (Hungary - INT3). Information and communication tools are used by almost everyone. During the group discussion, a new approach emerged: 'Due to the energy crisis and its consequences, information is changing

day by day. Digital tools are essential to follow it. Nowadays, it is expected that there is a smartphone at work' (Dura et al. 2023).

3.1.2 Public administrations sector

3.1.2.1 Development of digitalisation

Public administrations embarked on simplifying procedures and processes mostly in the early 2000s. Based on the doctrine of New Public Management, which has greatly transformed the management methods of administrations over the past decades, these initiatives have benefited from major technological changes in the field of information technology, supported by the rise and continuous development of the Internet and the development of methods for managing and exploiting computerised data. Management activities are now based on quantitative and algorithmic models that enable increasing automation of many administrative tasks. This has led to the emergence of a project for the digitalised management of public administrations, sometimes referred to as 'Administration 4.0' (Calay 2019).

Denmark and Finland, two countries with the most digitalised public services in Europe, started the process of digitalising their public administrations decades ago. In **Denmark**, the digitalisation of public administrations began in the 1980s with the aim of improving efficiency, reducing costs and alleviating labour shortages in the public sector. Numerous government strategies and initiatives have followed. While digitalisation has generally led to improvements, Refslund and Borello (2023) note that the road has been bumpy and has included some notoriously unsuccessful projects, some very costly for the state. This was the case with the digitalisation of the tax authorities, where a large national digital system for collecting tax debts was eventually scrapped. **Finland** started the digitalisation of the public administration decades ago by adopting a fully digitised census in the 1980s. In 2014, it introduced a national digital service architecture to improve cost efficiency and connectivity between public administrations. Kangas (2023) points out that the development of various ICT solutions and practices has played an important role in improving the accessibility of social services in particular. The services of Kela (in charge of social security) have been constantly developed and improved since 2006, when Kela started to share information digitally (also via Facebook, YouTube, Twitter, LinkedIn and Instagram). Today, Finland aims to develop a network of services based on artificial intelligence applications through the AuroraAI programme adopted in 2022, which is designed to ensure transparent access to services for citizens. The idea is to accelerate the transition of public administrations to the age of artificial intelligence in a safe and ethical way and to combat the digital marginalisation of low-income people (Ministry of Finance 2022; Kangas 2023).

France began the process of digital transformation of the public administration in the late 2000s, through various state reforms, with digital being only one element of a more global strategy. These reforms aimed to promote the digitalisation of public services and the transformation of the State's information system. Since 2016, *FranceConnect* has enabled the public to access various central and regional government services as well as other public services (taxes, municipalities, health insurance, etc.) via a single identifier. Today, almost three quarters of the relations between the French population and public institutions are now conducted digitally. A future 'digital backpack for civil servants' is being designed to provide public officials with simple means of working remotely, in particular through videoconferencing and instant messaging solutions. During the COVID-19 pandemic, specialised working groups of the Inter-ministerial Digital Directorate advised the State's IT services to encourage technical and organisational changes involving digitalisation in the ministries (Fleury et al 2023).

In **Germany**, the government has responded to the challenge of digitalisation since 2001 through action programmes including the 'BundOnline 2005' programme (2001), and the 'Digital Administration 2020' programme. In 2013, the Act on the Promotion of Electronic Administration obliged the authorities of the Federal Government to introduce the e-file by 2020. Since all three levels (federal, state (Länder) and local government) are affected by the challenge of digital transformation, an IT Planning Council was founded in 2010 to coordinate joint public sector digitalisation projects across federal levels and the modernization of public registers. To this end, it adopted a national e-government strategy in 2010 (Öz and Hamburg 2023).

In **Spain**, the public sector has undergone a significant transformation in recent years, incorporating a multitude of telematic services to citizens. One of the most striking examples is the digital transformation of the tax administration. At the same time, the use by companies and citizens of digital credentials and certificates to carry out procedures has gradually developed, although the process for accessing them is not yet simple. With the pandemic, the implementation of digital services progressed rapidly, and digital tools have increased exponentially (Martínez Poza and Cruces Aguilera 2023). In **Italy**, recent years have seen the introduction of significant changes in the public administration, including the launch of the e-government portal for businesses (2005) and an online knowledge management platform for public administration (2009), mandatory e-invoicing for all public bodies (2015) and the roll-out of the public digital identity system (2020). However, Freddi et al. (2023) point out that the degree of digitalisation varies considerably between agencies: while INPS (Istituto Nazionale Previdenza Sociale) and INAIL (Istituto Nazionale Infortuni al Lavoro (disability)) are at the forefront of digital transformation, with state-of-the-art digital tools implemented to improve workflow and processes as well as to facilitate citizens' access to services, other institutions (e.g. local courts, embassies and consulates) have made only limited use of even the most rudimentary digital tools.

In **Poland**, the digitalisation of public administration has been taking place at different rates since the second half of the 1990s, but the most advanced technologies have only been introduced in recent years. Currently, citizens have access to a wide range of online public services via government platforms and portals. Owczarek and Pankow (2023) note that the level of digitalisation of some agencies (such as the Social Security Institution, the Financial Supervision Authority and the State Fund for the Rehabilitation of Disabled Persons) is more advanced than that of the ministries. Similarly, digitalisation is less advanced in local government than in central government and government agencies, with small rural municipalities having only the most basic digital tools. Several factors have been put forward to explain this phenomenon: lack of financial resources, lack of skills both of managers to acquire digital tools and skills and of workers to use the new tools (INT7), and obsolescence of the management models applied in the public administration (FG4, FG5) (Owczarek and Pankow 2023).

For **Hungary**, Dura et al. (2023) attribute the ineffectiveness of the implementation of digitalisation projects in public administrations to the lack of a concrete plan for the implementation of strategies, the multitude of policy makers in charge of digitalisation issues, and the reorganisation of the public administration. Nevertheless, since January 2018, e-government has become mandatory for businesses and an option for citizens. All relevant public services are available online. As in Poland, digitalisation has developed unevenly at central and local levels. Important developments have taken place in recent years, with web-based programmes in central government offices (tax administration, statistics office) (INT18, 19). In local government, however, there have been very few similar developments (Dura et al. 2023). In both Poland[9] and Hungary[10], the digitalisation of the public administration is mainly supported by EU funds.

3.1.2.2 Patterns of digitalisation

Across the countries under scrutiny, interviewees and focus group participants reported a multitude of digital tools, applications and programs used by workers in their daily tasks in public administrations. Here are some selected examples:

- In **Spain**, the digital resources used include corporate software, digital time and attendance systems, basic ICT tools, virtual meetings, teleworking, laptops, smartphones available to workers. Digitalised machines and artificial intelligence tools are not yet used and the

9 The Integrated State Computerisation Programme (2019), the European Digital Development Funds 2021-2027 and the National Recovery and Resilience Plan for Poland are expected to accelerate the digitalisation process, including in small municipalities.

10 The Public Administration and Civil Service Development Programme (KÖFOP, 2013-2020) – in line with the EU2020 strategy – allocated more than €935 million to increase the efficiency of the Hungarian public administration, including the development of services provided by public authorities.

introduction of artificial intelligence is not seen as something imminent[11] (Spain - INT7, INT 11, FG3) (Martínez Poza and Cruces Aguilera 2023).

- In **Italy,** focus group participants discussed a range of tools and methods, which generally fall into three categories: digital management of documentation and workflow (e.g., Caliope, Pegasus); communication tools (email, cell phones, certified email 'PEC,') and platforms for collaboration and remote work (synchronous and asynchronous), e.g., Zoom, Citrix, Teams (Freddi et al 2023).
- In **France**, the focus group discussion shed light on the different forms of digitalisation of the public administration: online services (including administrative forms) and information to the public, interconnection between public services or departments, shared (intranet) platforms for the staff. Technologies/digital approaches seen in the public administration include emails, business applications, teleworking, videoconferencing tools, online training, remote connection (access), user-web side/agent-web side for administrative formalities, development of big data, digital spy devices, limited-access (for staff and users) 'social' networks, internal networks (for officials), 'chat' tools for officials and users, etc. (Fleury et al. 2023).
- In **Poland**, digital systems used in the central public administration include electronic document circulation systems; internal electronic mail used for HR matters and information for workers on leave and social benefits; the EIK system (electronic human resources information) that records basic information on employment in an electronic format (e.g. wages over time, leave register). Within the Financial Supervision Authority, advanced and diverse digital tools are also used, covering many areas of the institution's activities (Polan d - FG6): internal circulation of documents and internal communication on the Intranet, special HR programme for processing employee matters; contact with the entity under supervision is carried out via the net cloud system with the support of electronic checklist systems. Communication with external entities, as well as within staff teams, is carried out using licensed Zoom or Skype. In the State Fund for the Rehabilitation of Persons with Disabilities, internal digital systems include: an electronic document workflow, personnel programme (OCP system), system for reporting irregularities to the IT department (ZEN Desk), fully digitalised accounting (Owczarek and Pankow 2023).
- In **Hungary**, all relevant public services are available online and the most important ones have their own structured online forms, online applications or applets. All other services are available via the e-paper online form service. Both the outcomes of the FG and the interviews suggest that the use of mobile devices is strictly linked to the position of the employee (e.g. working in the field, middle manager and above) and that fewer workers use them than do

11 'Artificial intelligence will not be introduced unless there is a cultural change in which the digital transformation is conceived at a global level, (in the public administrations) which will not happen in the short term. The public administration, for various reasons, is very slow in taking up change processes and in organising work, unless the change is driven from Europe by the Next Generation funds beyond pilot experiences' (INT 7). Inspection selection, registration, database maintenance, identification of needs are fields where artificial intelligence could be introduced.

not use them. Focus group members unanimously attributed this to the financial difficulties of local authorities (Dura et al. 2023).

3.1.3 Hospital and health sector

3.1.3.1 Development of digitalisation

The digitalisation of the health care sector developed earlier in the Scandinavian countries than in the other six countries studied. In **Finland**, an individual and unique social security number for each Finn was introduced in 1962, making it possible to collect data on health, health care use, vaccinations and medication. Finland was the first country to digitise national health registers. The processing and analysis of the resulting rich data repositories offers enormous opportunities for a digital health revolution. By 2007, 100% of the population was covered by electronic patient records (Kangas 2023). In **Denmark**, the government started to digitise public services in the 1990s. Hospitals and public health care services have a long history of introducing new technologies, with some successes and failures (Refslund and Borello 2023). To take account of the increased digitalisation within the hospital sector, the Department of Health has published a 'Strategy for Digital Health from 2018 to 2022. A Coherent and Trustworthy Health Network for All' covering five focus areas: public engagement, knowledge, prevention, data security and digital propulsion. The Strategy emphasises the importance of developing transparent IT systems that allow citizens to be involved and access their health data[12].

In the early 2000s, Spain, France and Italy also started to digitalise the health sector. Since 2000, **Spain** has introduced several plans for national e-government strategies, which include key health and digital health themes. Among them was the Avanza 2 Plan (2009-2015), which consolidated usage of ICT in strategic sectors and proposed the most significant changes to the healthcare system, including the nationwide implementation of patient summaries, e-prescriptions, booking appointments and patient portals (Thiel et al. 2018). In 2021 the government approved the Digital Health Strategy of the National Health System, promoting the digital transformation of the NHS in a 'harmonious and coordinated' manner. In the specific case of hospitals, the Strategy aims to introduce digital tools improving the relationship between patients and professionals from different health services on one hand, and improving the recording, integration, access to information, communication, coordination and cooperation of teams and professionals from different departments and services, even from different health centres on the other hand (Martinez and Cruces Aguilera 2023).

[12] https://sundhedsdatastyrelsen.dk/da/diverse/download

Italy has an overall healthcare strategy in which the state of digitalisation in the healthcare system is a key topic. Since 2008, digital health has been a focus for future developments in the country's healthcare sector (Thiel et al. 2018). Over the last ten years, three broad areas of change related to digital transformation have impacted healthcare: the introduction of electronic medical health records, digitalisation of the CUP and telemedicine, with telemedicine being the newest and least developed. Through the Piano Nazionale di Ripresa e Resilienza programme financed by Italy's share of the Next Generation EU funding, priorities for the next four years include: investments in telemedicine; increased digitalisation in hospitals; strengthening the use of electronic medical health records; interoperability of data and the ability of local health units to use aggregated data from patient records to improve quality of care in the system; and the use of advanced technologies including artificial intelligence (AI) (Freddi et al. 2023).

In France, the government laid the legislative foundation for the development of an electronic health record (*Dossier médical personnel* (DMP)) in 2004. Launched in 2011, the Digital Hospital Strategy[13] for the period 2012-2016 aimed at raising the level of maturity of information systems in all healthcare institutions towards a common core, in order to improve the quality and safety of care. Fleury et al (2023) point out that over the last five years, the hospital sector has been impacted by widespread use of digital tools, enabling the development of telemedicine and remote monitoring; the systematic transition to computerised patient records – increasing traceability and reversing the burden of proof but intensifying work; and the use of a wide range of software which has resulted in operational difficulties (Fleury et al. 2023). More recently in 2022, the Government adopted the HOP'EN[14] programme**,** a 5-year national action plan for hospital information systems (Fleury et al. 2023). Union representatives anticipate four main trends in digitalisation: increasing individualisation of care through the new digital technologies in hospitals; greater use of telemedicine and remote monitoring as regions lose their access to healthcare; centralisation of health data via the digitalisation of shared medical records; and standardisation of software (France - INT11, INT13; Fleury et al. 2023).

In **Germany**, according to national and international studies, the health and social services sector is considered as a weakly digitalised sector of the economy. Hospitals are becoming, however, increasingly digitalised, especially in some areas, with major successes in modern imaging as well as other specific functional areas (e.g., surgical robotics, operating room robotics or in intensive care) though there is a lack of uniform infrastructure for digital processes, to consistently link them

[13] The Strategy was structured around five functional areas: (i) imaging, biology and anatomical-pathology results; (ii) computerized and interoperable patient records; (iii) electronic prescriptions feeding into the care plan; (iv) resource scheduling and the patient's agenda; and (v) medico-economic management.

[14] Hop'en has taken up the objectives of increasing the maturity of the five priority functional domains, raising its level of requirements and including new priorities, such as communication and exchanges with external partners as well as online services for patients, in connection with the implementation of new regulatory requirements; https://sante.gouv.fr/systeme-de-sante/e-sante/sih/hopen

with each other and to enable cross-sector communication and patient/case data to other service providers (Öz and Hamburg 2023).

In **Poland**, efforts to introduce digital health were initially aligned with EU action plans and priorities, which included a range of projects for online platforms, telemedicine, electronic health records and management systems, largely made possible through external financing. However, most of these projects have been hampered by major setbacks and delays (Thiel et al. 2018). In recent years, digital tools have been introduced that notably change the way work is performed in healthcare entities and how certain services are provided to patients. These include the Patient Online Account (2018), digital sick-leave notes (2016), the e-prescription (introduced as mandatory in 2020), and e-referral (introduced as mandatory in 2021). The electronic medical documentation introduced in 2011 became mandatory for all medical entities from 2022 (Owczarek and Pankow 2023). In **Hungary**, digitalisation has been spreading slowly in all areas of healthcare, one of the most important digital developments being the introduction of the Electronic Health Service Space in 2017. In line with the extensive availability of broadband internet, the use of digital networks has become widespread in the healthcare sector. Larger healthcare providers also have an intranet network where internal information and data traffic are managed[15]. Although data transmission via e-mail and internet sharing is common, the benefits of internet-based systems are still limited in the health system (Dura et al. 2023).

The COVID-19 pandemic was also an important catalyst for the adoption of new technologies and new work organisation. In Spain the pandemic expanded the options for rapid interaction between patients and professionals. Tablets, laptops, screens and equipment were purchased, as well as network systems and software (FG1). This enabled the transmission and visualisation of images and thus streamlined work processes and patient care, as long as the systems worked (network failures). The systems make it possible to computerise and record all processes (Martínez Poza and Cruces Aguilera 2023). In the same way, in Finland, many services that were previously provided through face-to-face consultation were transferred online. For example, most medical consultations, psychotherapy services, etc. are now initially carried out via the internet. The extraordinary circumstances of the pandemic created an avalanche of new forms of digital health care (Kangas 2023). This trend was confirmed in Italy during the interviews (Italy - INT 10,11): the region of Emilia-Romagna had already put into place a sophisticated system to support the interoperability of EMHR across Local Health Units and hospitals; few, however, were using these systems. This all changed when, during the pandemic, the central government automatically created accounts for all citizens registered with the NHS. Once users (medical professionals, back-office operators and citizens) were forced to use the new tool, they came to see its usefulness (Freddi et al. 2023).

[15] Semmelweis University of Medicine research summary https://semmelweis.hu/mediasarok/2022/10/20/a-digitalis-egeszsegugy-mar-nem-a-jovo-hanem-a-jelen-magyarorszagon-is/

3.1.3.2 Patterns of digitalisation

In the health and social care sector, digitalisation takes many forms: electronic health records, watches or sensors for real-time monitoring of health parameters, robots that operate on patients (e-surgery), drones to quickly deliver blood bags or other medical materials, health services offered via digital platforms or interactive websites for the training and retraining of medical staff. In addition, digital monitoring and data processing systems are deployed across departmental and organisational boundaries. Such programmes integrate large amounts of data and can be used for real-time treatment and monitoring of patients, as well as helping medical staff (e.g. digital tracking of drug stocks) (Vereycken et al. 2020).

Across the countries under scrutiny, interviewees and focus group participants reported a multitude of digital tools, applications and programs used by health workers in their daily tasks in hospitals. Here are some examples:

- In **Denmark**, technologies introduced in the hospital sector include robotics in the broadest sense (e.g. robots sorting, moving and delivering biological samples or cut tissue samples); telemedicine and monitoring systems; AI and machine learning and image recognition (e.g. with PET and CET scans); machines which have taken over the sorting, archiving, cutting etc. in laboratory work (Denmùark - INT4); technologies to turn patients over in bed, hence reducing heavy lifting, and electric wheelchairs to move the patients (Refslund and Borello 2023).
- In **France**, computers and tablets using wifi and Bluetooth technology are widespread and essential tools for both care and hospital management. Computer software – extended to manage patient information and the different parts of the hospital (invoice, planning, work organisation and staff schedules, etc.) – and job platforms are the main digital tools used in hospitals. The use of e-mail is not yet completely widespread but, in many places, professionals have a work e-mail address. Intranets within hospitals have also spread massively (France - INT13). The focus group was less categorical concerning the widespread use of digital tools. The most widely used devices are computers. Nurses also use wireless landline phones. The intranet is used daily (more than the Internet), as are emails, but more by secretaries than nurses. For nurses, there is often an address for the service and email is used to communicate with management, more specifically to receive information from management (Fleury et al. 2023).
- In **Finland**, the *Apotti* system used in the capital area was shaped to create a digitalised client and patient record and enterprise resource and planning system combining social care and health care. For the individual, Apotti includes an e-service portal that gives access to combined digital public social and health care services, also via mobile phones. For health care workers there are devices for communication, monitoring, and collaboration. The aim of such digital devices is to lighten the load of medical doctors, nurses, and other hospital and health care professionals, with video appointments, a secure chat function, secure messaging, health questionnaires, remote health monitoring, and automated screening features (Kangas 2023).

- In **Poland**, digitalisation resulted in a number of tools for the direct diagnosis and treatment of patients: modern electronic solutions have been gradually introduced into intensive care units to measure the vital parameters of patients and to conduct therapy in a life-threatening situation. Over the years, more and more modern devices with an increasing degree of automation and improved ergonomics have been used (e.g. replacement of analogue knobs by liquid crystal touch displays). Another field in which digitalisation has been taking place for a long time is radiology-based imaging diagnostics, where the photo exposure process is being automated (Owczarek and Pankow 2023).
- In **Hungary**, computers and smartphones are commonly used by healthcare workers to perform their tasks related to patient care (e.g. admitting patients, drawing up final reports, prescribing medicines, recording patients' conditions, compiling patient statistics, dispensing medicines, and ordering laboratory tests). Larger hospitals have more sophisticated digital tools, but these are not yet widespread. These tools include, for instance, hygiene monitoring tools and digitally controlled beds (Dura et al. 2023).
- In **Spain**, the focus group confirmed that most of the tasks are performed digitally, and underlined the issues resulting from this use: the technological gap between occupations, professional categories and services (in services such as X-ray, workers are up to date with technology (very high tech), while in others there is no proper use of digital tools), and the differences between hospitals in the extent to which technology has been implemented. Some hospitals only work digitally, while in others, staff continue to work in both modes, digital and paper, with an overload of tasks (Martínez Poza and Cruces Aguilera 2023).
- In **Germany**, digital tools and processes with a close patient relevance include fields such as telemonitoring, mobile health (apps, smartphones), wearable computing or surgical robots. Technologies that control background processes are related to documentation of case data, digital communication of patient information and image data, hospital information systems, electronic health records, patient data management system, laboratory information system, clinical workstation system etc. (Öz and Hamburg 2023).

3.2 Incidence and purposes of digitalisation across the sectors and the countries

The project survey gives an insight into the incidence and uses of digitalisation in the three sectors and across the countries.

3.2.1 Incidence of digitalisation across the sectors and the countries

The project survey (DGQS) results confirm regular use of mobile devices such as tablets, laptops and smartphones across the sectors. In the electricity sector, 95.8% of respondents confirmed such regular use, with the highest percentages found in France and Germany. The percentage is slightly lower in the public administration sector, where 83.5% of respondents reported regular use of mobile

devices, the highest percentages being found in Denmark (100%), Germany (94.3%) and Finland (95.4%). Finally, regular use is lower but still significant in the hospital sector, where it is reported by 78.2% of respondents. The highest percentages were found in Spain (86.7%), Denmark (84.4%) and France (82.9%). Poland and Hungary are at the bottom of the ranking: 60.7% and 56.8% respectively (Table 1).

When it comes to the use of machines operated by digital commands to perform certain operations (for example, lifting heavy loads or persons, monitoring equipment or persons), the situation is different. Only 25.7% of respondents in the hospital sector reported the use of these machines. Such use is more common in Spain (56.7%), Denmark (51.6%) and Italy (43.4%). Only 14.0% of the Hungarian and 12.6% of the Finnish respondents reported that they use these machines in their daily work. The percentage is slightly lower in the electricity sector (23%), with the use of this type of machine being more common in Germany (56.0%) and Spain (34.5%)), and significantly lower in the public administration, where only 7.1% of respondents reported use of such machines (with relatively high percentages in Spain (22.4%), Denmark and Poland (9.1%)).

Unsurprisingly, the use of Information and Communication Tools is widespread in all the sectors under scrutiny and across the countries: 98.5% of respondents in the electricity sector, 98.2% in public administrations and 93.9% of staff in hospitals reported regular use of ICT.

Table 1: Incidence of digitalisation by countries – sectors – DGQS 2022 1
People answering YES to questions Q14, Q16, Q18

			Use mobile devices such as laptops, smartphones or tablets	Use machines operated by digital commands	Use information and communication tools
ELECTRICITY PRODUCTION AND SUPPLY	Denmark	%	-	-	-
	Finland	%	87.6%	17.3%	92.3%
	France	%	100.0%	6.3%	100.0%
	Germany	%	100.0%	56.0%	100.0%
	Poland	%	96.2%	30.8%	96.2%
	Spain	%	98.7%	34.5%	99.6%
	Hungary	%	84.5%	25.0%	98.8%
	Italy	%	97.0%	20.8%	99.1%
	All countries	%	95.8%	23.0%	98.5%

PUBLIC ADMINISTRATIONS	Denmark	%	100.0%	9.1%	100.0%
	Finland	%	95.4%	2.4%	98.8%
	France	%	87.3%	7.1%	97.1%
	Germany	%	94.9%	7.7%	97.3%
	Poland	%	52.1%	9.1%	98.9%
	Spain	%	84.5%	22.4%	95.3%
	Hungary	%	66.2%	6.8%	98.5%
	Italy	%	69.1%	2.6%	99.1%
	All countries	%	83.5%	7.1%	98.2%
HOSPITAL AND HEALTH SECTOR	Denmark	%	84.4%	51.6%	97.8%
	Finland	%	80.5%	12.6%	95.2%
	France	%	82.9%	32.4%	95.7%
	Germany	%	75.0%	32.7%	76.9%
	Poland	%	60.7%	17.9%	75.0%
	Spain	%	86.7%	56.7%	93.3%
	Hungary	%	56.8%	14.0%	76.7%
	Italy	%	63.2%	43.4%	96.7%
	All countries	%	78.2%	21.8%	25.7%

No data for Denmark, due to an insufficient sample in the electricity production and supply services
Source: DGQS (2022)

3.2.2 Purposes of digitalisation across the sectors

In the whole electricity, public administration and hospital sectors, uses of mobile devices were reported primarily to 'communicate with colleagues and internal or external services' (26.6%, 26.2% and 27.5% respectively of the total choices) The second most popular option in the three sectors was 'to plan/schedule the performance of work tasks' (24.8%, 24,1% and 22.5% respectively of the total choices). It is worth noting that the 'to interact with the users' option made up only 8% of total choices in the electricity sector compared to 18.1% and 15.2% respectively in the public administration and hospital sectors.

Regarding the possible uses of digital machines, some similarities emerged from the survey: digital machines are primarily used 'to measure data/collect/organise/retrieve information' in the electricity and public administration sectors (33.7% and 37% respectively of all choices) while they are mainly used 'to monitor and to control parameters of equipment or persons' in the hospital sector (28.9%

of all choices). The second most frequently picked option differed between the sectors: to 'monitor and control parameters of equipment or persons' in the electricity sector 32.6%); 'to perform routine repetitive tasks' in the administration sector (29.0%), and 'to measure data, to collect/ organise/ retrieve information' in the hospital sector (28% of all choices).

As far the use of ICT is concerned, the 'to send and receive emails' option was the option most commonly picked in the three sectors (37.8%, 34.4% and 39.7% respectively of the total choices in the electricity, public administrations and hospital sectors). This was followed by the 'to use web-based applications for training and learning' option in both the electricity (27.9%) and public administrations (24.5%), and by the 'to use web-based applications to exchange with partners' networks' option in the hospital sector (23.7 % of total choices).

Table 2: Incidence and purposes of digitalisation in the three sectors: comparative overview

USE OF DIGITAL TOOLS	Electricity	Public administrations	Hospitals
Mobile devices	95.8 %	83.5 %	78.2 %
Digital machines	23.0 %	7.1%	25.7 %
ICT tools	98.5 %	98.2 %	93.9 %
PURPOSES OF DIGITAL TOOLS	**Electricity**	**Public administrations**	**Hospitals**
Mobile devices			
To measure data, to collect/organise/retrieve information	21.9%	16.3%	19.6%
To plan/schedule the performance of work tasks	24.8%	24.1%	22.5%
To monitor the performance of work tasks	17.9%	15.3%	15.3%
To communicate with colleagues and internal or external services	26.6%	26.2%	27.5%
To interact with the users	8.8%	18.1%	15.2%
To measure data, to collect/organise/retrieve information	21.9%	16.3%	19.6%
To plan/schedule the performance of work tasks	24.8%	24.1%	22.5%
Digital machines			
To measure data, to collect /organise/retrieve information	33.7%	37.0%	28.0%
To perform routine repetitive tasks	21.1%	29.0%	16.4%
To lift, to move, to change the position of heavy loads or persons	12.6%	6.7%	26.8%
To monitor and to control parameters of equipment or persons	32.6%	27.3%	28.9%
ICT tools			
To send and to receive emails	37.8%	34.4%	39.7%

To use web-based applications to exchange with partners' networks	24.3%	22.6%	23.7%
To use web-based applications to connect with public service users	10.0%	18.6%	14.6%
To use web-based applications for training and learning online	27.9%	24.5%	21.9%

Source: DGQS 2022.

3.5 Remote work as a new practice of flexibility in work time and space

Various technological developments included in the digitalisation process have paved the way for increased flexibility in the world of work, including in public services, mainly through so-called **new forms of work** but also **new forms of employment.**

The multiplication of digital interfaces (computers, smartphones, tablets, etc.), combined with the digitisation of documents and the possibility of being permanently connected, have enabled new ways of organising work, allowing workers and employers to adapt their working places and times to their respective needs ('new forms of work'). These new ways of working, which are free from time and space restrictions (working anytime anywhere) while giving more responsibility to workers, have gradually developed since the early 2000s, riding the waves of digitalisation. The COVID-19 pandemic has been a powerful catalyst in accelerating the pace of digitalisation of work and intensifying the use of these new forms of work among public service workers, notably teleworking (Eurofound 2021b 2020a; Degryse 2020; Valenduc 2020; EU-OSHA 2019b, Eurofound and ILO 2017; Valenduc and Vendramin 2016). They are part of a cultural change process based on an organisational mix of (i) flexible working time and space practices (eg. remote work, including telework, activity-based working spaces), (ii) collaborative work organisation (e.g. team-based, semi-autonomous, virtual groups) and (iii) participatory management (mainly project-based, goal-based and knowledge-sharing) (Vereycken et al. 2020). According to Fox et al. (2016), two main types of work transformation can be identified, allowing tasks to be carried out in a variety of locations and at a variety of times:

- activity-based working space: reconfiguration of the workplace space into open-plan offices and the establishment of shared workspace offices divided into zones with distinct properties (silent zone, meeting zone, relaxation zone, etc.).
- remote work: this umbrella word refers to a range of organisational work arrangements allowing the worker to perform a series of tasks outside the institutional workplace. There are several variants of remote work, of which home-based telework (teleworking) is the most common form, where the worker carries out some of his or her tasks from home. Other less frequent forms of mobile telework also exist in the public services: satellite office telework (employees are located in adapted facilities), telecentres (several companies share office space), telework at the client's premises. The impact on working time and space is even

greater in the case of nomadic telework, where services can be provided at any location and at any time.

- Spatio-temporal flexibility can also take other forms, such as coworking (a space that brings together self-employed workers who can exchange with each other), or virtual teams that allow a work team to collaborate across time, space and organisational boundaries through communication technologies (Fox et al. 2016).

Reviewing how, specifically, these organisational transformations are being implemented in the public services, Vereycken et al. (2020) note a gradual adoption of these characteristics. Spatial flexibility through the transformation of workspaces often proves to be a fairly easy first step to achieve, as the reluctance of the members of the organisation is usually quite limited. On the other hand, many initiatives have encountered difficulties adopting transformations related to working time. There is often stronger opposition to such changes, both from workers' representatives (deterioration in working conditions, notably the work-life balance), and from employers, who object to the loss of control over the activity of these workers. Only some organisations reach the stage of transforming the modes of governance within their organisation.

As these new flexible work methods have gradually developed in the public services, in a context historically framed by the paradoxical imperatives of reducing budgetary expenditure while improving the quality of public services, the occupational structure of the public workforce has also tended to diversify. Alongside the traditional statutory workers (civil servants), new forms of employment have progressively appeared (Eurofound 2021b; Keune et al. 2020); EU-OSHA 2019b; Eurofound and ILO 2017). New recruits now often have employment contracts that depart from the standard public service arrangements (permanent or fixed-term, full-time, within the same organisation, complementary benefits). The use of (private) sub-contractors to carry out certain specific tasks or missions, including operational implementation, maintenance and management of digitalisation, has become relatively common, increasing the status mix in public workplaces. It carries the risk of reinforcing the inherent tension between public and private spheres (de Mello and Ter-Minassian 2020; Kettunen and Kinnunen 2019; Koudenburg et al. 2018; Meijer and Thaens 2018; Timmermans and Koster 2017).

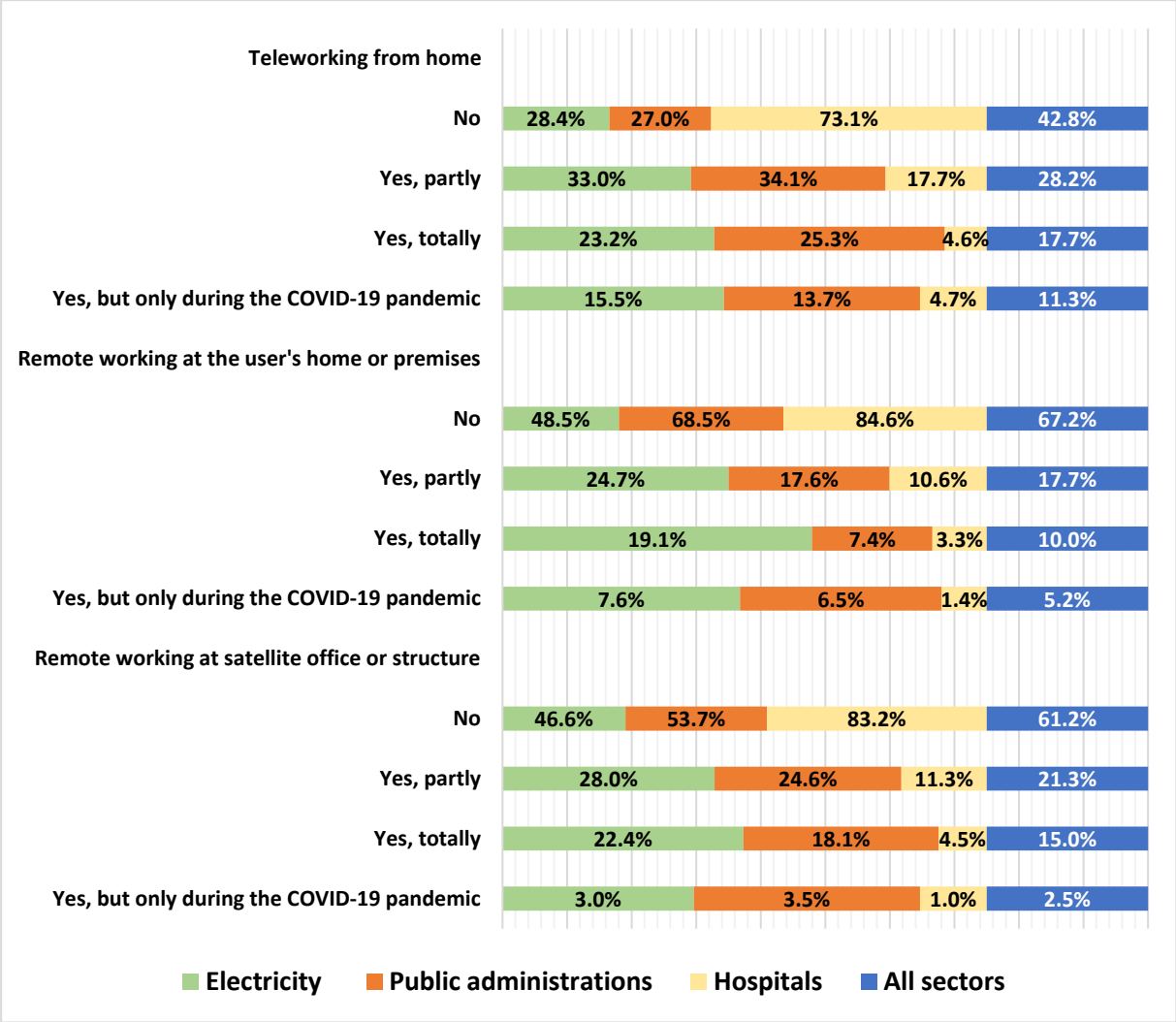
Telework at home is undoubtedly the 'new form of work' that is most widespread at present. Although this option had already been one way of enhancing work flexibility for some years, the use of telework increased strongly during the COVID-19 pandemic, as an accompaniment to lockdowns, school closures and forced household confinement of workers. The pandemic unlocked the social and technological potential of flexibility in terms of time and place of work (Eurofound, 2022a). Although this practice is likely to become less frequently used with the end of the pandemic, it has nevertheless become a recurrent feature of the daily professional practice of public workers. This close interrelationship between the surge of the pandemic and the increased recourse to telework

as an alternative form of flexibility is also referred to in several of the project's national reports (e.g. Germany, Hungary, Poland and Italy).

But telework, like the digitalisation tools and processes that make it possible, cuts both ways. It has positive effects, such as reducing commuting time, greater working time autonomy, a better overall work–life balance, and higher productivity. But it also has more negative outcomes, such as a tendency to lengthen working hours (overtime), to create interference between work and personal life, to reduce social interaction and to result in work intensification, even where workers have high levels of autonomy. This situation is known as the autonomy paradox. It can lead to high levels of stress, with negative consequences for workers' physical and mental health and well-being (Eurofound 2022b, 2020a; EU-OSHA 2021abc). The rise in telework and an awareness of its implications for working conditions have prompted a renewed focus on regulatory frameworks, with new telework regulations adopted in several EU Member States (Eurofound 2022ab, 2020b). These ambiguous and even contradictory effects on working conditions are a current, real-world example of the challenges linked to the future of work (Eurofound and the International Labour Office 2017). There are also marked gendered effects in teleworking. It has mixed effects on work-life balance inequalities, on the gender wage gap, and on gender disparities in career progression. Prevailing gender norms are likely to mediate the effect of teleworking on all three outcomes (Touzet, 2023).

The DGQS gives us an insight into the incidence of remote work, and particularly teleworking, in the three public sectors investigated in the project (Table 3 in the Statistical Annex (Deliverable D3.3)). The figure below illustrates the incidence of various forms of remote work.

Figure 3: Incidence of remote work in the three public sectors and total – DGQS 2022



Source: DGQS 2022

On average for the three sectors, 45.9% of the respondents said they could telework from work either partly or totally. This proportion drops to 27.7% for the possibility to work remotely at the user's home or premises and 36.3% for remote work in a satellite office. This aggregate average masks considerable differences between sectors. Partial or full use of telework is much less frequent in the hospital sector (26.9%) than in the other sectors (around 70%). This difference between sectors also exists for other forms of telework. Remote work at customers' premises or in satellite facilities is possible for approximately half of the workers in the electricity sector but for only one in three workers in the public administration sector. The possibility of working remotely stopped with the end of the COVID-19 pandemic for 19% of workers in the three sectors. If we consider the number of workers who do not have the possibility to work outside their workplace, the difference between the hospital sector and the other two public sectors is even more striking. On average, eight out of ten workers in the hospital sector are unable to work remotely, whereas this is only the

case for four and five out of ten workers in the electricity production and public administration sectors, respectively.

Moreover, the differences observed between sectors are partly due to variations in the occupational composition of these sectors and the tasks related to the jobs. If, in the sample of the DGQS survey, we consider the distribution of occupational skills in the three public sectors considered in the project, we see marked differences (see Table 1 in the Statistical Annex (Deliverable D3.3)). In the electricity production and supply sector, the dominant occupational profiles are 'skilled technicians', which include the electricians (46.1%) and the 'highly skilled professionals and technicians' (22.9%). In the public administrations, the most common profiles are the 'skilled professionals' (39.5%) and 'medium skilled clerical workers' (33.2%). In the hospital and health sector, the most strongly represented occupational profiles by far are the 'skilled professionals', which include notably nurses (65%), and to a lesser extent 'low-skilled elementary workers' (14.9%).

