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**The impact of digitalisation
on job quality and social
dialogue in the public
services: the case of
Denmark**



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EXECUTIVE SUMMARY

The Danish public sector is among the most digitalised in the world, and Denmark therefore serves as a good case for assessing the impact of digitalisation on job quality and the work environment. This report addresses the relationship between digitalisation and job quality through a review of the relevant policies, the existing research literature, a European wide survey (DGQS) and through qualitative research conducted for this project. The qualitative data was collected in three specific sectors – the public administration, hospitals and electricity production and distribution – and emphasises the experiences of public sector workers. The first ten interviews were conducted with sector-level (and a few national-level) worker representatives from the relevant unions. Next a focus group was conducted in each of the three sectors with workers, to probe their daily experiences of what digitalisation means for job quality and their daily work experience. While the focus groups emphasised the personal experiences of the workers, many of them are shop stewards and hence have a broader perspective on what their co-workers may experience. These data were supplemented by a cross-national European survey, which, however, did not get a very high response rate in Denmark. So, the results from the survey mainly supplement the qualitative data.

The results show that most of the changes and impact experienced by the workers do not relate directly to the technologies but rather to the organisation of work and the organisational handling and implementation of new technologies. Digitalisation of the Danish public sector is quite advanced, and the changes were perceived by the workers as comprehensive, but incremental. The workers in general have a positive attitude towards digitalisation, which in many cases is seen as improving workflows and labour processes as well as making the public sector more efficient. Nonetheless, they would strongly urge a more carefully designed implementation and more reflection on the purpose and advantages of different technologies. The workers in general reported that most policymakers and top management still have an overly tech-optimistic perspective and tend to downplay the implementation challenges. Additionally, workers often feel that there is not enough time for implementing the technologies before new changes and technologies are introduced. This suggests that successful digitalisation requires a close collaboration between workers and management. Many workers in the study felt they have good collaboration with the local level management, but that digitalisation processes were imposed on them top-down from the political system and top management. While digitalisation and new technologies have been linked in public debates to fear of significant job reduction, this was not evident at all in our data; almost the opposite, the workers stressed the need for improved technology to handle the workload and staff shortages.

We did find some examples of where digitalisation and new technologies have improved the work environment, mainly the physical work environment, through reduction of strenuous and repetitive work, however the overall positive impact on health and safety was reportedly moderate. The

results in terms of the psycho-social work environment are more mixed: there were positive examples, but many workers did also emphasise that stress-levels had gone up. Some workers like electricians and technicians highlighted a decline in job autonomy. Yet several workers (for instance in the public administration) highlighted how digitalisation had made their job more interesting and stimulating. In sum the impact of digitalisation on job quality can best be described as ambiguous and to a large degree subjective: what for one worker is an improvement in job quality is a decline for another. While the overall impact on job quality is mixed, the main tendency seems to be that digitalisation has the potential for improving both public services and the working life of the public sector workers, if implemented and adjusted to the needs of both citizens and these workers.

SECTION 1. INTRODUCTION

Work and everyday working life is increasingly affected by technological transformations, including digitalisation. In this project - DIGIQU@LPUB - digitalisation is defined as various technologies that transform work, more specifically tools and technologies that convert analogue information into digital information. Denmark is among the European societies where the digitalisation of work is most advanced, (for instance ranked first in the European Commission's 2021 Digital Economy and Society Index, see below). This also applies to public sector work (Petersen and Schou, 2020), which is the focus of the project. The Danish ⁽¹⁾ case therefore serves as a prime cross-European example of how digitalisation may affect work, in particular the quality of work and the work environment, which is the aim of the DIGIQU@LPUB project ⁽²⁾. Additionally, the social partners and in particular the trade unions still have a very prominent role in Danish society at large, but of course particularly in the Danish labour market and industrial relations systems (Knudsen et al., 2023). As DIGIQU@LPUB is also scrutinising the influence of digitalisation on social dialogue and how social dialogue is influencing the quality of public sector work, Denmark likewise is an interesting case as social dialogue remains comparatively strong. There is a long tradition of unions and employers engaging in comprehensive and mutually binding discussions on the development of work and working life at national, sectorial and company level, and the use and implementation of new technologies have always been a topic in these discussions.

1.1 Purpose of the research

The overall aim of the DIGIQU@LPUB project is, firstly, to investigate how digitalisation, broadly understood, impacts the quality of work in three selected public sectors, and secondly, how digitalisation influences the social dialogue. However, we will in this report also have an explicit focus on the impact of social dialogue and cooperation between unions and employers on digitalisation. This includes the pace and willingness to implement new technology at work, since the actors in Nordic countries are in a good position to influence this through the long-standing tradition of including unions and workers in these developments (Alsos and Dølvik, 2021). The project focusses on three public sectors: the electricity sector, hospitals and public administration at local, regional and national level. The data were collected through 10 interviews, three focus groups with workers (one in each sector) and a web-based survey. The DIGIQU@LPUB survey (DGQS) was conducted specifically for the research project DIGIQU@LPUB across the eight countries. However, the Danish part of the survey had only a small number of respondents ⁽³⁾, and the results must therefore be seen as providing only limited evidence and be read very

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1. The other countries in the project are France, Finland, Germany, Hungary, Italy, Poland and Spain.
 2. See more about the overall project at: www.DIGIQU@LPUB.eu
 3. Overall, 190 respondents completed the DGQS survey in Denmark, 49 from the public administration, and there were so few respondents from the electricity sector that the survey results are not included in this report. In the hospital sector the number of respondents was higher (n=133), hence providing a stronger input, yet this is not enough to make any quantitative statements.

cautiously as a supplement to the qualitative data. Nevertheless, the survey results may provide some relevant information on how the workers experience digitalisation and include, in particular, the hospital sector, where there were most respondents. The interviews were with union and worker representatives in these sectors, but a few more cross-sectional interviews have also been conducted (see list of interviews in Annex 1). Since the DIGIQU@LPUB project looks at job quality and social dialogue from the perspective of the workers, no interviews with employers or employers' associations have been included. While the report includes perspectives from various workers and groups of workers, the majority of data collected for the report concern workers with short- and medium length educational training, in particular workers with vocational qualifications (see the overview in Annex 1 and 2).