The table 3 below shows the different patterns in the use of digital tools and processes, such as remote work, for the different categories of occupational skills.

Table 3: Incidence of digital work and remote work possibilities according to occupational groups – All sectors – DGQS 2022

		Highly Skilled Professionals and Technicians	Skilled Professionals	Skilled Technicians	Moderately Skilled Clerical Workers	Moderately Skilled Technicians	Low-Skilled Elementary Workers
Do you regularly use mobile devices?	Yes	89.9%	84.1%	92.7%	80.4%	78.6%	68.6%
	No	10.1%	15.9%	7.3%	19.6%	21.4%	31.4%
Do you regularly use machines operated by digital command?	Yes	17.6%	16.5%	25.1%	4.2%	20.8%	17.3%
	No	82.4%	83.5%	74.9%	95.8%	79.2%	82.7%
Do you regularly use ICT tools?	Yes	99.6%	96.6%	96.5%	99.4%	89.1%	83.9%
	No	0.4%	3.4%	3.5%	0.6%	10.9%	16.1%
Remote work - at user's home or premises	No	47.6%	74.7%	63.9%	69.9%	84.3%	93.4%
	Yes	52.4%	25.3%	36.1%	30.1%	15.7%	6.6%
Remote work -at satellite office or structure	No	38.8%	69.5%	60.3%	53.8%	83.0%	95.8%
	Yes	61.3%	30.5%	39.7%	46.2%	17.0%	4.2%
Remote work - teleworking from home	No	19.7%	52.5%	44.1%	21.7%	73.9%	85.0%
	Yes	80.3%	47.5%	55.9%	78.3%	26.1%	15.0%
How many days of teleworking at home?	Mean	2	2	2	3	2	2

Source : DGQS 2022 – Q14 Q16 Q18 Q21

Nearly all the occupational groups regularly use mobile devices and ICT tools in their everyday work. Mobile devices are slightly less used by moderately skilled clerical workers and technicians, followed by low-skilled elementary workers. As could be expected, the use of digitally operated machines is less frequent in all the occupational groups, while slightly higher among the technical professions (see Table 4 in Statistical Annex (Deliverable D3.3)).

The possibility of working outside the established workplace increases with the level of qualifications required by the job. For the different patterns of remote work, a polarisation between high and low-skilled workers could be observed. Partial or total teleworking is more frequently possible for highly skilled professionals and technicians, be that working from home, working at the client's premises or in a satellite facility. Among medium-skilled workers, a difference emerges between clerical workers on the one hand and technicians on the other. The former have teleworking possibilities relatively equivalent to those of the more skilled workers. Teleworking from home is even possible

for them, in a similar proportion as for highly skilled professionals and technicians. This is apparently less the case for medium-skilled technicians. Finally, low-skilled workers clearly have more limited possibilities to access telework than other occupational groups. Teleworking from home is possible on two days a week, on average, for all the occupational groups, with the exception of moderately skilled clerical workers, for whom the average duration is 3 days a week.

However, beyond this overall picture, some differences appear between the public sectors reviewed in the project. In the public administrations and hospital sectors, the lower skilled occupations (elementary workers and technicians) declare lower levels of utilisation of digital tools and processes, illustrating the polarisation around skills already mentioned. This is less the case in the electricity sector, except for the low-skilled elementary workers (see Table 4 in Statistical Annex (Deliverable D3.3)).
In the public electricity sector, nearly all the workers regularly use mobile devices and ICT tools in their jobs, irrespective of their occupational group. Digitally operated machines are more frequently used by technicians, especially less skilled workers. Remote work from satellite offices or infrastructure is more common for skilled and high-skilled technicians and professionals, while remote work from the user's home or premises is more frequent for skilled and moderately skilled technicians. These last two groups of technicians have fewer opportunities to telework from home. This is of course related to the specific nature of the electricity sector, which combines a high degree of decentralisation with a multiplicity of sites of production/intervention and a higher prevalence of technical profiles in the workforce. The average duration of teleworking is 3 days for skilled professionals and moderately skilled clerical workers, and 2 days for the other groups.

In the public administrations sector, the use of ICT tools is already a daily practice for nearly all the workers. This is also the case for the use of mobile devices, with rates of utilisation ranging from 74.7% for low-skilled elementary workers to 89.1% among the skilled technicians. Digitally operated machines are used by around 20% of the skilled and elementary skilled technicians, but the rates fall to below 10% for the other occupational groups. Remote work is more common for the highly skilled professionals and technicians, followed by the skilled professionals and technicians. The same distribution can be seen for access to teleworking, with the noticeable exception of the group of moderately skilled clerical workers, whose opportunities are similar to those of the highly skilled professionals and technicians (81.4% and 85.9% respectively). The average duration of teleworking is 3 days for the moderately skilled clerical workers, compared with 2 days for the other occupational groups.

As in the other public services considered in the project, the use of ICT tools in the public hospital and health sector is almost universal in all occupational groups. The use of mobile devices is also widespread across all groups (eight out of ten workers), although it is less marked for moderately skilled clerical workers, low-skilled technicians and low-skilled elementary workers (around two out

of three workers). The latter three groups are also the least likely to use digitally operated machines, with the noticeable exception of low-skilled elementary workers, who have a similar level of use to highly skilled professionals and technicians. Remote work opportunities are highest for the latter group (from 32.4% for working from home to 51.7% for teleworking from home). Low-skilled technicians and low-skilled elementary workers have significantly fewer remote work opportunities than the other occupational groups. Moreover, in the group of skilled professionals, which includes notably the nurses, it is less frequently possible to work from the users' home, in satellite structures or from home (respectively 15.8%, 16% and 25.4%). Overall, remote work, and especially teleworking, is less common in the hospital sector than in the other two public sectors. While fewer workers can telework, those making use of this possibility do so during a small fraction of their weekly working time; this is especially true for the more highly skilled, who report only one day of teleworking per week on average, which rises to two days among medium and low-skilled workers.

SECTION 4. IMPACT OF DIGITALISATION ON JOB QUALITY

The digitalisation of public services is an ambivalent process, with potentially positive or negative impacts, notably on the job quality of public service workers. The job quality of public sector workers has deteriorated across Europe, with stagnating or declining (real) wages and the intensification of work and workload against a background of control/reduction of staff (Keune et al. 2020). This deterioration of the qualitative dimensions of work in public services goes hand in hand with concerns about the quality of public services themselves. There is a growing consensus on the fundamental importance of the job quality of public sector workers for the quality of public services (Voss and Rego 2019; Kirov 2017). In recent years, a large number of studies have been devoted to the challenging question, notably for trade unions, of the poor quality of the jobs created by the platform economy, and to the social and economic consequences of the arrival of automation and artificial intelligence in the world of work. But relatively few studies have examined the changes in work processes generated by the increasingly widespread use of digital tools in the performance of tasks, especially for public services across the European Union (Keune et al. 2020; O'Reilly and Foley 2020; Voss and Rego 2019; Kettunen and Kinnunen 2019; Peña-Casas et al. 2018; Kirov 2017).

4.1 Literature review and DGQS overall findings on digitalisation and job quality

The literature on the impact of digitalisation on work in the public services, and some of the national studies referenced in the country reports of the DIGIQU@LPUB project, highlight a number of positive changes for public service workers resulting from digitalisation, such as greater flexibility, autonomy and a better work-life balance (Meijer and Thaens, 2018). Digitalisation contributes to the enhanced efficiency and effectiveness of the public services, resulting in higher job satisfaction for workers (Voss and Rego 2019; Meil and Kirov 2017). The use of digital tools can improve collaboration, communication and knowledge-sharing among public service workers, improving job performance and job satisfaction (De Cremer and Annen 2020; Eurofound and ILO 2017). The ability to work remotely has also been shown to improve productivity, reduce absenteeism and increase job satisfaction among workers (Eurofound 2021; Charalampous et al. 2019; van der Lippe and Lippényi 2018).

Work organisation

Digitalisation has enabled significant changes to work organisation in the public services. The growing omnipresence of digitalised processes and tools in the basket of instruments and skills needed by public service workers in their everyday work has enabled employers and workers to accommodate their workplaces and working times to their respective needs, in terms of flexibility. New ways of organising work have emerged, allowing workers and employers to improve both productivity as well as job satisfaction through new flexibility in space and time (Eurofound 2020a, 2021b; Degryse 2020; Valenduc 2020; Gal et al. 2019; Meil and Kirov 2017; Eurofound and ILO 2017). Digitalisation is the vessel, but not necessarily the cause, of fundamental changes in the organisation of work, particularly in public services. It undeniably contributes to a certain

improvement in the work carried out and hence in the quality of the public service itself. Digitalisation has increased the amount of information that is instantly available, processed and usable, leading to improved collaboration within work teams and better interactions with users of public services. Digitalisation has also broadened and accelerated the use of work organisation methods based on greater flexibility in working time and space. But digitalisation has also contributed to more negative strains on public service workers, as highlighted above.

The ambivalent role of digitalisation on work organisation is reflected in the responses of public service workers to the DGQS. The workers in the three sectors in the eight countries investigated in the DIGIQU@LPUB project have in general a rather positive perception of the impact of digitalisation on their work organisation. The positive assessment of the impact of digitalisation on work organisation ranges from 43.3% to 52.4% concerning the aspects linked to autonomy of workers, teamwork, working time patterns (with the noticeable exception of work intensity (see below)) and the quality of interactions with users of public services (see Table 6 in Statistical Annex (Deliverable D3.3)). The positive assessment is strongest for aspects related to work autonomy, such as the organisation and planning of tasks (52.1% and 50.8% respectively), the reduction in the time needed for routine repetitive tasks (50.8%) or the improvement in the coordination of tasks and cooperation with colleagues (respectively 50.9% and 44.2%). The questions concerning the control of work show lower rates of positive evaluation than other dimensions of work organisation, ranging from 31.3% for the improved external assessment by users to 39.7% for the improved internal evaluation by supervisors. On average, around one worker in three in the public services is affected by the work control aspect. But, unlike what is observed for the other main dimensions of work organisation, the dominant pattern for the control aspect is the *status quo*, with the majority of workers experiencing no change related to digitalisation.

Also, about one in four workers in the three public sectors have a negative perception of the impact of digitalisation on all aspects of work organisation. The share of workers somewhat or strongly disagreeing with the positive statements ranged from 22.6% (coordination with colleagues) to 29.9% (external assessment by users). There is even more disagreement with the statements reporting more time to focus on significant aspects of the job (34.7%), the reduction in time taken up by routine repetitive tasks (30.3%), and especially the suggestion that digitalisation has increased the pace and intensity of work (62.9%).

This latter figure is more surprising. This result contradicts the choices made for the other aspects of work organisation, which generally reflect a positive assessment. It is also relatively counter-intuitive, insofar as work intensification is often associated with digitalisation in the scientific literature (see above). One possible explanation may be linked to the structure of the questionnaire: the respondents may have been misled, as the proposed item on work intensity was the only one in the question suggesting a negative perspective. However, the almost systematic repetition among

all respondents of this possible misinterpretation makes this unlikely. A more plausible hypothesis, also discussed in some of the project's country studies, is that in the DGQS, the public service respondents strongly reject the idea that the digitalisation of work is the primary cause of the intensification of their everyday work, because they see the intensification of work as the result of other factors generating overload and overtime work in the public services, including: public funding restrictions; chronic understaffing possibly due to non-replacement of departing staff; restructuring and redundancies; difficulties in recruiting suitable profiles. This explanation seems to be more consistent with the positive assessments expressed by the workers on the other dimensions of work organisation, as well as with the 20% of public services workers who responded, in reaction to the same question, that digitalisation has not changed the pace or the intensity of their work. In other words, while digitalisation allows public service workers to work more effectively, this does not mean that they are working less or more slowly than before the digitalisation of work.

Working time

With regard to the impact of digitalisation on working time itself, the predominate impression in the responses received to the DGQS is very much that digitalisation has not changed the duration of working time (see Table 7 in Annex 5 (Deliverable D3.2)). This feeling is expressed by 61% (regarding commuting time from or to home), to 82.7% (paid overtime hours) of the workers from the three public services. The aspects evaluated most positively are the reduced commuting time (34.1%) and the increased number of break/rest periods during working hours (26.3%). The negative aspects most frequently mentioned are the perceived increase in the number of contractual working hours (21.6%) and particularly in unpaid overtime hours (18.3%), as well as in unsocial working hours (e.g. nightwork, weekend work) (24.9%).

Work-life balance

Scientific literature suggests that the flexibility induced by digitalisation may provoke a disruption of the work-life balance. Digitalisation may negatively impact workers, especially in the digital economy, because they must often be available on-demand. In other words, there is a negative side to the increased job flexibility. Research has found that this issue mostly affects workers who must quickly respond to work demands, whatever the time of day. The blurring of work and home life boundaries resulting from the need to always be connected disrupts balance and raises stress levels (Touzet 2023; Stacey et al. 2017). In an environment of irregular working time, tight deadlines, and constant availability, job quality is compromised because it often leads to health and safety risks for workers (Eurofound 2016b; EU-OSHA 2015).

The findings on the impact of digitalisation on the work-life balance are fairly unclear in the responses to the DGQS, with the replies of workers in the three public sectors being relatively evenly distributed between the different assessments (see Table 8 in Statistical Annex (Deliverable D3.3). A first group of respondents (between 30.3% and 40.4% of the responses for each statement) felt that

digitalisation had not affected their work-life balance. A second set of responses referred to positive effects of digitalisation, as they strongly or partially agreed with the suggestion that it has increased the time available for themself and their family (28.5%) or disagreed with the idea that digitalisation may have increased working time at the expense of personal time (31.6%). For those who telework, 33.6% strongly or partially rejected suggestions that digitalisation makes it more difficult to combine work and home obligations (23.7%) or to set clear boundaries between personal and work time. Finally, a last group of respondents believe that digitalisation has had a negative impact on the balance between their private and professional life. A third of the respondents agree that digitalisation has increased working time to the detriment of personal time (34.1%) or deny that it has increased personal time (30.4%). 40.3% of respondents also reject the idea that digitalisation has not changed the amount of time spent outside the workplace. 29.7% and 28.9% of teleworkers, respectively, totally or partially agree that it is now more difficult to combine work and household obligations or to set clear boundaries between personal and work time.

There is an acknowledged association between individual characteristics, particularly gender, and the perceived effects of digitalisation on the work-life balance[16]. For example, as recalled in a recent OECD paper, the effect of teleworking on gendered work-life balance inequalities reflects prevailing gender norms and the managerial culture. Teleworking increases work-life balance inequalities between men and women in some cases, and reduces them in others. To reduce gendered work-life balance inequalities, what matters is the combination of desired flexible work practices, such as teleworking, with other policies, such as childcare, eldercare and any other policies challenging traditional gendered roles (Touzet 2003).
70.2% of respondents either agreed with the statement that digitalisation has not really affected the amount of time spent outside the workplace (33.6%) or reported no change (36.6%).

Physical and mental health

Abundant literature highlights that digitalisation has an impact on the physical and mental health of workers. Some positive outcomes for physical health are mentioned in the literature, such as the potential reduction in occupational safety and health (OSH) risks. The use of digital tools could help to remove people from hazardous environments or to better protect them, by automating dangerous and/or monotonous repetitive tasks. Additional positive outcomes of connected tools are the new opportunities for communicating good OSH practice, providing good quality training, keeping and sharing records about exposure to OSH risks. On the other hand, digitalisation can also contribute to increased exposure to physical health risks. Nomadic public workers (remote workers) are more vulnerable to traffic accidents when commuting. More sedentary workers are

[16] It should be kept in mind that two-thirds of the DGQS respondents are female workers (62.8%), and that women strongly predominate among the respondents from the public administration sector (70.7%) and the public hospital sector (80.3%). In contrast, for the public electricity sector the situation is completely opposite, with male workers making up 79.3% of the sample (see Table 1 in Annex (Deliverable D3.2)).

confronted with greater risks at their workplaces, linked to the use of digital tools (e.g. electro-magnetic radiation, blue light, musculoskeletal disorders). Digitalisation can lead to overwork, over-fatigue and 'techno-stress', which have consequences on both physical (e.g. overweight, migraines, high blood pressure) and mental health (e.g. depression, burn-out). Several physical risks are linked to physical inactivity. The use of computers and automated systems at work leads to fixed body postures and physical inactivity at work. Physical inactivity is associated with increased health risks such as coronary heart disease, being overweight or obese, certain types of cancers and psychological disorders such as depression and anxiety. The blue light emitted by electronic devices can disrupt the body's natural sleep cycle, leading to insomnia and other sleep disturbances. Another important risk for physical health comes from the combined exposure to a mixture of environmental stressors that, taken together, augment the risks of musculoskeletal disorders (MSDs), the leading cause of sickness absence and work disability (EU-OSHA 2018, 2019ab, 2021abcd; WHO and ILO 2021; Meijer and Thaens 2018).

Digitalisation also has adverse consequences on the mental health of service workers. Mental health problems exacerbated by the practice and management of digital work are frequently mentioned in the literature, but also in the interviews and focus groups conducted in this project. The increased space-time flexibility allowed by digitalisation can lead to workers facing increasing workload and task complexity, excessive working hours, feelings of isolation (as personal relations are replaced by virtual contacts) and finding it increasingly difficult to achieve a good work-life balance due, in part, to work pressure but also driven by the 'fear of missing out' syndrome. As a result, there is a danger that workers can suffer stress and 'burn-out' and also face increased psychosocial risk factors such as emotional demands, including violence, harassment and bullying (EU-OSHA 2018, 2019ab, 2021abcd, Eurofound 2020a, 2022; Sostero et al. 2020; Charalampous et al. 2019; van der Lippe and Lippényi 2018; Popma 2013). Exposure to psychosocial hazards and risk factors is linked to poorly organised and managed work environments (e.g. excessive workloads, tensions with colleagues and superiors), which can have negative psychological, physical and social consequences for workers, such as musculoskeletal disorders, stress, burnout or depression. These deficient work environments can also lead to or intensify harmful social behaviours such as harassment, bullying, verbal and even physical aggression from colleagues, managers or users (EU-OSHA 2021bc). By facilitating an increased and dematerialised interaction and control of work practice, digitalisation can also contribute to the occurrence of psychosocial risks (EU-OSHA 2018).

Paradoxically, the dominant opinion voiced by the respondents to the DGQS survey is that digitalisation has a neutral effect on the physical and mental health of workers in the three public services (see Tables 9 and 10 in the Appendix). For the majority of workers, digitalisation has no significant effect on their physical (46.5%) or mental (65.9%) health. A very small number reported

positive effects on their physical (11.2%) or mental (4.9%) health[17]. For 43.3% of respondents, digitalisation has either generated a new physical problem (26.6%) or aggravated a pre-existing problem (16.4%). For 29.2% of respondents, digitalisation has either generated a new psychological problem (20.2%) or aggravated a pre-existing problem (9%). For the respondents to the DGQS who reported the existence of physical health problems, the bulk of these are related to neck pain (18.6%), back pain (16.7%) and also vision problems (17.6%). A second set of ailments, less frequently mentioned, were other musculoskeletal disorders such as headaches (12.3%) or hand pain (11.2%), as well as the sensation of great physical fatigue (11.7%). In terms of mental health, problems such as mental fatigue and stress were cited first and foremost by one worker in five (22.2% and 20.9% respectively). This is followed to a lesser extent by demotivation (13.5%) or anxiety (12.8%) and burn-out (9.1%) (see Table 11 in Statistical Annex (Deliverable D3.3)). Almost half of the respondents to the DGQS also state that digitalisation has increased their exposure to psychosocial risks, including harassment or bullying by colleagues and managers (48.2%), exposure to verbal or even physical violence from colleagues and managers (48.6%) or from public service users (51.6%) (see Table 12 in Statistical Annex (Deliverable D3.3).

Learning and skills

The transition to an increasingly digitalised organisation of work means that public service workers need to acquire and master new (digital) skills in order to adapt to the reconfiguration of tasks and associated skills within their job or occupational category. Digitalisation leads to changes in the nature and distribution of tasks within jobs and occupational groups. The scientific literature generally distinguishes between three main types of work tasks associated with specific skills[18]. The digital skills needed to implement digital tools and processes must be added to these. A Eurofound report (2016) shows that these skills do not exist in isolation, but are specifically and consistently combined, or bundled, in the realisation of the tasks needed to complete the job, and that job quality is strongly linked to task content. Physical tasks show a clear negative correlation with job quality, whereas intellectual tasks have an even stronger positive correlation. Social tasks also have a positive correlation with job quality, but much less so than intellectual tasks (Eurofound, 2016a). Digitalisation impacts directly on tasks and skills, but only indirectly on job substitution. Routine physical tasks are increasingly being replaced by machines, while there is an

[17] Digitialisation could have helped them to cope with a pre-existing physical problem (3.8%), made them less subject to painful working postures (3.6%) or reduced the exposure to the risk of accidents at the workplace (3.2%). 4.9% of workers believe that digitalisation has enabled them to deal with an existing psychological problem (DGQS, Tables 9 and 10 in Annex (Deliverable D3.2)).

[18] A Eurofound study, for example, identifies three main types of tasks that could be impacted by the use of digital tools and methods: (i) *physical tasks* aimed at the physical manipulation and transformation of material things, which use abilities such as strength, dexterity or navigation in unstructured or changing places; (ii) *intellectual tasks* aimed at the manipulation and transformation of information and the active resolution of problems. These involve capacities of information processing, literaracy, numeracy, problem solving through information gathering and evaluation, creativity and planning; (iii) *social tasks* are aimed primarily at interaction with other people. They encompass a range of dedicated areas of application such as serving/attending, teaching/training, selling/influencing, managing/coordinating and also caring (Eurofound 2016).

overall growing need and demand for intellectual and social tasks not easily replaceable by automated machines or procedures, due to the use of digitalised tools and processes (CEDEFOP 2022; Nedelkoska and Quintini 2018; Eurofound 2016).

When asked whether the introduction of digital tools and methods in their everyday work required public workers to develop new (digital) skills, most respondents to the DGQS answered positively (see Table 13 in Statistical Annex (Deliverable D3.3)). They either had to acquire both general and specific digital skills (23%) or only specific skills related to the digital tool used (38.8%). 30% of the respondents already had the required digital skills due to their level of education, while 8.1% said that these skills are not necessary for their job.

With regard to the provision of training by the employer to acquire or develop these new digital skills, approximately one in two workers (54.7%) stated that they had received training, whether only on general digital skills (8.8%) or on specific skills required by the digital tool (28.9%) or both aspects (17%). While 6.1% of respondents claim to have had a combination of formal and informal learning, as many as 39.2% of workers have not received any training from their employer. Of these, 16.7% had not received any training at all and 22.5% said they learned informally at work (on-the-job learning and exchanges with colleagues). This high proportion of untrained workers in the digital sector illustrates the effort that still needs to be made to ensure that all public sector workers are as well-equipped as possible to enter the era of digitalisation of work. This has of course for some time been a major matter for bargaining and tension between the social partners in the public sector.

One question in the DGQS also focused on the respondents' perception of the adequacy of the training received to meet their individual needs in this area. 18.7% of the respondents reported a complete match between the training offered and their needs. For the majority of respondents, the match was partial but regular updates were necessary (58%). Around one in five workers felt that the match was not optimal, either because new training was deemed necessary (10.9%) or because they felt that insufficient resources and time had been devoted to the training of public sector workers (12.3%).

Career prospects and employment security

A fairly high proportion of the respondents to the DGQS survey do not feel that digitalisation has changed their prospects or job security (see Table 15 in the appendix). This is particularly so regarding increased confidence in future prospects (52%), but also for the other items proposed, which received responses ranging from 33.5% (digitalisation is positive for my job security and future prospects) to 41.6% (digital skills reduce my job security). There were strong rates of agreement with some of the positive statements, such as that digitalisation is beneficial for job security and future prospects (42.4%), or that learning digital skills opens up career prospects within the institution (32.3%) but also outside it (37%). However, another large share of the respondents

are more pessimistic. Thus, 45.4% of workers partially or totally agreed with the statement that digital skills reduced their job security. On the other statements, there was partial or total disagreement with regard to improved future career opportunities internally (31.9%) or externally (25.5%), the statement that digitalisation is positive for job security (24.1%) and that the worker is more confident about his or her future prospects (23.7%).

Workers' rights

When asked about the organisation in their workplaces of formal information and consultation procedures concerning various aspects of the introduction and implementation of digital tools and procedures in their daily practice, almost one in two workers in the public sectors surveyed stated that they did not know whether such procedures had taken place (see Table 18 in Statistical Annex (Deliverable D3.3)). The extent of this lack of knowledge varies from 48.8% concerning the holding of an information/consultation procedure on the possibilities and options for the concrete implementation of digitalisation of working methods to 57.4% who did not know the reasons and opportunities inherent to the digitalisation of work. Another significant proportion of respondents stated more categorically that such procedures have simply not taken place (25.7% on average). The observed rates varied from 22.7% to 27.7% for the three proposed topics. Finally, another set of respondents reported that information procedures were indeed carried out (22.7% on average), whether at individual level (7.6% on average), through trade unions (4.2% on average) or through both channels together (10.2% on average).

According to the DGQS survey, one in two respondents felt no pressure to get connected, either because their jobs do not require this (23.5%) or because they do not feel any pressure to connect (30.7%). The workers who reported feeling pressure to connect (45.9%) are mainly workers assuming that this is a personal behavioural choice (22.7%) (see Table 17 in Statistical Annex (Deliverable D3.3)). For 15.3%, the pressure to be permanently connected is only occasional, coming from colleagues (6.3%) or supervisors (9%). 7.8% of the workers in the sector report frequent pressure of this kind, either from supervisors (5%) or from colleagues (2.8%). However, even though the DGQS seems to report relatively low rates of exposure to the obligation to be connected at all times, most respondents strongly emphasised the importance they attached to the right to disconnect (RTD) as a workers' right. Thus, 82.9% of public service workers totally or partially agree that the RTD is an essential right in an increasingly digitalised world of work. In the view of 83.3% of respondents, RTD should be included in labour law, if this is not already the case, and should be one of the subjects dealt with in the social dialogue at workplace level (80.3%) or at sectoral and cross-industry levels (81.3%).

The DGQS also contains a question on the perceived effectiveness of trade unions in negotiating the sustainable management of digitalisation, in the workplace or more broadly in the occupational sector (see Table 19 in Statistical Annex (Deliverable D3.3)). Here too, the majority of respondents

said they did not know whether their unions were effective or not on the matter, either in the workplace (38.8%) or at sectoral level (41.4%). Another large proportion of respondents had a negative perception of their unions' effectiveness in collective bargaining on the digital transition. Thus, 39.9% of respondents said that their unions were not at all or only moderately effective at the workplace level, and 35.8% of respondents said the same about effectiveness at the sectoral level. In contrast, some respondents said that they perceived the unions to be effective or very effective in the workplace bargaining on digitalisation (22%) or in the sector in general (22.8%).

4.2 Impacts of digitalisation in the three public sectors

4.2.1 Electricity production and supply

The public electricity generation and supply sector differs from the other two public sectors considered in this study in several ways.

Firstly, in this public sector, digitalisation and automation have been in place for a longer period of time, due to the strategic nature of the sector but also due to its wide dispersion, especially in the area of power supply. Computerised network management has been in place for a long time in the sector. Due to its strategic nature, the sector has long remained a state monopoly. However, in the second half of the 1990s, as part of the creation of the single market, the EU put an end to the public monopolies that existed in the electricity sector (Directive 96/92/EC of 1996 on the liberalisation of the electricity sector), but also in other sectors such as gas, airports and telecommunications. This liberalisation has taken place at different paces and in different ways in the Member States[19]. In the electricity sector, digitalisation was needed to improve efficiency and safety, monitoring and maintenance, and to have greater control over power generation and distribution. With digitalisation, massive amounts of data can be collected and analysed more quickly and accurately, leading to better decision-making, resource allocation and maintenance or repair.

Second, the electricity sector is also characterised by a high level of decentralisation (production, maintenance and distribution) and faces significant challenges in integrating networks (interconnections) and new 'green' sources of energy (wind and solar). This has led the sector to constantly develop digital solutions to manage interoperability between increasingly numerous and diversified actors (e.g. individual solar power producers).

Third, another specificity, largely shared with the healthcare sector for different purposes, is the increased use of AI and 'intelligent tools' to optimise the control and maintenance of the multiple elements necessary for the production and supply of electricity (e.g. smart grids, smart meters,

[19] The DGQS gives us a rough idea of the diversity that currently exists in the EU. In the DGQS, respondents were asked about the status of their employer (Q8). This shows that public employers predominate in Poland (95.4%) and Hungary (65.6%). In France, public and private employers each employ about half of the workers. In Germany, public and semi-public employers share the market in more less equal proportions, while in Italy a combination of semi-public and private employers predominates. In Finland and especially in Spain, private employers employ most workers (82.2% and 96.3% respectively). Denmark is not considered in the calculations for the electricity sector due to the low sample size.

drones). The energy production sectors are among those where processes guided by AI have developed the most in recent years.
Fourth, a last particularity of the sector lies in the characteristics of the workers. There are significantly higher proportions of male workers, skilled technicians and highly qualified technicians or professionals than in the two other sectors.

The academic literature highlights that the (almost) continuous digitalisation of the electricity sector has had positive effects by enabling this (semi) public service to improve the quality of the service provided. Thus, the electricity sector has become more efficient thanks to the faster and more accurate processing of the plethora of information generated by its functioning, which is expected to lead to better decision-making and resource allocation. Digitalisation also supports real-time monitoring of the situation and planning, as well as improved relations with users (e-billing, e-services). It also allows a better delivery of the service to the users through more interconnected networks in the EU and alternative sources of electricity. The diverse and complementary types of digitalisation also play a role in improving the reliability and the safety of electricity production and supply. The increased capacity to monitor the production sites and network grids in real time allows the optimisation of problem detection, faster planning of an intervention if needed, as well as better coordination of the staff allocated to the intervention (Deljoo et al. 2020; Larsson and Teigland 2020; Madaeni and Mokhtari 2020; Colmenar-Santos et al. 2019). The public electricity production and supply sector also plays a key role in the dual digital and green transitions that will shape the future. The mitigation of climate change effects is favoured by the increasing integration of more environmentally friendly sources of electricity (solar, wind, hydro and tidal powers) but also by the development of safer and well-maintained electricity networks (European Commission 2020a).

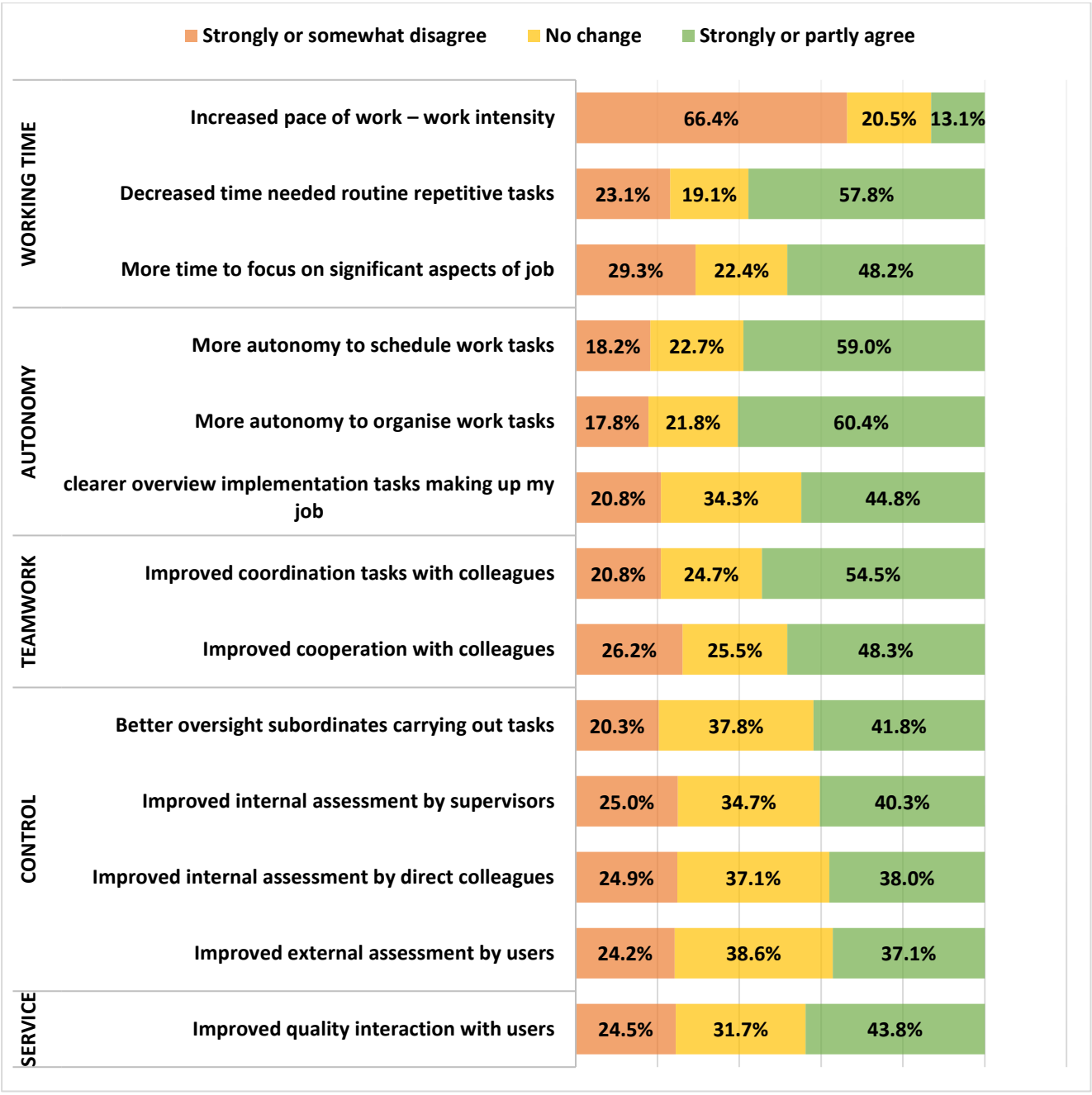
The revitalisation of the electricity sector ushered in by the different waves of digitalisation has also had positive effects for the workers in the sector. On the one hand, efficient and well-functioning networks increase the job satisfaction of workers, their well-being and their safety. Digitalisation can improve the health and safety of workers by preventing exposure to risks (drones, remote monitoring tools) but also through greater flexibility in work schedules and locations, allowing workers to be less vulnerable to commuting accidents while having a better work-life balance and reduced work-related stress. On the other hand, digitalisation can also contribute to increased exposure to physical health risks. Remote public workers are more prone to traffic accidents when commuting. More sedentary workers are confronted with greater risks at their workplaces, linked to the use of digital tools. Digitalisation can lead to overwork, over-fatigue and 'techno-stress', which have consequences on both physical and mental health (Kozlowski & Hultink 2020; Lee et al. 2020).

4.2.1.1 Work organisation

The project survey gives us an initial idea of the assessment of workers in the electricity sector regarding the impact of digitalisation on various aspects of work organisation. With the exception of

the question relating to pace and intensity of work [20], it can be seen that the workers who responded to the survey have a generally positive assessment of the effects of digitalisation on their work organisation (Table 6 in Statistical Annex (Deliverable D3.3)).

Figure 4: Effects of digitalisation on work organisation features – Electricity sector – DGQS survey



Source: DGQS 2022 – Q24 Has the introduction of digital tools/programmes affected each of the following aspects of your work (in the last 5 years)?

[20] As discussed previously, this apparently counter-intuitive observation could be due to respondents rejecting the statement that digitalisation is the main influencing determinant of their pace of work; they may believe that other factors are more significant in generating overload and overtime work, including public funding restrictions; chronic understaffing possibly due to non-replacement of departing staff; restructuring and redundancies; difficulties in recruiting suitable profiles. (see Section 4.1).

The impact of digitalisation is assessed most positively for aspects related to work autonomy (organisation and planning of tasks), the reduction in the time needed for routine repetitive tasks or improved coordination of tasks with colleagues. This is also the case to a slightly lesser extent for items relating to improved cooperation with colleagues or having more time to devote to the meaningful aspects of one's work. The questions concerning the monitoring/control of work are those with the lowest rates of positive evaluation, although about one worker in three gives a positive assessment. On this later aspect of control, the majority of workers have experienced no change as a result of the digitalisation of work tools and processes. Overall, the percentages of workers agreeing in whole or in part with the statements ranged from 37.1% (improving the quality of interaction with users) to 60.4% (digitalisation allows more autonomy in the organisation of work tasks). Nevertheless, about one in four workers in the electricity sector had a more negative perception of the impact of digitalisation on all aspects of work organisation.

According to the results of the DGQS, the public electricity sector workers have a clearly positive view of the contribution made by digitalisation to improving their working autonomy. Nevertheless, the interviews and opinions gathered during the sectoral focus groups organised as part of the project provide a more mixed perspective on the issue.

Autonomy

The positive contribution of digitalisation was confirmed by the focus groups organised in **France, Hungary, Italy and Poland** for instance, which all highlight that technical professions such as electricians now have greater autonomy thanks to the organisation of their daily work through 'digital planning orders' (DPO). They have instantaneous access to all the documentation needed to resolve an issue, or are now able to order specific parts directly from the wholesaler's homepage rather than waiting for the back-office to do this. The digitalisation and real-time monitoring of networks has made the work of the technicians more flexible: they receive maintenance orders directly on their tablet, interact with it and move around individually. This allows them to arrange their working day flexibly according to their preferences. A **French** unionist interviewed recalls however that although the digital tools bring more autonomy, the extent of this autonomy also depends on how far the worker has mastered the technology through qualitative training: *'It is not because you have the tool to be autonomous that you are autonomous'* (France-INT9).

Digitalisation brings flexibility to workers in the electricity sector but also creates some rigidities that reduce their individual working autonomy. The whole chain of work tasks is now digitally categorised in the DPOs, from the initial detection and diagnosis to the resolution of the problem, from the planning of the intervention to the work needed and the time allocated to the task ('digital Taylorism'). The workers of the **Danish focus group** underline that this implies a tendency to 'work-to-the-book' accompanied by a disregard of their professionalism and a reduction in their personal autonomy: *'We are no longer obliged to make professional assessments – the app does*

this for us. It removes our professionalism. It is no longer up to me to say whether the distribution board needs fixing. No one expects me to open and check, you just get a message about it. But when our responsibilities are taken away from us, you also lose the quality of work' (Denmark - FG2). Other sources of rigidity that reduce workers' autonomy were also mentioned by this focus group, such as Global Positioning Systems (GPS) to plan routes for field operatives, which sometimes force them to follow illogical routes that make the journey longer, or the introduction of fixed time-slots for planned interventions, which forces the workers to stay on site even if the work has been completed. The **French** and the **Italian** reports both mention a similar feeling of down-skilling among technicians. The general introduction of DPOs has greatly reduced the autonomy of technicians. If the application's algorithm is set up so that the tasks deemed necessary to do the job required by a field intervention require another technician with higher skills than those of the on-site technician, the latter has to stop his work. This limits problem-solving capacity and learning-by-doing for some workers. The Italian workers interviewed find the guidance apps useful because they explain the work to be done; however, they think that these tutorials reduce the competences of the workforce. Using this application, it is now possible for workers with little experience to perform their duties just following the instructions given by the app. According to the workers attending the Italian sectoral focus group, this has allowed their company to reduce labour costs, as many tasks can be performed by external companies with a less experienced workforce, often belonging to sectors falling under different and less expensive national collective agreements.