1.2 Digitalisation: state of play and national strategies

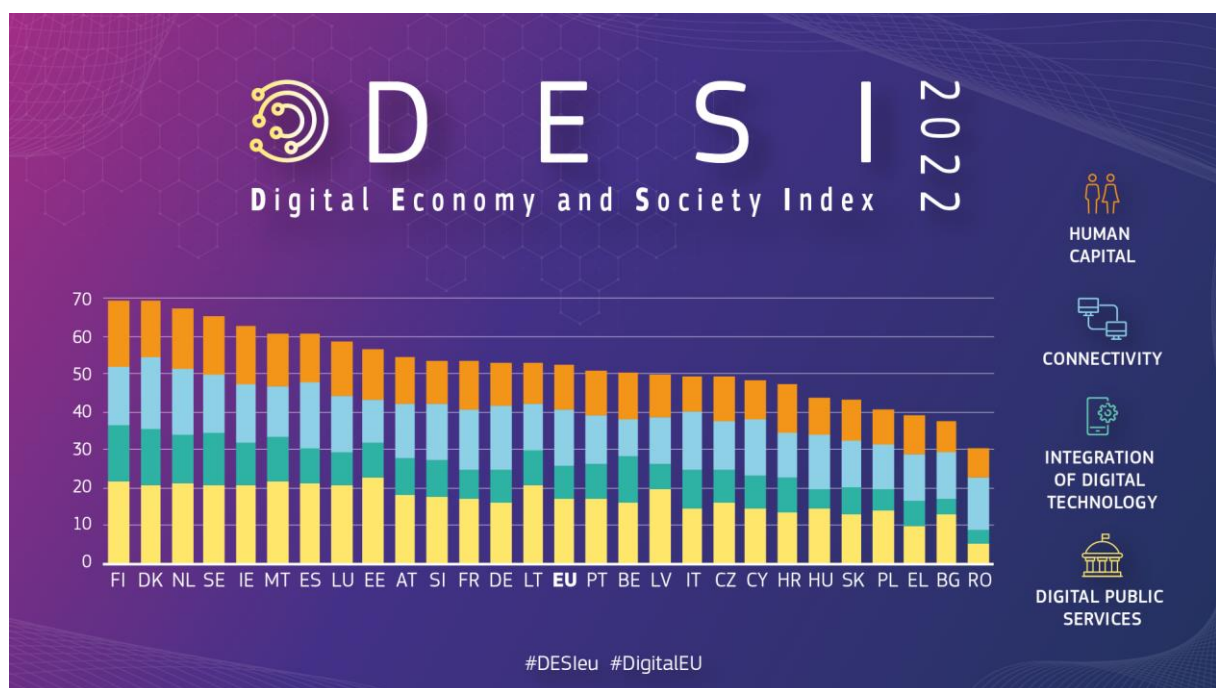
Denmark is among the most digitalised societies in both Europe and globally and is hence quite advanced in terms of integrating and applying digital technologies in work and employment, welfare services and in society at large. The Danish public sector is also among the most digitalised globally. Digitalisation has been a key element in modernising and increasing the efficiency of the public sector in Denmark for several decades (Ejersbo and Greve, 2016). Although Danish society and the public sector are among the most digitalised in the world, there have been numerous examples of failures of, in particular, large digital infrastructure projects, but also of projects directed towards citizens, requiring implementation by workplace-level employees (Christensen and Mortensen, 2018; Nielsen et al., 2020; Petersen and Schou, 2020).

It has been argued elsewhere in the literature that rapid technological changes are nothing new to the Nordic and hence Danish labour market, but that current changes seem to be accelerating the overall development (Rolandsson et al., 2020). Nonetheless, the overall findings from a large research project on the future of work in the Nordic countries suggests that technological development and its impact on work is '...more marked by gradual, evolutionary change and institutional continuity than by disruptive transformation' (Rolandsson and Dølvik, 2021:25).

In an increasingly digitalised reality, the integration of digital technologies is an important part of Danish national policies, and in May 2022 a new digital national strategy was presented implementing the European Commission recovery and resilience plan (RRP) (Danish Government, 2022). The strategy is to accelerate technological development, to '...the benefit of all', and to '...maintain Denmark's leading digital position' (Danish Government, 2022:3). The government stated they are to invest two billion Danish kroner (DKK) specifically via this strategy (roughly 270 million EUR). The largest share of digital investment is focussed on digitalising enterprises and the second largest share focussed on implementation. The former includes grants for expertise on digital implementation as well as tax reductions for companies that purchase ICT equipment in the form of robotics, 3D-printers and artificial intelligence. The implementation part is targeted at

enhanced digital public administration and preparation for future challenges in the realm of digitalisation (and has been implemented from 2022). Accordingly, digital investment and implementation is a high governmental priority, as Denmark 'is determined to remain a digital leader in Europe' (European Commission, 2021:4). The strategy outlines nine visions of strategic interest, several of which are directly linked to the sphere of work and the sectors studied in this project. The relevant visions include 'Coherent service for citizens and companies' (Vision 2), 'More time for the core [welfare] task through increased use of new technologies' (Vision 3), 'The digital health system of the future' (Vision 5) and 'Danes ready for the technological future' (Vision 9). Put succinctly, the political visions directly address the public administration, health care and skills.