The digitalisation of work does not necessarily mean more autonomy for workers and could provoke stress and feelings of down-skilling and demotivation, potentially leading to mental health problems. As expressed by a **French** unionist in an interview: *'In this job, autonomy is not sought. There is no autonomy. In the past, work allowed people to gain autonomy by asserting themselves, by showing off on different tasks and by taking on prerogatives in order to benefit from the famous social mobility, but today social mobility is based on productivity criteria and not on autonomy. Today, productivity has replaced the term intelligence. (…) Software does not allow for human emancipation. The emancipation of the human being is in autonomy and in the ability to adapt. Digital planning greatly reduces autonomy, and therefore the ability to adapt'* (France - INT6). According to another French interviewee (France - INT10), the change in the organisation of technicians' work exacerbated by DPOs is leading to a gradual 'uberisation' of the electricians' jobs. Like workers in the platform economy, they are becoming (bogus) self-employed, as they receive work orders directly on their tablet, leave their homes in the morning and go directly to the site of the task, interact with their smartphones or tablets all day long and sometimes no longer go to a central workplace. As they are responsible for their stock of tools, they have to anticipate and plan variations in their tool stock according to the upcoming tasks. Technicians are becoming like small traders.

For other **French** interviewees (France – INT6, INT8 and INT10) and workers in the sectoral focus group, while digitalisation has enabled some employees to increase their analytical tasks to the

detriment of repetitive and routine tasks, other employees have, on the contrary, experienced an increase in routine tasks. New 'revamped' routine tasks appear with the digitalisation of work. These are routine administrative protocols that the technicians have to perform at the end of each job and each day of work, encoding their working hours and tasks in a digital format, with each task having a specific code. Digitalisation has also led to new routine tasks for employees, especially administrative tasks. The greater segmentation of work tasks as a result of the DPOs has made them more repetitive. Indeed, after each task is completed, the technicians must mark it as 'completed' in the application on the tablet and send live feedback (figures, photos) before moving on to the next task. But the DPOs force technicians to carry out tasks as quickly as possible, with a daily quota and an expected output. Indeed, each task is associated with a maximum intervention time that the technicians must not exceed.

Teleworking (from home) as a means of flexibility in the public electricity production and distribution sector was not mentioned very often by the interviewees or focus group participants. However, the **Italian** report points to its importance in the national labour market in general and the electricity sector in particular. Teleworking significantly and suddenly increased the share of people working remotely during the COVID-19 pandemic period. After the lockdown, the idea of permanently increasing the share of teleworkers gained ground. Electricity companies appreciated the increase in productivity and autonomy due to teleworking, so they pushed to make it permanent. According to an internal survey launched in 2021 by a trade union in the largest company in the sector, 38% of the 1,734 respondents often worked more than the contractual working time when teleworking and 34% felt under pressure or monitored. The same share of respondents (34%) said that they would not like to continue teleworking after the pandemic or, if they did, would like to correct some negative aspects. This opened up two major issues to be addressed by the unions: the need to find a way of measuring the increase in productivity brought about by teleworking and the need to find a solution for those workers who do not want to work remotely on a permanent basis.

Control and surveillance

It is also observed that the increased flexibility and automation of work made possible by digitalisation is accompanied, for the workers, by greater individualisation and responsibility for the work done, as part of a (public) system of work organisation increasingly based on performance and a certain meritocratic pattern of work organisation. Digital tools are used to provide employers with real-time structured information on the individual efficacy of work, enabling them to allocate performance-based incentives (e.g. salary supplements, medal systems for certain colleagues). This point is particularly emphasised in the **Spanish** report and is also concisely expressed by a **Hungarian** unionist: *'In summary, team spirit, teamwork and physical contact are becoming less and less important as digitalisation advances, while surveillance of employees is becoming more and more essential'* (Hungary - INT9).

The issue of monitoring work and workers and the possible (illegal) misuse of confidential information is of course a sensitive subject that is closely scrutinised in the social dialogue processes at all levels. The **French** report points out that while the impact of digitalisation on autonomy is seen as both positive and negative, digital tools have increased control over working time and the course of the employee's day, both in technical and reception jobs (France – INT6). Among technicians, the DPOs have increased the monitoring and control of the technicians' work by the management, thanks to the real-time recording of the technicians and the real-time monitoring enabled by the geo tracking of vehicles, but also due to the use of tools such as tablets, smartphones or smart meters. For administrative workers on reception desks and in call centres, connection times are measured, as well as break times. Supervision is carried out in a pyramidal manner and break times are controlled as soon as a stand-by situation is detected: everything is noted, break times, activity times, inactivity times. Everything is recorded in a report, which is analysed by other software. In the same vein, the **Hungarian** report mentions the existence of procedures for monitoring performance of work tasks, linked to the tracking of workers and work tools. The GPS built into the vehicle and the mandatory data-reporting on the work allows very tight control by the shift supervisors and the management, who receive highly accurate reports on work efficiency. A similarly tight working pace is also typical for customer service jobs, where employees have to answer a set number of customer calls and respond to a set number of email enquiries. Their work performance can be measured and they can also check at any time how much of their daily requirement has been completed (Hungary - INT2, INT5 and INT9). The participants in the **Spanish** focus group from the electricity sector stress that the individualisation of work also means greater dependence on and control by the employer. Digital tools reinforce the direct and indirect monitoring of the hours worked (from the digital clocking system to a traffic light system that assesses the connection activity). Control is also reinforced in the workplace, by means of job reservation systems or the tracking of workers on the customer's premises. In addition, on-site attendance is organised through clocking-in and workspace reservation systems via a mobile application, which are often perceived as surveillance mechanisms (Spain - FG2 and INT10). The **Polish** participants in the electricity sector focus group also expressed their concern that digitalisation could be a tool for surveillance and monitoring of workers, which could lead to privacy violations in the workplace. Awareness that the work done is being closely monitored does not promote work efficiency; on the contrary, it can lead to more frequent errors and mistakes due to the pressure felt by the workers.

Work intensity

According to a **French** unionist interviewed, digitalisation and the introduction of new digital tools speed up the pace of work for certain professions. This often leads to increased productivity and time savings. However, these time savings are not always reflected in a reduction in working time, but rather in an increase in the number of tasks performed by employees. For certain jobs, employees can have up to 15 applications open on a maximum of 5 screens, which increases the intensity of the work. The project manager attending the sectoral focus group explained that the

increasing intensity of work comes from the stacking of communication channels, with different employees using different channels which do not communicate with each other (Teams, WhatsApp, e-mails, etc.). In addition, the massive influx of e-mails also contributes to the increased work intensity via 'information overload', as well as to the increase in working hours. However, the same interviewee acknowledged that digitalisation can lead to a gain in productivity and therefore in time. It has simplified the search for information for employees in the HR department. With the digitisation of employees' files, the search for information is no longer physical (looking for administrative files in drawers). Tasks are simplified and fewer in number, which saves time on specific actions, but again it does not result in a reduction in working hours. Nevertheless, the human resources employee interviewed in FG1 notes that the updated versions of certain applications crash regularly. For example, the payroll software crashes every month. When this happens, all digital tools are stopped; the stoppage can last for 2 or 3 days and reduces productivity gains. Managers and even supervisors have 'umbrella' applications that combine all business applications into one, allowing them to organise themselves more efficiently and save time. However, these time savings do not result in a reduction in working hours, since digitalisation encourages professional and managerial staff to work more (France – INT6).

The **Italian** report highlights that digitalisation has allowed the company to rely more on digital tools such as smartphone applications to coordinate and guide the work to be performed. This has had two major consequences for workers in the field: the number of people in the team has been reduced (from 4-5 to 2-3) and they have to monitor their work step by step. The combination of these two factors has resulted in an enormous increase in work intensity. The manual and technical work to be done is the same but now they have some additional tasks linked to the monitoring activity (Italy - FG1). According to the discussions in the Italian sectoral focus group, work intensity has increased for field workers as the number of tasks have expanded, which often leads to a need for overtime (paid). **Spanish** interviewees also underscore that the workload has clearly increased, in a model of work organisation that prioritises meritocracy and presses for individual shouldering of responsibilities, promoting greater involvement, in terms of workload and working time, on the part of employers. The company uses the digital option to ensure that workers are permanently aware of business needs (INT9 and 10). As summarised by a **Hungarian** participant in the sectoral focus group: *'Just because we can do our jobs faster through better work organisation, it does not mean that we work less, we only have less time to do a task'* (Hungary - FG10).

The **Danish** report recalls that while the overall assessment is that new digital technologies are helpful when applied and implemented in the right manner, there was a wide-spread agreement in the sectoral focus group that this is currently not fully achieved. Numerous examples of malfunctions and misleading information were given. This however might reflect the tendency to take more notice of technology when it is not working. The report suggests that this is not a technological issue but mainly an organisational and managerial matter of how the technologies are implemented, used and

handled. As an example, administrative tasks are increasingly handled by individual workers, thus requiring what one worker labelled a 'chain-reaction' between a multitude of stakeholders within the company to ensure proper procedures. Overall, digitalisation has transformed everyday routines, with more administration and less communication, and has potentially increased the workload. As such, it can potentially affect the well-being of all workers, as tasks now have a more digital dimension, whereas the intra-human aspect has decreased, and the administrative tasks are seen by some workers in the sector as stressful (Denmark - INT10 and FG2).

While highlighting that digitalisation has reduced work intensity, according to the majority of the interviewees from the electricity sector, the **Polish** report singles out a profession for which this it not the case: the network dispatchers, whose job is to manage and monitor all network parameters. This 24/7 work - three shifts a day – has a high work intensity requiring a high level of focus and attention. New technologies have made it possible to digitalise all elements of the network and, as a result, the dispatcher is exposed to an enormous amount of data, which has to be received, classified, interpreted and then reacted to. Digitalisation has therefore intensified the work of the network dispatcher.

Electricity as a public service

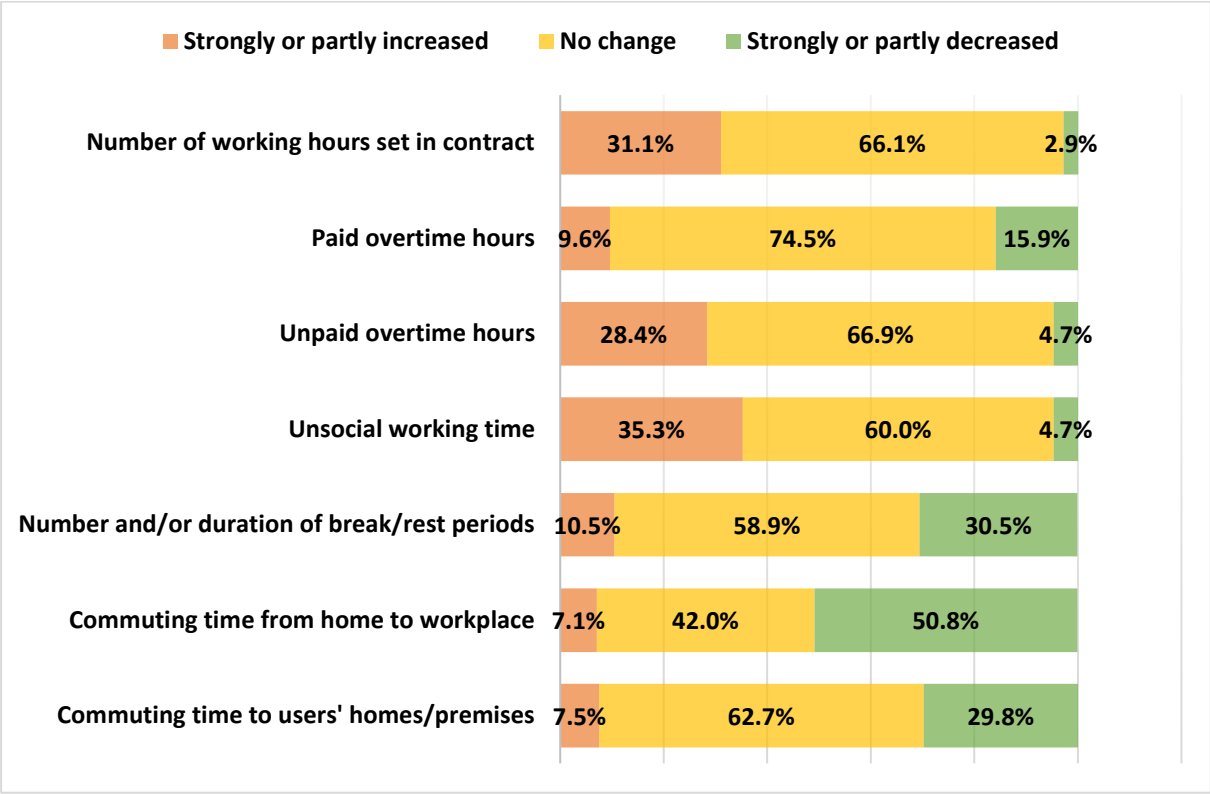
The **Polish** report underlines that digitalisation is generally viewed positively by interviewees and focus group participants as an instrument for modernising energy production and distribution, and even as a prerequisite for functioning in the modern world. The interviewees emphasised that the introduction of the latest digital solutions and their constant updating improves the efficiency of the electricity network, the quality of the public services provided, but also working conditions. One interviewee stressed that: *'It is difficult to imagine the energy sector without modern digital technologies. It is a matter of civilisation and a matter of energy system security to maintain critical infrastructure at the highest level and at the same time to provide the highest quality public services. There is no going back to analogue solutions'* (Poland – INT5).

According to the German report, the interviewees underline the importance of the electricity sector and the provision of services for public welfare and the meeting of basic needs. The focus should be on public welfare, not just economic and competition-related issues. They emphasise the importance of the human factor in the digitalisation process and call on decision-makers in the companies and departments to not simply buy the latest thing, but to make only necessary investments in safe technology.

4.2.1.2 Working time

Among the respondents to the DGQS from the electricity sector, the predominant assessment is that digitalisation has not affected the working time of the workers, as illustrated in the figure below.

Figure 5: Effects of digitalisation on working time features – Electricity sector – DGQS



Source: DGQS 2022 – Q25 How much has the introduction of these digital tools and processes impacted the following aspects of your working time?

In the DGQS survey, the main perception is obviously that digitalisation has not changed the major aspects of contractual working time. The size of the group of respondents expressing this lack of impact ranges from 42% who said there had been no impact on commuting time from home, to 74.5% who reported no impact on paid overtime hours (see Table 7 in the Annex (Deliverable 3.2). The most positively evaluated aspects are the reduction in commuting time to or from the workplace (50.8%) or in travel to users' premises (29.8%) and the extension of the number of break/rest periods (30.5%). Among the most frequently mentioned negative aspects were the perceived increase in the number of working hours in general (31.1%) and also the increase in unpaid overtime (28.4%), as well as unsocial working hours (35.3%).

The interviews conducted in the electricity production and distribution sector through the national reports make little direct reference to the issue of exceeding contractual working hours per se, even though they refer to the work overload described in the previous section.

The **French** report, for example, indicates that digitalisation seems, on the whole, to increase the working time of managers and employees in the electricity sector. Working time is being extended through both increased work intensity and work overload. As employees experience a 'tunnel effect' (i.e. they are so focused on their screens that they do not see the time passing), this increase in workload often leads to an overrun in working hours. Moreover, as the increased workload prompts employees to follow e-learning courses or read notes from the management during their lunch

breaks or after their working day, this means having to work longer hours if they want to complete the training or professional obligations (France – INT9 FG1).

The **Danish** report also mentions the overtime experienced by technicians due to the increase in additional tasks and duties to be carried out during normal working hours, as well as the greater frequency of work assignments arising at the end of the working day. This is arguably also linked to a lack of manpower in the sector, which results in many tasks being handled by fewer workers (Denmark – INT6 INT10 FG2).

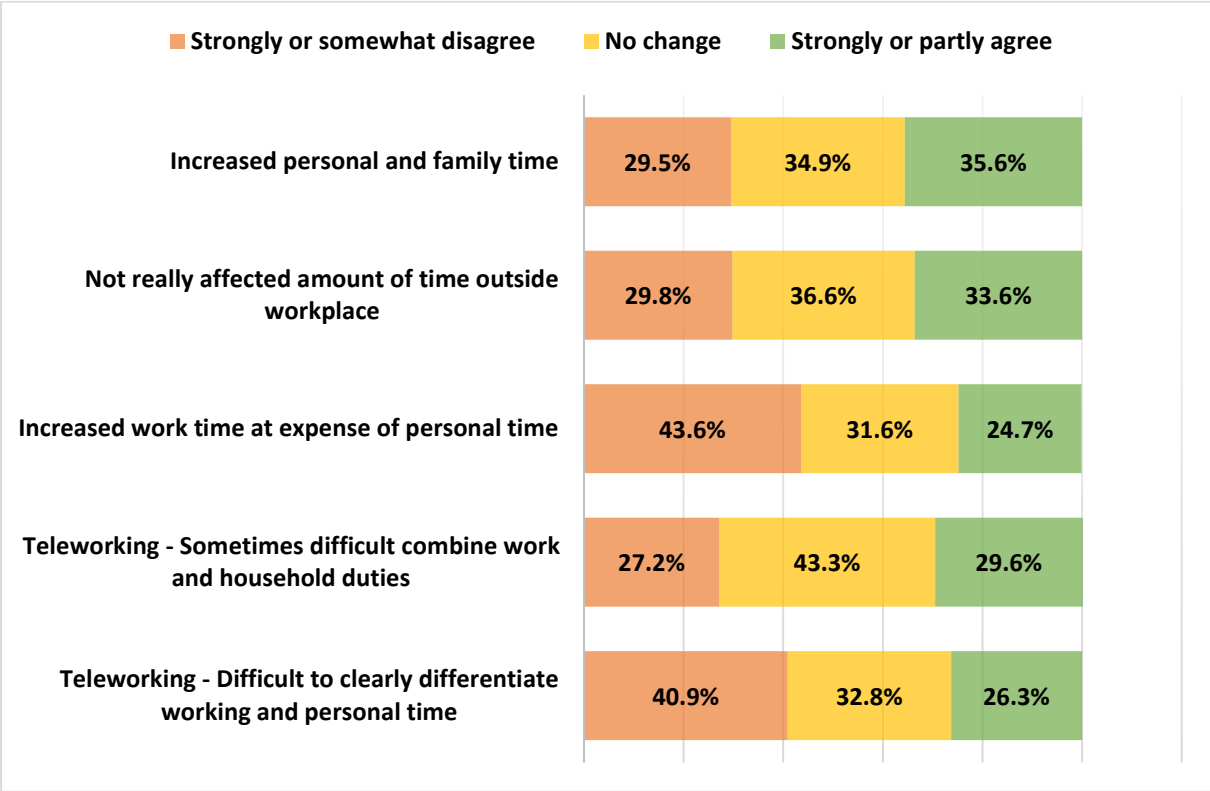
The interviewees in the **Spanish** report point to an upward trend in the working hours of workers in the sector. Digitalisation of the monitoring of working hours (digital-clocking) does not take account of extensions to working hours, even though initially, according to the legislation, it was supposed to regulate fairly the time spent at work. The employer considers that it is the workers who are responsible for exceeding their working hours. The **Polish** report also makes reference to an overtime problem for electricians, which is considered by an interviewee as making up part of their jobs, particularly in the event of breakdowns that need to be repaired urgently.

The extension of working hours, particularly during the pandemic period, is also mentioned by a **German** unionist interviewed: *'Mobile working can be described as both a blessing and a curse. Although employees were able to save on commuting to work, the workload continued to increase enormously. Time pressure and work intensity increased. Lack of contact between colleagues as well as cancellation of the division of working time and free time has burdened the employees. Many employees were given business cell phones, which they could not switch off after working hours. Constant availability and on-call periods for duty rosters increased'* (Germany - INT3).

4.2.1.3 Work-life balance

In the responses to the DGQS, the assessment of the effects of digitalisation on the work-life balance of workers in the public electricity production and supply sector is distributed more or less equally between three groups of respondents, as illustrated in the figure below.

Figure 6: Effects of digitalisation on work-life balance – Electricity sector – DGQS



Source: DGQS 2022 – Q26 How has the digitalisation of your work affected your work-life balance?

As observed for the overall results of the DGQS survey, the respondents are relatively evenly distributed between the different assessments (see Table 8 in Statistical Annex (Deliverable D3.3)). A first group of respondents felt that digitalisation had not changed their work-life balance. Views were split, 29.6% said it is sometimes difficult to combine work and household duties and 70.2% either agreed with the statement that digitalisation has not really affected the amount of time outside the workplace (33.6%) or reported no change (36.6%). A second set of responses gave positive assessments of the effects of digitalisation on their work-life balance, by strongly or partially agreeing with the suggestion that it has increased the time available for themself and their family (35.6%) or, on the contrary, disagreeing with the idea that digitalisation may have increased working time at the expense of personal time (43.6%). For those who telework, there was a similar strong or partial denial that teleworking makes it more difficult to combine work and home obligations (27.2%) or to set clear boundaries between personal and work time (40.9%). Finally, a last group of respondents from the electricity sector think that digitalisation has had a negative impact on the work-life balance. 24.7% of the respondents agree that digitalisation has increased working time to the detriment of personal time while 29.4% deny that it has increased their personal time. 29.8% of the respondents also deny that digitalisation has not affected the amount of time spent outside the workplace. Respectively 29.6% and 26.3% of the teleworkers totally or partially agree that digitalisation makes it more difficult to combine work and household obligations or to set clear boundaries between personal and work time.

The **French** report recalls that the pervasive omnipresence of digital tools or methods in the everyday practice of workers in the electricity sector can put further pressure on employees' personal lives and lead to blurring of boundaries between their personal and professional lives. Individualisation and personal responsibility for work means that workers are more isolated from their colleagues and their managers. Thus, in order to maintain hierarchical social relations and allow for continuity of communication, 'WhatsApp' groups have been created, reflecting a new mode of operation and management. These digital modes of interaction mean that workers are contacted outside working hours (France – INT10).

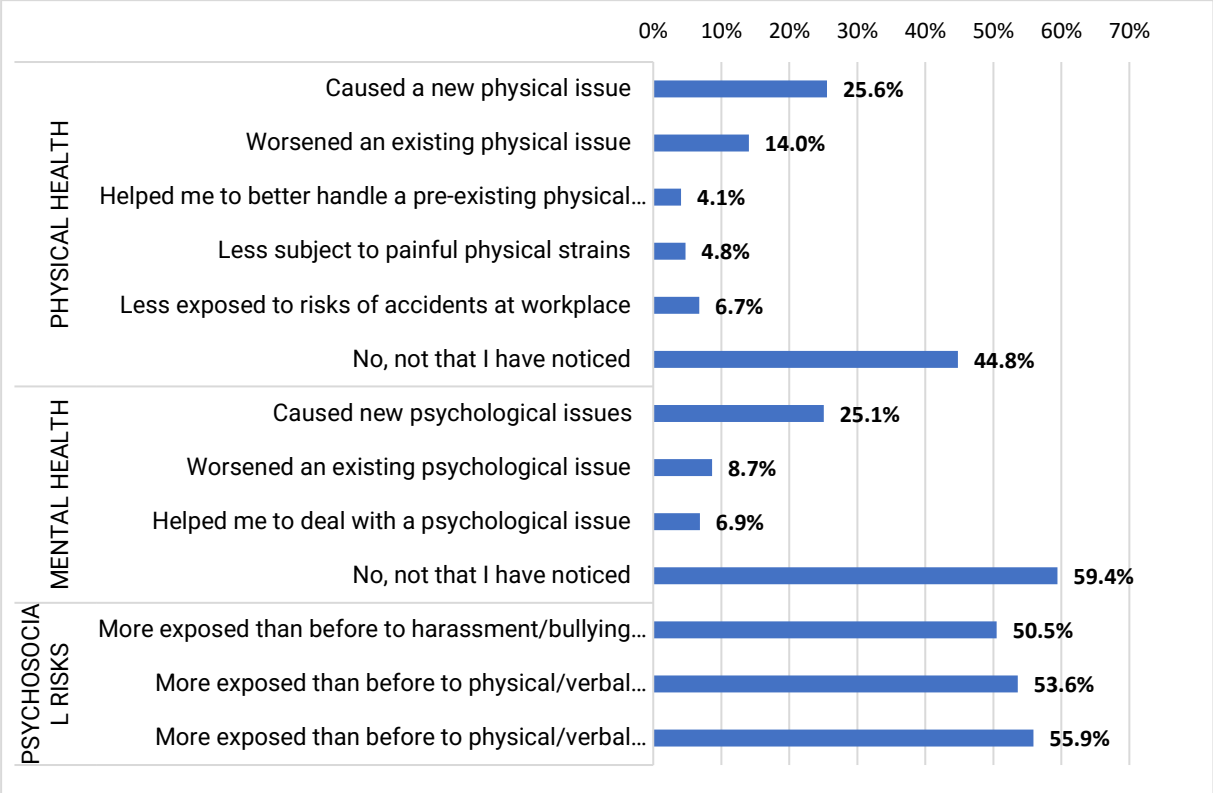
The **Spanish** interviewees from the sector recall that although teleworking was supposed to facilitate the reconciliation of personal and family life, the pandemic months showed that in practice it could lead to an increase in working hours. They underline that teleworking should be accompanied by the digital disconnection agreement and another one currently being negotiated on flexibility (Spain - INT10).

In the **Hungarian** report, some interviewees acknowledge that combining work and private life can be challenging, as employees typically do not finish their work by the end of the working day or work even in the evening or at night, to try to catch up on work, finish their remaining tasks or fulfilled additional short tasks recently received. As these situations have led to conflicts in many cases, employees have had to find different solutions (for example insisting that they would only work in official working hours, not working/answering the phone/checking emails after a certain time (Hungary - INT6). These questions are expected to become even more important, and the number of training courses and coaching sessions on this issue may well increase in the near future (Hungary - INT3). In a home environment, it is much harder to separate home and work and to tell how much time a worker is spending on home tasks and how much on work. Women in particular tend to do household work during the day and therefore work after the official working hours, even at night, in order to finish their daily work (Hungary - INT6). It is also sometimes difficult to separate work and private life when only one spouse works from home. Some households found it challenging to accept different working patterns within the family, for instance teleworking after official working hours while the spouse has already finished his or her work (Hungary - INT4).

4.2.1.4 Health outcomes

The following figure illustrates that the majority of the respondents to the DGQS survey from the electricity sector feel that digitalisation has had a neutral effect on their health outcomes, reporting that they have not experienced any changes in their physical (44.8%) or mental (59.4%) health that could be related to digitalisation.

Figure 7: Effects of digitalisation on physical and mental health – Electricity sector – DGQS



Source: DGQS 2022 – Q31 and Q33 Do you feel that the introduction of digital tools and methods in your daily routine has had an impact on your (respectively) physical or mental health?

The majority of survey respondents from the electricity sector indicate a neutral effect of digitalisation on health. However, despite this overall trend, many respondents from the electricity sector also report that digitalisation has either caused a new physical problem (25.6%) or aggravated a pre-existing problem (14%) (see Table 9 in Statistical Annex (Deliverable D3.3)). As a result, no less than 39.6% of respondents in the sector point to a physical problem related to digitalisation. For a much smaller number of workers, the digitalisation of work has also had positive effects, reducing painful working postures (4.8%), enabling them to better manage a pre-existing physical problem (4.1%) or helping to reduce the risk of accidents in the workplace (6.7%). When asked about the nature of the physiological problems encountered, the main physical disorders reported by electricity sector workers are vision problems (19.6%), neck pain (16.9%) and back pain (18.4%), followed to a lesser extent by headaches and physical fatigue (around 12%) (see Table 11 in Statistical Annex (Deliverable D3.3)).

The situation is quite similar with regard to mental health. For almost 60% of workers in the electricity sector, the digitalisation of work has not affected their mental health (see Table 10 in Statistical Annex (Deliverable D3.3)). But for one in three workers, digitalisation has led to new mental problems (25.1%) or aggravated one or more existing problems (8.7%). Only a small fraction of respondents point to a positive effect of digitalisation in remedying a pre-existing problem (6.9%).

The main problems mentioned in the survey are mental fatigue (23%), stress (18.5%), demotivation (15.2%) and anxiety (14.6%) (see Table 11 in Statistical Annex (Deliverable D3.3)).

The exposure to psychosocial hazards and risk factors is linked to poorly organised and managed work environments (e.g. excessive workloads, tensions with colleagues and superiors) which can have negative psychological, physical and social consequences for workers, such as musculoskeletal disorders, stress, burnout or depression. These deficient work environments can also lead to or intensify harmful social behaviours such as harassment, bullying, verbal and even physical aggression from colleagues, managers or users. By allowing more fluid, instantaneous interaction and communication, but also increased surveillance of the work done, the digitalisation of work tools and practices can cause or amplify these adverse practices and thus increase exposure to psychosocial risks. This feeling is expressed by almost half of the respondents from the public electric sector in the DGQS, referring to either harassment or bullying by colleagues and managers (50.5%), but also exposure to verbal or even physical violence by colleagues and managers (53.6%) or by public service users (55.9%) (see Table 12 in Statistical Annex (Deliverable D3.3)).

The national reports generally agree in highlighting the positive contribution of digital tools and devices to the physical health of workers in the public electricity sector. For example, the **Italian** report mentions several times the reduced risk of accidents for electricians due to the use of drones and the reduced risk of traffic accidents that this entails. The **Hungarian** report also mentions the improved protection of electricians and technicians resulting from the use of work vehicles equipped with automatic checking and intervention devices. The **French** report indicates that for workers in nuclear power stations, the use of virtual reality devices reduces the risk of exposure to radiation and improves efficiency by eliminating the need to wear personal protective equipment and by saving time spent travelling to the site. For administrative workers in the electricity sector, the digitisation of paper documentation has significantly reduced the number of workplace accidents and the occurrence of certain musculoskeletal disorders among workers.
Little is said in the information collected through the national reports on the adverse effects of digitalised work on physical health of the workers in the electricity sector, with the bulk of considerations being rather on mental health issues. According to the participants in the **Spanish** sectoral focus group, there has been an increase in some physical problems, such as back, head or neck pain. They point out that some of the physical workload, especially in distribution, has been outsourced so cannot be seen in surveys or records. On the other hand, delegates believe that there is an increased risk associated with the lack of human control of the use of electrical equipment to be used by technical staff. Eight out of ten participants in the **Hungarian** focus group report a deterioration of their vision or back pains.

However, the interviews and national focus groups for the electricity sector focused above all on the impact of digitalisation on the mental health of workers.

The **French** report discusses in some detail the negative impacts of digitalisation on mental health in the electricity sector. One interviewee reports an observed increase in the number of psychosocial risks and incidences of burnout (declared and undeclared), particularly for call centre employees in the electricity distribution sector. He underlines the psychosocial risks linked to the very fast pace of work and output demanded and the reduction in the time between two calls (from 30 to 20 seconds). According to him, the reduction in break times speeds up the pace, does not allow workers to relieve pressure between two calls, and can lead employees to botch the forms, which can mean a risk of customer dissatisfaction. The reduction in break times leads to a build-up of pressure, and at the end of the day employees are exhausted and there may be a risk of burnout. In addition, the response rate has to be 100%, which increases the stress on employees (France – INT6). Moreover, the psychosocial risks felt by some workers stem from their feeling of being obsolete, of being downgraded, which has an impact on mental health and on their self-esteem: *'People are saturated by all the digital tools. Employees find it difficult to cope with all the new applications. It gives some employees the impression that they are obsolete. You have to put meaning and reason behind digital tools. But as digital tools will be part of the future, we need to rethink their use'* (France – INT8). Similar concerns are expressed for employees in the HR department of the electricity production sector. The increase in productivity resulting from the digitisation of administrative files generated a record rise in the number of days of sick leave in the support services department of the largest public employer in the sector. Among managers and supervisors, it is the inability to disconnect that triggers psychosocial risks (France – INT8 and FG1).

The **Spanish** report highlights a general perception among interviewees and FG participants that the increased pressure on workers stems from a clear intensification of work, which in turn implies higher levels of stress, anxiety and even burn-out. However, they associate this with both the organisation of work and the incorporation of new technologies. The **Hungarian** reports an interviewee as saying that a stressful job can also lead to premature burnout, frustration, high turnover rates and other health issues. These are not only harmful for the employee, but also have a negative effect on the employer, given the high costs of recruitment and training in addition to the skills lost with the senior employee. Other interviews note that among older workers there is a feeling that they cannot entirely adjust to the rapid changes, which may lead to frustration and mental stress in a highly digitalised world (Hungary - INT 1 INT4 INT5). The **Polish** report recalls that while digitalisation reduces stress levels for some categories of workers, particularly the electricians, thanks to the flexibility of the digital planning system, this is not the case for network dispatchers, who had to learn to process an increasing amount of information and react appropriately in a short period of time.

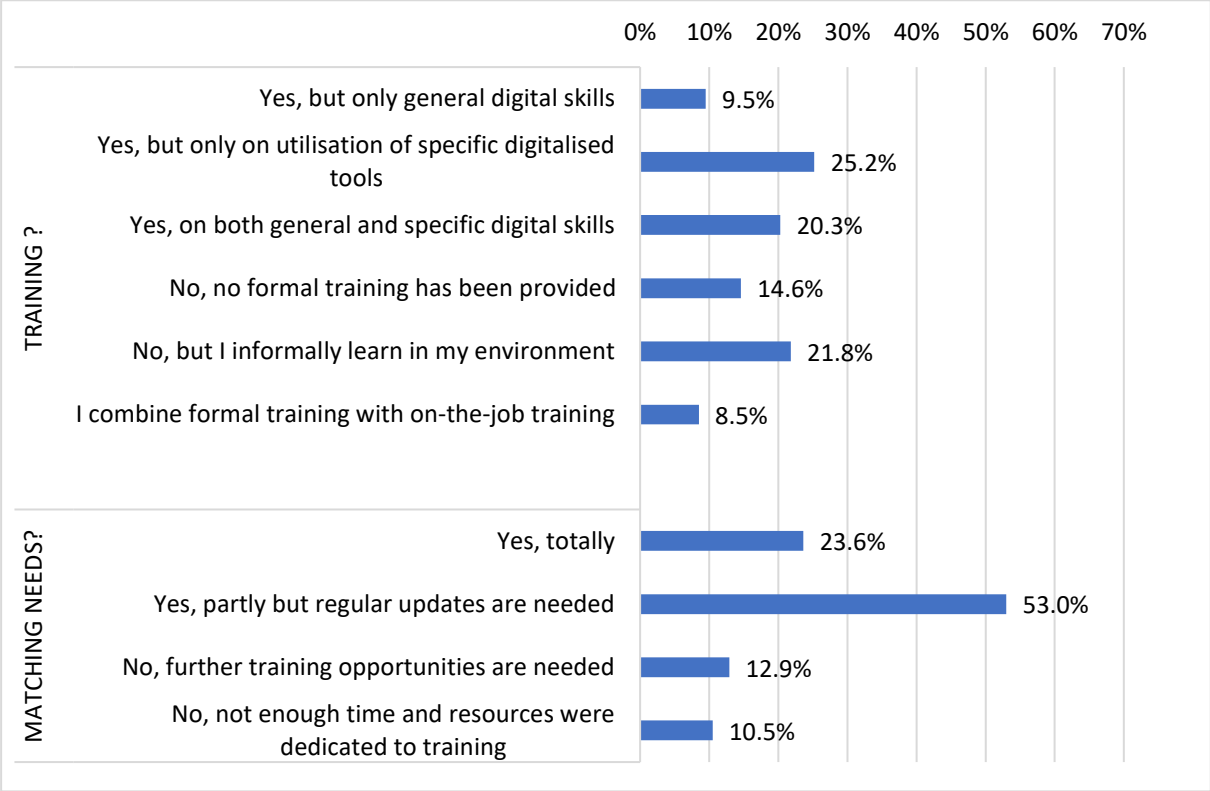
In another vein, the **Danish** report, discussing mental wellbeing concerns expressed in the interviews, recalls that a more digitalised everyday working routine may remove human interaction and consequently, aspects of information, recognition and relationships. One unionist interviewed

emphasises that collectivism among workers may therefore potentially be harder to establish, which may also ultimately cause a decline in union membership (Denmark - INT10).

4.2.1.5 Skills and learning

In order to adapt to the reconfiguration of tasks and associated skills within their job or occupational category, the public service workers in the electricity production and supply sector need to acquire and master new digital skills. The DGQS survey includes a number of questions on skills, related to their perceived usefulness, the training actually received and the extent to which it matched their personal needs.

Figure 8: Provision of training on digital skills and matching with individual needs - – Electricity sector- DGQS 2022



Source: DGQS 2022 – Q28 Have you received training from your employer to acquire or develop the new required skills? + Q29 Do you think the training provided matched your needs?

When asked if they feel that the introduction of digital tools and methods in their everyday work requires them to develop new digital skills, most respondents from the electricity sector answered yes[21]. They either had to acquire both general and specific digital skills (18.8%) or only specific skills related to the digital tool used (36.2%). No less than 37.7% of the workers answered that they already had the required digital skills due to their educational background. Only a very small share

[21] The results for this question are not shown in Figure 14 but can be found in Table 13 of the Annex (Deliverable D3.2).

of workers felt that digital skills are not necessary for their jobs (7.4%) (see Table 13 in Statistical Annex (Deliverable D3.3)).

While the majority of respondents from the electricity sector feel that digital training is useful, they still need training from their employer. In the electricity sector this is true for approximately two thirds of public workers (64.5%), who stated that they had received training from their employer to acquire or develop new digital skills. This training could focus on general digital skills only (9.5%) or on specific skills linked to the digital tool (36.2%), or on both aspects (18.8%). 8.5% of respondents said they combined formal training with on-the-job training. However, no less than 36.4% of workers in the electricity sector reported that they have not received any training from their employer. Among them, 14.6% have not received any training at all and 21.8% report that they learned informally at work (on-the-job learning and exchanges with colleagues (see Table 13 in Statistical Annex (Deliverable D3.3)).

Another DGQS question focused on the respondents' perception of the adequacy of the training received in relation to their individual needs in this domain. 23.6% of the respondents from the public electricity sector reported a full matching between the training offered and their needs. For the majority of respondents, the matching was partial but regular updates are necessary (53%). Around one in five workers felt that the matching was not good, either because they felt they needed further training (12.9%) or because they felt that not enough resources and time had been devoted to the training of public sector workers (10.5%) (see Table 13 in Statistical Annex (Deliverable D3.3)).

In the national reports produced as part of the project, the interviewees and sectoral focus group participants generally acknowledge the usefulness of digital learning in the current world of work, as well as the major role that digital training tools play nowadays in implementing digital learning. A general upward trend in the training provided through e-training systems is reported.
The **Polish** report is quite positive about the quantity and quality of learning in the electricity sector. It states that when asked about their level of satisfaction with training, interviewees indicated that the employer's actions are necessary and helpful, while the employees are mostly satisfied with the knowledge and skills provided. Workers want to be given training, while management understands that effective implementation of technological changes requires preparation of employee teams and operational support of these teams. The employer always provides training to accompany the introduction of new technologies. Employees are generally satisfied with the training and tend to feel prepared to work with the new tools (Poland - INT4). However, the participants in the sectoral focus group also emphasised the need to tailor individual digital programmes not only to the specifics of work, but also to the needs of the workers who will use the technologies on a daily basis. Respondents pointed to insufficient consideration of these needs, as well as the incompleteness of

the process by which developers create digital solutions. The design process should, from the outset, include a stage of modification and consideration of employee feedback.

Several of the national reports (e.g., **France, Hungary, Poland, Italy**) also highlight certain positive contributions of digitalisation, such as drones and other digital monitoring and intervention equipment, or the use of virtual reality devices to train workers, particularly technicians working in nuclear power plants.

The **French** report points out that the trade unionists interviewed describe a sharp increase in (online) training in digital technologies, particularly in the largest public electricity production company. However, less positive aspects are also mentioned. The participants in the French sectoral focus group appreciate the possibility to develop new skills thanks to the e-learning courses. In their view, the training sessions are more helpful for administrative tasks (such as HR) than for technical skills (such as those related to technicians' work on electrical equipment). They also find that the e-learning is of very low quality and seems to be used to reduce costs and to relieve the employer of liability in case of accident (France – FG2). One unionist interviewed, while praising the usefulness of virtual reality devices for the training of technicians in nuclear plants, points out that although increasingly realistic, these virtual training tools should not be used across the board and take the place of face-to-face training. Trainers need to analyse non-verbal elements, such as stress or apprehension, when assessing trainees. *'This training provides know-how but does not provide all the skills. Digitalisation is not everything and the process of acquiring know-how must be based on real practice'* (France - INT9). The same interviewee indicates that e-learning courses are often taken outside working hours and therefore extend working hours. In his opinion, they are often not completed. This results in a deterioration in collective skills in non-certified technical areas (e.g., team training). Another interviewee reports that the e-training is of poor quality and can lead to errors in technical procedures. There is also a loss of skills due to the increase in e-learning. The number of training courses has been reduced, there is very little practical experience and more accidents. Instead of training, employees train informally, through 'frictional training' (employees who have mastered the tools train others informally) (France – INT8).

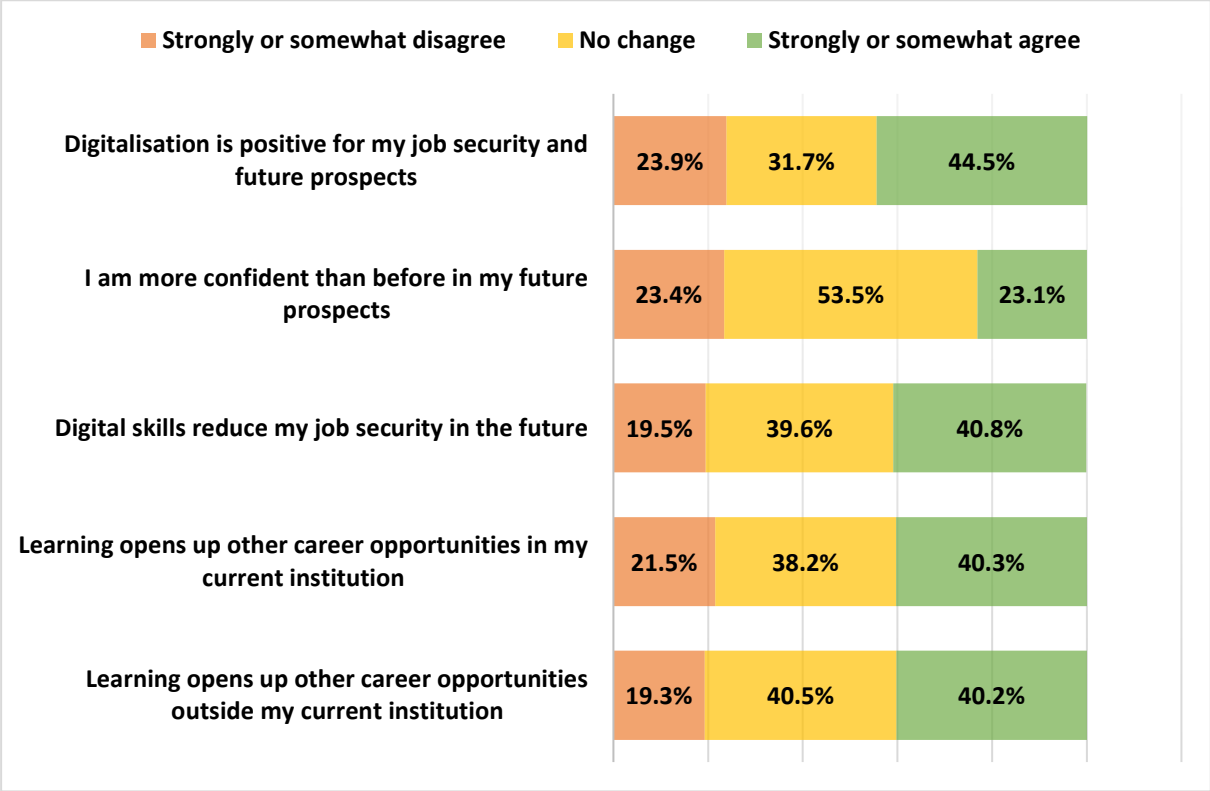
In the **Hungarian** report, several interviewees also expressed a negative view on the quality of e-training, particularly because of the depersonalisation associated with the use of digital tools, which involve standardised information, a lack of contact and, above all, no productive interaction with the trainer. The information received is standardised and there is a lack of community feeling; participants in these e-training sessions miss being inspired by the personal commitment and excitement of the teacher (Hungary – INT5). Another interview underlines that, combined with the absence of on-the-job training in the sector, this use of virtual training leads to the flattening of knowledge levels. In addition, test-type examinations do not provide accurate feedback on the candidate's real knowledge. (Hungary - INT9). Digitalised training can also generate inequalities in the workplace, as stated by another unionist interviewed. He recalls that while most employees

enjoy the flexibility of online training (they can choose the date and the starting time according to their preference), those who are less familiar with the digital world miss personalised training. Older people find it harder to complete or pass online tests, especially if they contain effects that are obvious to the younger generation who grew up in a digital world (Hungary – INT6).

4.2.1.6 Job security and career prospects

The DGQS survey highlights polarised attitudes among the respondents from the electricity sector regarding the influence of digitalisation of work on their job security and career prospects, as shown in the figure below.

Figure 9: Perceptions of job security and future prospects – Electricity sector- DGQS 2022



Source: DGQS 2022 – Q30: Do you think that learning these new skills required by digitalisation … ?

For a first group of respondents, the main feeling is that digitalisation has not affected their job security or prospects (see Table 15 in the appendix). This group ranges from 31.7% for those who say that digitalisation has not affected their job security and future prospects, to 53.5% who report feeling no change in their confidence concerning their future prospects. Another group of respondents express a positive perception of the impact of digitalisation on their job prospects. Large shares of respondents agree with, for example, the statement that digitalisation is positive for job security and future prospects (44.5%), or that learning digital skills opens up career prospects within their current institution (40.3%) but also outside it (40.2%). Finally, another set of respondents from the electricity sector are more pessimistic about the future. As many as 40.8% of workers partially

or totally agreed with the suggestion that the rising need for digital skills reduces their future job security. Around one in five respondents disagree totally or partially that digitalisation will enhance their future career opportunities, either internally (21.5%) or externally (19.3%), deny that digitalisation is positive for job security (23.9%) and claim no increase in confidence regarding their job security and future prospects (23.4%).

Interviewees from the **French** public electricity production and distribution sector emphasised the decisive role played by vocational training in workers' career prospects. According to one of the trade unionists interviewed, there is unequal access to relevant information, caused by the huge increase of optional and online information flows, in a context where employees do not have the time to read and sort the information. This has consequences on career prospects: *'The person who masters the knowledge is the one who is most likely to become more competent and therefore to progress in his career. Access to information is access to power. The availability of information, which is optional and online, hinders employees' access to knowledge because they do not have the time or the obligation to seek out this information. Without information, career development is hampered'* (France - INT9). This opinion is shared by another interviewee, who pointed to the importance of the mastery of digital tools, and identified a potential vicious circle between digital literacy, access to e-learning and career development (France – INT10). Another interviewee is less pessimistic regarding the effects of digitalisation on future prospects, underscoring that the growth in e-learning training courses has not had any influence on employees' career prospects, as the employees who are reluctant to take e-learning courses are older employees who have already climbed the ladder (France – INT7).

4.2.1.7 Workers' rights

According to the DGQS survey, more than half the respondents from the electric sector do not know whether a formal information and consultation procedure has been organised at their workplace, nor the reasons to digitalise work (52.2%), nor the practical possibilities (40%) or about the process of implementation of digital working methods and tools in itself (42.3%) (see Table 18 in Statistical Annex (Deliverable D3.3)). Moreover, between 19.4% and 25.7% of the respondents declare that no procedures of information and consultation were followed. Among the workers who have experienced such a procedure, this occurred, depending on the topic, at individual level for 5.8% to 8.1% of the workers, through trade unions for 7.2% to 8.8% of them, or through both channels for 15.5% to 18.8% of the respondents.

According to the **Spanish** report, the people interviewed do not consider that collective rights to information and consultation have changed substantially due to technological change. But workers attending the sectoral focus groups highlight the lack of information mechanisms prior to the implementation of new systems or digital tools, involving either the workforce or the trade union representatives (Spain - FG2). The focus group believes that trade union activity has become very

difficult without direct contact, hampering the capacity to build a properly committed solidarity network. Some of the interviewees point out that the new technologies facilitate communication between unions and staff. There are new opportunities for holding mass training meetings or the collection of information by trade union representatives (Spain - INT9 INT10). The **Polish** report indicates that according to the interviewees and the sectoral focus group, workers in the sector are rarely consulted on digitalisation plans, strategies and their implementation. They explain also that digitalisation processes have not been the subject of collective labour agreements or work regulations, with the exception of the introduction of data protection procedures, which have been enforced by pan-European regulations. The general impression is that information is passed on after the event, hence the need for negotiations and agreements on issues such as telework, digital disconnection and flexibility (Poland - INT9 INT10 INT12 and FG2). The **German** report describes the assessment of the trade unionists interviewed of the impact of the COVID-19 pandemic on trade unions representing the interests of workers in the electricity sector. The contact with works councils, employees and shop stewards was sometimes lost because they could not be reached when working from home, and since the trade unions were not allowed to use internal company communication channels. Some economic sectors (e.g. the rubber and chemical industries) have been able to negotiate agreements between the social partners to allow trade unions to use the company information channels to inform their members, but no such agreement exists in the electricity sector. Since the relaxation of the pandemic-related restrictions, the situation has improved, but it depends on what will happen in the near future (Germany – INT1 INT4). The **Hungarian** report also reports the difficulties experienced during the pandemic period. Four out of five respondents think that this has negatively affected membership, as there was no sense of community, team spirit was eroded, and individual instead of union interests came to the fore.

For around a third of the DGQS respondents from the electricity sector, the pressure to remain connected at all times is not seen as an issue, either because their jobs do not require a connection (8.7%) or simply because they do not feel any pressure to connect (28%) (see Table 17 in Statistical Annex (Deliverable D3.3)). The workers exposed to pressure to connect (36.5%) are mainly workers assuming that this is a personal behavioural choice (27.3%). 24.3% say that the pressure to remain connected is only occasional, coming from colleagues (9.3%) or supervisors (15%). But for 11.7% of the workers in the sector this pressure is frequent, either from supervisors (8%) or colleagues (3.8%). However, even though the reported percentages of those required to be always connected may appear relatively low in the DGQS, most respondents strongly emphasised the importance they attached to the right to disconnect (RTD) as a workers' right. Thus, 87.3% of public service workers in the electricity sector totally or partially agree that the RTD is an essential right in an increasingly digitalised world of work. For 87.1% of respondents, RTD should be included in labour law, if this is not already the case, and should be one of the subjects dealt with in the social dialogue at workplace level (86.9%) or at sectoral and cross-industry levels (87%).

In spite of the widespread acknowledgment expressed in the DGQS of the importance of a right to disconnect, the topic was scarcely discussed in the national reports. The **Danish** report highlights a certain ambiguity in the interviews and sectoral focus group on the potential of a right to disconnect. Some workers were in favour of fixed guidelines on disconnection, based on the difficulties in reconciling work and private life when checking and responding to e-mails. But others were opposed to a stricter regulation of disconnection, arguing for flexibility and autonomy rather than rigidity. The **Polish** report states that the right to disconnect is not discussed in the electricity sector, although trade unionists are aware of the debate that is taking place on this topic at EU level and in other countries. For the time being, trade unions are taking a wait-and-see attitude, hoping that the relevant (EU) directive will introduce appropriate standards in this area.

4.2.2 Public administrations

Digitalisation in its various forms appears to be a powerful vector for change in the nature and organisation of the work of public administrations and their employees. It has helped to accelerate the deployment of alternative working methods and practices within public administrations. The outbreak of the COVID-19 pandemic catapulted to the fore the use of teleworking, and the development of hybrid forms of work combining remote and face-to-face work in the workplace. At an institutional level, digitalisation as a technological resource is part of the extension of a public management paradigm which, to varying degrees, has structured the development of European public services since the 1970s and which is generally identified under the name of 'New Public Management'. This neo-paradigm is generally referred to in the EU context as the 'modernisation' of public services (see, for example, European Commission 2020a). In a nutshell, the idea is to draw on private sector management methods to reform public services, in order to resolve the complex paradox of making them more efficient and accessible to citizens while reducing their size and operating costs. The means used to achieve this purpose include the definition of performance standards and measures (benchmarking) to monitor the efficiency of work, the instigation of individual responsibility among workers and a 'culture' of competition supported by more collaborative management practices, the control and parsimonious management of resource allocation, and also the trend towards maximum decentralisation of public services to promote economies of scale (McLaughlin et al. 2001). This also requires the possibility of standardising the work and an acceptance of the role of management to control and monitor work activities. By allowing an increased standardisation of work and making it possible to dematerialise not only information but also working methods, as well as virtually instantaneous access to it wherever you are, digitalisation has become an essential tool for implementing these means as part of the reform of public services (Calay 2019; Timmermans and Koster 2017).

As already mentioned, the academic literature highlights some positive consequences of digitalisation for public services in general and public administrations in particular, such as increased

efficiency and transparency, better-informed decision-making processes and better access to public services for the users. Some potential negative outcomes of digitalisation were also pointed out, such as cybersecurity risks, privacy concerns about the access to and utilisation of personal data, the development of a digital divide as not all citizens and workers can use digital technologies equally, and/or the potential restructuring and job losses provoked by the digital automation of routine administrative tasks.

Digitalisation has had a significant impact on workers in the public administrations sector, enabling greater collaboration, efficiency, and transparency. The use of digital tools and platforms has also enabled workers to work remotely, reducing the need for travel and improving the work-life balance. This has led to increased job satisfaction and reduced stress levels among workers. Digitalisation has also resulted in increased pressure on workers in the public administration sector, who may be required to work longer hours or deal with more complex tasks due to the use of digital tools and platforms. Additionally, the need for workers to be constantly available and responsive can create stress and anxiety. Finally, some workers may lack the necessary digital skills, which can create additional stress and frustration.

4.2.2.1 Work organisation

The project survey gives us an initial perspective on the assessment of workers in the public administrations sector as to the impact of digitalisation on various aspects of work organisation. With the exception of the question relating to pace and intensity of work[22], the following figure shows that the workers in the public administrations sector who responded to the survey have a polarised assessment of the effects of digitalisation on certain features of their work organisation.

[22] As discussed previously, this apparently counter-intuitive observation could be because respondents reject the idea that digitalisation is the main influencing determinant of their pace of work, but feel that other factors are more important in generating overload and overtime work, including: public funding restrictions; chronic understaffing possibly due to non-replacement of departing staff; restructuring and redundancies; difficulties in recruiting suitable profiles. (See Section 4.1).

Figure 10: Effects of digitalisation on work organisation features – Public administrations sector – DGQS survey

Source: DGQS 2022 – Q24 Has the introduction of digital tools/programmes affected each of the following aspects of your work (in the last 5 years)?

A first group of respondents from the public administrations sector express that the digitalisation of work has not changed their pre-existing situation. This group ranges from 18.8% (both more time to focus on significant aspects of the job / improved interaction with users) to 41% (improve external assessment by users) of the respondents (see Table 6 in Statistical Annex (Deliverable D3.3)). The more important share of the respondents shows a positive assessment of the impact of digitalisation on the whole set of work organisation features. The items related to improvements in the teamwork, autonomy, control or working time (excepted the suggestion of an increase of work intensity) are

the more positively assessed. The size of this group ranges from 34.7% (improvement of external assessment by users) to 57.8% (improvement of task coordination with colleagues) of the gathered answers. A last set of respondents has a negative perception of the impact of digitalisation on work organisation in the sector. The size of this group ranges from 19.8% (coordination of tasks with colleagues) to 28.7% (time to focus on tasks / external assessment by users).

Taken as a whole, the interviews and focus groups conducted in the public administration sector in the eight European countries covered by the project reflect to some extent this positive view of the impact of digitalisation on ways of organising work. As one Finnish trade unionist put it: *'I must say that digitalisation is here, and that our work and the future of work very much depend on our ability to use digital possibilities in various public and private services. In Finland, geographical distances are huge. In particular in the northern part of the country, most of the services must be based on the internet instead of on the client travelling hundreds of kilometres to the service office. Thus, digitalisation is a win-win solution for all'* (Finland – INT4). However, the discussions held in the various countries also highlighted a number of more negative aspects linked to the digitalisation of tools and work organisation in public administrations.

The **Spanish** report highlights 'the paradox of autonomy' linked to digitalisation. On the one hand, from a trade union perspective, it seems that digitalisation confers more autonomy on public service staff, which they associate with positive aspects, but also with negative ones, such as increased responsibility. On the other hand, from the perspective of public employees, it is felt that neither digitalisation nor the work processes in public administrations allow for greater autonomy, although it is recognised that a potential synergy exists (Spain - INT6 INT7 INT11).
A unionist interviewed in the **French** report notes also that while digitalisation reduces the routine part of the work in the sector, this is not normally followed by more 'quality work'. This is because digitalisation is combined with an increase in other tasks given to public officials, and the time gained is not spent on other services or on additional attention to public service users. While digitalisation (and in particular teleworking) should enhance workers' autonomy, it often results in more surveillance at the workplace. The workers in the sectoral focus group FG3 also underline that monitoring of the work by managers has increased. It has been rendered very easy by the digital tools, which include a tracking device which records all operations carried out by the worker and can be accessed by the manager. This is due to the administration's lack of trust in its employees, which is acknowledged by several interviewees (France – INT1 INT2 INT4). Another interviewee underlines that enhanced fluidity brings with it increased complexity, with more reporting, less autonomy, and more surveillance: *'Digitalisation renders things [work] on the surface fluid and easy, which adds an extra burden in terms of the quantity of work to be done'* (France – INT2). The French report also notes that the standardisation of work enabled or accelerated by digitalisation has generated a dehumanisation of administrative procedures which does not give officials autonomy. The insistence on the productivity made possible/accelerated by digital tools and applications has reduced the work

quality and limited the scope of intervention of the officials. For instance, the development of 'data entry clerk' platforms has reduced the autonomy and the quality of work of the officials concerned, with a significant increase in their routine activities. The increase in routine-type work has also been generated by problems with the existing digital software/applications, which often require double or triple data entry (lack of interoperability of the systems/applications, problem with the data flow, etc.) (France – INT4).

The **Polish** report emphasises that work intensity has increased at both local and central levels with the introduction of digital tools in the public administration. Digitalisation has also been accompanied by an expansion of the scope of officials' responsibilities, due to new requirements related to EU membership, new reporting obligations and the increase in the number of enquiries through the access to public information procedure (increased civic awareness). These parallel processes are difficult to separate clearly from each other, to indicate their individual impact on work intensity (Poland – INT6). Work in the public administrations at both local and central levels has become more routine due to the introduction of digital systems, in connection with the standardisation of administrative procedures. For instance, the use of template letters or forms speeds up the work of officials and standardises the quality of communication. The use of digital tools in the local and central public administration has not affected the autonomy of work, because this depends mostly on the organisation of work in the team and the degree of freedom decided on by the supervisor, especially in local administrations, which to a large extent are not yet digitalised. (Poland – INT6 INT7). Another interviewee stresses that new workers are more likely to get into a routine enforced by digital applications, while older workers tend to check information using other sources, as a particular case may cover a period when regulations have changed (Poland – INT8).

The **Hungarian** report underlines that none of the interviewees from the public administrations felt that digitalisation had reduced work intensity. However, according to an interviewee, the increased workload is not the consequence of digitalisation, but of the fact that in most cases offline administration (scanning and printing documents and sending them by post) and processing the online versions have to be done simultaneously. The amount of work has not changed, but the process has been accelerated (Hungary - INT14). Local government interviewees and participants in the sectoral focus group stress that the process of centralisation of the public administration is an important reason for the loss of autonomy (Hungary - INT20). The **German** report notes that the interviewees regard the digitalisation process in general as a positive and somehow inevitable development, but point out problems associated with work organisation and increased pace of work during the pandemic period when the employees were overburdened in some cases, and as a result, their work was compressed and overloaded. This then gives rise to reservations about digitalisation, because it at the beginning it had negative connotations (Germany – INT6).
The **Italian** report states that no evidence was found of the impact of digitalisation on work organisation, with none of the interviewees reporting concerns around issues like work pace,

psychological burden, etc. Comments were more focused on the impact of a lack of adequate devices and technology infrastructure on the work, particularly in workplaces with a limited internal capacity to develop and support new digital tools. The specific challenge of over-reliance on third party contractors was cited, as developers unfamiliar with the work often created technology solutions at odds with the actual workflow. This point is also made in the **Spanish** report, which notes that recruiting the necessary profiles to implement digitalisation is very complicated and costly. Public sector employment is likely to be unattractive for the hyper-skilled individuals required, and the public administration is already outsourcing specialised digital management services to private companies. In addition to privatisation, there is a risk that this outsourcing process will be subject to influences, lobbies and monopolies (Spain – INT7 and FG3). In the same vein, a **German** unionist underscored that knowledge relating to digitalisation is often bought in from external consultants, resulting in external dependency, costs and a further lack of in-house expertise. Consultants sell new trends or fashions (agile working in the public sector, for example, was also fashionable for a while). The question is whether this is sustainable after so much effort and cost (Germany – INT6).

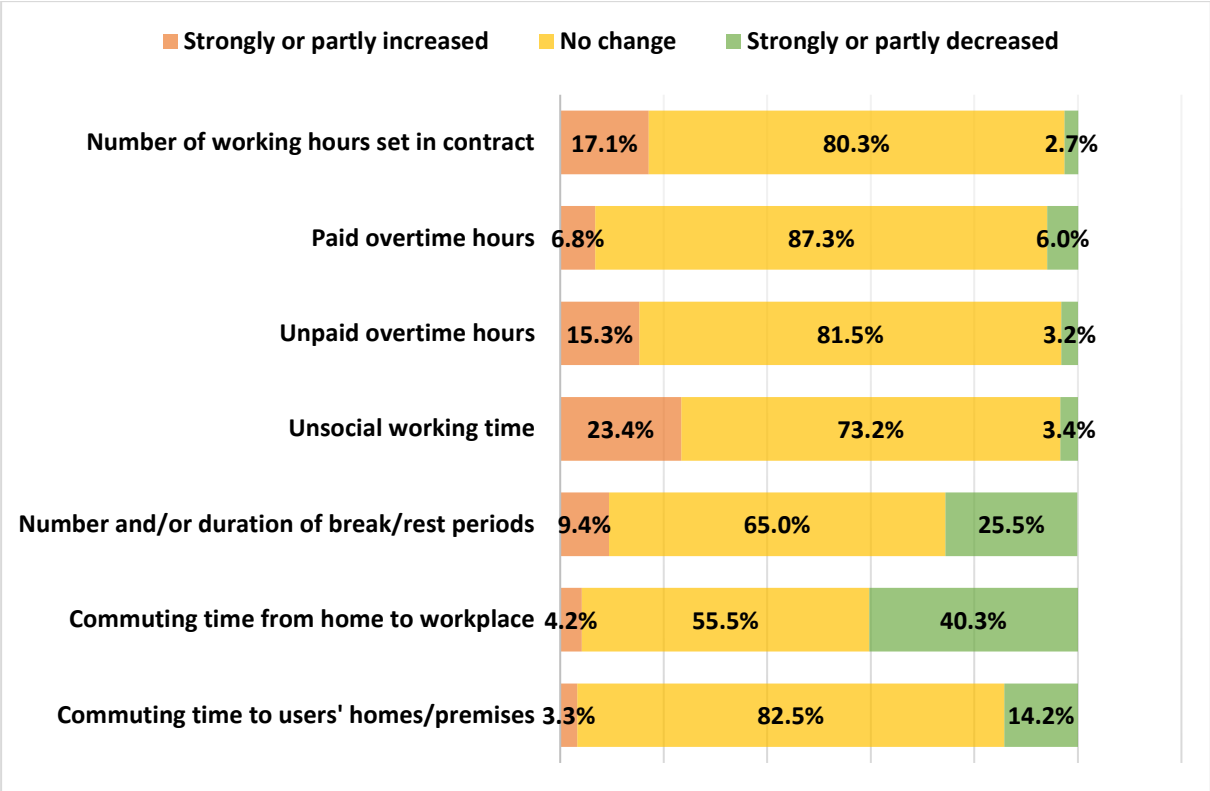
The opinions contained in the **Danish** report also generally suggest a positive perception of the impact of digitalisation, thanks to the increased flexibility and the digitisation of information. However, one of the interviewees emphasised that, at the same time, care must be taken to safeguard the administrative profession and the specific skills it entails. Digitalisation is accompanied, particularly in the view of policy-makers, by an increased tendency towards 'do-it-yourself administration', where self-time and task-management are outsourced to every individual employee rather than being handled by administrative staff. This could be time consuming as well as watering down the profession of administrator (Denmark - INT3).

All the national reports highlight to a certain extent that the age of workers is a determining factor in their perception of the impact of digitalisation on work. For many older employees, digitalisation is a challenge. As summed up by a **German** unionist: *'Older employees in particular are overwhelmed and awkward with the new digital processes. There is no support in the form of training. Successful implementation at the individual level is based on the employees' own responsibility. Those who fall away in the process are effectively left behind and given other tasks outside the digitalised processes. This also changes the work methods and content for these individuals'* (Germany - INT8).

4.2.2.2 Working time

With regard to the impact of digitalisation on aspects of the working time of public administration workers, the predominant assessment stemming from the DGQS is that digital tools and methods have not changed any aspect of the working time, as illustrated in the figure below.

Figure 11: Effects of digitalisation on working time features – Public administrations sector – DGQS survey



Source: DGQS 2022 – Q25: How much has the introduction of these digital tools and processes impacted the following aspects of your working time?

In the DGQS survey, it is apparent that in the public administrations sector the main perception is that digitalisation has not changed the features of contractual working time. The size of the group of respondents expressing this status quo ranges from 55.5% (no change in commuting time from home) to 87.3% (no change in paid overtime hours) (see Table 7 in Annex (Deliverable D3.2)). The most positively evaluated aspects are the reduction in commuting time from or to the workplace (40.3%) or to users' premises (14.2%). However, 25.5% of the public administration workers reckon that there has been a decrease in the number or duration of break/rest periods (30.5%) or that unsocial working hours (23.4%) and contractual working hours (17.1%) have strongly or partly increased with the digitalisation of work. Moreover, for 15.3% of the workers the extra working hours are unpaid.

The **Danish** report underlines that the focus group participants did not say that digitalisation had increased their working time. Nevertheless, they stress that the pace of change has accelerated. According to the **Finnish** report, one of the explanations for the increase in unpaid overtime work and reductions in rest breaks is the disappearance of assisting personnel. Many of the work tasks that previously were taken care of by assistants and secretaries have been digitalised and are now performed by the employees themselves. The **Hungarian** report underlines that the volume of tasks has increased in recent years and that the interviewees agreed unanimously that the actual length

of working time mainly depends on the amount of work and the number of staff available. Seasonality of work was also mentioned as an additional factor. In certain periods of the year the workload is temporarily higher than usual, which leads to longer working hours. In some cases, civil servants have to stay after office hours and do overtime. As there is no paid overtime in the public administration, the extra working hours are only compensated by time off. The **Polish** interviewees and focus group participants also all agreed that digitalisation has increased work intensity and the number of cases handled, but that the greatest impact on working time is due to the constant increase in the scope of responsibilities in the public administration. As a result, employees feel overburdened with work and are required to work overtime.

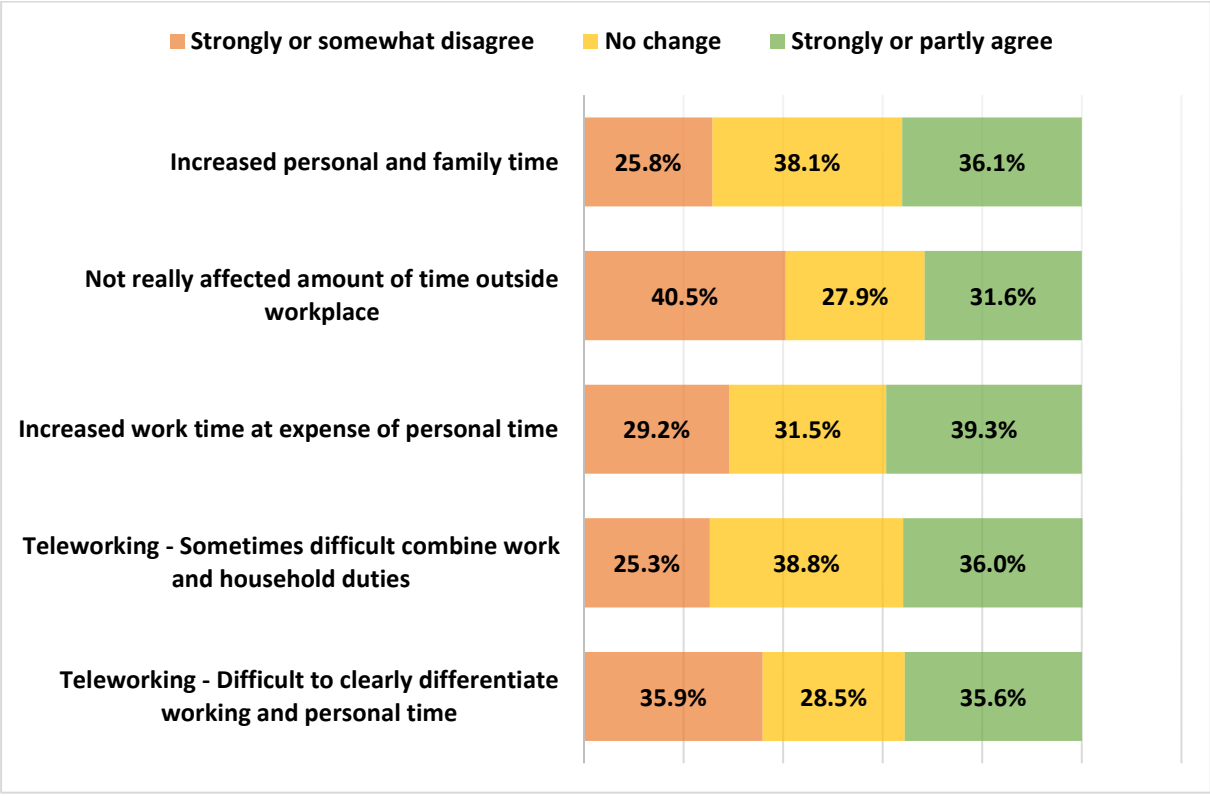
In several reports, the issue of overtime is discussed in relation with the boost of teleworking in the public administrations since the COVID-19 pandemic. The **Italian** report states that the strongest effect on working time appears to be in the context of the COVID-19 pandemic and remote work. Multiple interviewees express concern that, without proper training in self-management, employees run the risk of over-work because they lack the ability to organise their own work around objectives, to manage their time and properly disconnect. The **Spanish** report notes that the sudden implementation of telework was a major challenge for public employees and sometimes involved overtime, lacking effective formulas to ensure an appropriate balance between workers' personal circumstances and jobs requirements (Spain – INT6 INT7 INT11). According to the **French** report, the participants in the sectoral focus group (FG3) confirm that there is more work outside regular working hours due to the new digital tools in their administration, while only a limited number of overtime hours are taken into account for time in lieu/overtime payment. A unionist from the public employment service emphasised that teleworking saves a significant amount of time while, for many officials, digitalisation has not increased total effective working hours. There is an exception for managers, as many of them are used to excessive working hours, due in particular to the increased number of reports they have to produce (France – INT5). Another interviewee notes that working time is skyrocketing in some national ministries, boosted by teleworking. The situation varies considerably depending on the administration or the worker's position. For instance, data entry clerks do not suffer excessive working time, unlike officials working in services linked to some ministerial offices. Teleworking has strongly increased among managers, as has overtime. A manager who does not demonstrate that he stays working until 8 or 9 pm is not considered as serious (France – INT4). Let us recall here that according to the DGQS, managers are the professional group with most access to digital tools and work methods, including teleworking (see Section 3.5 in this report). Another unionist says that teleworking increases work intensity, notably because some managers think they can make teleworkers work more. In all administrations, there is a tendency to give more work to people who are teleworking. Although teleworking allows workers to structure their work, the surging workload for teleworkers is such that some employees decide to give up this mode of work after a period of time (France – INT1). One unionist also reports that in some administrations and for certain officials, the 'potential' working time slots have been extended, with the inclusion of mandatory time

slots. Working hours have to be within certain time slots for the workers without particular constraints, due to their position in this local administration. These work schedules were negotiated at the same time as the teleworking management system, which allows workers to clock in/clock out. A debit-credit system ensures that over a certain period the statutory working time is respected, which limits overtime hours. Within these boundaries, teleworking has enabled high (chosen) flexibility in daily work organisation. For the people who save a lot of transport time, this work system 'has changed people's lives' (France - INT2). In the same vein, a **German** unionist recalls the importance of such boundaries: *'Even before Covid, there were service agreements regarding mobile working, which was also used by employees on a selective basis with the agreement of their superiors. Since the introduction of working-from-home through the Covid situation, no clear rules exist in this regard. The old company agreements regarding working hours, core working hours and flexitime were adopted for working-from-home. The approval procedures for teleworking are very complex, as regulations on occupational health and safety are very important'* (Germany - INT7).

4.2.2.3 Work-life balance

In the DGQS, the assessment of the effects of digitalisation on the work-life balance of workers in the public administrations is split more or less equally between three groups of respondents, as illustrated in the figure below.

Figure 12: Effects of digitalisation on work-life balance – Public administrations sector – DGQS survey



Source: DGQS 2022 – Q26 How has the digitalisation of your work affected your work-life balance?

As has been observed for the public electricity production and supply sector, the respondents to the DGQS from the public administrations sector are broadly distributed among the different assessments (see Table 8 in Annex (Deliverable D3.2)). A first group of respondents felt that digitalisation had not changed their work-life balance. Between 27.9 and 38.8% of the respondents from the public administrations sector report no change for each of the items in the section, in addition to those agreeing strongly or partly that digitalisation has not really affected the amount of time spent outside the workplace (31.6%). A second group give positive assessments of the effects of digitalisation on their work-life balance, strongly or partially agreeing with the suggestion that it has increased the time available for themself and their family (36.1%) or, on the contrary, disagreeing with the statement that digitalisation has increased working time at the expense of personal time (29.2%). Those who telework strongly or partially reject the suggestion that it is sometimes difficult to combine work and household obligations (25.3%) or to set clear boundaries between personal and work time (35.9%). Finally, a last significant group of respondents from the public administrations sector feels digitalisation has had a negative impact on their work-life balance. 39.3% of the respondents agree that digitalisation has increased work time to the detriment of personal time, while 25.8% deny that it has increased their personal time. 40.5% of the respondents also disagree with the statement that digitalisation has not affected the amount of time spent outside the workplace. Respectively 36% and 35.6% of the teleworkers totally or partially agree that it has made it more difficult to combine work and household obligations or to set clear boundaries between personal and work time.