1.2.1 Latest DESI Index



Denmark is ranked second in the European Commission's 2022 Digital Economy and Society Index and has been consistently ranked among the frontrunners in Europe over the years, often together with the other Nordic countries (European Commission, 2022). More specifically, Denmark ranks first in connectivity, second in integration of digital technology and digital services and fifth in human capital (related to digital skills), but only eighth in digital public services. Since 2016, the National Broadband Fund has provided state aid to implement Very High-Capacity Networks in local communities, which means that 84% of all Danish households today have a fixed internet connection of some kind (while the EU connectivity average is 78%) and 99% can access the 5G network. Thus, Denmark has a strong digital infrastructure, which might partly also explain why it has the highest rate of e-government use as well as the highest score of all EU Member States on open data. In addition, Danes generally have strong digital competences, as 69% of adults have basic digital skills and 37% have above-basic digital skills. These skills became widely used during the COVID-19 pandemic, as the educational-network infrastructure saw a 200% increase in the

use of digital tools due to the lockdown (European Commission, 2021). Regardless of these strong general digital competences, 30% of all Danish adults (of whom 25% are still part of the active workforce) still lack some digital skills, which has prompted an enhancement of vocational digital skills amongst the Danish workforce (as elaborated in the section below) (Danish Government, 2019:14).

In this vein, educational priorities and accompanied funding for digital implementation are important factors that explain Denmark's high ranking in the Index. The combination of an integrated digital infrastructure, strong digital competences and the focus on digitalisation in the Danish national plans and budgets makes Denmark a front runner in digitalisation both in Europe and globally.

1.2.2 National strategies on digitalisation

There have been various national strategies on digitalisation over the last 10 to 15 years, including the 2022 added national strategy on digitalisation, the most recent at the time of writing (Danish Government, 2022). There have also been government-initiated commissions and partnerships to address the issue. The trade unions have been included in the work and in the commissions, however alongside a broad range of other actors who have an interest in digitalisation, including tech companies. The range of interest representation in the commissions reflects a general tendency in Danish corporatism to include more actors, particularly in policy fields that have implications beyond narrow labour market interests (Binderkrantz and Christiansen, 2015). In December 2022, a 'Ministry of Digitalisation and equality' was established as part of the new Danish government formation (4). A few years prior, a 'Disruption Council' was announced in 2019 and following this a 'Digitalisation partnership' in February 2021 aimed at producing more practical solutions to digitalisation challenges. The Digitalisation partnership is comprised of a variety of actors operating on the Danish labour market, such as employers' associations, trade unions, managers and business leaders, legal advisors, experts and researchers (again illustrating the increasingly plural approach to corporatism in Danish politics).

The aim of the partnership is to make recommendations to the Danish government on how to utilise digitalisation opportunities and digital partnerships in the future (Ministry of Finance, 2021). The Digitalisation partnership is highly oriented towards European policies, but with a focus on Danish implementation and on-the-ground practices. To meet this objective, the recommendations from the partnership include public sector management and public-private partnerships and innovation, digital employment, digital workplaces and data management in a globalised labour market. More specifically, a public digitalisation strategy offers recommendations for small and medium sized enterprises, cross-sector coordination, protection of personal digital data as well as

4. Read more: <https://digmin.dk/>

future development in accordance with Danish values. In a recent report (Digitaliseringspartnerskabet, 2021), the Digitalisation partnership further presents no less than 46 recommendations on a range of themes. While these specific recommendations are beyond the scope of this report, we will briefly mention three overarching themes. Firstly, the Digitalisation partnership advocated digital transformation in the form of more counselling, more workers with digital competences and more Danish involvement in European data protection cooperation.

Secondly, Denmark should be a frontrunner in establishing so-called European 'data spaces' with the aim to increase digital exchanges across national borders, such as innovation, research and AI-based projects (Digitaliseringspartnerskabet, 2021: 18–19). And lastly, the partnership emphasises that social media must comply with democratic principles, which requires Danish attendance and involvement in EU regulations concerning the tech giants (Digitaliseringspartnerskabet, 2021: 66).

In a similar vein, the Disruption Council's 2019 report grapples with the challenges Denmark faces in the realm of rapid digital growth and offers solutions to practical issues till 2025 (Danish Government, 2019). The report emphasises equality and prosperity amongst Danes as well as social security and protection through four objectives: i) new and higher requirements for the future educational system, ii) productive and responsible companies in a digitalised world, iii) a modern and flexible labour market and iv) the importance of fair working conditions and free competition in a globalised world with foreign labour and free trade. In line with the latter objective, one of the main challenges identified in the Disruption Council's report has to do with the platform economy and internationalisation of work. As the Danish labour market is characterised by negotiations and cooperative regulations between the social partners, which sign collective agreements on wages and working conditions, the internationalisation of labour markets and the growth of work performed through digital platforms challenges the traditional so-called 'Danish model' of industrial relations regulation and collective bargaining (Danish Government, 2019:42). Thus, the report identifies a need to ensure good working conditions and regulate the labour market in the midst of new digital transformations in an increasingly global and digitalised labour market (Danish Government, 2019; see also Ilsøe and Söderqvist, 2023; Nielsen et.al, 2021a; Ilsøe, 2017; Kristiansen and Andersen, 2017). Based on the Council's recommendations, the Danish government has allocated funding to the Danish Working Environment Authority and has launched several initiatives. The Disruption Council has also been in dialogue with several platform companies, and the company Hilfr has consequently signed a collective agreement with the trade union 3F (United Federation of Workers in Denmark) through the Confederation of Danish Industry. A long-term goal is to pave the way for similar collective agreements among platform companies to ensure better working conditions for workers employed by digital platforms (Danish Government, 2019:46).