The sectoral interviews and focus groups carried out for the project acknowledge generally the potentially positive effects of digitalisation, and particularly telework, on the work-life balance. The positive influence of regulatory frameworks or practices on this aspect are underlined in certain reports. A **French** interviewee believes that the option to telework allowed by the 2021 Framework agreement on teleworking in the public sector contributes to a better work-life balance, by enabling officials to avoid carrying out family-related tasks if they are at home. This agreement also contains two other provisions relative to private life: on the right to disconnect and the prevention of domestic violence (France – INT1). Another interviewee considers that at the workplace there are quite a few safeguards to protect the separation between private life and professional life, such as warnings through pop-up windows on the computer if an official receives or sends emails at weekends or on public holidays, support for teleworking and digital tools (online guides, guidelines) and a 'Quality of working life' assessment twice a year (France - INT5). According to the **Italian** report, trade unions recognise that 'agile' work forms, including teleworking, as reflected in the content of the recently negotiated agreement, are important instruments for helping to strike a better balance between work and personal life. They however stress that the reality of agile work during the COVID-19 pandemic appears to be at odds with how the law sees it. Law 81/2017 envisions a model whereby the parameters of agile work are jointly negotiated. But during the pandemic, agile work was imposed unilaterally by the employer as an urgent health and safety measure, with workers and

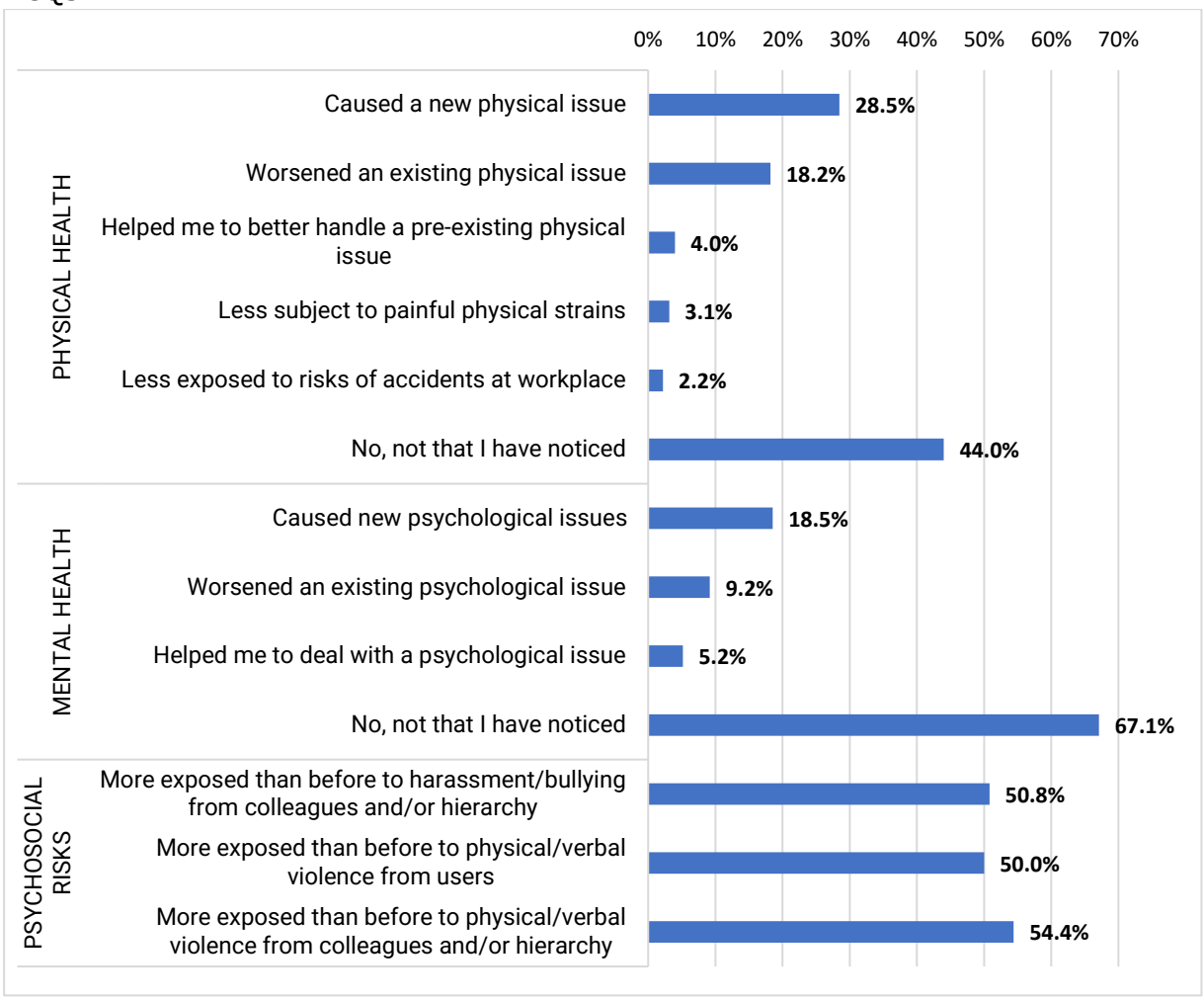
managers alike left to improvise solutions with little to no support. A similar concern is expressed in the **Spanish** report, which highlights that during the pandemic, it became clear that teleworking took place without the reconciliation measures that were necessary to care for dependents, leaving teleworkers without the cover they needed and overburdening them with work and care responsibilities (Spain – INT6 INT11 and FG3).

Some reports stress the role of professional, personal and family conditions in explaining discrepancies in the work-life balance. The **Finnish** report underlines that the positive and negative sides of teleworking are related to age and family situation. Often those with families and small children or school-age children are happy to telework from home. They do not need to take time to travel to work and from work back home. Therefore, there are degrees of freedom to combine work and family life (Finland – INT3). The **Polish** report stresses that according to interviewees, the public administration sector is dominated by women in the workforce who, often following the traditional family model, have more caring responsibilities than men. The tension related to a poor work-life balance makes some employees - especially women - resign from their jobs (Poland - INT8). Still according to some interviewees, digitalisation and the use of digital tools in the administration are less of an issue for the work-life balance than an overload of responsibilities. The **Italian** report highlights that generational differences in attitudes toward work may come into play, as evidenced by one interviewee, who commented that younger workers more willingly use their own personal devices to enable them to work remotely, as a way to better reconcile work and personal life, whereas older workers may see this as an intrusion of work into personal life. The **Hungarian** report stresses that according to the interviewees, digitalisation is most likely to affect the work-life balance of managers and senior executives, due to the emerging requirement for them to be available outside working hours (Hungary - INT12 INT14 INT15 INT16 INT20).

4.2.2.4 Health outcomes

As illustrated in the following figure, the majority of the respondents to the DGQS survey from the public administrations sector did not notice any impact of digitalisation on their health condition, reporting that they have not experienced any changes in their physical (44%) and especially mental (67.1%) health that could be related to digitalisation.

Figure 13: Effects of digitalisation on physical and mental health – Public administrations sector - DGQS



Source: DGQS 2022 – Q31 and Q33 Do you feel that the introduction of the digital tools and methods in your daily routine has had an impact on your (respectively) physical or mental health?

A first group of survey respondents from the public administrations sector indicates that they have not experienced any changes in their physical health that could be related to digitalisation (44%) (see Table 9 in Annex (Deliverable D3.2)). However, for a slightly higher share of workers, digitalisation has either caused a new physical problem (28.5%) or aggravated a pre-existing problem (18.2%). As a result, as many as 46.7% of respondents from this sector highlight physiological problems related to digitalisation. For a smaller group of workers, the digitalisation of work has also had positive effects, whether by reducing painful working postures, enabling them to better manage a pre-existing physical problem or helping to reduce the risk of accidents in the workplace (altogether 9.3%). When asked about the nature of the physiological problems encountered, the main issues reported by workers in the public administrations sector relate to vision problems (17.6%), neck pain (19.2%) and back pain (17.2%). Around one in ten respondents also reported problems of headaches and hand pain, as well as physical fatigue (see Table 11 in Annex (Deliverable D3.2)).

The situation is quite similar with regard to mental health. 67.1% of workers in the public administrations sector report that the digitalisation of work has not affected their mental health. But for 27.7% of the workers, digitalisation of work has led to new mental problems (18.5%) or aggravated one or more existing problems (9.2%). Here also the share of respondents reporting a positive effect of digitalisation on a pre-existing problem is quite low (5.2%). The main psychological problems reported in the survey are mental fatigue (21.5%) and stress (20.7%), followed to a lesser extent by demotivation (12.6%), anxiety (12.5%), burn-out (10.5%) and the difficulty of dealing with overwhelming emotional demands (9.4%) (see Table 10 in Annex (Deliverable D3.2)).
By allowing more fluid, instantaneous interaction and communication, but also increased monitoring of the work done, the digitalisation of work tools and practices can also lead to or intensify harmful social behaviours such as harassment, bullying, verbal and even physical aggression from colleagues, managers or users. This feeling is expressed in the DGQS by almost half of the respondents from the public administrations sector, related to harassment or bullying by colleagues and managers (50.8%), but also exposure to verbal or even physical violence from colleagues and managers (50%) or from public service users (54.4%) (see Table 12 in Annex (Deliverable D3.2)).
The impact of digitalisation on workers' mental and physical health was discussed relatively little by the interviewees and focus group participants from the public administration sector.

The impact on physical health was only occasionally mentioned: for example, the risks of physical problems linked to more sedentary work were referred to in the **Polish** report, and those related to the quality of workplace equipment, which can cause musculoskeletal disorders, were mentioned in the **French** report.

The main issue discussed in the national reports for the public administrations sector was the impact on workers' mental health of the increased flexibility in work organisation, particularly with the surge of teleworking. Several national reports point out that the individualisation of work inherent in teleworking can have consequences for workers' mental health, such as stress and mental exhaustion, with damaging outcomes such as nervous breakdown or even burn-out. A **Hungarian** trade unionist, for example, stresses that: *'Teleworking extends the working day, allows for continuous working and increases the risk of burnout. I had colleagues who were very stressed by forced teleworking during the COVID-19 pandemic'* (Hungary - INT19). According to **French** interviewees, burnout is not limited to the private sector but also exists in the civil service. Some also mentioned increased feelings of guilt among public sector workers, notably managers, who have to face unattainable targets, insufficient support with digital equipment and teleworking, and a lack of recognition of the work done.

French and **Italian** trade unionists interviewed pointed out that, in the absence of adequate training in the self-management of working time and the establishment of regulatory frameworks, teleworking can lead to overwork, physical exhaustion and even burn-out. This can also be

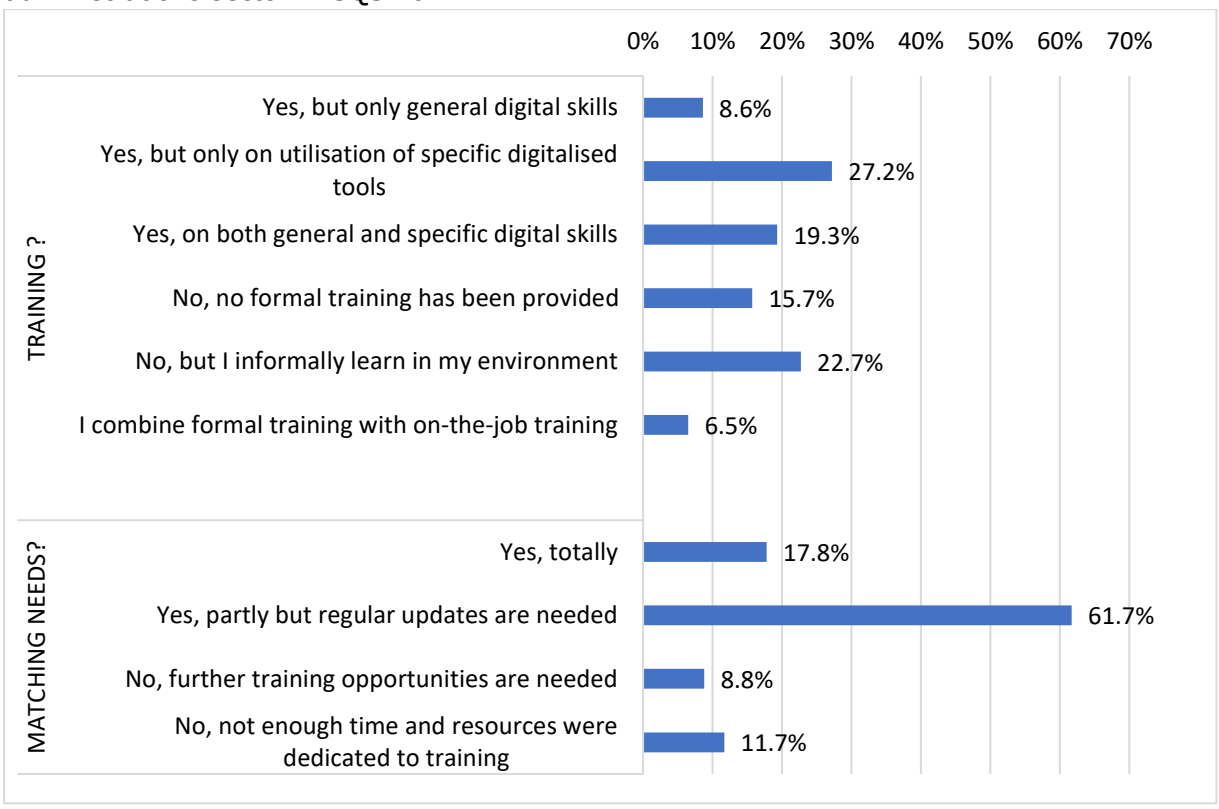
exacerbated by breakdowns and malfunctioning of digital tools, which can be sources of stress and mental exhaustion. The **Hungarian** report also notes that missing or inadequate support for new and modified digital tools or programmes increases mental health risks. Without proper preparation for change or training in new systems and programmes, it can lead to increased stress. The primary sources of stress mentioned by the participants in the focus group were the difficulty of introducing new programmes, the frequent changes made to existing programmes, and their unreliability (lack of preparation and support and freezing of programmes). Employers did not offer programmes to mitigate the physical and mental risks.

The **Spanish** report highlights the difference in perception that may exist between trade unions and workers when it comes to the issues and challenges of digitalisation and teleworking. From the trade unions' point of view, issues such as the psychosocial risks of isolation, the problems linked to the lack or inadequacy of technological and material resources at home workplaces, as well as the excess working hours are the main concerns. Both the interviews and the focus group acknowledge that these risks are either not recognised by a large number of public employees or not seen as so important (Spain - INT7 FG3).

4.2.2.5 Skills and learning

Like the other public service workers, employees in the public administrations sector need to acquire and master new digital skills to adapt to the reconfiguration of tasks and associated skills within their job or occupational category. The DGQS survey includes a number of questions relating to the issue of skills, their perceived usefulness, the training actually received and the extent to which it matches personal needs.

Figure 14: Provision of training on digital skills and matching with individual needs – Public administrations sector- DGQS 2022



Source: DGQS 2022 – Q28 Have you received training from your employer to acquire or develop the new required skills? + Q29 Do you think the training provided matched your needs?

Regarding their perception of the need to learn and develop new digital skills with the introduction of digital tools and methods in their everyday work, most respondents of the public administrations sector recognised this need[23]. They either had to acquire both general and specific digital skills (21.7%) or specific skills related to the digital tool used (40.2%). 31.3% of the workers answered that they already had the required digital skills through their educational background. Only a very small share of workers felt that digital skills are not necessary for their jobs (6.8%).

While the majority of respondents from the public administrations sector feel that digital training is useful, they still need to have received training from their employer. Around half the respondents from the public administrations sector (42.3%) stated that they had received training from their employer to acquire or develop new digital skills. This training could be related only to general digital skills (8.6%) or to specific skills required by the digital tools (27.2%), or to both aspects (19.3%). 6.5% of respondents claim that they have received both formal and informal learning. However, another group of respondents of a quasi-similar size in the public administrations sector report that they have not received any training from their employer (38.4%). While 15.7% of workers have not

[23] The results for this question are not shown in the figure 14 but could be found in the Table 13 of the Annex (Deliverable D3.2).

received any training at all, for 22.7% the learning took place informally at work (on-the-job learning and exchanges with colleagues) (see Table 13 in Annex (Deliverable D3.2)).

Another question in the DGQS focused on the respondents' perception of the adequacy of the training received compared to their individual needs in this domain. 17.8% of the respondents reported a complete match between the training offered and their needs. For the majority of respondents, the match was partial but regular updates are necessary (53%). Around one in five workers felt that the match was not good: either they still needed new training opportunities (12.9%), or they felt that not enough resources and time had been devoted to the training of public sector workers (10.5%) (see Table 13 in Annex (Deliverable D3.2)). Clearly, there is still some way to go before all workers in the public administration sector have been fully and adequately prepared for the transition to the digital age of work.

In the national reports produced as part of the project, the interviewees and sectoral focus group participants generally acknowledge the usefulness of digital learning in the current world of work, as well as the major role that digital training tools play nowadays in implementing digital learning. An upward trend in the training provided through e-training systems is generally reported, but all reports also underline to some extent the considerable training needs in the public administrations. This is particularly highlighted in the **French** report, in which several interviewees point to a significant need for upskilling of public workers and emphasize the problems that may hamper such an upgrading of skills. Many officials are not aware of the importance of training (some have a very low educational level) and the employer is not willing to reward skills and training through salary increases. The employers have no long-term vision on this important subject, according to INT2. Another interviewee adds that the workload is generally too heavy to allow time for training, and that the skills of public workers are often underused or not recognised, which in turn does not encourage them to participate in training. But generally, the administration does not take time to consider how to make better use of officials' skills to enhance the quality of (collective) work and workers' well-being. The heavy reliance on contract workers and individual contractors also impacts the work collectives and limits the integration of these workers and their skills (France – INT4).
Spanish interviewees and participants in the focus group perceive that the training offered to staff is inadequate in spite of the extensive use of basic office automation and information management tools. Public employees are forced to self-manage training and learn by themselves (INT 6 and INT10). The participants in the sectoral focus group consider that training is insufficient and that the online training that has become widespread is unattractive and ineffective, while often undertaken outside regular working hours. In the **Hungarian** report, interviewees underscore that training is undoubtedly needed in the public administration, but with much more useful curricula and in a more effective way than at present. None of the interviewees or the participants in the sectoral focus group were satisfied with the quality of the training. Since the outbreak of the COVID-19 pandemic, only online courses have been launched, offering asynchronous training without tutoring. Online

learning materials - with downloadable documents - are gone through independently by the workers, with an online self-test at the end of the course. For this reason, these courses should be categorised as self-education courses rather than training sessions. There is no time allowed for taking the courses, and workers take them partly in their free time and partly during less busy working hours. Another interviewee recalls that: *'There used to be free professional training courses at the national level, but now we have to pay for them. There are big differences between the fields of public administration, both in terms of the use of databases and programmes and the training they provide. Today you have to consider whether you can send a colleague to a professional training course because of the cost. Today, it's more common to send one person to training and then expect he/she to pass on the knowledge to other colleagues'* (Hungary - INT14).

The importance given to informal learning in the acquisition of digital skills is also highlighted in the **Polish** report. Current workers are often expected to explain the digital systems to new workers. However, inadequate time is set aside for the implementation period, which is challenging in the case of increasing work intensity and more new responsibilities. New workers can therefore often feel confused and that they have received insufficient information about their responsibilities in the entry period. These problems result in more mistakes, longer procedures and frustration among staff. As expressed by an interviewee: *'Training is insufficient, the workers learn by doing (on-job training), one will catch on faster and the other slower. Training should be extended and more adapted to the needs of the workers. Younger workers learn faster and older workers find it more difficult. In-house training comes at the expense of other responsibilities in the workplace'* (Poland - INT7). It is also noted that training is increasingly electronic (e-learning). This is criticised by the trade unions, who believe that it leads to less interaction between participants and thus makes it more difficult to learn and remember the provided content. E-learning also lacks elements of team building, which is an important part of face-to-face training.

The **Italian** report also recalls the generational inequality in the learning of digital skills, as, according to interviewees, younger employees appear to be a significant source of innovation, as they bring a set of skills and a more general attitude and aptitude regarding technology to the work than their older colleagues.

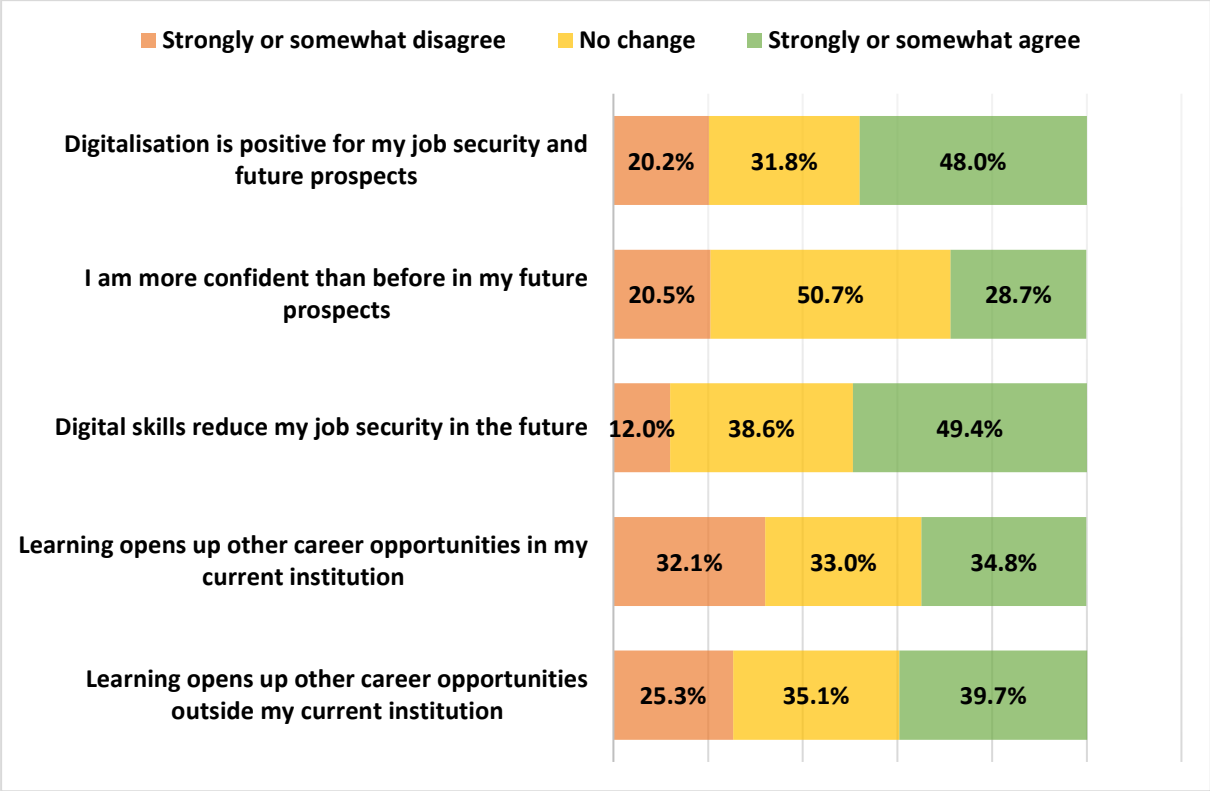
The **Danish** report describes a general impression from the interviewed unionists and the sectoral focus group participants that there is a strong need for further investment in upgrading skills among the public sector workers, in particular digital competences, which were not considered to be sufficient in the current contexts (Denmark - FG3 INT2 INT3). Participants noted that the responsibility for acquiring new digital skills had become highly individualised and that task-based peer-to-peer-training was still the main form of skill development across professions. Skill upgrading and training is therefore a recurrent theme for the unions and their members. This includes enhancing understanding of the intersection between digital systems, as well as bridge-building

between professions about the functions of digital systems that are introduced in new areas. An example is given by a representative from HK (Union of Commercial and Clerical Employees in Denmark), who stresses the importance of skill development, and the initiatives of the union to accommodate the need for skill development in a digital age. Among other things, the union has developed a so-called 'digital competence wheel': union members can input their skills and profession and be advised on where their digital skills need improvement in the light of recent technological developments in their sector. Additionally, a certain budget in the 'Competence Funds' (which are established through the collective agreements, workers can apply to them for funding to upgrade their skills and competences) is earmarked for digital competences. He also recalls a campaign launched by the union a few years ago, in which six so-called 'job spheres' (hence not professions) were selected as places where digitalisation would have a future impact. As an example, one of these 'spheres' is the handling of complex data – they are thus not restricted to certain professions but serve as overarching skills across professions. HK stresses the importance of not restricting digital skills upgrading to certain professions, but also including workers in the public administration with lower educational qualifications. The representative disagrees with the narrative that digitalisation equals increased complexity which in turns requires a higher level of education. The union underlined the importance of respecting the different professions, of considering the important role of all administrative staff, of all levels of education, and of including the workers in the process of bringing digitalisation into the professions (Denmark - INT3).

4.2.2.6 Job security and career prospects

The DGQS survey highlights a polarised attitude of the respondents from the public administrations sector regarding the influence of digitalisation of work on their job security and career prospects, as shown in the figure below.

Figure 15: Perceptions of job security and future prospects – Public administrations sector- DGQS 2022



Source: DGQS 2022 – Q30 Do you think that learning these new skills required by digitalisation …?

For a first group of respondents from the public administrations sector, the main feeling is that digitalisation has not affected their job security or future prospects (see Table 15 in the annex). The size of this group ranges from 31.8% who feel that digitalisation has not affected their job security and future prospects, to 50.7% who say it has not affected their confidence on these aspects. Another group of respondents express a positive perception of the impact of digitalisation on their job prospects. Some of the propositions receive a high level of total or partial agreement from this group of respondents, such as the idea that digitalisation is positive for job security and future prospects (48%), or that learning digital skills opens up career prospects within their current institution (34.8%) but also in other institutions or jobs (39.7%). Finally, another set of respondents from the public administrations sector are more pessimistic about the future. Around half the workers in this sector partially or totally agree with the statement that the rising need for digital skills reduces their job security in the future (49.4%). Around one in five respondents disagree partially or totally that these skills enhance their future career opportunities internally (32.1%) or externally (25.3%), that digitalisation is positive for job security (20.2%) or that it makes them more confident about their job security and future prospects (20.5%).

The issue of job security and future prospects for the public administrations sector is barely discussed in the national reports. The **Polish** report highlights the differences between the national and local administrations regarding the attractiveness of public jobs. While recalling that employment in the

public administration continues to be associated with career stability, although the salaries remain low, an interviewee states that although in smaller towns a job in the public administration offers career stability, this is less the case in larger cities, where it could be challenging to recruit new workers, as the market offers a wider range of jobs and because working in the business sector is usually more attractive in terms of salary and career prospects (Poland – INT7).

4.2.2.7 Workers' rights

According to the DGQS, half of the respondents from the public administration sector do not experience pressure to be connected, either because their jobs do not require this (23.2%) or simply because they do not feel any pressure to connect (34%) (see Table 17 in Annex (Deliverable D3.2)). Most of the workers feeling pressure to connect (42.9%) assume that this is a personal behavioural choice (22.7%). 13.3% of the respondents experience only occasional pressure to stay connected, coming from colleagues (5.5%) or supervisors (7.8%). But for 6.8% of the workers in the sector this pressure is frequent, either from supervisors (4.2%) or colleagues (2.6%). However, even though the reported rates of those feeling an obligation to be always connected may appear relatively low in the DGQS, most respondents strongly emphasise the importance they attach to the right to disconnect (RTD) as a workers' right. 83.2% of the workers from the public administrations sector totally or partially agree that the RTD is an essential right in an increasingly digitalised world of work. For 83.5% of the respondents, RTD should be included in labour law, if this is not already the case, and should also be included in the subjects dealt with in social dialogue at workplace level (79%) or at sectoral and cross-industry levels (79.7%).

Regarding the organisation at the workplace of an information and consultation procedure related to the process of digitalisation of work, the DGQS shows that more than half the respondents from the public administrations sector do not know if a formal information and consultation procedure has been organised, either on the reasons to digitalise work (58.4%), or on the practical possibilities (50.4%), or on the process of implementing digital working methods and tools in itself (51.7%) (see Table 18 in the Annex (Deliverable D3.2)). Moreover, depending on the proposed topic, between 23.7% and 28.9% of the respondents declare that no procedures of information and consultation were followed at their workplace. Among the workers who have experienced such a procedure, this took place, depending on the topic, at individual level for 6.5% to 9.2% of the workers, more rarely through trade unions for 2.5% to 3.5% of them or through both channels for 7.5% to 9.1% of the respondents.

The **Hungarian** report highlights that according to the unionists interviewed, the number of trade union members has declined significantly in recent years due to institutional reorganisations, and partly to the difficulties in organising and their reduced capacity for advocacy. More worryingly, three interviewees (INT13 INT17 INT20) also report workplace intimidation and pressure in the public administration because of trade union membership: *'At my workplace, only two of the twenty of us*

remained union members. The employer is not supportive. No one told me directly that I should not be a member. And the rest of it, I just sort of didn't hear' (Hungary - INT17).

In several reports, the unionists interviewed and the workers participating in the sectoral focus groups said that they thought that the unions' work in terms of sharing and spreading of information has become more complicated because of teleworking and ICT tools. According to the **French** report, sharing union information with a large segment of teleworkers is becoming difficult: the trade unions try to organise meetings when people are physically present, to make sure the information gets across. INT2 reports that it is often difficult to organise face-to-face meetings as hybrid meetings are common now, because many people prefer videoconferences. One unionist interviewed points out how difficult it is to exercise her rights as a union representative, to lead local inspections and interview officials: *'Now, when I spend some time in an agency, I'm confronted with the 'desertion of the personnel' as whole corridors or whole floors are empty. As many as half the workforce can be absent'* (France – INT5). Another unionist considers that the stakes are high for the trade unions, because the question for them is how they can use digital tools for social dialogue and to bring a new population into trade unionism. It is more difficult to represent groups of workers in the administration because of the rapidly changing parameters, which can be triggered by digitalisation. But she mainly warns of the reorganisation of the bodies equivalent to the works councils (the technical committees) in the public sector. This reorganisation has increased the responsibilities of the councils and could make it more difficult for the workers' representatives to defend staff. This is a serious matter, as trade unions and workers' representatives in the works councils are the right people to discuss and warn of the effects of digital tools in the workplace (France – INT4). The **Spanish** report makes a similar point, underlining that individualisation linked to teleworking will have an impact on collective awareness and result in loss of union power to negotiate working conditions (Spain - INT6 INT11 and FG3). According to the **Hungarian** document, the interviewees reported that even though it is required by law, employees and trade unions are not involved and consulted on the design and implementation processes of digitalisation at work, and in practice, they cannot enforce such consultation. The sectoral and national consultative forums have been stagnating in recent years, with no meaningful consultations or negotiations taking place. However, this is not due to digitalisation but rather to a lack of political will. Both the Hungarian and the Polish interviewees recall that one reason why digitalisation is not perceived as having an impact on workers' rights is because the collective rights of public workers are quite limited. Thus, digitalisation is not subject to collective agreements or negotiations with the employer. However, there is some variability between public institutions. An interviewee from the ZUS, the **Polish** national social insurance institution, is more positive and highlights that, in contrast to other public institutions covered by the study, the digitalisation process is subject to social dialogue at ZUS, as it has been going on for more than two decades and sometimes stirs up controversies also in open public debate. When the trade unions request it, they are given a presentation on the progress on digitalisation. The unions try to monitor the implementation of digital tools and also to submit

suggestions for change, which are collected from the employees. The consultation process on this issue is quite intensive, due to the wide range of digital tools used. The employer tries to respond to the reported comments and to correct the applications, adapting them to the needs of employees and clients of ZUS. However, he also notes that the employer's response is not always fully satisfactory (Poland – INT8).

The **Italian** report underlines some common concerns among trade unions regarding specific aspects linked to workers' rights in the digitalised world of work. The main concerns are around the right to disconnect, freedom from remote surveillance – linked to the right to data privacy – and protection against termination without just cause. The right to disconnect is of particular concern in the case of remote work, as the paradigm shifts from how many hours have been worked to what objectives have been met, the risk being that workers' hours increase in order to meet specific objectives (Italy - INT 6). Similar concerns are expressed by the **French** interviewees. In France, the 'right to disconnect' for teleworkers in the public administration sector is enshrined in the 2021 'Framework agreement on teleworking in the public service' and is described as well functioning by several unionists interviewed. Differences are however noted between institutions or professions. The workers contributing to the focus group (FG3) explain, however, that while disconnecting from the computer/laptop/emails is easy outside regular working hours, it is harder to do so effectively because of the various chat applications (from which you receive messages directly on your mobile phone). There are also worries about the possibility that the enhanced control brought by digital tools and potential continuous monitoring during working hours could be detrimental for workers.

4.2.3 Hospitals and health sector

Digitalisation has transformed healthcare by enabling remote consultations, improved communication, and better patient care. This has led to improved patient outcomes, reduced waiting times, and greater efficiency. Workers in the hospital and health sector have also benefited from greater flexibility and autonomy. In the hospital and health public sector, the use of digital tools and devices is pervasive and applies to varying degrees in most internal hospital services (care, surgery, patient transport, logistics, maintenance, monitoring, etc.), but also in services dedicated to relations with the outside world (patient information and management, but also transmission of medical records to other medical services). For some professionals, such as nurses, digitalisation touches upon almost every daily task, including digital tools ranging from practical technologies such as beds, thermometers, blood pressure monitors and robots to electronic documentation and communication devices such as video-consultations, patient communication through apps and electronic patient documentation systems.

While digitalisation has improved patient outcomes and enabled greater efficiency in the hospital and health sector, it has also created new challenges for public workers. Their work organisation has changed with the increasing use of digital tools and processes in their everyday work. Overall,

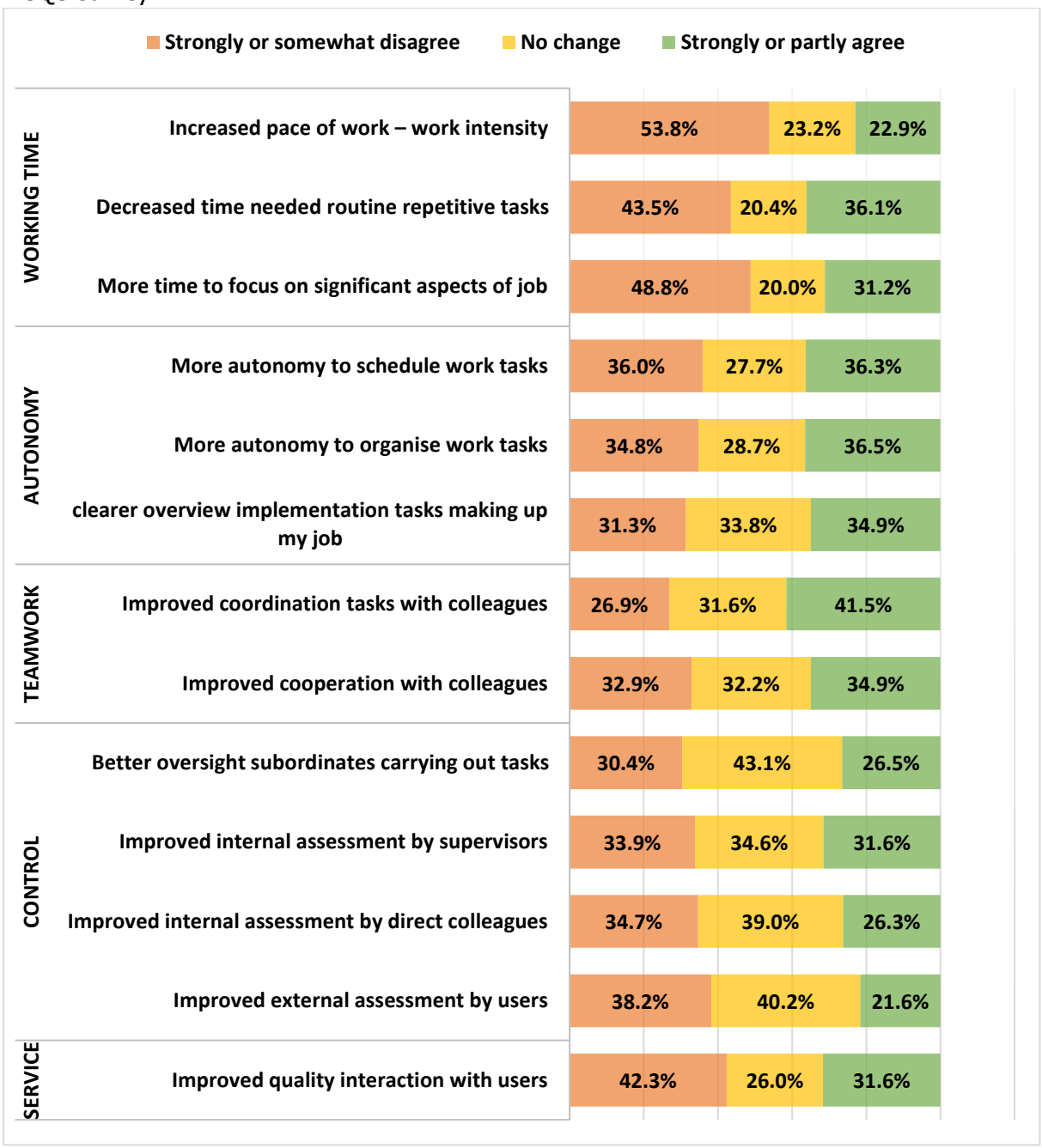
while digitalisation has brought significant benefits to the sector of public health services, there are also potential risks and limitations that need to be addressed. It is important to strike a balance between the benefits of digitalisation and the need to protect patient privacy and ensure access and equity in healthcare services.

4.2.3.1 Work organisation

The project survey gives us an initial perspective on the assessment of workers in the public hospitals and health sector regarding the impact of digitalisation on various aspects of work organisation. With the exception of the question relating to pace and intensity of work[24], the following figure shows that the workers who responded to the survey have polarised views on the effects of digitalisation on features of their work organisation.

[24] As discussed previously, this apparently counter-intuitive observation could be because respondents reject the idea that digitalisation is the main determinant of their pace of work, but feel that other factors generating overload and overtime work prevail, including: public funding restrictions; chronic understaffing possibly due to non-replacement of departing staff; restructuring and redundancies; difficulties in recruiting suitable profiles (See Section 4.1).

Figure 16: Effects of digitalisation on work organisation features – Hospitals and health sector – DGQS survey



Source: DGQS 2022 – Q24 Has the introduction of digital tools/programmes affected each of the following aspects of your work (in the last 5 years)?

A first group of respondents from the hospitals and health public sector report that the digitalisation of work has not affected their situation. This is stated by around 20 to 30% of the respondents for nearly all the statements, with the exception of the items related to work control, for which the rates are around 40% (see Table 6 in Annex (Deliverable D3.2)). However, the main share of respondents strongly or somewhat disagree with the propositions on features of work organisation, indicating a negative perception of the impact of digitalisation on work organisation in the sector. This disagreement is particularly marked for the items related to working time, such as that digitalisation has reduced the time needed for routine tasks (43.5%) or that it provides more time to focus on

significant aspects of the job (48.8%). This group also disagrees with the statements related to the users: that interaction with them has improved (42.3%) or that these users now have a better assessment of the work done by public service workers (38.2%). For the items relating to autonomy in work or teamwork, the number of negative assessments is roughly the same as the number of positive assessments, except for the suggestion that digitalisation improves coordination of tasks with colleagues, where the balance is clearly in favour of positive assessments. For items relating to work control and monitoring, while the main position of respondents in the sector is that digitalisation has not impacted these aspects, the negative assessments generally outnumber the positive ones.

Regarding work intensity, several national reports produced for the project point to an increase of work intensity in the hospital and health sector due to digitalisation. The **French** report underlines extensively that all the trade union representatives interviewed insist that digitalisation has resulted in an intensification of work[25]. On one hand, this could be explained by the standardisation of digitalised work. The content and duration of the tasks needed to perform the work are now prescribed through an algorithm, with times calculated for each task. But in reality, things do not happen this way: *'On paper, it works. The patients are put in boxes on the computer schedule and then at the end, there is no real study of the workload. The management says 'you have 12 patients to take care of', but if 5 of them are very complex cases, it's not the same as having 12 easy patients. So, it's this notion of real evaluation of the workload that is not yet underway and that digitalisation does not yet allow'* (France – INT13). Moreover, digital tasks are added to care-related tasks. For instance, an interviewee highlights that the secretaries continue to print out the reports and put them in the doctor's box even though he has an e-mail address. Nurses in the focus group are more explicit and report that their tasks now include starting up the doctor's/s' computer, changing the paper in the printer and even resolving computer problems, as IT departments are called in only when they cannot find a solution themselves. Moreover, there is a dual analogue/digital system in use in the hospitals, as the digitised information in the medical files is duplicated and circulated in paper form for compatibility and security reasons. All the information transmitted between nurses in the service is in paper format (for safety reasons). In addition, the patient file has a hybrid format (digital + paper). The reason is that the digital tools used by various departments cannot always communicate with each other, even within the hospital itself. For continuity across the different services, paper patient files are still necessary. This hybrid format has two consequences. Firstly, it creates different uses according to the categories of staff: medical staff (doctors) use information in digital format and can share information with each other, but the same does not apply to non-medical staff (nurses, caregivers). Secondly, it leads to an increase in secretarial tasks for

[25] This is confirmed by the French national surveys on working conditions (2013, 2016, 2019), showing that work intensity is greater for nurses, midwives and caregivers than for all other hospital sector workers. Nurses and midwives are the two professional groups that most frequently declare an excessive amount of work (around 65% in 2019, upward trend), or work under pressure (65% in 2019, upward trend), or having often or always to hurry (72% in 2019, upward trend). Frequent interruption for an unplanned task has also increased for this professional group (Fleury et al. 2023).

secretaries. Scanning documents and gathering information for the patient file are very time-consuming activities, especially since more information about the patient is now needed. Examples given are the need to retrieve more information during patient admission; or to complete the missing information when appointments are made directly on the web platforms, (which is increasingly the case). The digital file is however perceived as a useful tool, as it gives nurses more autonomy and flexibility, as well as more time dedicated to patients. They can immediately check the medical information on their tablets, without being constrained to go elsewhere in the service to consult the paper file. Similarly, when the patient is discharged from the hospital, nurses no longer have to wait next to the doctor when he/she makes his check-up visit, as the prescription is directly included in the computerised patient file. The nurse sees that it is done and so the patient can leave.

Overload may also result from management practices. As stated by a **Spanish** interviewee regarding the slower spread of teleworking in the public hospital sector: *'Management of hospitals show a huge mistrust of teleworking, which seems to have created a false perception that teleworking is less efficient than face-to-face work. The consequence is that managers increase the number of tasks to be performed when working remotely and at the same time there is greater pressure on professionals to demonstrate the effectiveness of this way of performing tasks'* (Spain - INT5). He also adds that work in hospitals is now based on the premise that 'the less time the patient spends in hospital, the better', leading to a greater burden on work schedules. The reluctance of managers to accept teleworking in the sector is also described in the **French** report by the focus group participants, who say that the permission to telework is largely dependent on the manager and that monitoring practices, which do not normally exist in hospitals, have appeared with teleworking. A secretary noted that she is not monitored by her manager, except when she is teleworking. The increased workload is also described in the **Finnish** report by a nurse participating in the focus group: *'Nowadays, there are many more demands to report what we [the nurses] are doing and what we did with our patients. This increases the workload. In addition to the usual tasks, you have to report everything in digital reporting systems. On one hand, the increased demand for reporting is partially caused by legal obligations to report all curative measures, in view of possible legal complaints. On the other hand, reporting is linked to digitally sharing information between different actors in the social and health care sector. The flow of information and access to information on our clients is better, but the flip side is increased workload and feelings that we have to engage in secondary tasks instead of concentrating on what we really need to do. Furthermore, when we write down the clients' stories and diagnoses, they feel that we are more interested in the computer than in their business'* (Finland – FG 4).

The paradox of autonomy and the ambivalent perception of the impact of digitalisation on work autonomy is highlighted in several national reports. The **Hungarian** report, for instance, notes that on the one side, according to the majority of interviewees, digitalisation has increased the autonomy of employees in the workplace. On the other, the participants in the sectoral focus group report that

digitalisation has not been accompanied by greater autonomy if there is no impact on the evaluation of work performance. Rather, it has meant closer collaboration between the doctor and assistants. Some argue that digitalisation has also reduced routine, by replacing some of the routine tasks that were previously required (Hungary – FG22 FG25, FG26).

In the **Polish** report, a representative of a sectoral trade union covering various occupations in public healthcare (INT9) points out that there is a kind of substitution of routine tasks, as some processes have replaced others; a representative of the nurses' union (INT10) says that working with electronic forms of medical documentation may cause a worker to fall into a routine, and in turn to miss some important observations. At the same time, in her opinion, the digital equipment in hospitals reduces the autonomy of her professional group in such a way that doctors have greater insight into the work of nurses and can verify their truthfulness in certain situations. These devices record the patient's condition and store information on whether certain events took place during someone's duty hours, such as cardiac arrhythmias. The **Danish** report highlights that a recurrent theme of discussions in the focus group was the challenges linked to this increased demand for documentation and coordination. Along with the increasing digitalisation, there are growing demands to document the workflow and the actions and decisions made by the hospital workers. While most actors acknowledge the need for data to increase accountability, bring about better allocation of resources and improve the quality of health services, there were worries of overly bureaucratic practices. This was also echoed by the union representatives interviewed (Denmark – INT5 INT8 INT9). This points to a development where health care workers are experiencing a shift from patient-centred work to data-centred work due to 'data intensification' (Hoeyer and Wadmann 2020). While technology may reduce some monotonous tasks, these may be replaced by other similarly monotonous tasks, that could become problematic if workers are unable to see the possibilities and professional development in the new duties. For instance, the medical laboratory technologist reported that some of them feel like 'blood sampling robots', since the actual robot cannot handle the blood sample collection (with the needle in the patient's arm), unlike most of the other monotonous tasks. This highlights the ambiguity of increased technological implementation alongside the need for human professionalism to control for potential technological errors or delays; this results in a strong increase in time spent looking at a computer screen instead. Accordingly, there is a need to strike a balance between professional skill, in cases where it is needed, and introducing technological solutions in cases where tasks lack variety and can be relieved by technological tools (Denmark – INT4).

Contact with patients, which is vital in the hospital and care sector, was also the subject of numerous worries in the national reports about its feared weakening. The **French** report stresses that digitalisation can lead to conflicts of values among workers when there is a mismatch between workload, the demands associated with the job and the means available to carry it out. As stated by an interviewee: '*For example you have a goal: at the end of the day, you must have taken everyone's*

blood pressure. If you are with someone who is not well, if you make the choice to sit down with that person and talk with him/her, you know that then the rest of the job will not be done. But that person is not well. So, there are times when your choices are constrained at work. It can be seen as a way of compartmentalising the work' (France – INT11). As recalled by an interviewee: '*the nursing staff spend more time in front of their computers to deal with computerised patient records. This requires the nursing staff to set out all care activities, examinations and prescriptions: It adds considerably to the administrative workload. Caregivers are very unhappy that they spend part of their time not caring'* (France – INT12). Moreover, the same unionist emphasises that digitalisation has also reduced social relations between colleagues, as the staff members themselves communicate through emails and record information in the computer, instead of sharing it around the table with colleagues after each one has gone round the rooms of her/his patients. Everything is in the computer because it saves time, but this has negative effects on learning the job. The interviewees in the **Danish** report underline that while digital technologies are seen as indispensable in everyday work practices, it may be problematic if such technologies influence intra-human and emotional aspects of the profession and cause reductions in patient care. This perception was especially expressed by the nurses, who explained how their professional identity is intimately linked with caregiving and close relations with patients (Denmark – INT8 INT9). As an example, the potential introduction of 'feeding robots' (which have been demonstrated at a health care technology exhibition) had faced strong opposition amongst the nurses as these robots encroached too much on their professional identity.

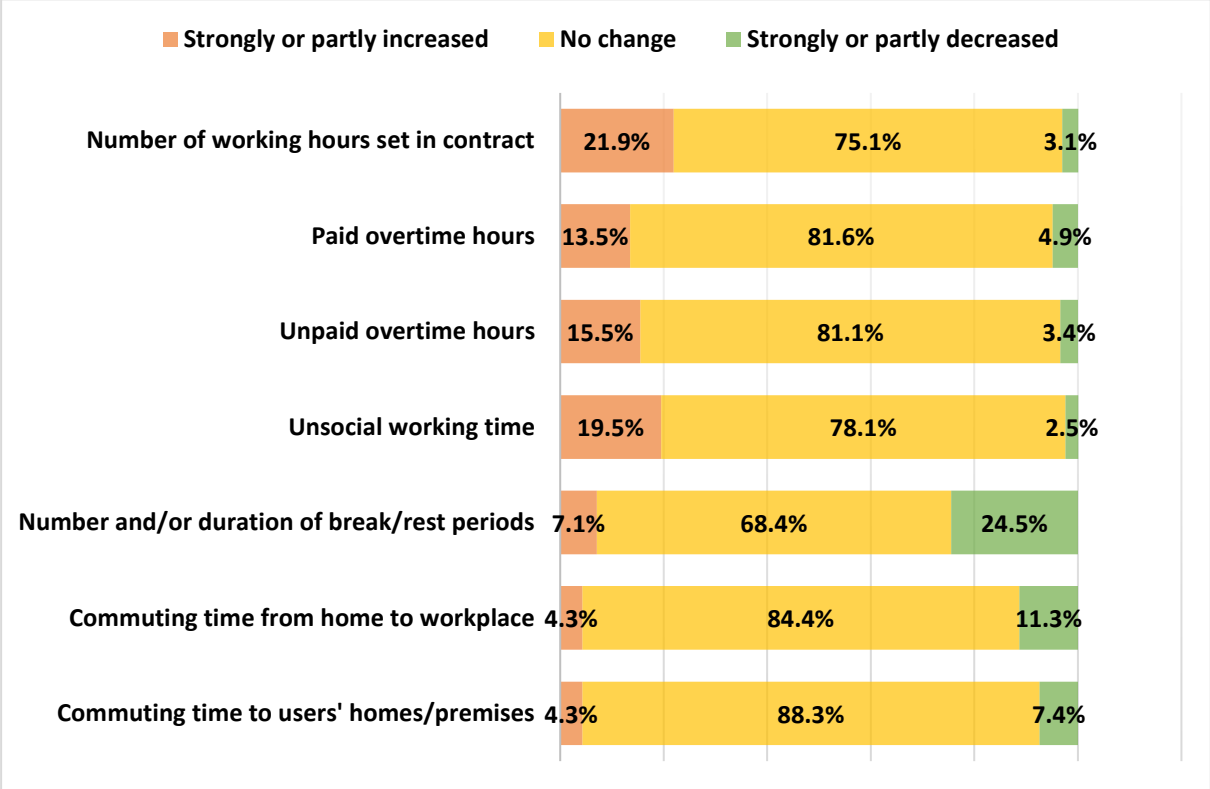
Some of the national reports also draw attention to the dangers of over-reliance on digital tools, and of potential malfunctions. The **Polish** report underlines that many nurses do not fully trust digital equipment and closely monitor its operation, which in some situations may turn out to be important for the patient's health. One interviewee described the case of a nurse who realised that the digitalised pump used on a patient was delivering the drug into his bloodstream at much too fast a pace. As the nurse was legally threatened with the loss of the right to practice her profession, a court case had to establish that she had performed the required activities correctly. The error resulted from the use of an incorrect component, for which the liability lay with those responsible for conducting the tender for the purchase of equipment for the hospital. The **Hungarian** report indicates that while the interviewees generally acknowledge positive impacts of digitalisation on the everyday work of nurses, there is also a view that over-reliance on digital tools makes it easy to overlook the fine detail. In the same vein, the **Danish** report underlines how breakdowns and malfunctions (such as updates, restarts or slow uploading) are a source of frustration, causing stress. Interviewees as well as focus group participants moreover emphasised the need for technical solutions to be matched with and be tested by the end users. As an example, when lifts and similar helping-equipment are not compatible and cannot work together, the respondents felt unable to benefit from this equipment and avoid using it. Staff should be included, in dialogue with management, to determine what new digital tools to select and acquire (Denmark – FG1). This is

also emphasised by a **German** unionist interviewed: *'Another problem is that the new digital systems are introduced within everyday nursing practice. There is often only minor training for this, and employees tend to be overburdened by these processes instead of being relieved. Overall, the basic problem is that there are coordination problems between IT experts and nurses, as different views and concepts exist. IT systems should be thought of in terms of the needs of the nursing staff. Standardization of the care process through digital systems reduces the complexity of the holistic approach to care'* (Germany – INT12).

4.2.3.2 Working time

With regard to the impact of digitalisation on various features of working time, the predominant assessment voiced by public hospital and healthcare workers in the DGQS is that digital tools and methods have not changed anything in the working time of the workers. This view was expressed by around eight out of ten respondents to the survey, as illustrated in the figure below.

Figure 17: Effects of digitalisation on working time features – Hospitals and health sector – DGQS survey



Source: DGQS 2022 – Q25 How much has the introduction of these digital tools and processes impacted the following aspects of your working time?

From the DGQS survey, it is apparent that in the hospitals and health sector the main perception of public workers is that digitalisation has not affected their working time. This was stated by a large group of around eight out of ten of the respondents for almost all the proposed items (see Table 7

in Annex (Deliverable D3.2)). Among the remaining respondents, some point to an increase in the number of working hours set in their contracts (21.9%) but also in unsocial working time (19.5%) or overtime hours, either paid (13.5%) or unpaid (15.5%). It should be noted also that 24.5% of the respondents report a strong or partial reduction in the number and/or duration of break periods.

The feeling that digitalisation has had little or no impact on the working hours of public sector hospital and healthcare workers is echoed in most of the national reports. The **Italian** report underlines that digitalisation has impacted working time. Working time in the hospital, according to one interviewee, is primarily driven by two factors: lack of adequate staffing levels and the flow of patients into the hospital during a given shift.

The **French** report also states that according to the unionists interviewed, digitalisation in itself has impacted the quality of work rather than working time. Professionals work overtime, but not as an effect of digitalisation. The participants in the focus group also consider that digitalisation does not generally result in overtime. However, some staff may work overtime due to network failures constraining them to (unpaid) overtime hours. When asked about the additional hours offered in other services/hospitals, some participants explain that they have sometimes replaced other staff but rarely through such platforms. They nevertheless underline that there are several tens of offers (especially for nurses) of (formal) overtime hours at any moment, for tasks representing from 7 to 12 hours of work. Such overtime proposals can be offered through specific platforms, via emails from the managers, or even from WhatsApp groups.

The **Danish** report highlights that the focus group and the interviews generally acknowledge that technology is a major time saver in everyday working practices, allowing professionals to treat more patients than previously and to have a more efficient everyday routine. On the other hand, digitalisation places increased pressure on health care professionals and sometimes compromises breaks and 'small-talk' with colleagues, which were emphasised as important in order to hand over correct information. As expressed by a radiographer in the sectoral focus group: *'We are able to do so much more [with the new technology], it is definitely time sparing. We produce more, but this includes digital material. In our [radiographers'] case, a million, billion pictures. And the technology is able to handle that (...) But we also have to work at an additional faster pace. Before, people used to smoke in the dark rooms while the pictures were being processed, have a cup of coffee… but all this has been cut back. So, for the patients and the relatives, it is definitely the right development. But for us and our breaks? Not so much.'* (Denmark – FG1). As highlighted above, the DGQS respondents from the public hospitals and health sector, emphasize the reduction in the number or duration of break/resting periods as among the main negative consequences of digitalisation on working time. As a direct consequence of technological development, work that used to be restricted to between nine and five can now take place over a longer time span. As an example, certain samples can be taken and analysed by intelligent technology during the night-time; this means that more

employees need to be present to monitor and ensure quality, leading to more working hours outside the traditional nine-to-five than previously. The report also notes that not all professions within the hospital sector have been equally affected by the introduction of electronic systems. While the Medical Laboratory workers had mixed experiences with the implementation of new digital tools (due to, for example, increased workloads during the night-time), one shop steward interviewed representing care and service assistants highlighted the positive impact of digitalisation as a time saver. In this case, new technology made it possible, for instance, to wash entire beds in large washing machines rather than washing them by hand, hence releasing time for more important tasks such as patient care (Denmark - INT7). The **Spanish** report also highlights the differing experiences depending on the profession. For example, some technical staff have been asked to extend their working hours at times when new digital tools are being introduced, some medical departments have demanded an extension of working hours beyond those spent in person, requesting consultations over the phone from home, or training outside working hours (Spain - FG1 INT5).

The **Polish** report highlights that, according to the representative of the nurses' union, digital tools related to the treatment and monitoring of patients' health condition in the hospital's intensive care unit are assessed as positive by employees because they reduce the intensity of work, simplifying it and shortening the time needed to perform certain activities (e.g., monitoring of blood pressure). On the other hand, she points to the coexistence of electronic and paper health documentation, which makes the tasks of nurses more difficult. In some hospitals, there were errors in the introduction process – on which nurses were not consulted - which even increased the intensity and time taken to do work. The biggest problems encountered include the continued requirement to also keep documentation in paper form; different structures between e-documentation and traditional documentation; the quantity of e-documents; or even the lack of a sufficient number of computer workstations for entering data. At the same time, it is expected that in hospitals where there has been a complete transition to electronic documentation, this tool will facilitate the work of nurses. *'Where there has been a complete shift to this electronic documentation, it seems to be a convenience for nurses. If I have a patient who comes for diagnostics, I can prepare some templates for a report and make a copy-paste, and I have a report on twenty patients written in five minutes. I would write it by hand for two hours'* (Poland – INT10).

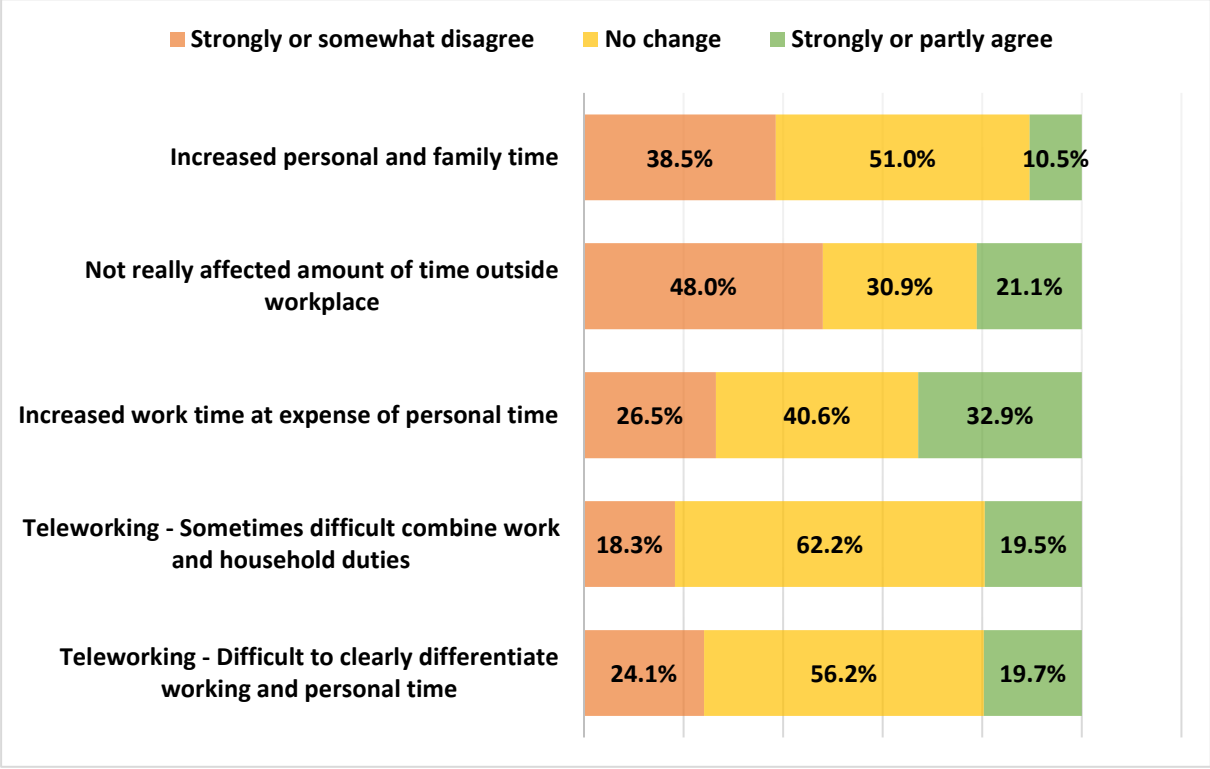
The **Hungarian** report also states that according to the focus group, automated clinical workflow management tools not only optimise administrative tasks, but also allow healthcare personnel to spend more time on direct patient care in the time freed up. The vast majority of interviewees (almost three quarters) said that digitalisation has fundamentally reduced the time spent on work processes. This, however, has had no impact on their working hours, because of the high demand for health care, especially in the current COVID-19 pandemic period. Today, the average working week in the hospital sector in Hungary is 48 hours, but without digitalisation it might be even longer.

The **German** report highlights the impact of a specific digitalised system, the 'diagnosis-related groups' (DRG)[26], which has had a structural impact on the health care system in Germany, particularly in the commercialisation of the health care system. It is associated with a significant increase in the workload and working time of nurses and doctors. As a major consequence of the staff reductions in the 1990s and the shift to the DRG-system in 2003, the ratio between patients and care staff has continued to rise.

4.2.3.3 Work-life balance

In the DGQS, the evaluation of the effects of digitalisation on the work-life balance of workers in the hospitals and health sector is distributed more or less equally between three groups of respondents, as illustrated in the figure below.

Figure 18: Effects of digitalisation on work-life balance – Hospitals and health sector – DGQS survey



Source: DGQS 2022 – Q26 How has the digitalisation of your work affected your work-life balance?

The views of the respondents to the DGQS from the public hospitals and healthcare sector are more or less equally divided between the three assessments (see Table 8 in Annex (Deliverable D3.2)). The main group of respondents feel that digitalisation has not affected their work-life balance. This group makes up between 30.9% and 62.2% of the respondents from the sector, in addition to those

[26] The 'diagnosis-related groups' (DRG) system is a flat-rate billing system in which inpatient hospital treatment is billed via flat rates per case, largely independent of the patient's length of stay. A case is assigned to a flat rate per case on the basis of various criteria (main diagnosis, secondary diagnosis, procedures, patient age, ventilation hours, etc.) by means of software that since 2003 has been standardised throughout Germany (Öz and Hamburg 2023).

agreeing strongly or partly that digitalisation has not really affected the amount of time spent outside the workplace (21.1%). It is worth noting also that this group is significantly larger in the hospitals and health sectors than in the two other public service sectors reviewed in the project. A second set of responses note negative assessments of the effects of digitalisation on the work-life balance. Nearly half the workers from the public hospitals and health sector partly or strongly disagree with the statements that digitalisation has not changed the amount of time outside the workplace (48%) or has increased personal and family time (38.5%). 32.9% of the respondents also agree that digitalisation has increased working time at the expense of personal time. Among the small share of workers in the hospitals and health sector allowed to telework, most respondents do not note any change in their work-life balance due to difficulties combining work and household tasks (62.2%) or the blurring of boundaries between working and personal time (56.2%). While around 20% of respondents agree that these difficulties exist, a slightly higher share of respondents have not experienced such difficulties.

The topic of work-life balance is referred to much in the national reports on the public hospitals and health sector. In two reports, some considerations are voiced on the specific role played by digital instruments in the blurring of boundaries between private and working life. All the **French** trade union representatives interviewed highlight that digitalisation has blurred the boundaries between their professional and personal life. According to them, two changes related to digital applications explain this development. First, there are several online platforms (Hublot, Whoog, Meetgo) where hospital workers can register when they need to provide work to other services or establishments ('missions') in order to be better paid. Overtime working hours are paid. These applications have made it easier for managers to address the shortage of nursing staff but they constitute disguised on-call duty work. They also increase overtime work beyond the legal framework (maximum 3 days per month of unscheduled work through these platforms). As staff working time on these apps does not seem to be monitored, managers using the platform cannot know how much time an agent has already worked previously to carrying out an assignment, which can even lead to illegal practices, as explained by a senior nurse*: 'Sometimes, staff members accept things that are totally illegal. For example, if I need a nurse this afternoon, I send a mission on Whoog. A nurse answers. I don't know if she was on morning duty or night duty. We can't see that. We realised that there were people who replied that they were available in the afternoon even though they were on morning duty. And, as a result, they were working the equivalent of two days, which is totally illegal. This puts patients at risk. Managers have no way of monitoring this'* (France – INT12). Second, the smartphone, as an easier means to call people back to work, is also highlighted by the interviewees as another digital tool favouring the blurring of the boundaries between private and professional life. The interviewees stress that it has changed the lives of staff, especially since some departments have asked for email addresses and phone numbers to call people. The divide between private and professional life divide has been erode by permanently interconnecting a work collective (e.g., WhatsApp groups). The unionists interviewed are worried by the fact that, even when not working,

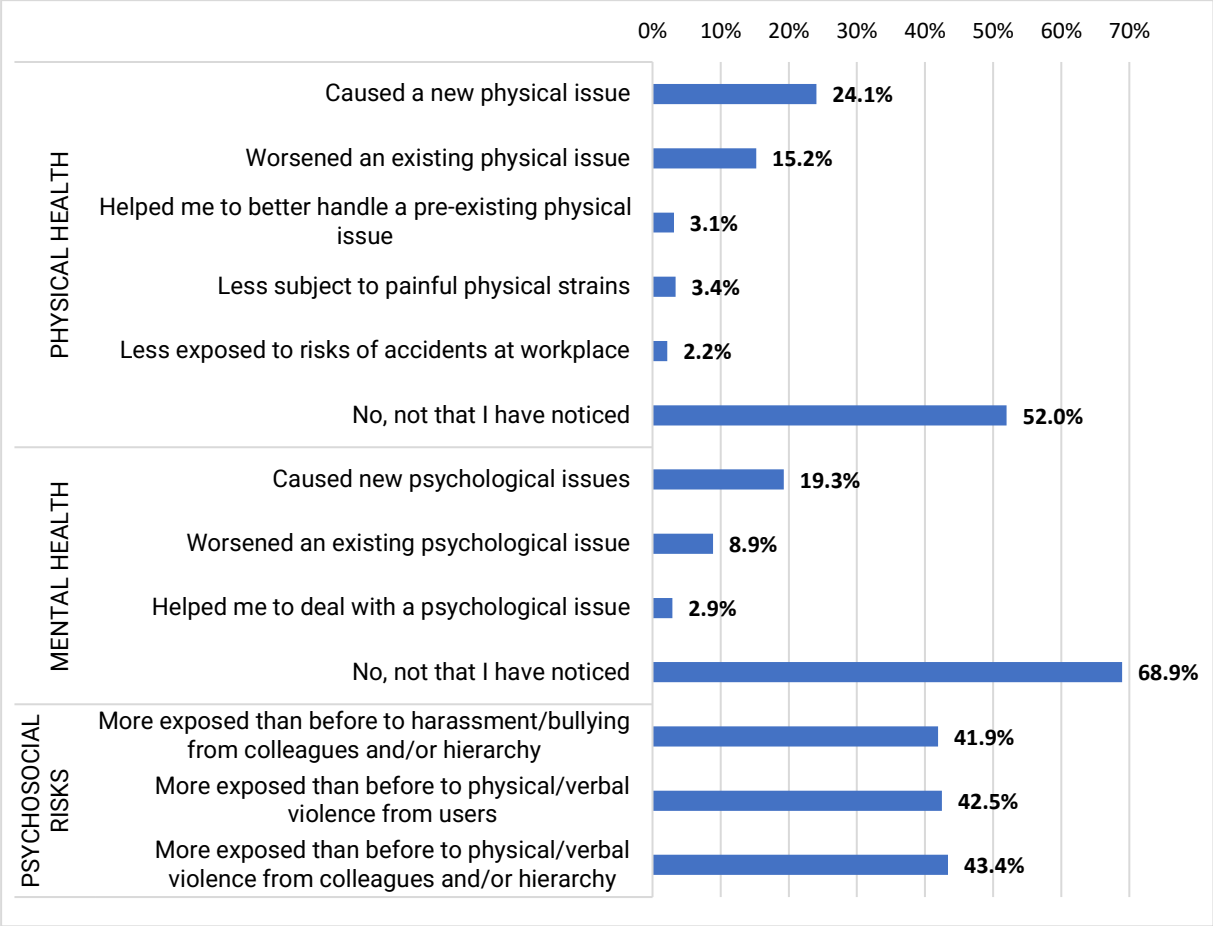
staff continue to be aware of what's going on in via discussion groups, which compromises their resting time: *'Being on WhatsApp groups where they see that there are colleagues in trouble could prompt some to volunteer to go to work'* (France – INT11). Another interviewee goes further and sees these virtual groups as a way of disguising on-call duty: *'It is often initiated by the manager. For example, so-and-so is ill, who can replace them? It becomes the equivalent of a disguised on-call duty that is absolutely illegal'* (France – INT12).

The focus group participants and interviewees quoted in the **Danish** report also underline the blurring of boundaries between private and professional life due to the use of instant messaging applications, as messages concerning shifts, illness and the like are sometimes conveyed via private platforms. A participant in the sectoral focus group also highlights the role of unpredictable working time, linked to the specificity of working in hospitals and healthcare: *'we are talking about humans. We cannot just leave at 11.30 if a family is sitting there and the child is not breathing'* (Denmark - FG1). This unpredictability makes it difficult for staff to plan time off and requires a degree of flexibility from both the worker and management. This further suggests that clear-cut guidelines are difficult to establish for the heterogeneous and unpredictable hospital sector. The report also discusses the impact of the increased need to be online after work, to be able to respond to e-mails and help colleagues out, which leads in reaction to an increased need to disconnect, to better reconcile work and personal life. But, it is also about daring to disconnect. The report underscores that technology has changed the everyday routines for many professionals such as analysists, as tasks previously restricted to daytime can be conducted at night. This may make it difficult for parents and lone parents, for example, to achieve a good work-life balance, as there are more evening and night shifts (Denmark - INT4).

4.2.3.4 Health outcomes

As illustrated in the following figure, the majority of the respondents to the DGQS survey from the public hospitals and health sector did not notice any impact of digitalisation on their health, reporting that they have not experienced any changes in their physical (52%) and especially mental (68.9%) health that could be related to digitalisation.

Figure 19: Effects of digitalisation on physical and mental health – Hospitals and health sector - DGQS



Source: DGQS 2022 – Q31 and Q33 Do you feel that the introduction of the digital tools and methods in your daily routine has had an impact on your (respectively) physical or mental health?

Half of the respondents from the public hospitals and health sector indicate that they have not experienced any changes in their physical health that could be related to digitalisation (52%) (see Table 9 in Annex (Deliverable D3.2)). However, for 39.3% of workers, the digitalisation of work has either caused a new physical problem (24.1%) or aggravated a pre-existing problem (15.2%). For a much smaller number of workers, the digitisation of work has also had positive effects, whether by reducing painful working postures, by enabling them to better manage a pre-existing physical problem or by helping to reduce the risk of accidents in the workplace (altogether 8.7%). When asked about the nature of the physiological problems encountered, the main physical disorders reported by respondents from the hospital and health sector are vision problems (16%) as well as musculoskeletal disorders such as neck pain (18.8%) or hand and back pain (13.2% and 14.6% respectively). A significant proportion of respondents also reported physical fatigue (11.6%) (see Table 11 in Annex (Deliverable D3.2)).

The situation regarding mental health is quite comparable. 68.9% of the respondents from the hospitals and health sector report that digitalisation of work has not affected their mental health

(see Table 10 in Annex (Deliverable D3.2)). But for 28.2% of the workers, digitalisation of work has led to new mental problems (19.3%) or aggravated one or more existing problems (8.9%). Similarly to what was observed in the two other public services, the share of respondents reporting a positive effect of digitalisation on a pre-existing problem is quite low (2.9%). The main psychological problems reported in the survey are mental fatigue (22.8%), stress (23.6%), demotivation (13.5%) and anxiety (12.8%). A significant proportion of workers in the sector also report burn-out (7.6%) or inability to cope with overwhelming emotional demands (9.4%) (see Table 11 in Annex (Deliverable D3.2)).

As explained previously, the exposure to psychosocial hazards and risk factors is linked to poorly organised and managed work environments (e.g., excessive workloads, tensions with colleagues and superiors), which can have negative psychological, physical and social consequences for workers, such as musculoskeletal disorders, stress, burnout or depression. These deficient work environments can also lead to or intensify harmful social behaviours such as harassment, bullying, verbal and even physical aggression from colleagues, managers or users. By allowing more fluid and immediate interaction and communication, while increasing the monitoring of the execution of job tasks, digital work tools and practices can cause or amplify these adverse practices and thus favour the development of psychosocial risks. This feeling is also expressed by the DGQS respondents from the hospitals and health sector. A significant share of workers say that they are more exposed than previously to harassment or bullying by colleagues and managers (41.9%), but also to verbal or even physical violence from colleagues and managers (42.5%) or from users of public services (43.4%) (see Table 12 in Annex (Deliverable D3.2)).

Following the adage of the poorly shod shoemaker, the interviews contained in the national reports on the public hospital and health sector are relatively unsparing when it comes to the impact of digitalisation on the physical and mental health of workers in the sector.

According to the **French** report, union representatives do not mention any improvement in physical health. On the contrary, they report negative effects related to the use of computers (musculoskeletal and vision problems). Another interviewee from the sector recalls that physical problems are more related to the intensification of work caused by digitalisation than to the digitalisation itself, and highlights the importance of ergonomic improvements (e.g., chairs and desks). The **Danish** report emphasises a more positive vision of the effects of digitalisation on occupational safety and health in the sector. New digital tools have helped to reduce heavy lifting and reoccurring work postures, such as those involved in lifting patients, and cleaning tasks, which of course is mostly relevant for certain groups of workers engaged in caring and cleaning for the patients, improving overall occupational safety and health in the industry. The medical laboratory technologist explains that machines and robots have reduced many of the repeated tasks that often resulted in wear and tear on fingers and arms for this profession, since most of this was related to the process of taking samples and conducting analyses (Denmark - FG1 INT4 INT7 INT8 INT9). However, it is also observed that digitalisation may just shift the burden to new demanding and

repetitive tasks. For instance, while lifts and similar digital tools are implemented and in use in hospitals, they may still require more workers to operate them, as when patients are severely obese (Denmark - FG1 INT4 INT9).

The impact of digitalisation on the mental health of public workers in the hospitals and health sector is commented on in some reports, mainly in relation to the stress arising from time pressure and its potential effects on mental health. Several stress factors are underlined in the reports.
The **Danish** report highlights that focus group participants mentioned so-called 'capacity screens' which make it possible to see the number of patients in a ward, but do not show the conditions of the patients nor the competences of staff. While this was overall described as positive in terms of capacity, it could potentially simultaneously increase the work pace, workload and cause a decline in communication, potentially resulting in errors and increased psychological constraints on workers, including stress (Denmark - FG1). The **Polish** report underlines that the operation of new devices is associated with increased stress, as some workers are concerned that they may damage the complicated digital devices used in hospital wards. Malfunctions of digital tools are also mentioned by an interviewee as a source of stress leading to frustration and sometimes aggression among medical staff members (Poland – FG15). A **Hungarian** unionist interviewed also reports the constant sounds and noise emitted by the equipment among the stress factors. The **Spanish** report notes agreement among the unionists interviewed and focus group participants that levels of mental fatigue and stress have increased, which is explained by both the intensification of psychologically demanding work, and the anxiety generated by working without adequate training. The **French** report indicates that all the trade union representatives interviewed highlight the effects of digitalisation on mental health. The impact of technology on rising levels of stress among workers in the hospitals and health sector is discussed by several unionists interviewed, in relation to diverse factors. These include frequent changes of tools and software, as well as problems related to the increased numbers of and frequent change of passwords on the equipment[27], the malfunction of digitalised tools, the widespread use of emails as a preferred means of information, and the anxiety generated by the increased likelihood to be called at home on their mobile phone to go back into work (France – FG2 INT11 INT12 INT13). A unionist also recalls that this deterioration in mental health and increased exposure to psychosocial risks must be linked to the organisation of work*: 'Stress, burnout, mental fatigue, I think it is all linked to the organisation of work. Perhaps digital technology is a factor in the increase of psychosocial risks, but these are primarily due to the organisation of work'* (France - INT13). The French report also shed light on an indirect negative impact of digital tools on the way in which workers cope with the high emotional demands inherent

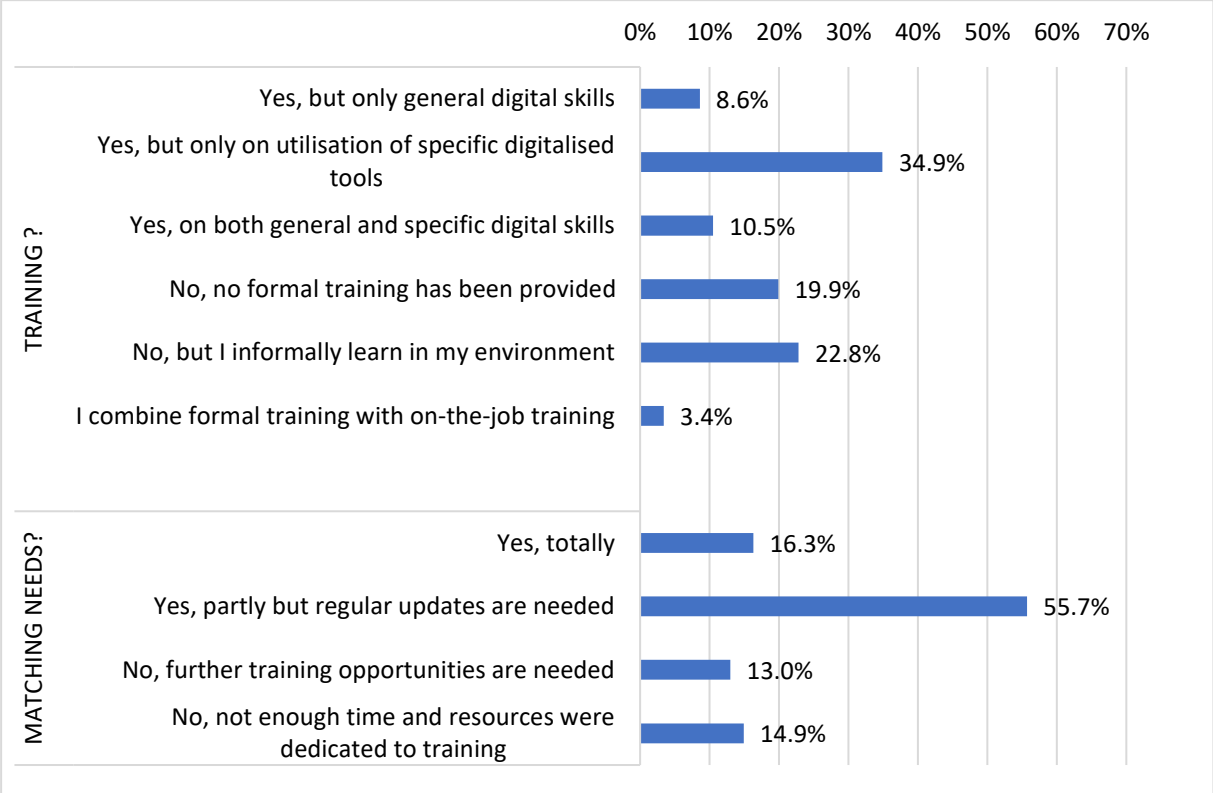
[27] As explained in the focus group, there are several passwords to access the computerised patient file, which are changed every month. Some difficulties may occur due to the 'log-in' procedures on computers shared by several people. The worker who is assumed to be logged in is the one who turned on the computer in the morning. Similarly, if a colleague on leave is replaced, the temporary staff member cannot log in with his own identifier but must use his colleague's ID (different accreditations are planned for different users), with password/logins 'automatically inserted' (France – FG2).

to their jobs. For certain workers, digital tools can appear as a way out, as priority can be given to digital tasks to the detriment of those related to care. This may result in some nurses withdrawing too much from personal contact with the patient. As emphasised by an interviewee*: 'ICT tools have become a refuge for some healthcare staff. This is mainly true of young people lacking experience. We have seen students who hid behind the computer to avoid contact with patients because they lacked training and knowledge of pathologies. Nursing training is very much criticised today'* (France – INT12). This phenomenon is all the more serious because it occurs in a context of declining social relationships. This produces a division of labour between certain nurses and caregivers, as explained by the same interviewee: *'Before, when a patient rang the bell, it was either the caregiver or the nurse who went. Now, the nurse is in front of her computer, she doesn't go anymore. It's the caregiver who goes there systematically'.*

4.2.3.5 Skills and learning

In order to adapt to the reconfiguration of tasks and associated skills within their job or occupational category, the public service workers in the hospitals and health sector need to acquire and master new digital skills. The DGQS survey includes a number of questions on the issue of skills, related to their perceived usefulness, the training actually received, and how well it matches their personal needs. The following figure illustrates the two latter aspects.