Furthermore, robotics and alike technologies are mentioned in the Disruption Council's report as a potential challenge for the Danish labour market, as these new technologies could put workers at risk of losing their jobs due to automation. The report identifies a number of particularly vulnerable professions: operators and transport workers, office workers (with postmen as an example), service workers and craftspersons (blacksmiths, mechanics, manual production workers and the like) (Danish Government, 2019:41). On the other hand, however, the report also predicts the emergence of new jobs as a direct consequence of digitalisation and automation. Therefore, 400 million DKK (53.33 million EUR) has been allocated to enhance digital skills among low-skilled or semi-skilled workers, 100 million DKK (13.33 million EUR) to new courses in IT and English and 420 million DKK (56 million EUR) to improved vocational training (Danish Government, 2019:44). Educational training is thus a high priority, even though Denmark's educational level is above the OECD average (Danish Government, 2019: 14). That is, the report concludes, digital skills are expected to be in higher demand in every Danish sector, which requires increased educational efforts and highlights the importance of funding.

Additional government documents address other aspects of digitalisation beyond the scope of this report. This includes 'The National Strategy for Cyber- and Informational Security', a report that addresses cyber-attacks and digital security (Danish Government, 2021). While this theme is not directly linked with job quality and digitalisation, it might indirectly affect procedural sequences among workers, especially in sectors that are labelled 'critical to society' (such as workers using IT-systems in relation to state security) as well as the police, public management and law enforcement. An additional report from the Ministry of Finance and Ministry of Industry, Business and Financial Affairs (2019) grapples with AI and sets four priority areas where AI will be implemented: healthcare, energy and utilities, agriculture and transport. These four have been identified as areas where the preconditions for utilising AI are especially suitable, for instance due to access to high-quality data (Ministry of Finance and Ministry of Industry, Business and Financial Affairs, 2019:61) ⁽⁵⁾. Similarly, the national strategy for digital health aims for a holistic and cross-sectoral effort in which hospitals, municipalities, street level bureaucrats and similar actors can cooperate through shared digital platforms (more will be said on this in Section 2.3.2) (Sundhedsdatastyrelsen, 2018).

Moreover, the Danish government has published national strategies for high performance computing (Uddannelses- og Forskningsministeriet, 2018) and earmarked funds for research to enhance digital infrastructure in relation to, for instance, cyber-attacks (Danish Government, 2021) and personalised medicine (Sundhedsdatastyrelsen, 2018). Furthermore, the recent launch of the new electronic identification 'my-ID' (MitID) has been developed as a public-private partnership to enhance digital security for Danish citizens (European Commission, 2021:14). On a more practical

5. This strategy is also included in 2.1.2 on the electricity sector and in 2.3.2 on the hospital sector.

level, the integration and adoption of advanced new technologies by small and medium sized enterprises (SMEs) is supported by the publicly funded business development centre and its 14 consolidated clusters (European Commission, 2021), (three of these are dedicated to, respectively, digitalisation ⁽⁶⁾, advanced manufacturing ⁽⁷⁾ and robotics ⁽⁸⁾).

Overall, as suggested by the Disruption Council's report, there are several state-led initiatives that address digitalisation from different angles and offer funding, strategic implementation and practical solutions. To quote the national strategy for digital health, 'there is really no alternative to increased digital cooperation' (Sundhedsdatastyrelsen, 2018:8). As this quote suggests, digitalisation is a main objective throughout the various Danish national strategies and initiatives.

1.3 Research on the impact of digitalisation on job quality at cross-sectoral level: state of the art

Our search for Danish research literature concerned with the impact of digitalisation on job quality showed that there has been very limited research on this topic, or at least very little published until now. We were only able to identify one study that directly considered job quality (Siren et al., 2021), and a few others that more indirectly touch on the topics (in particular Holm and Lorenz, 2022). However, we did not find any studies mainly aimed at investigating how digitalisation affects job quality. Accordingly, this report will hopefully help to improve the state of the research knowledge and contribute to closing the knowledge gap as well as paving the way for further studies on job quality and digitalisation. Several other aspects related to digitalisation of the public sector have been the object of more research, including the management of digital transformations in the public sector (Nielsen et al., 2020), the impact on professions and their understanding of digital work, in particular case workers (Justesen and Plesner, 2018; Pors, 2015; Pors and Schou, 2021), and the implications of digitalisation for citizenship (Schou and Hjelholt, 2019). We did find a range of other studies that touch upon elements relevant to the core question of how job quality is affected by digitalisation. We will discuss these next. First, we turn to Siren et al. (2021) which explicitly discusses job quality and technological development.

In their qualitative study on assistive technologies in the institutionalised old age care sector in Denmark, Siren et al. (2021) investigated the accounts given by municipalities (who ran the care homes), the care workers and the residents on the impact of new technologies. They found that the care workers had an ambiguous view on the motives for implementation of the new technology, with a positive perception of the potential improvements in their work environment, but a negative perception of the municipalities' motive of cost reduction. The new technologies were, in this case, mainly lifting technology in the ceiling and assistive technology for hygiene, for

6. <https://digitallead.dk/english/>

7. <https://en.made.dk/>

8. <https://www.odenserobotics.dk/>

turning the citizens in bed, and for helping with compression socks. The project implied that much of the work previously done by two care workers could now be done by one worker; this reduces the waiting time for both the residents and care worker, since before this, they would need to find an available colleague when shifting from one-person tasks to two-person tasks. More importantly in terms of job quality, the care workers had a positive understanding of how the technology had reduced work-related pain, and improved occupational safety (Siren et al., 2021: 485). The authors (2021: 487) further found that the implementation of the new technology had positive spill-over effects on the psychosocial work environment by reducing stress and conflicts among the staff, since they did not have to discuss who had to handle the heavy lifts or have to wait for a colleague. Hence this is a clear example of how technological development can improve the work environment by reducing strain-inducing postures. The professional point of view of health care workers was more ambiguous, since the workers at the same time argued that the new technology reduced contact with the residents, but also reduced time-consuming tasks and thus freed up time for caring for the elderly residents.

In the study with most obvious indirect linkages to job quality, Holm and Lorenz (2022) investigated the impact of AI on work and skill requirements. The study shows that AI may cause an increase in job pace, but also resulted in less monotony (often taken as a measure of increased job quality) as well as more learning potential. However, if used only as a tool for giving orders for workers in high-skilled jobs, AI results in decreased autonomy and potentially causes a drop in job satisfaction. The study hence points towards ambiguous outcomes of digitalisation for job quality and concludes that the impacts of digitalisation at work (at least in the form of AI) are not uniform, either on a sectoral level or within the same occupational group of workers (Holm and Lorenz, 2022:94). On the contrary, whether or not the inclusion of AI (and thus potentially similar digital tools) is successful appears to be linked with the policies implemented by the employer and with the involvement of the relevant partners in implementation, for instance the local and national social partners.

On the broader, societal level, a large research project funded by the Nordic Council (The Future of Work in the Nordic countries project) found that digitalisation has a very diverse impact across sectors. Some sectors – like manufacturing and banking – were much more affected and had been for several decades, while others, in particular human input-intense services, were less affected by digitalisation (Rolandsson and Dølvik, 2021). Rolandsson and Dølvik (2021) moreover report a tendency towards upgrading of blue-collar jobs due to digitalisation (however less so in Denmark), whereas the upgrading effect for white-collar workers was less clear. Some service/white-collar workers experienced intensified individual demands to adapt their qualifications to the new digital technology, which in turn could have a negative impact on job quality (this was not, however, suggested by Rolandsson and Dølvik but is our line of argumentation). Research has in general highlighted a tendency towards work intensification in the public sector, including hospitals

(Caraker et al., 2014; Mailand and Larsen, 2020), with a direct effect on job quality for many workers, for instance a poorer psychosocial work environment. Many workers feel they have less time to do 'core tasks' typically attending to citizens' needs. Implementation of digital technologies in the public sector may contribute to this, in particular during the first phases of the implementation, and especially if there is discrepancy between the expected time- and task-gain and the actual time it takes to implement the technologies (Hansen and Grosen, 2019; Thomsen, 2020). Yet, it is still not certain whether job intensification as such is an outcome of digitalisation, increasing workloads or cost reductions in the public services.

Since we found very little research on the direct impact of digitalisation on job quality in the Danish context, we will highlight a few additional, relevant studies that deal with related topics, yet are not directly linked with the core issues addressed in this project.

Pors (2015) conducted an ethnographic case study of frontline workers in public services in a municipal citizens' centre. She found that the frontline workers, due to digitalisation, had to change their role in relation to the citizens from that of specialised caseworker to an educational or support worker, helping the citizens to become 'digital citizens' able to solve their administrative issues themselves online. Hence, e-government has the potential for altering the overall tasks and the accompanying job identification of welfare and social case workers in particular. However, this may also apply to other administrative staff who may mainly be motivated by helping citizens with their individual situations rather than providing digital support. This may in turn reduce their job satisfaction. Some of the same tendencies regarding changing perceptions of work and professional identity were also found by Hoeyer and Wadmann (2020) in the case of health professionals. Another study (Sundstrup et al., 2020) found that the introduction of new technologies was a push factor for some older workers' decision on when to retire, as they found that the introduction of new technologies was challenging and potentially taking time away from their core welfare tasks. Nielsen et al. (2020) conducted a case study of a large digital transformation project in a Danish municipality, emphasising the role and importance of management in the process, but also arguing that worker involvement is important for successful implementation. Here we argued that projects that are not successfully implemented will typically have adverse effects on the workers' experience of job quality. A large survey of workers' attitudes and opinions in 2014 (Caraker et al., 2014) found that two-thirds of the public workers felt increased demands to record information, which could reflect increasing digitalisation. Moreover, this survey showed that two-thirds of the public workers felt that their workload had increased.

Similar results on worker involvement were also found in a report from the National Research Centre on Work Environment, regarding the impact of technologies on social and healthcare assistance in Denmark. The report concludes that the implementation of so-called 'welfare technologies' depends largely on the organisational strategy, which seems to directly affect the

workers' experiences of their work environment and well-being at work (Ajslev et al., 2017:6-7). In other words, an explicitly articulated, strategic and ethical use of digital technology initiated by management appears to be key to successful implementation of new technologies in the social and healthcare assistance centres. This sort of implementation and argumentation is less often questioned by the social and healthcare assistants and makes them more prone to learn new technical skills than in cases of non-transparent implementation that might seem arbitrary and obscure (Ajslev et al., 2017). With regard to the implementation of AI specifically in the social and healthcare services, Ajslev and colleagues investigated the attitudes of social and healthcare workers to intelligent robotic pets and found mixed results, in line with the study by Holm and Lorenz (2022). While some of the nursing homes were positive about the introduction of robotic pets and found that they gave the workers more time and calmed the elderly, it made others feel insecure and uncomfortable. The study therefore argues that successful introduction of intelligent technology is intimately linked with the stories that are told around it and depends on whether it aligns with the perceptions and ethical underpinning of the occupation of both the manager and workers, as it should not compromise the professional identity of workers (Ajslev et al, 2017:54). Accordingly, while the above studies have highlighted the importance of implementation practices in relation to the introduction of digital tools, there is a need for more studies that can successfully shed light upon the within-job relationship between technology, increased skills requirements and wellbeing.

Overall, as this state-of-the-art review shows, there is a knowledge gap on the impact digitalisation may have on the wellbeing and job quality of workers. The findings from this project can contribute important knowledge to help close this gap.