Figure 20: Provision of training on digital skills and matching with individual needs - – Hospitals and health sector- DGQS 2022



Source: DGQS 2022 – Q28 Have you received training from your employer to acquire or develop the new required skills? + Q29: Do you think the training provided matched your needs?

When asked if they feel that the introduction of digital tools and methods in their everyday work requires them to develop new digital skills, most respondents from the hospitals and health sector answered yes[28]. They either had to acquire both general and specific digital skills (28.4%) or only specific skills related to the digital tool used (38.5%). 22% of the workers answered that they already had the required digital skills through their educational background. Only a very small share of workers felt that digital skills are not necessary for their jobs (11%).

While the majority of respondents from the hospitals and health sector perceive digital training as necessary, not all of them have received training from their employer. In the sector, training is available to 54% of the public workers, who stated that they had received training from their employer in order to acquire or develop new digital skills. This training focused on general digital skills only (8.6%) or on specific skills required by the digital tools (34.9%), or on both aspects (10.5%). A very small group of respondents said they combined formal and informal learning (3.4%). However, no less than 42.7% of workers in the public hospital and health sector said that they have not received training from their employer. Among these, 19.9% have not received any

[28] The results for this question are not shown in Figure 14, but can be found in Table 13 in the Annex (Deliverable D3.2).

training at all and 22.8% say that they have learned informally at work (on-the-job learning and exchanges with colleagues) (see Table 13 in Annex (Deliverable D3.2)).

Another question from the DGQS focused on the respondents' perception of the adequacy of the training received in relation to their individual needs in this domain. 16.3% of the respondents from the hospitals and health sector reported that the training offered fully matched their perceived needs. For the majority of respondents, the matching partially matched their needs but regular updates are necessary (55.7%). Around one in five workers felt that the match between the digital training received and their individual needs was not good, either because they required new training opportunities (13%) or because they felt that not enough resources and time were devoted to the training of public sector workers (14.9%) (see Table 13 in Annex (Deliverable D3.2)).

The mixed picture of the quantity and quality of digital skills learning that emerges from the DGQS results is reflected only to a limited extent, if at all, in the national reports.
The interviewees and sectoral focus group participants from the hospitals and health sector generally acknowledge the usefulness of digital learning in the current world of work, as well as the major role that digital training tools play nowadays in implementing digital learning. An upward trend in the training provided through e-training systems is generally reported. In several country reports, the enhanced possibilities to deliver learning opportunities to the workers in the hospitals and health sector provided by digital tools are quasi-unanimously acknowledged by the unionists interviewed and the focus group participants. This is for instance underscored in the **Polish** report, in which a representative of the nurses' union describes the increased access of her professional group to knowledge resources in the form of digital repositories or electronic courses. There is an electronic training platform available at the hospital, thanks to which employees do not have to leave the facility to improve their skills. Using the application, they can train themselves during their duty hours, and even update some professional qualifications, e.g., those needed to perform blood transfusions. According to the **Hungarian** report, there is no doubt that digitalisation allows easier access to learning material. In online learning, where teaching theory is easier, one does not need to be physically in the same room as the instructor, the material can be re-watched, even practical knowledge can be partially mastered with special programmes, illustrative video material is provided, and it motivates young people. There are no major difficulties in developing the skills and qualifications needed for digitalisation. The **Spanish** report echoes that digitalisation has provided very good opportunities for training: courses online or participating in conferences or congresses on-line, training sessions held by doctors on a weekly basis that can be accessed online, or even certain surgical interventions that can be recorded or streamed. The **Danish** report also reflects a generally positive assessment of digital learning among interviewees in the sector. For instance, e-learning has been introduced to provide more flexibility at one hospital unit, which also had set up an educational department specifically to develop e-learning modules. Another example is a digital onboarding sequence for new health and service assistants, that has been implemented alongside a

mentoring agreement with a more experienced colleague at certain hospitals. This initiative has been developed in collaboration between workers and the management, and interviewees expressed the need for more cooperation between workers and management to implement successful digital solutions (Denmark - INT7).

In the **French** report, an interviewee expresses the view that training is often poorly integrated into the process of introducing new technologies. Training issues are aggravated by the fact that the software has not been developed with input from the staff. It is designed only by computer scientists, which means that it is not intuitive enough and is difficult to use for some workers (France – INT11). This is also echoed in the **Danish** report, which underscores a recurrent issue referred to in the interviews, that management failed to allocate the time and resources needed for the implementation of digitalisation. As emphasised both in the focus group and by the vice chair of the nurses' union, it is not enough 'just' to teach the skills need for the specific technology. Both advocated a need to teach 'technology understanding', the ability to understand digitalisation and new technology in the relevant context (Denmark - FG1 INT8).

Not all public workers have equal access to digital training. The **Spanish** report underlines that from the point of view of the delegates interviewed and participating in the focus group, the training provided is very poor, as training plans in hospitals are not digital-specific and there are no measures to ensure that all occupations affected by the change receive the necessary training. A large training gap is identified between occupational categories: while medical and nursing staff and midwives seem to have more opportunities, the other categories are somewhat neglected: ward staff, auxiliary nurses and technical staff. Likewise, there is reportedly a need to train substitutes, with coordinators and training contracts. In the same vein, according to a **Danish** shop steward representing hospital health and service assistants, these workers are often forgotten in the additional training and skills upgrading. Moreover, for medical laboratory technologists, in-service educational training is not an integral part of a formalised system, as is the case with nurses. This is viewed as problematic by the employees, given that the medical laboratory technologists work intensely with digital technologies, fostering a need for development of technological skills (Denmark - INT4). It should be noted that alternative training opportunities are nevertheless available to them, as, for instance, the Union for Medical Laboratory Technologists have developed their own union-run courses for additional training, which the hospitals and other employers than buy in for their members. The **Hungarian** report states that digital training is replacing physical training at the expense of social interaction. But there are parts of the healthcare sector where personal involvement is absolutely necessary (nursing, practical activities, activities requiring special equipment, e.g. chest compressions on dolls, defibrillation, injections). There are simulation tools for specific direct skill development, which have been awarded EU grants, but are mostly used in the training of physicians, and not yet nurses.

Several national reports also refer to a generational gap in the effectiveness of digital learning. The **Spanish** report states that, according to the focus group, older workers have difficulties in using the applications and the information given in an electronic format if they do not even use a computer. For two unionists interviewed, age is a major determinant of digital skills and willingness to learn and incorporate digitalisation (Spain - INT5 INT8). In the **Danish** report, two interviewed unionists emphasise that for some groups of workers, for instance older workers or those with a non-native background, the increased demand for written documentation can be challenging. This fosters a need for ongoing skills upgrading and equal opportunities to develop digital competences, which again requires time and practical solutions (Denmark - INT8 INT9). The **Hungarian** report notes that according to most of the interviewees, young people are at an advantage, as they are already well established in the digital world. It also notes that the age of nurses is lower in departments where more digital tools are used, such as the emergency or care units. In the **French** report, a unionist interviewed estimates that young professionals have easier access to the digital tools than older ones, especially since the software has been developed by external IT specialists and is not geared to the work at the hospital (France – INT13).

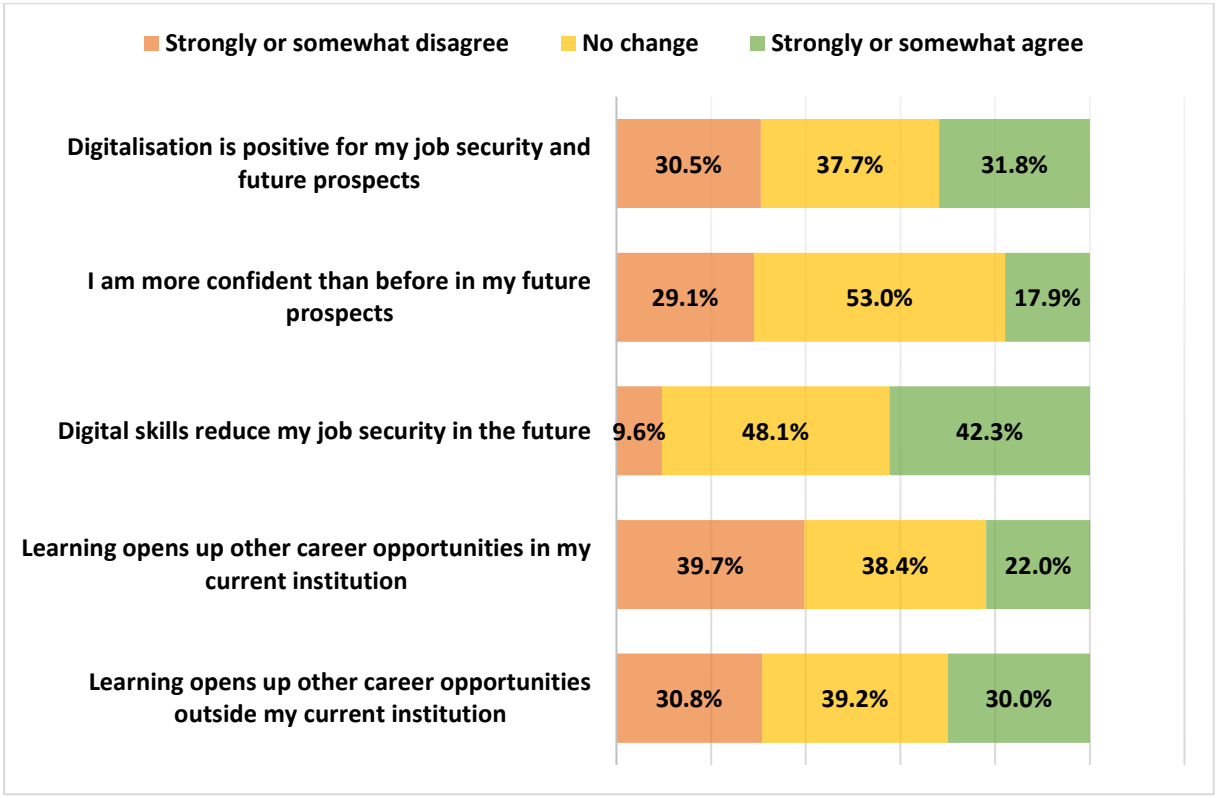
There are not many comments in the national reports on the quality of digital learning. Regarding the methods used, the **Spanish** report underscores that the majority of workers are trained on the basis of information that comes to them from the salesperson. In other cases, there is a kind of 'snowball training', as one worker is trained, and he or she trains the rest of the workers afterwards. The **Hungarian** report also describes the assessment of a unionist interviewed that learning is inadequate if only the manager of the team is given a broader briefing and later passes the information on to colleagues. In the **French** report, the unionists interviewed also highlight the requirement to look outside the hospital for expensive training because of the lack of internal trainers. One interviewee emphasised that the nursing staff were not trained because computer training was very expensive (France – INT11). Sometimes, public workers in the hospitals and health sector unfortunately do not have enough time available for training. As expressed by a **French** unionist: *'We don't have enough people to send people to training because, during that time, we still have to take care of the patients. This is a big problem, with training courses being refused because of a lack of staff'* (France -INT13). According to the **Polish** representative from the nurses' trade union, who works in an intensive care unit, her hospital lacked sufficient training in the use of electronic documentation; in other wards, however, where work is performed at a slower pace and the scope of activities performed with the patient is narrower, her colleagues probably had more time to learn to use digital tools, and thus the training process is more effective (Poland – INT10).

4.2.3.6 Job security and career prospects

The DGQS survey highlights polarised positions among the respondents from the public hospitals and health sector regarding the influence of digitalisation of work on their job security and career prospects. As illustrated in the figure below, around two out of five respondents in the sector feel

mainly that digitalisation in itself has not affected their job security or prospects, while around one out of three respondents have a more pessimistic perception about their future prospects.

Figure 21: Perceptions of job security and future prospects – Public administrations sector- DGQS 2022



Source: DGQS 2022 – Q30 Do you think that learning these new skills required by digitalisation …?

For a first group of respondents from the hospitals and health sector, the main feeling is that digitalisation in itself has not affected their job security or prospects (see Table 15 in the appendix). This significant group, making up around two out of every five respondents in the sector, ranges from 37.7%, for the suggestion that digitalisation is positive for job security and future prospects, to 53%, concerning improved confidence on these aspects. Another large group of respondents in the sector are more pessimistic about their future prospects. They indicate partial or strong disagreement with all the positive statements made. This group represents around one out of three respondents, ranging from 29.1% (disagreeing that digitalisation has made them more confident than before in the future) to 39.7% (who disagree that it has opened up career opportunities within their current institution). In addition, 42.3% of workers partially or totally agree that the rising need for digital skills reduces their job security in the future. Another group of respondents express a high level of agreement with the positive perceptions suggested about the impact of digitalisation on their job prospects. Many respondents agreed with certain statements such as the idea that digitalisation is positive for job security and future prospects (31.8%), but fewer agree that digitalisation has increased their confidence in their future prospects (17.9%). A similar differentiation is observed on the items related to the opening of new career opportunities, where more can see prospects outside

their current occupation (30%) than within their current institution (22%). Only 9.6% reject the suggestion that digital skills reduce their job security in the future.

The **French** report highlights a general dissatisfaction and even discouragement among staff in the hospital sector. This generates considerable mobility of workers, which does not improve their career prospects or job security: *'There is enormous mobility, professional wandering. This is linked to the introduction of the managerial logic according to which people have to be moved, put in subjective insecurity to give their best, break the routines to be more productive. The result is that you no longer belong to the hospital'* (France – INT12). Looking beyond the general situation, another unionist states that professional mobility is hampered by the wide range of the software used and the incomplete training: *'As some caregivers or less trained professionals have sometimes refused to change departments or to take up another post because they knew it was such and such software in another department and it scared them. There is the notion of digital divide which is important'* (France – INT13). In the **Spanish** report, challenges to job security and future prospects introduced by new technologies are mentioned with reference to problems of staff retention for certain occupations, due to job substitution resulting from digitalisation, as in the case of telephone operators. An interviewee also mentions the cascading skills effect due to the staff shortages for certain occupations: *'As a cascade, ward staff are taking over the functions of nurses, nurses are taking over the functions of doctors(…) because there are fewer and fewer doctors'* (Spain – INT8). These 'inherited skills' are not taken into account in the professional career pathways of these workers. The report underscores the need to ensure that career progression frameworks take into account skills improvements and continuous training, as a basis for increasing wages. Along the same lines, the **Polish** report reports the opinion of a representative of the trade union covering various healthcare occupations, that digital solutions have no impact on staff professional development prospects because these are closely related to the specific structure of medical professions and specialisations. The acquisition of new digital competences as a result of mastering new skills, such as issuing an e-referral, does not lead to the acquisition of new entitlements, nor is it associated with passing any state exams. Therefore, it is not reflected in formal qualifications, the job position or the employee's remuneration.

4.2.3.7 Workers' rights

For two out of three respondents to the DGQS from the public hospitals and health sector, the pressure to be digitally connected is not an issue, either because their jobs do not involve the need for a connection (36.2%) or simply because they don't feel any pressure to connect (27.3%). Most of the workers experiencing pressure to connect (36.5%) assume that this is a personal behavioural choice (19%). Occasional pressure to be connected is experienced by 11.3% of the respondents, coming from colleagues (5.2%) or supervisors (6.1%). For 6.2% of the workers in the sector, this pressure is frequent, either from supervisors (3.9%) or colleagues (2.4%). Nevertheless, even though the reported rates of pressure to be always connected may appear relatively low in the

DGQS, a large majority of respondents strongly emphasise the importance they attach to the right to disconnect (RTD) as a workers' right. 79% of the workers from the public hospital and health sector totally or partially agree that the RTD is an essential right in an increasingly digitalised world of work. For 80% of the respondents, the RTD should be included in labour law, if this is not already the case, and should also be one of the subjects dealt with in the social dialogue at workplace level (77.5%) or at sectoral and cross-industry levels (79.7%) (see Table 17 in Annex (Deliverable D3.2)).

The same contrast can be seen in the national reports, which include only scarce references to discussions by interviewees or focus group participants of disconnection issues or the RTD. The **Spanish** report notes that numerous references were made concerning the possibilities to disconnect, notably for teleworkers. It highlights that some professionals accept worse working conditions when teleworking, as it is presented as an option that facilitates the reconciliation of personal and working life. It is also noted that for teleworkers, the opportunity for collective problem management is lost, due to increased isolation and a shift to a more direct communication with the boss or supervisor. In the **German** report, a unionist recalls the challenges posed to workers by the use of smartphones to organise and monitor work (e.g., duty schedules on '*WhatsApp*' groups, a frequent practice in the hospitals). This fosters a permanent connection between workers and management.
Not many workers are equipped with smartphones provided by the employer which can be switched off outside working hours. Personal smartphones usually stay connected all the time, so workers can always be reached. The **Danish** report notes that the participants in the sectoral focus group were not entirely in favour of written-in-stone rights (such as the right to disconnect). Rather, issue of accessibility was seen as a matter for personal boundary settings rather than clear-cut rules and regulation.

In the DGQS, the majority of respondents from the public hospitals and health sector do not know whether a formal information and consultation procedure on digitalisation has been organised at their workplace, either on the reasons to digitalise work (59.9%), or on the practical possibilities (53.2%), or on the process of implementing digital working methods and tools itself (55.6%) (see Table 18 in Annex (Deliverable D3.2)). Moreover, between 23.7% and 27.5% of the respondents declare that no information and consultation procedures were followed concerning these aspects. Among the remaining respondents who did benefit from such a procedure, this was done, depending on the topic, at individual level for 5.4% to 8.2% of the workers, more rarely through trade unions for 3% to 3.7% of them, or through both channels for 7.3% to 8% of the respondents.
The **Spanish** report underscores that generally speaking, workers' representatives are not informed or consulted about the changes being made. According to the sectoral focus group, there is no direct involvement of workers in the digital change, as machines are purchased without taking into account the workers and their needs. There is no direct or indirect involvement in the incorporation of technology, the changes that are taking place, or the existing needs. This is also highlighted in the

Hungarian report, which notes a complete lack of information for trade unions, which could have been involved in training and in making older workers more receptive to digitalisation. The importance of consulting and involving workers in the implementation of digitalisation in work is recalled by the head of the nurses' trade union, who underlines that workers' rights should be taken into account from the very beginning of the digitalisation strategy and the introduction of digitalisation. Employees can only give their clear support to digitalisation, unfamiliar tools, and work processes, if they are meaningfully involved in the planning phase. This means not only that they have the right to be informed about the planned technological and technical changes, but also that they have the right to know and understand the digital solutions to be implemented in sufficient detail, to see the changes in work processes, working conditions, and roles accurately, and to be prepared in good time for them. A similar statement is also made by a **German** unionist, who underscores the importance of consulting and involving workers early in the process of implementing digitalisation, to eliminate possible resistance and concerns and to ensure a better process.

Several national reports note that digital tools have enhanced the exercise of representation rights in trade union work. **Polish** unionists interviewed note the far-reaching development of digital means used both in communication between trade union members and between unions and the employer, contributing positively to ensuring workers' rights. A **French** unionist makes a similar comment, pointing out that digital technology has facilitated access to staff thanks to e-mails (France – INT13). The **Spanish** participants in the focus group underline that in hospitals with a large number of members, digital means (emails, videoconferencing, instant messaging) enable them to reach many workers with great immediacy. In addition, this technology allows them to address the common problems faced by the various representations in the different hospitals. A unionist also recalls that in everyday trade union work, the use of digital media has meant that the working day can be extended as long as you want: *'You can be hooked in 24 hours a day! More delegates are needed to cover the needs that arise, which are very diverse and in various areas. They receive many requests for help from people to carry out procedures using digital tools because they don't know how to do them. In fact, in one hospital, the trade union representation dedicates one person to deal with these types of formalities and queries (which are requested by all occupations) In total, this represents a quarter of the union's resources, which are therefore resources provided by the union that are not covered by the administration'* (Spain - FG1).

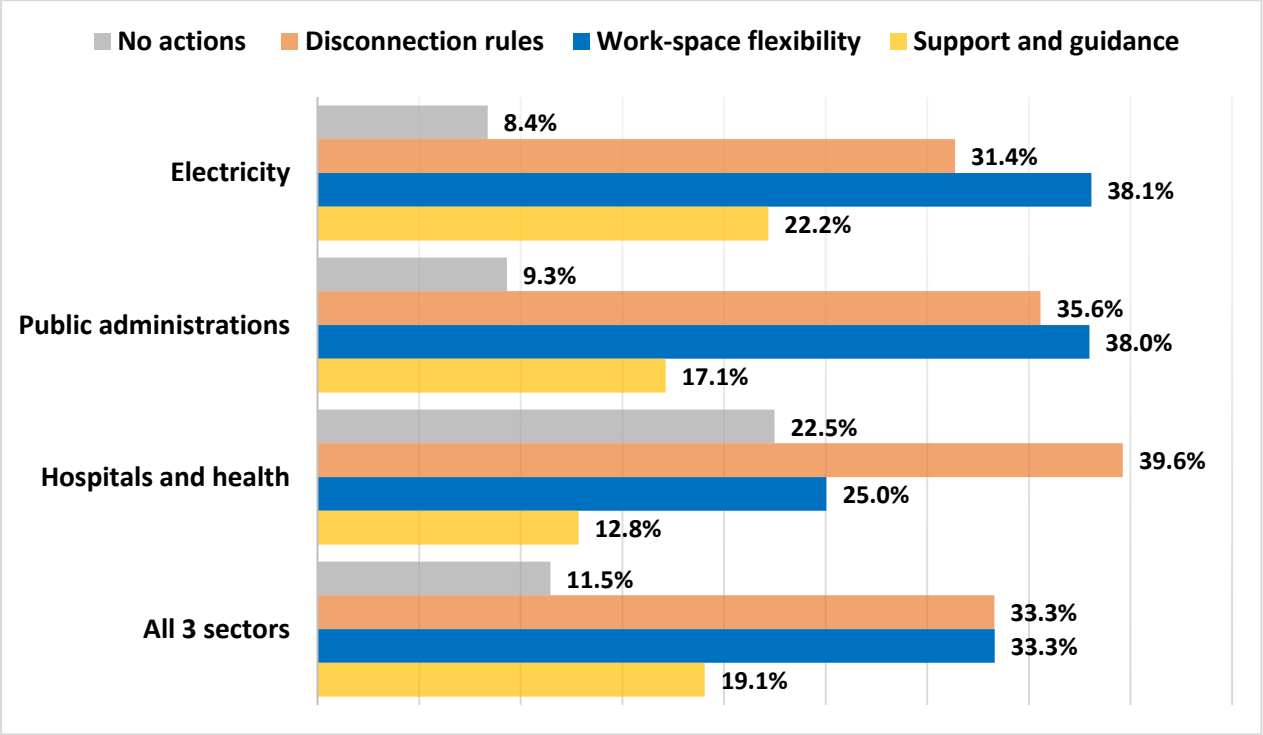
Finally, in other national reports, issues related to the monitoring and control of workers allowed by digital tools have given rise to debates. The **Danish** report reflects the ambivalent nature of digitalisation in relation to these issues. On the one hand, interviewees and focus group participants express concerns about the increasing surveillance and control of workers following the growing digitalisation of work. The recent implementation in certain hospitals of a logistic IT system that can log workers' activities has sparked debates around the use of personal data and the degree of surveillance of workers. For instance, the case is mentioned of a hospital porter who had been

dismissed based upon the tracking in the system. While overall guidelines are in place on a regional level, it is up to the individual hospitals to implement them in practice. On the other hand, the interviewees and focus group participants emphasise the positive effects of GPS-tracking devices, as it has become possible for the rest of the staff to contact the closest service assistant directly, rather than having to call around randomly for help. With this device, tasks are assigned more equally to everyone. This introduction of more transparency has reduced mistrust and fostered a better working environment. When used properly, these tracking systems are meaningful. As underscored by the authors of the report, these declarations need, however, to be qualified by the consideration that none of the workers in the focus group were themselves under GPS surveillance (rather, this situation affected service assistants in the hospitals) (Denmark - INT7 FG1). Concerns about data security and monitoring issues are also echoed in the **German** report, in which a unionist summarises the debate in these terms: '*The danger is that digitalisation can create new monitoring possibilities and apply them in practice. Not only time monitoring (e.g., in patient care: how long patients have to wait, time spent on certain activities, etc.), but also exploration of potential savings from the employer's perspective if these temporal components are digitally recorded and monitored. There is also monitoring of the use of assistive devices in patient care. Accurate recording through digital technologies can also lead to a negative evaluation of employees. For example, if you can see where the material trolley is and what this contains, you can constantly monitor this. Then the employee and caregivers are not able to make their own decisions and evaluate which patient should get what (how much time, which aids etc). In the end, this increases the control and monitoring possibilities of the controllers but can limit the freedom of decision of the employees'* (Germany - INT11).

SECTION 5. PREVENTIVE ACTIONS IN THE PUBLIC SECTORS

In this section, we briefly review the various preventive actions implemented in the three public sectors under scrutiny in the project - measures aimed at preventing and managing the potential harmful effects of the digitalisation of work. As illustrated in the figure below, the findings from the DGQS show that respondents report mainly measures concerning the establishment of rules onf disconnection or related to flexibility arrangements.

Figure 22: Preventive measures in the public sectors– Actions and sectors – DGQS 2022



Source: DGQS 2022 – Q37 At your workplace, have any of the following actions been put in place to support you regarding increased digitalisation of some aspects of your daily work?

The first observation is that overall, 11.5% of all respondents to the DGQS reported that no support measures had been put in place in their public sectors. In the hospital-health sector, the proportion is even twice as high (22.5%) as in the other two public sectors considered (just under 10%) (see Table 16 in Annex (Deliverable D3.2)). A third of the preventive actions are related to the establishment of disconnection rules, which are mentioned by one in three respondents (33.3%). This framework for disconnection is frequently referred to in the three sectors, particularly in the hospital-and health sector, where it was mentioned by 39.6% of the respondents. Another group of measures concerns the use of space-time flexibility arrangements, mentioned by the same proportion of respondents (33.3%). Among these measures, the respondents mainly refer to expanded possibilities to telework from home (16.9% of the total of the three sectors). This opportunity appears to be much less common for the workers in the hospital-health sector (9.3%) than for those in the other sectors (around 20%). Another facet of this space-time flexibility concerns the improvement of workplaces, which is reported by a similar proportion of respondents in the

three public sectors (around 15%). Lastly, internal support and guidance measures were reported by 19.1% of all respondents. Here again, these are less frequent in the hospitals and health sector than in the two other public services. Among these measures, the low share of respondents reporting specific vocational training measures (around 3%), regardless of the sector, is a worrying finding in itself.

SECTION 6. SUMMARISING CONCLUSIONS

We must emphasise the increasingly widespread use of remote working as a way of organising work flexibility in the public services. The technological changes brought about by digitalisation, the multiplication of digital interfaces combined with the digitisation of documents and the possibility of staying permanently connected to professional information flows have all contributed to the development of new forms of work organisation, such as remote work and particularly teleworking from home. The incidence of remote work has increased dramatically in recent years among public service workers[29] . The possibilities and conditions of remote work have now become an almost unavoidable point for consideration when drawing up employment contracts and making job offers. Partially freed from time and space (working anytime anywhere), these new forms of work generate more individualised opportunities but also responsibilities for workers and employers, enabling them to adapt their workplaces, their jobs and their working times to their respective needs in terms of flexibility. However, there are marked differences in the incidence of remote work between the three public services considered in the project. The various forms of remote work are generally more widespread in the public electricity production and distribution services, but also in the public administration sector. In contrast, teleworking is much less common in the public hospital and healthcare services, where almost 80% of the workers have no opportunity to work away from their professional workplace.

The pervasive and ambivalent impacts of digitalisation on job quality

Even more than the previous wave of technological transformation in public services (computerisation and networking), the digitalisation of work has spread rapidly to all the aspects of daily work, via individual devices such as laptops, tablets and smartphones, and the so-called Internet of Things (IoT). The COVID-19 pandemic acted as a powerful catalyst in accelerating and intensifying the use of digitalised work among private and public workers.

The findings on the consequences of digitalisation on the job quality of public service workers also highlight the ambivalent nature of these changes for public services and their workers. On the one hand, digitalisation undeniably contributes to a certain improvement in the work carried out by public service workers, and hence in the quality of the services provided, in terms of efficiency and effectiveness. Expected positive impacts on the job quality of workers include greater flexibility in time and space (remote work), more autonomy at work, reduction of routine repetitive tasks, better work-life balance, improved collaboration, communication and knowledge sharing with colleagues and users, the reduction of absenteeism, and physical and mental health outcomes. All these changes are expected to improve the job performance and ultimately job satisfaction of public

[29] According to the data collected by the project's web survey, in 2022 almost half of the workers in the different public services claim to currently have partial or full access to teleworking from home (45.9%) while others have experienced teleworking only during the COVID-19 pandemic (11.3%). This proportion falls to around one third of respondents who work at service users' premises, or in decentralised professional structures.

service workers. On the other hand, there are also negative impacts of digitalisation on workers' well-being. To mention just a few: work intensification, de-personalisation of service tasks ('social time'), individualisation of work relationships with colleagues and managers, control and monitoring of workers and their job tasks, blurring of boundaries between work and private life, physical and mental health hazards.

The ambivalent effects of digitalisation on the nature of work organisation in the public services generate paradoxical tensions: workers must cope with these in order to strike a proper a balance. These tensions include: greater flexibility in time and space vs. respect of effective contractual working hours, work-life balance vs. hyper-connectivity, individualised work vs. team work, enhanced information vs. information overload, increased autonomy vs. increased control, upskilling vs. deskilling, better public services vs. distancing from the users.

The empirical evidence collected in the DIGIQU@LPUB project, in particular from the web survey (DGQS), shows ambiguous perceptions among public service workers of the impact of digitalisation on the features of job quality. The main emerging picture is that for roughly one half of the respondents, digitalisation has had a neutral (no change) impact on job quality, for around one third of workers it has had positive effects, while for about one fifth of respondents the change has been seen as negative. Obviously, this aggregated overview masks a certain variability between the aspects of job quality, the sectors and the countries considered. For instance, workers from the public hospital and healthcare services stand out from the other public services considered in the project by expressing stronger negative impressions and describing a less positive impact[30].

The prevalence of 'no change' and positive assessments of the impact of digitalisation on job quality by a majority of public workers in the survey seems to indicate that digitalisation is perceived by workers as an additional factor, rather than the cause of fundamental changes in the quality and organisation of work in the public services. Technical advances allowed by digitalisation exacerbate trends towards reorganisation, flexibilisation and individualisation of work which were already affecting EU public services. These trends are the outcome of the packages of reforms implemented as part of the process of privatising public services, the overwhelming application of the 'New Public Management' organisational paradigm in a context of constrained austerity of public expenses, including limitations of public workforce size.

[30] When asked in the survey about the impact of digitalisation on their overall job quality, almost one in two respondents (47.2%) from all sectors aggregated felt that it had had no effect on job quality, while around one in three public workers felt that it had had a positive effect (31.1%). On the other hand, for almost one in five workers, the perceived effect of digitalisation on overall job quality is negative (21.7%). Respondents from the public hospital and healthcare services stand out from the other public services considered in the project. More of them perceive a negative impact of digitalisation on overall job quality (31.3% compared to around 18% in other public services), while fewer perceive a positive impact (32.2% compared to around 50% in other public services).

The impact of digitalisation on aspects of job quality

In addition to the overall perspective provided by the web survey on public service workers' individual perceptions of the impact of digitalisation on job quality, the DIGIQU@LPUB project has also gathered a substantial amount of information from the eight countries and three European public services, through sectoral focus groups of workers and in-depth interviews with trade unionists at sectoral and cross-industry levels. The full extent of the information gathered through these channels can be fully appreciated in the eight national studies, as well as in the resulting cross-cutting reports on the impact of digitalisation on job quality (this deliverable) and on social dialogue practices (deliverable D4.2). It also enables us to shed light on some of the positive and negative aspects of the effects of digitalisation on the various dimensions of job quality.

1. Impact on work organisation

In the public electricity production and distribution services, the DGQS shows that the assessment of the workers questioned on the impact of digitalisation on various areas of work organisation is mostly positive. This is particularly true for the impact on the time available for carrying out tasks, autonomy in cooperating on work, and communication/interaction with colleagues and service users (50 to 60% positive opinions). It is less the case for aspects related to control/surveillance of work by colleagues, managers or public service users, where the positive assessment was less clear-cut, although still in the majority (around 40% positive opinions). On the other hand, almost one in four workers have experienced a negative impact of digitalisation on every aspect of work organisation, particularly internal and external monitoring of the work carried out.

In the national reports, the positive aspects of digitalisation are generally acknowledged by the interviewees and participants in the sectoral focus groups of public workers. This positive perception encompasses digital tools to optimise the control and maintenance of the multiple elements necessary for the production and supply of electricity (e.g. smart grids, smart meters, drones), and digital planning and organisation systems (DPOs), which improve individual flexibility and autonomy at work, particularly for technical professions such as electricians.

However, these national reports also discuss more negative aspects of digitalisation:

- Several national reports mention an increase in the intensity and pace of work as a result of digitalisation, due to the multiplicity of digital devices used and the increase in the amount of instantaneous information to be managed in a just-in-time work environment, making it impossible to reduce the pace of work and the number of hours worked. This more flexible, fast-paced work can also generate stress and the physical and mental health problems that go with it.
- In spite of the positive effect of digitalisation on the reduction of time spent on repetitive routine tasks, work autonomy could be hampered by the 'digital Taylorism' inherent to DPOs and the algorithms that underpin them, as the whole chain of work tasks is now digitally

categorised and rationalised. This may generate among technicians a feeling of downskilling and loss of professionalism, as well as a lack of consideration of their problem-solving capabilities.

- Reference is made to a 'paradox of autonomy', as new routine tasks related to the digitalised work have replaced analogue/paper administrative tasks. This is true for clerical work but also for technicians, who have to perform new routine administrative protocols at the end of each intervention and working day in order to encode them in the digitalised work process.
- The risks associated with the pervasive real-time monitoring of work and workers brought about by digitalisation are mentioned in interviews with trade unionists in several national reports. This is of course a particularly sensitive issue in the context of social dialogue. The use of permanently connected digital tools (DOPs) provides managers with a massive flow of real-time structured information about individual location and performance in the execution of work tasks. There is a risk that this information, some of which is of a strictly private nature, could be re-processed to assess the performance of employees and their prospects for promotion or possible bonuses, but also to permanently locate workers and follow their movements or activity and inactivity times, including breaks.

In the public administrations sector, similarly to what is observed for the public electricity provision and supply service, the majority of workers responding to the survey have a positive assessment of the impact of digitalisation on the whole set of work organisation features (34.7 to 57.8% positive assessments). The items related to improvements in teamwork, autonomy, control and working time are the most positively assessed. The remaining respondents are distributed more or less equally between neutral or negative perceptions of the impact of digitalisation, with the noticeable exception of the item related to the quality of interaction with users, for which the negative opinions clearly outnumber the 'no change' opinions.

Most of the national reports recognise the positive contribution of digitalisation to the organisation of work in the public administration sector, in terms of flexibility and optimisation of the availability and circulation of information, standardisation of procedures and ultimately the quality of the public service provided to users. Similarly, the increased possibility of teleworking from home or from decentralised facilities is seen as a positive step forward for this public sector.

A number of more negative aspects were also discussed by the interviewees and participants in the sectoral focus groups. They are similar to the points discussed above for the public electricity production and distribution service:

- The national reports are divided as to the direction of the impact of this greater flexibility on work intensity: some say it has increased, some that it has been eased. Added to this is the fact that in several countries there has been a process of decentralisation of activities, which has led to increased responsibilities and workloads in regional and local administrations,

without the required budgets necessarily being available. This has provoked an excess burden on workers in some public administrations.

- The recurrent lack of internal financial and human resources to implement the digitalisation of work efficiently within administrations is mentioned several times in national reports, as well as the risks of relying on external private resources to make digitalisation operational. Moreover, these external operators generally lack the practical experience of working in public administrations that would enable efficient and smooth implementation of work in the digital age.
- The question of the supposed improvement in workers' autonomy was also discussed critically by the interviewees and focus group participants in a number of countries. Here, too, the existence of an autonomy paradox is highlighted, as digitalisation has been accompanied by the substitution of new digital tasks for old analogue ones, sometimes with the addition of new tasks to remedy the technical problems associated with digitalisation. What is more, a significant proportion of the work overload is not attributable to digitalisation but to pre-existing factors in the public sector, such as the persistent lack of financial and human resources.
- Some reports point out that digitalisation, and teleworking in particular, is viewed with suspicion by managers, as it individualises workers' performance and blurs the hierarchical relationship between managers and workers. As working from home is more difficult for managers to monitor, this can lead to a tendency to overload teleworkers' work agendas.
- The risks associated with the management of the increased real-time monitoring of work and workers brought about by digitalisation are also discussed in interviews with trade unionists from the public administration sector in several national reports.

In the public hospitals and healthcare services, contrary to what is observed in the survey for the other public services scrutinised in the project, the perception of the impact of digitalisation on work organisation features is mainly negative. The main share of respondents from this public service strongly or somewhat disagree with the items on work organisation features (26.9 to 48.8% of negative assessments). This is particularly striking for the items related to working time, such as the feeling that they have more time to focus on significant aspects of the job or the reduction in time needed for routine tasks. There are also negative assessments of the impact on relations with public service users, on the quality of interaction with these or on users' assessment of the work done by public service workers.