SECTION 2. IMPACT OF DIGITALISATION ON JOB QUALITY

Section 2.1 Electricity production and distribution sector

2.1.1 Overview of the sector

The Danish electricity sector (both production and distribution) was liberalised in the late 1990s, at a time when many other large state monopolies, such as the telecommunications and airport sectors, were being dissolved across Europe. This was initially a political decision, as a result of liberalisation of the internal market in the European Union through the 1996 EU directive on liberalisation of the electricity sector (Frederiksen, 2012). The energy supply infrastructure (gas and electricity) is still publicly owned by the public utility company Energinet.dk. During the liberalisation, the public energy companies were turned into private entities (but often with semi-public ownership or owned by local consumers through cooperatives, which remain widespread in the Danish economy). The state-owned energy companies have been sold off by the state: the large company DONG energy, which was a merger of several public utility companies, was partly sold to Goldman Sachs in 2014 in a controversial deal, which ultimately resulted in billions of euros going to the Danish state (the Danish state still owns 50.1% of the stocks in Ørsted, as the company is now called). There are more than 40 different energy companies in Denmark, varying greatly in size.

According to Statistics Denmark, in 2021 there were around 8,800 employees in the 'Electric power generation, transmission and distribution' sector (NACE code 35.1). Of these, more than 70% are male. Besides electricians and technicians, there are many administrative and engineering positions in the sector.

2.1.2 History and patterns of digitalisation in the sector ⁽⁹⁾

Much of the work in the electricity production and distribution services is typically manual work, such as maintenance and installation. This remains the case very much, but 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) (INT6; FG2). Other new technologies include automatic app-based maps of tasks (e.g. servicing local electric supply boxes), but also developments in electric plants and reactors and the use of QR-codes for tasks. Some companies also use GPS-tracking systems as well as laser prints locally (INT10; FG2) On a more experimental level, one company in our FG2 were introducing virtual reality as a tool for on-site problem-

9. Unlike the two other sectors investigated in the project, there are unfortunately no Danish data from the Digiqu@lpub survey on the electricity sector. The results for this sector are therefore based exclusively on data from the interviews and the focus group.

solving: a support technician could remotely help the worker to resolve problems on-site (FG2). However, this was still at a trial stage.

Denmark is at the forefront of sustainability and green development within the energy and utility sector. As mentioned, the electricity sector has been selected as a priority area for implementing AI and further enhancing energy and environmental technology, due to the already strong digital infrastructure within this sector (Ministry of Finance and Ministry of Industry, Business and Financial Affairs, 2019: 61). A main focus is to develop AI, to optimise energy consumption and reduce the carbon footprint, hence benefitting both the environment and Danish businesses implementing green technology (Ministry of Finance and Ministry of Industry, Business and Financial Affairs, 2019: 65). The Danish Government has launched initiatives to ensure continuous green transition in the energy sector through the so-called 'Energy Agreement' – a strategy in which AI is key. As an example, Energinet has installed a number of sensors at selected electricity stations throughout Denmark, from where patterns in vibrations, sounds, temperature and the like can be measured. AI can detect when something in the station deviates from the norm and ensure better and more effective monitoring. Furthermore, AI can help to analyse fluctuations in Danish electricity consumption and help utility companies to adjust production according to demand (Ministry of Finance and Ministry of Industry, Business and Financial Affairs, 2019: 65). However, this use of AI was not mentioned in the FG, as it did not relate directly to the participants' daily work.

2.1.3 Work organisation

The increasing use of apps for administrative tasks and for handling the workflow is significantly impacting work organisation in the sector (INT6; FG2). For most workers, daily tasks are now communicated on an app, while they used to be physically handed out upon arrival at the company every morning. This means that electricians are now only physically present at the company when picking up new equipment, as most communication with management and colleagues is online. Consequently, solo work is increasing, which may also affect the psychological working environment (INT6; INT10). FG2 showcased a striking range of digital tools in work planning across companies: One FG2 participant reported that 28 different apps were being used in a large company (stating that he had to '*reinvent the wheel all the time*') whereas another, who worked in a small, local energy distribution company with only 12 electricians/technicians, was still documenting everything manually. These examples show how the electricity and distribution sector is subject to local organisational and variation in practice, which appears intertwined with company size.

While the overall assessment is that new digital technologies are helpful when applied and implemented in the right manner, there was widespread agreement in FG2 that this has not yet been fully achieved. Numerous examples of malfunctions and mis-guiding incidents were given

during the FG. This, however, most likely reflects somewhat the tendency to take more notice of technology when it is not working. As expressed by one participant: *'When the shit is not working, it's a hassle.'* However, as another worker said; *'It is not necessarily the technology's fault!'*, suggesting that it is 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, so there is a need for what one worker labelled a 'chain-reaction' between a multitude of stakeholders within the company to ensure proper procedures. As another FG2 participant said: *'All tasks are now mine.'* He explained that he needed to go to the site, fix the problem, change the drawings afterwards and complete the online reporting. Overall, this development has changed everyday routines, adding administration and reducing communication, and has potentially increased the workload (INT10; FG2). As such, digitalisation can potentially affect the wellbeing of all workers: tasks now have more of a digital dimension and less of an intra-human aspect, and the administrative tasks are seen by some workers in the sector as stressful (INT10; FG2).

Overall, the impact of the implementation of digital tools is seen as mixed: the unionists we interviewed, and many FG participants were undecided about whether digitalisation had actually in general made work easier or not (INT6; INT10; FG2). On the positive side, digitalisation has removed some practical and routine-based tasks from workers, such as surveillance of installations and equipment. Before, workers needed to drive out to regularly check whether the equipment was functioning correctly, whereas today, workers are notified in the control centre or on their app if action is required. While this was overall thought of as a positive development, there are still problems, as the apps often fail to report the specific problems in detail, for instance what side of the supply box needs fixing (FG2). Therefore, FG2 participants identified a need for more specific information on the apps to be able to resolve specific tasks. They further ascribed some of these errors to a decline in face-to-face interaction between professionals and the result of outsourcing order-placement to HR departments, which may be unable to determine what counts as important information for electricians (FG2). Some workers said that GPS-tracking systems make it easier to find the closest colleague when they had to handle tasks that require two workers (which increases efficiency). Individual autonomy has also *increased* in some cases, for instance as workers are now able to order specific parts directly from the wholesaler's homepage, rather than waiting for the back-office to do this. This both saves time and reduces the number of faulty deliveries (INT6; FG2). Another example of where digital development is helpful was given by a worker explaining how he uses the internet to find out the technical specifications of various pieces and instalments. This is done on-site, whereas the worker previously had to phone, for instance, the company which made the device to get the specification of a specific part or instalment. In sum, FG2 participants highlighted many positive outcomes associated with digitalisation, such as flexibility, overview and the opportunity to help colleagues who suffer from dyslexia (as tasks could be read out loud by digital devices).

On the negative side, however, FG2 participants noted that technological solutions sometimes cause rigid systems, which can also decrease autonomy. As an example, route planning had become more difficult since it had been taken over by digital technology, which meant that electricians had to drive illogical routes and spend more time in the car than needed. One FG2 participant said: *'Before, we controlled everything from A to Z. But this independence has been taken away from us... and it is just so inefficient!'* Moreover, participants noted that specific tasks were now allocated fixed time slots. Consequently, a FG2 participant reported that a colleague always brought his bicycle along with him in the car, so he could go for a ride in-between tasks that he finalised earlier than the template had calculated (as the time for the task is fixed he cannot move on to the next task, unlike previously when the workers planned the work processes themselves). These examples highlight the relationship between rigid systems, lack of flexibility and autonomy. Bearing this ambiguity in mind, the FG2 participants felt that digitalisation sometimes caused disregard for professionalism and a shrinking of personal autonomy. One participant said: *'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 (FG2).'*

Overall, this results in low incentives to solve problems that you might have noticed but are not on the task list in the system, and a tendency to 'work-to-the-book'. This was new to most of the workers, as they used to have more autonomy and feel more responsible for their work. In this vein, the organisation of work was discussed at greater length in FG2 than the actual technologies themselves, and in particular the increased need for documentation was highlighted as time-consuming. This suggests that digital implementation is interlinked with organisational strategies which need to match the workers' everyday practices.

2.1.4 Working time

As a result of the rise in digital solutions and accompanied increased administration, several of our interviewees' experience what one union worker expressed as: *'...an indirect expectation to finalise the [administrative part of the] job before going home for the day. Otherwise, you are rung up after the documents are sent off [and have to finalise it after work]'* (INT10; FG2). Moreover, workers said that technology could easily 'serve as a time-consumer'. One said: *'it steals much of the time where we were in reality going to use our hands out on the site – instead we fumble around on computers and tablets and mobile phones or what not'*. As such, whether digitalisation serves as a time-saver or a time-consumer is not explicitly clear from our FG. This highlights the ambiguity between flexibility on the one hand, and the need for proper skill development and guidelines on the other. Furthermore, urgent assignments that come in just before the working day is over have become more frequent. This is arguably also linked with a lack of manpower in

the sector, which results in many tasks needing to be handled (INT6). Many electricians in the sector have on-call duties, but these remain highly regulated in the local collective agreements, so the workers are (well-)paid extra for these. One local shop steward, for instance, said; *'We don't want to be contacted outside working hours... and we share this understanding with management.'* In this case, a good balance was found locally after discussing it in the local cooperation committee (INT10).

2.1.5 Health and safety and outcomes for workers

As the sector is characterised by much physical work, work-related injuries are relatively common, in particular wear and tear along with falls (typically from ladders). Therefore, the unions are currently working on initiatives to rethink digital tools as health and safety resources, for instance so-called 'co-bots': a robot that can perform repetitive tasks such as heavy lifting, but also demanding work postures such as twists (INT10). However, these initiatives are still in a preliminary phase, and no concrete examples or collaborations were presented in the interviews or in the focus group.

Furthermore, in relation to mental wellbeing, concerns were expressed that a more digitalised everyday working routine may remove human interaction and, consequently, information, recognition and relationship aspects. It may therefore potentially be harder to establish a collective spirit among workers, which may also ultimately cause a decline in union membership (INT10).

Overall, digitalisation appears to have a limited direct effect on health and safety. The main topics discussed revolved around work organisation and increased stress.

2.1.6 Skills and learning

A majority of the participants in the focus group felt they do not possess the adequate digital competences needed to take full advantage of the benefits of digitalisation. Older electricians, it was emphasized, often feel that the digitalisation of labour processes and work organisation is challenging (many of the participants are in this category). This fosters a need for increased digital skills and learning, which are currently not matched, and much is left to local solutions. Several workers noted that they had tech-savvy colleagues (referred to as 'super-users' or 'ambassadors' - often younger colleagues) who were able to understand and disseminate new digital solutions to colleagues. This was helpful. The members of FG2 emphasised that those who were interested in technology found it easier to learn new digital skills. Furthermore, it was generally reported that it is sometimes not made clear what the technology should and can do. One FG2 participant said: *'There are all sorts of different systems, and there is rarely information available around how they really should be used or what they can be used for. So, we are often unable to really benefit from them, compared to what they potentially could do'.*

The FG2 participants generally stated that courses and training are either lacking or do not function very well. Firstly, the company HR offices are often in charge of the courses, which means that the courses are ill-designed for skilled tradesmen. Secondly, courses tend to be taught via online platforms and, thirdly, in English – a combination many participants noted they were unfamiliar with. One participant said that courses *'are gabbled though and we cannot make head or tail of anything'* (arguing that the HR department's teaching, the English language and the online format were all problematic). FG2 participants identified the need for union-held courses around digitalisation designed for electricians specifically, as a potentially good way forward. In addition to profession-specific courses, some workers also mentioned a need for more basic digital courses such as in Microsoft-outlook, as the training they were able to get from their own HR department was either too simple (basically learning to turn on the computer) or too difficult or irrelevant (not designed for electricians). A shop steward said in an interview that in his company, workers' skills were updated, for instance, through courses in ICT-handling for those lacking these competences (INT6). Hence in this electricity distribution company they managed to ensure that workers have the necessary skills.