As in the other public services investigated in the DIGIQU@LPUB project, interviews with trade unionists and focus groups of workers from the public hospitals and health services in several countries begin by emphasising the positive contribution of digitalisation, in terms of centralisation, exchange and consultation of patient information in near-real time (electronic medical records) and

the detailed procedures to be followed. Digitalisation gives doctors and nurses more autonomy and more time for patients.

However, several negative aspects of digitalisation in the public hospital service are also discussed in detail in the national reports:

- A number of national reports point to an upward trend in work intensity in the hospital sector. Work overload may result from the high degree of standardisation of digitised work and a relative mismatch between the tasks planned by digital algorithms and the complex reality of hospital work, especially as workers are rarely consulted before digital procedures are created.
- Another factor reducing workers' autonomy and increasing work overload is the failure to fully replace traditional administrative tasks with digital tasks more related to maintaining and updating the digital information base in real time (autonomy paradox). In hospital departments, these digital administrative tasks are not replacing the old analogue tasks, but rather are adding to them, because of the utilisation of a dual monitoring system of patients (digital and paper-based), for obvious reasons of safety in the event of problems.
- Teleworking from home is not widespread in the public hospital service, not only due to the nature of the activities, which lend themselves less easily to it, but also because even when it is possible, there is a distrust of remote working on the part of hospital managers and a tendency to authorise it sparingly or even to allocate a greater workload to teleworkers.
- The question of the permanent and omnipresent monitoring of individual worker performance, which digitalisation encourages, is also much discussed in the national reports. One aspect specific to the hospital sector is the legal use of this information as evidence in the event of errors, malfunctions or incompatibility of tools.
- Against this backdrop, several national reports highlight the risk of overconfidence in digital tools, which can be misleading or even dangerous.
- Several national reports also allude to the risks of downskilling and de-professionalisation of nurses, because of the time devoted to digital tasks, to the detriment of time for what is a key skill in the hospital sector: contact with patients.

2. Impact on working time

In the results of the DGQS survey, public workers from the electricity production and supply services mainly state that digitalisation has not changed features of their contractual working time. The size of the group of respondents expressing this lack of impact ranges from 42% (commuting time from home) to 74.5% (paid overtime hours). The most positively evaluated aspects are the reduction in commuting time to or from the workplace (50.8%) or users' premises (29.8%), and the increase in the number of break/rest periods (30.5%). Around three out of ten public workers give a negative assessment on certain items, such as the perceived increase in the number of working hours in general and also of unpaid overtime and unsocial working hours.

The interviews organised in the electricity production and supply public services through the national reports make little direct reference to the issue of exceeding contractual working hours per se, even though they recall that working time has mainly been extended because of both increased work intensity and work overload. These may to some extent be a result of digitalisation (digital Taylorism), but are mainly attributed to other structural factors of the public services, such as a persistent lack of human and financial resources, seasonal effects, external events (e.g. the war in Ukraine) and constraints (liberalisation of the market, decarbonisation and the green transition).

The results of the DGQS survey for public administration workers mainly reflect the view that digitalisation has not changed the features of contractual working time. The size of the group of respondents expressing this feeling of 'no change' ranges from 55.5% (commuting time from home) to 87.3% (paid overtime hours) of the respondents from the sector. There are fewer positive perceptions, except concerning the reduction in commuting time from or to the workplace (40.3%), in a public sector where there are more possibilities to telework. However, a sizable group of workers from the public administrations assess that there has been a reduction in the number or duration of break/rest periods (30.5%) and that unsocial working hours (23.4%) and contractual working hours (17.1%) have strongly or partly increased with the digitalisation of work. Moreover, for 15.3% of the workers, the extra working hours are unpaid.

The interviews and focus group opinions from the public administration sector contained in the national reports make limited reference to the issue of overtime in itself, but rather point to the influence of both increased work intensity and work overload. In addition to understaffing and underfinancing, various reasons are suggested in national reports for this situation in public administrations:

- The massive flow of monitoring and reporting information generated in real time by digitalisation.
- The rise in the number of cases dealt with due to devolution of competences from the national level to sub-national levels.
- The cut in the numbers of support staff, as these tasks are now performed directly by the workers themselves in the digital world of work.
- The strong boost of teleworking among workers in the public administration – generated by the surge of the COVID-19 pandemic – which occurred without proper preparation, training or learning of self-management.
- A tendency to give more work to people who are teleworking because of distrust among managers. The resulting overload leads numerous workers to withdraw from the teleworking system to alleviate their workflow.
- The limited possibilities, or impossibility, for teleworkers to benefit from regulated working time slots based on in-out-clocking systems.

Similarly to the other public services considered in the project, the main perception voiced by workers from the public hospitals and health services sector in the DGQS survey is that digitalisation has not changed the features of their working time. However, in this sector, a far larger proportion of around eight out of ten of the respondents describe a neutral effect of digitalisation on almost all the proposed items. Among the remaining respondents assessing a more negative impact of digitalisation on their working time features, some point to an increase in the number of working hours set in their contracts (21.9%) but also in unsocial working time (19.5%) or overtime hours, either paid (13.5%) or unpaid (15.5%). It should be noted also that 24.5% of the respondents report a strong or partial reduction in the number and/or duration of break periods.

The interviews and focus group opinions gathered from within the public hospitals and health services through the national reports underscore that overtime and overload are not the outcome of digitalisation but result from other structural factors already discussed in relation to the other public services scrutinised in the project. In some cases, overtime is due to network failures constraining workers to (unpaid) overtime hours. Reference is also made to systems existing in the sector to cope with the chronic understaffing. Through dedicated web platforms, emails from managers or professional WhatsApp groups, specialised workers (notably nurses) may be allowed to access overtime hours at any time in other hospitals.

3. Impact on work-life balance

The issue of work-life balance and the blurring of boundaries between work and private life is closely connected to the aspects of work organisation and working time discussed previously, notably overtime, overload and frequency of teleworking.

In the results of the DGQS survey, the respondents from the **public electricity production and supply services** are relatively evenly distributed between the different assessments. For around one third of the respondents, digitalisation has not changed any aspect of their work-life balance. A second third of respondents give a positive assessment of the effects of digitalisation on their work-life balance, either agreeing that digitalisation has made more time available for themselves and their family, or disagreeing that it has increased their working time at the expense of their personal time. Among those who telework, there is a similar strong or partial rejection of suggestions that digitalisation makes it more difficult to combine work and home obligations or to set clear boundaries between personal and working time. Finally, the remaining third of the respondents from the public electricity services think that the effects of digitalisation have been negative on the work-life balance.

The national reports are relatively silent on the issue of reconciling work and private life, although certain aspects are discussed in relation to other aspects of job quality, such as the organisation of work, particularly teleworking, and the consequences of digitalisation in terms of overload and overtime. The interviews in some of the reports draw attention to the intrusive and disruptive effects

on the work-life balance of the increasing use of digital tools and devices that imply a perceived and/or real need to be constantly connected. These include, for example, work-related groups on instant messaging applications, which have developed as alternative ways of organising work, and make it possible to maintain a hierarchical relationship in a digitalised world of work that is more individualised, and where workers are more isolated from their colleagues and hierarchy. There is therefore a need for a legal framework (right to disconnect) for the professional use of these digital tools, but also for adequate training of (public) workers in their smart use and management.

The respondents to the DGQS from the **public administrations sector** are broadly equally distributed between the three kinds of assessments, without marked differences between the levels of neutral, positive or negative perceptions of the impact of digitalisation on the work-life balance.

In the national reports, the issue of work-life balance is mainly discussed in relation to the increased volume of telework in the public administration sector. Some critically underline the limited but nevertheless welcome existence of legal tools (laws, collective agreements) framing the use of telework and the protection of private life (right to disconnect).

The respondents to the DGQS from the **hospitals and health public services** express, more strongly than workers from the other public services scrutinised in the project, a neutral assessment of the impact of digitalisation on the work-life balance. Unsurprisingly, in view of the more limited expansion of telework in the sector, they have a stronger 'no change' perception concerning the items related to teleworkers. Nearly half of the workers from the public hospitals and health services disagree that digitalisation has not changed the amount of time outside the workplace or has increased personal and family time.

As for the other public services, the topic of the impact of digitalisation on the work-life balance is barely touched upon in the national reports by the unionists interviewed or workers participating in the sectoral focus group. The role played by specific digital tools in the blurring of working and private life boundaries is mentioned as a particular feature of the sector. Dedicated web platforms or instant messaging apps allow medical technicians, and particularly nurses, to apply to work supplementary hours in other services or units in order to compensate for the chronic understaffing in the sector. While this enables these workers to maintain or improve their income, it does so at the expense of their personal time. Another specific feature of hospital and healthcare services is the greater unpredictability of working hours, which can also significantly affect the work-life balance.

4. Outcomes: physical and mental health

According to the results gathered from the DGQS survey, the majority of respondents from the **public electricity supply and delivery services** report no effects of digitalisation on their state

of health. Thus, 44.8% of respondents stated that they had not noticed any physical health problems due to the digitalisation of their work, and this rate rose to 59.4% for mental health problems. However, while the central tendency is neutrality on health outcomes, as many as 39.6% of respondents in the sector point to a physical problem related to digitalisation, either a new problem or aggravation of a pre-existing issue. Around one third of the respondents from the sector (33.8%) report that digitalisation of work has generated mental health problems. The main physical disorders reported are vision problems (19.6%), back pains (18.4%), neck pains (16.9%), followed to a lesser extent by headaches and physical fatigue (around 12%). The main mental health issues mentioned in the survey are mental fatigue (23%), stress (18.5%), demotivation (15.2%) and anxiety (14.6%). Moreover, almost half of the respondents report an increased exposure to psychosocial risks due to digitalisation, either harassment or bullying by colleagues and managers (50.5%), exposure to verbal or even physical violence from colleagues and managers (53.6%) or from users of public services (55.9%).

The interviews and opinions of focus groups contained in the national reports highlight the positive contribution of digital tools to the physical well-being of workers, in terms of protecting workers' health and safety and reducing the risk of accidents. But it is mainly the negative effects of digitalisation on the health of workers in the sector that are discussed. Several reports make the link between mental health problems and the increase in stress among workers, at various professional levels, generated by the intensification of the pace of work inherent to the use of digital tools. The increased individualisation of digitalised work and the resulting greater social isolation of workers were highlighted as among the factors generating stress and mental problems.

For the majority of respondents to the DGQS from the **public administrations sector**, the digitalisation of work has not impacted their state of health. Thus, 44% of respondents stated that they had not noticed any physical health problems due to the digitalisation of their work, and this rate rose to 67.1% for mental health problems. Nevertheless, a worrying share of workers have experienced negative consequences on their health. About half of the respondents (46.7%) report physical health issues related to the digitalisation of work, while 27.7% of workers also state the existence of mental health disorders. The main physiological issues reported by workers in the public administrations sector relate to vision problems (17.6%), neck pains (19.2%) and back pains (17.2%). The main psychological problems reported are mental fatigue (21.5%) and stress (20.7%), followed to a lesser extent by demotivation (12.6%), anxiety (12.5%), burn-out (10.5%) and the difficulty of dealing with overwhelming emotional demands (9.4%). Furthermore, as many as half of the respondents from the public administrations sector also report increased exposure to psychosocial risks: harassment or bullying by colleagues and managers (50.8%), but also exposure to verbal or even physical violence from colleagues and managers (50%) or from users of public services (54.4%).

Health outcomes for the workers of public administrations, the main health outcomes discussed in the national reports concern the impact on workers' mental health of the increased flexibility in work organisation, particularly with the surge of teleworking. Several national reports point out that the individualisation of work inherent in teleworking can have consequences for workers' mental health, generating, for example, stress and mental exhaustion, with damaging outcomes such as nervous breakdowns or burn-out. Several reports underscore the need for adequate training and organised learning in the self-management of working time, as well as for the establishment of regulatory frameworks (right to disconnect), to avoid digital flexible work – and particularly teleworking – causing overwork, physical exhaustion and even burn-out. Breakdowns, malfunctions or incompatibility of digital tools can also exacerbate stress and mental exhaustion. Proper adequate internal resources (material and human) are often lacking in the public administrations, as well as in the other public services, to mitigate rapidly these sources of stress and mental problems.

The majority of the respondents to the DGQS survey from the public hospitals and health services did not notice an impact of digitalisation on their state of health, reporting that they have not experienced any changes in their physical (52%) and especially mental (68.9%) health that could be related to digitalisation. However, 39.3% of workers declared that digitalisation of work has caused them physical problems, while mental health issues are reported by 28.2% of the respondents. The main physical disorders reported by respondents are vision problems (16%) as well as musculoskeletal disorders such as neck pains (18.8%) or hand and back pains (13.2% and 14.6% respectively). The main psychological problems reported in the survey are mental fatigue (22.8%), stress (23.6%), demotivation (13.5%) and anxiety (12.8%). As in the other public services scrutinised in the project, about half of the workers report increased exposure to psychosocial risks and report that they more frequently experience harassment or bullying by colleagues and managers (41.9%), but also verbal or even physical violence from colleagues and managers (42.5%) or from users of public services (43.4%).

The impact of digitalisation on the mental health of public workers in the hospital and health services is commented on in some reports, mainly the issue of stress arising from time pressure and its potential effects on mental health. Several stress factors are highlighted in the reports, such as: increased workload and pace of work, permanent remote monitoring of work and patients in a context of growing isolation of workers, anxiety generated by demanding work, possible (dangerous) malfunctions of tools, undertraining and the need to stay permanently connected.

5. Skills and learning

Sufficient digital skills for workers is obviously a crucial precondition for an efficient and non-damaging implementation of digitalisation of work in the public services. The DGQS survey includes a number of questions on the issue of skills, related to their perceived usefulness, the training actually received and the extent to which it matches personal needs. The findings of the project

highlight that there is still some way to go before all workers in the public services under scrutiny have been fully and adequately prepared for the transition to the digital age of work.

Regarding their personal assessments of whether they need to develop new digital skills to achieve tasks related to their everyday work, most respondents from the **public electricity production and supply services** agree on the usefulness of skills training, either training limited to specific skills related to the digital tool used (36.2%) or wider learning on both general and specific digital skills (18.8%). 37.7% of the workers in the sector report that they already had the required digital skills from their educational background.

In the electricity sector, approximately two thirds of public workers (64.5%) stated that they had received training from their employer to acquire or develop new digital skills. This share is higher than those observed in the other public service sectors scrutinised in the project. However, no less than 36.4% of workers in the electricity public sector assess that they have not received any training from their employer. Among them, 14.6% have not received any training at all and 21.8% declare that they learned informally at work (on-the-job learning and exchanges with colleagues).

Regarding the match between the actual training and the individual needs of workers, only 23.6% of the respondents from the public electricity services state that the training fully matched their needs. For the majority of respondents, the matching was partial and regular updates are necessary (53%). Around one in five workers felt that the match was not good, either because new training opportunities were deemed necessary or because they felt that insufficient resources and time had been devoted to the training of public sector workers.

In several of the project's national reports, the trade unionists interviewed and the workers taking part in the sectoral focus groups from the electricity public services stressed the importance and absolute necessity to improve digital skills. The use of digitalisation for training and learning (e-training, virtual reality programmes) is seen as a positive contribution because of the flexibility of access and the wide range of training on offer. However, some negative aspects are also highlighted, such as:

- the individualisation of the responsibility for planning the learning process but also of the training process in itself, as e-training deprives workers of the dynamic of learning through direct interaction with the trainer and also with colleagues.
- The lack of certification of many digital training modules, which does not encourage career progression.
- The risk of overtime and unpaid working hours, because training courses have to be taken during the working hours.
- The lack of internal training resources and the need to outsource training at great expense.

- The potential deepening of inequalities between workers, for instance between older staff and younger workers already at home in a digital culture.

Asked about their perception of the need to learn and develop new digital skills due to the introduction of digital tools and methods in their everyday work, most respondents from the **public administrations sector** acknowledged this need. They either had to acquire both general and specific digital skills (21.7%) or specific skills related to the digital tool used (40.2%). 31.3% of the workers answer that they already had the required digital skills through their educational background.

42.3% of the workers from the public administrations sector report in the DGQS that they had received training from their employer to acquire or develop new digital skills. This share is significantly lower than those observed in the two other public services. Almost as large a proportion of workers (38.4%) reported no training from their employer (15.7%) or that they learned informally at work (22.7%).

Regarding the respondents' perception of the adequacy of the training received in relation to their individual needs in this domain, only 17.8% of the respondents feel that the training fully matched their needs. For the majority of respondents, the match was partial but regular updates are necessary (53%). Around one in five workers felt that the match was not good, either because new training opportunities are necessary (12.9%) or because not enough resources and time had been devoted to the training of public sector workers (10.5%)

On the whole, the main thrust of the comments and observations made by the trade unionists and workers from the public administrations sector in the national reports are very similar to those mentioned above for the public electricity production and supply services.

When asked if they feel that the introduction of digital tools and methods in their everyday work requires them to develop new digital skills, most respondents from the **public hospital and health services** answered yes. They either had to acquire both general and specific digital skills (28.4%) or only specific skills related to the digital tool used (38.5%). 22% of the workers answer that they already had the required digital skills through their educational background. Only a very small share of workers assess that digital skills are not necessary for their jobs (11%).

While the majority of respondents from the hospitals and health public services perceive digital training as a necessity, not all of them in fact receive training from their employer. In the sector, 54% of the public workers stated that they had received training from their employer to acquire or develop new digital skills. This training could focus on general digital skills only (8.6%), or on specific skills required by the digital tools (34.9%), or on both aspects (10.5%). A very small group of

respondents declared that they had combined formal and informal learning (3.4%). No less than 42.7% of workers report that they have not received any training from their employer. Of these, 19.9% have not received any training at all and 22.8% say that they learned informally at work.

Another question from the DGQS focused on the respondents' perception of the adequacy of the training received in relation to their individual needs in this domain. For 16.3% of the respondents from the hospitals and health public services, the training offered fully matched their perceived needs. For the majority of respondents, the match was partial but regular updates are necessary (55.7%). Around one in five workers felt that the digital training received had not well matched their individual needs, either because new training opportunities were deemed necessary (13%) or because they felt that not enough resources and time were devoted to the training of public sector workers (14.9%).

Again, the views expressed by the trade unionists and workers interviewed from the public hospitals and healthcare services, contained in the national reports, are very much in line with those mentioned above for the other public sectors covered by this project.

6. Job security and career prospects

The DGQS survey again enables us to compare the public sectors of the various countries investigated in the project, with regard to workers' perceptions of impacts on their job security and their future prospects for career progression.

Among respondents from the **public electricity production and supply services**, the perception is mainly polarised between those who do not think that digitalisation has influenced their job security (31.7 to 53.5% of opinions on the proposed items) and those who believe that digitalisation has a positive effect on their job security and future prospects (40.2 to 44.5% of responses). In contrast, around one in five workers has a more pessimistic view of their future in a digitalised world of work.

In the **public administrations sector**, we find more or less the same polarisation of expectations of the impact of digitalisation on job security and future prospects. Respondents are divided between those with neutral perceptions of the impact of digitalisation (31.8 to 50.7%), those with a more positive view of the future (28.7 to 48%), and respondents with a more negative assessment of their future prospects in their current job (20.2 to 32.1%).

Within the **public hospital and health services**, the polarisation observed differs from that in the other public services considered in the project. A large proportion of respondents still consider that digitalisation has not affected their job security or career prospects (37.7 to 53%, depending on the items proposed). But for a larger proportion of workers in this sector, the view is more pessimistic

than in the other public services (29.1 to 42.3% negative opinions) and positive perceptions are less frequently expressed (17.9 to 31.8%).

It is worth noting that in the national reports, the issue of job security and future prospects of public service workers is barely discussed by the trade unionists and participants in the focus groups from the three public services.

7. Workers' rights

The DGQS survey also contained a question on the organisation of formal information/consultation procedures at the workplace, whether on the reasons to digitalise work, the practical possibilities, or the process of implementation of digital working methods and tools in itself. The answers received illustrate that very few information/consultation procedures have taken place.

Across the three sectors considered in the project, around half of the workers stated that they did not know whether a formal information/consultation procedure had been organised in their workplace.

In all of the public sectors, almost one in four workers stated more affirmatively that no information and consultation procedure on the implementation of digitalisation had been organised in their workplace.

Across all the sectors considered, fewer than 10% of workers state that they have benefited from a formal information/consultation procedure, whether at individual level, through the unions or through a combination of the two methods.

Public service workers were also questioned in the DGQS about a new worker right closely linked to the digitalisation of work, particularly the increase in remote working: the right to disconnect.

The data collected in the DGQS illustrate firstly that just over a third of workers in the public services considered in the project feel pressure to be permanently or frequently connected (36.5% in public electricity utilities and hospitals, 42.9% in the public administration sector).

Secondly, when asked about the importance to them of this right to disconnect as a workers' right, the vast majority of respondents (generally more than three quarters of responses) from the three public services emphasise its importance, and the need to include it in labour law and social dialogue at all levels, from cross-industry to the workplace level.

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ANNEX 1: LIST OF INTERVIEWS

ID	Institution	Sectors	Position	Date	Method
GERMANY					
INT1	IG-Metall NRW, Strukturpolitik	Electricity	Sectoral delegate	07.09.22	Face-to-face
INT2	IGBCE-Stiftung Arbeit und Umwelt	Electricity	Department leader	23.09.22	ZOOM
INT3	IGBCE-Düsseldorf	Electricity	District responsible	22.10.22	Phone
INT4	Ver.di, Department Energy	Electricity	Department leader	08.06.22	ZOOM
INT5	Ver.di, Berlin	Electricity	Sectoral delegate	31.05.22	Phone
INT6	DGB, Berlin	Public Sector	Political delegate	06.09.22	ZOOM
INT7	Staff Council, Düsseldorf City Administration	Public Sector	Head of the staff council	11.07.22	ZOOM
INT8	Staff Council, Köln City Administration	Public Sector	Head of the staff council	12.07.22	Phone
INT9	Staff Council, City administration Köln	Public Sector	Member of the staff council	11.08.22	Phone
INT10	Ver.di; Berlin	Health	Sectoral delegate	24.07.22	ZOOM
INT11	Ver.di, Berlin	Health	Sectoral delegate	11.08.22	ZOOM
INT12	Ver.di, Berlin	Health	Sectoral delegate	05.08.22	ZOOM
DENMARK					
INT1	OAO	Collaborative organisation between public sector unions	Consultant	14.2.22	Zoom
INT2	Danish Trade Union Confederation (FH)	Confederation	Political consultant	26.4.22	Zoom
INT3	HK/Stat	Public administrations (PA)	Chairperson	17.5.22	Zoom
INT4	Danske Bioanalytiker	Health and hospitals (H&H)	OHS and work environment specialist	19.5.22	Zoom
INT5	FOA	Mainly Health and hospitals	Health policy specialist	23.5.22	Zoom
INT6	Dansk El-forbund	Electricity	Elected national union representative	10.6.22	Zoom
INT7	FOA	H&H	Joint shop steward	27.6.22	Zoom
INT8	DSR	(H&H)	Vice-chair	30.6.22	Zoom
INT9	DSR	H&H	Joint shop steward	7.7.22	Zoom
INT10	Dansk El-forbund,	Electricity	Joint shop steward	5.10.22	Zoom
SPAIN					
INT1	Comisiones Obreras	Confederation	Union expert	04.04.22	Zoom
INT2	Comisiones Obreras	Regional Confederation	Union expert	26.04.22	Zoom
INT3	Comisiones Obreras	Confederation	Confederal Secretary	05.05.22	Zoom
INT4	Comisiones Obreras	Confederation	Union expert	05.05.22	Zoom
INT5	Comisiones Obreras	Health & hospitals	Sectoral delegate	26.04.22	Zoom
INT6	Comisiones Obreras	(PAs)	Sectoral delegate	09.05.22	Zoom
INT7	Observatorio Nacional de Tecnología y Sociedad		PA expert	17.05.22	Zoom
INT8	Comisiones Obreras	H& Hs	Sectoral delegate	17.06.22	Zoom
INT9	Comisiones Obreras	Electricity	Sectoral delegate	14.07.22	Face to face
INT10	Comisiones Obreras	Electricity	Sectoral delegate	14.07.22	Face to face
INT11	Comisiones Obreras	PA	Sectoral delegate	11.06.22	Zoom

INT12	Comisiones Obreras	Electricity	Sectoral delegate	27.09.22	Zoom
FRANCE					
INT1	CGT (UFSE-CGT)	PA	National secretary	11.04.22	Face to face
INT2	CFDT Plaine Commune	PA	Co-secretary	11.05.22	Face to face
INT6	CFDT ENEDIS	Electricity	Shop steward, present in the national and regional work councils	20.04.22	Online
INT7	CFE CGC EDF	Electricity	Shop steward, joint secretary of the works council	09.05.22	Online
INT8	CFE CGC EDF	Electricity	Elected representative (works council)	01.06.22	Online
INT9	CFE CGC EDF	Electricity	Elected representative at the works council	07.06.22 & 9.06.22	Online
INT10	FNME-CGT100% seconded from ENEDIS	Electricity	Federal administrator	18.06.22	Online
INT11	FPSPS-FO	Public and private hospital	Federal secretary	20.04.22	Face to face
INT12	UFMICT-CGT & CGT Santé Action Sociale	Public and private hospital	General secretary UMICT-CGT, and Federal secretary (CGT Santé Action Sociale)	23.05.22	Face to face
INT13	Santé Sociaux-CFDT	Public and private hospital	Political leader	26.08.22	Online
ITALY					
INT 1	Flaei Cisl Reti	CISL/Electricity	Secretary	7/3.22	Zoom
INT2	UILPA	UIL/Central Functions	Delegate	1/3.22	Zoom
INT3	ILCTEM	CGIL	Functionary	4/5.22	Zoom
INT4	FILCTEM	CGIL/Electricity	Secretary	28/03.22	Zoom
INT5	FILCTEM	CGIL/Electricity	Secretary	28.03.22	Zoom
INT6	FPCGIL	CGIL/Central Functions	Secretary	23.02.22	Zoom
INT7	FPCGIL	CGIL/Local Functions	Secretary	17.03.22	In Person
INT8	FPCGIL	CGIL/Central Functions	National Coordinator	25.03.22	Zoom
INT9	CGIL	Emilia-Romagna Region	Functionary	21.10.22	Phone
INT10	Emilia-Romagna Region	Health and hospitals	Worker	15.11.22	Teams
INT11	Emilia-Romagna Region	Health and hospitals	Worker	15.11.22	Teams
INT12	FPCGIL	CGIL/Healthcare	Secretary	17.11.22	In Person
HUNGARY					
INT1	Trade Union of Electricity System Managers and Operators	Electricity	Chairman	01.03.22.	Zoom
INT2	North Transdanubian Electricity Trade Union	Electricity	Chairman	01.03.22	Zoom
INT3	South Hungarian Electricity Trade Union	Electricity	Chairman	03.03.22	Zoom

INT4	Technical Workers' Interest Group Paks Nuclear Power Plant	Electricity	Chairman	04.03.22	Zoom
INT5	Tiszántúli Electricity Industry Trade Union.	Electricity	Secretary	07.03.22	Zoom
INT6	Budapest Power Plants Trade Union	Electricity	Vice chairman	08.03.22	Zoom
INT7	South Transdanubian Electricity Workers' Union	Electricity	Chairman	09.03.22	Zoom
INT8	Mátra Power Plants Trade Union	Electricity	Chairman	10.03.22	Zoom
INT9	Hungarian Electricity Workers' Union	Electricity	Vice chairman	10.03.22	Zoom
INT10	Paks Nuclear Power Plant Workers' Union	Electricity	Chairman	11.03.22 .	Zoom
INT11	KSZSZ	PA	President	01.03.22	Zoom
INT12	MKKSZ	PA	Regional secretary	01.03.22	Zoom
INT13	MKKSZ	PA	President	02.03.22	Zoom
INT14	MKKSZ	PA	Secretary	03.03.22	Zoom
INT15	MKKSZ	PA	Chairman	08.03.22	Zoom
INT16	MKKSZ	PA	Trade union steward	08.03.22	Zoom
INT17	KSZSZ	PA	Chairman	09.03.22	Zoom
INT18	MKKSZ	PA	Secretary	10.03.22	Zoom
POLAND					
INT1	NSZZ 'Solidarność'	Electricity	Chairman of the National Section	20.05.22	phone
INT2	NSZZ 'Solidarność'	Electricity	Chairman of the National Section	13.05.22	phone
INT3	Manager at ENEA	Electricity	Manager at energy company responsible for digital processes	17.05.22	phone
INT4	National Energy Section OPZZ	Electricity	Chairman of the National Section	17.05.22	phone
INT5	National Energy Section of the TU of Engineers and Technicians	Electricity	Chairman of the National Section	13.05.22 and	phone
INT6	NSZZ 'Solidarność'	PA	Member of the Board	10.06.22	phone
INT8	TU of the Workers of Social Insurance Institution	PA	Chairwoman of the union	16.05.22	phone
INT9	NSZZ Solidarność	Hospitals	Expert, adviser	27.04.22	Ms Teams
INT10	All-Poland Trade Union of Nurses and Midwives	Hospitals	Member of the National Board	10.06.22	Google Meets
INT11	All-Poland Trade Union of Radiographers	Hospitals	Chairman	28.05.22	phone
INT12	OPZZ - Public Services Section	Hospitals	Chairwoman of the Public Services Section	11.08.22	Face to face
INT13	NSZZ 'Solidarność'	Cross-sectoral	Expert	04.01.23	Face to face

Source: National country reports

ANNEX 2: LIST OF FOCUS GROUPS

ID	Trade union affiliation	Sector	Occupation
Denmark			
FG1	Radiographers' Union	Health and hospital	Radiographer and shop steward
FG1	HK/ union for salaried employees	Health and hospital	Medical secretary and joint shop steward
FG1	Danish Nurses Union/DSR	Health and hospital	Nurse and shop steward
FG1	The Association of Danish Physiotherapists	Health and hospital	Physiotherapist and joint shop steward
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician

FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Electrician/technician
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Unionist
FG2	Dansk El-forbund or 3F	Electricity production and distribution	Unionist
FG3	HK/Stat, union for salaried employees, section for state employees	Public administration	Shop steward for the police
FG3	HK/Stat	Public administration	Laboratory technician and former shop steward
FG3	HK/Stat	Public administration	Public administration in prison service
FG3	HK/Stat	Public administration	Public administration in prison service
FG3	HK/Stat	Public administration	Vice Chairperson in HK/Stat
FG3	HK/Stat	Public administration	Analytical chief officer in HK/Stat
SPAIN			
FG1.1	Comisiones Obreras	Hospitals	Radiology Technician
FG1.2	Comisiones Obreras.	Hospitals	Nurse
FG1.3	Comisiones Obreras	Hospitals	Warden
FG1.4	Comisiones Obreras	Hospitals	Warden
FG1.5	Comisiones Obreras	Hospitals	Radiology Technician
FG1.6	Comisiones Obreras	Hospitals	Radiology Technician
FG1.7	Comisiones Obreras	Hospitals	Radiology Technician
FG1.8	Comisiones Obreras	Hospitals	Radiology Technician
FG2.1	Comisiones Obreras	Energy	Commercial
FG2.2	Comisiones Obreras	Energy	Commercial
FG2.3	Comisiones Obreras	Energy	Generation
FG2.4	Comisiones Obreras	Energy	Distribution
FG2.5	Comisiones Obreras	Energy	Distribution
FG2.6	Comisiones Obreras	Energy	Distribution
FG2.7	Comisiones Obreras	Energy	Commercial
FG2.8	Comisiones Obreras	Energy	Distribution
FG2.9	Comisiones Obreras	Energy	Distribution
FG2.10	Comisiones Obreras	Energy	Systems
FG3.1	CC.OO.	Regional Administration Madrid	Administrative
FG3.2	CC.OO.	Regional Administration Madrid	Administrative
FG3.3	CC.OO.	Education Administration Madrid	Administrative

FG3.4	CC.OO.	State General Administration Ministry of Economy	Computer technician
FG4.5	CC.OO.	Higher Council for Scientific Research	Researcher
FINLAND			
FG1	Central Organisation of Finnish Trade Unions	Central organisation of TUs	Development officer
FG2	Trade Union for the Public and Welfare Sectors (JHL)	TU public sector employees	Researcher
FG2	JHL	TU public sector employees	Officer
FG2	JHL	TU public sector employees	Bargaining officer
FG2	JHL	TU public sector employees	Collective agreement coordinator
FG3	Kela employees	TU public sector employees	Senior TU officer
FG3	Kela employees	TU public sector employees	Senior TU officer
FG4	TEHY The Union of Health and Social Care Professionals in Finland	TU Nurse	Head of the section
FG4	TEHY	TU Nurse	Head of negotiations
FG5	Trade Union Pro	TU public employees	Head of the section
FRANCE			
FG1	CGT Enedis	Electricity	Technician
FG1	CGT Enedis	Electricity	Human resources employee
FG1	CGT Enedis	Electricity	Project manager
FG1	CGT Enedis	Electricity	Technician
FG2	CGT Trousseau	Public and private hospital	Nurse
FG2	CGT Trousseau	Public and private hospital	Nurse
FG2	CGT Trousseau	Public and private hospital	Caregiver
FG2	CGT Trousseau	Public and private hospital	Secretary
FG3	CFDT	Public administration	Inspector of Finance
FG3	CFDT	Public administration	Collections officer
FG3	CFDT	Public administration	Inspector of Finance
FG3	CFDT	Public administration	Inspector of Finance
FG3	CFDT	Public administration	'Operating system developer' Inspector
FG3	CFDT	Public administration	Administrative official
HUNGARY			
FG1.1	MKKSZ: Trade Union of Hungarian Civil Servants and Public Service Workers	Public administration	Notary coordinator
FG1.2	MKKSZ	Public administration	Public area inspector
FG1.3	MKKSZ	Public administration	Public area inspector
FG1.4	MKKSZ	Public administration	Administrator of the body of representatives

FG1.5	MKKSZ	Public administration	HR administrator
FG1.6	MKKSZ	Public administration	Notary clerk
FG1.7	MKKSZ	Public administration	Tax administrator
FG1.8	MKKSZ	Public administration	Financial administrator
FG1.9	MKKSZ	Public administration	Archiving administrator
FG1.10	MKKSZ	Public administration	Social affairs administrator
FG2.1	Independent Trade Union of Health Workers	Hospital	Nurse
FG2.2	Independent Trade Union of Health Workers	Hospital	Assistant
FG2.3	Independent Trade Union of Health Workers	Hospital	Administrative
FG2.4	Independent Trade Union of Health Workers	Hospital	Nurse
FG2.5	Independent Trade Union of Health Workers	Hospital	Nurse
FG2.6	Independent Trade Union of Health Workers	Hospital	Nurse
FG2.7	Independent Trade Union of Health Workers	Hospital	Nurse
FG2.8	Independent Trade Union of Health Workers	Hospital	Administrative
FG2.9	Independent Trade Union of Health Workers	Hospital	Nurse
FG2.10	Independent Trade Union of Health Workers	Hospital	Patient transporter
FG2.11	Independent Trade Union of Health Workers	Hospital	Patient transporter
FG2.12	Independent Trade Union of Health Workers	Hospital	Operating theatre assistant
FG2.13	Independent Trade Union of Health Workers	Hospital	Operating theatre assistant
FG2.14	Independent Trade Union of Health Workers	Hospital	Operating theatre assistant
FG2.15	Independent Trade Union of Health Workers	Hospital	Administrative
FG2.16	Independent Trade Union of Health Workers	Hospital	Administrative
FG2. 17	Independent Trade Union of Health Workers	Hospital	Nurse
FG2.18	Independent Trade Union of Health Workers	Hospital	Nurse with high school degree
FG2.19	Independent Trade Union of Health Workers	Hospital	Patient transporter
FG2.20	Independent Trade Union of Health Workers	Hospital	Specialist nurse
FG2.21	Independent Trade Union of Health Workers	Hospital	Administrative
FG2.22	Independent Trade Union of Health Workers	Hospital	Nurse
FG2.23	Independent Trade Union of Health Workers	Hospital	Public health controller
FG2.24	Independent Trade Union of Health Workers	Hospital	Nurse with high school degree
FG2.25	Independent Trade Union of Health Workers	Hospital	Administrative
FG2.26	Independent Trade Union of	Hospital	Specialist nurse

	Health Workers		
FG2.27	Independent Trade Union of Health Workers	Hospital	Assistant
FG2.28	Independent Trade Union of Health Workers	Hospital	Specialist nurse
ITALY			
FG1	FPCGIL	Local Functions	Functionary
FG2	FPCGIL	Local Functions	Employee IT Services
FG3	FPCGIL	Central Functions	Functionary
FG4	FPCGIL	Central Functions	Employee
FG5	FPCGIL	Central Functions	Social Worker
FG6	FPCGIL	Local Functions	Functionary
FG7	FPCGIL	Central Functions	Employee
FG8	FPCGIL	Central Functions	Employee
FG9	FPCGIL	Healthcare	Administration
FG1	FILCTEM CGIL	Chemistry, Textile, Energy, Industries	Electrician
FG2	FILCTEM CGIL	Chemistry, Textile, Energy, Industries	Electrician
FG3	FILCTEM CGIL	Chemistry, Textile, Energy, Industries	Electrician
FG4	FILCTEM CGIL	Chemistry, Textile, Energy, Industries	Electrician
FG5	FILCTEM CGIL	Chemistry, Textile, Energy, Industries	Electrician
POLAND			
FG1	Warsaw City Hall, Confederation of Labour	Public administration	Manager
FG2	Szczecin City Hall, Confederation of Labour	Public administration	HR specialist
FG3	Szczecin City Hall, Confederation of Labour	Public administration	Accountant
FG4	Job centre in Warsaw, Confederation of Labour	Public administration	Employment agent
FG5	Job centre in Warsaw, Confederation of Labour	Public administration	Employment agent
FG6	Financial Supervision Authority, Confederation of Labour	Public administration	Auditor
FG7	State Fund for Rehabilitation of Disabled People, Confederation of Labour	Public administration	Support Service (SOW) specialist
FG8	National Energy Section of the All-Poland Alliance of Trade Unions of Continuous Process Industry Employees	Electricity	Dispatcher
FG9	Association of Energy Workers' Unions, PGE Dystrybucja in Łódź	Electricity	Electrician
FG10	Association of Energy Workers' Unions, Tauron Polska Energia	Electricity	Electrician

FG11	National Energy Section of the Trade Union of Engineers and Technicians	Electricity	Administrative worker
FG12	Digital Nurses' Association	Hospital	Nurse
FG13	None	Hospitals	laboratory diagnostician
FG14	None	Hospitals	head of the hospital's medical records department
FG15	None	Hospitals	FG15
FG16	none	Hospitals	ICT technician
FG17	National Section of Healthcare of NSZZ « Solidarność »	Hospitals	physician, doctor of medicine

Source: National country reports