2.1.7 Reconciling work and personal life

Digitalisation has blurred the lines between work and personal life, since administrative tasks as well as ongoing communication can be performed online after the working day ends. Participants moreover stated that technology had increased flexibility and the possibility to work from home; this option, however, is severely limited, due to the predominant requirement for physical, onsite work for the electricians and technicians in the public electricity distribution companies. The flexibility was overall thought of as a positive development. Nevertheless, some workers are satisfied and others less so with their work-life balance. Some say that they are over-burdened, while others are happy with the number of tasks. The data from the interviews and workshops do not suggest that this has been changed by digitalisation. Rather, participants argued that due to digitalisation, managers need to take extra care of the workers' work-life balance, by setting rules and expectations.

It is hence not possible to draw a clear-cut conclusion from our data, as we found that personal preferences, skills and competences, the size of the company and implementation by managements all affect whether workers felt able to stick within normal working hours and reconcile their work and private life (FG2). There is therefore a need for workers and management to discuss the topics of stress and coping; especially in male-dominated sectors that used to be embedded in a discourse around masculinity, where such vulnerabilities may have been off-topic (INT6). Therefore, the debate concerning the 'Right to Disconnect' is becoming increasingly relevant in this sector as well, and unionists we interviewed stated they would be happy if, for instance, the EU were to regulate on this issue (INT10). In the company where the joint shop

steward works, the cooperation committee discussed when workers can be contacted, for instance, by project managers, and have agreed to handle all issues within business hours (INT6).

2.1.8 Career prospects and employment security

Based on the data collected in the interviews and the focus group, technological development has not really changed career prospects and employment security in the sector. If anything, there will be more jobs in the future due to the 'green transition' of the economy and of energy production⁽¹⁰⁾.

2.1.9 Workers' rights

The potential problem of GPS tracking being used to monitor workers and the work process seems quite predominant in many public and scholarly debates. Many of the workers in FG2 worked in companies where GPS-tracking of their vehicles (and partly of the labour process itself) now takes place. In all companies this caused a lot of commotion before implementation; however, there was a consensus in the focus group that the GPS-tracking had not caused much (if any) disturbance after it was implemented. The general understanding was that management is highly aware that this is a very sensitive issue, and that GPS-tracking and close monitoring of work processes can be a red flag for workers if used unethically, which for the workers in the focus group meant monitoring the workers and labour process. As one worker stated: 'Management is highly attentive to not cross the fine line'. In one case, management agreed not to implement GPS tracking after a consultation with the shop steward, but rather, to base the relationship on trust (INT6). In another case, some of the FG2 participants reported that management had projected the tracking on a large screen in the management office. The shop stewards immediately confronted the management and demanded that this procedure be stopped, which management then agreed to do (FG2). The fact that the workers were able to stop the monitoring so quickly potentially reflects the enduring power that these workers hold in the Danish industrial relations system.

The interviews and focus group left us with the impression that the workers have mixed feelings concerning a potential 'right to disconnect'. While some workers were in favour of fixed guidelines (arguing that it is difficult to strike a balance between work and private life when checking and responding to e-mails due to loyalty, curiosity and excitement), others were against (arguing for flexibility and autonomy rather than rigidity). As one worker said: 'If things become too strictly divided, we lose our flexibility' (FG2). These opposing positions show the difficulties with fixed guidelines and highlight the need for joint and flexible adaptations agreed between workers and management in a local setting.

10. We covered most of this in section 2.1.6 skills and learning.

2.1.10 Conclusions on the sector

'Ambiguity' seems to characterise our findings from the electricity and distribution sector at large. Digitalisation has mainly impacted work organisation and the management of tasks rather than the technical work itself, although initial experiments with AI were also briefly mentioned. While there were overall positive connotations related to digitalisation, many drawbacks were mentioned, and the overall impression is that the advantages of digitalisation are not fully utilised. This mainly relates to organisational and managerial issues. Although digitalisation did enhance flexibility in some cases, it caused more rigidity in others. This appears closely linked with company size, organisational and managerial practices and personal preferences. Further, the need for skill development and dialogue between management and workers was emphasised, in order to avoid a decline in professionalism due to the increased documentation demands. Overall, digitalisation mostly has implications for work organisation and the autonomy of workers: much planning has been digitalised, which as such has not improved it. Moreover, the workers felt an increased need to document events and handle digital tools, which increased the workload.

Section 2.2 Public administration sector

2.2.1 Overview of the sector

Denmark has a large public sector, with public spending higher than 50% of GDP in 2020 ⁽¹¹⁾. The public sector is also an important employer: around 30% of total employment was in the public sector in early 2022 ⁽¹²⁾. More specifically, according to Statistics Denmark, the public administration (NACE code 84.1) has 94,206 employees, of whom two-thirds are female ⁽¹³⁾.

2.2.2 History and patterns of digitalisation in the sector

The Danish public sector is among the most highly digitalised in the world and has been dubbed the most digitalised public sector world-wide by the UN (Petersen and Schou, 2020; Sørensen et al., 2020). Digitalisation has since the 1990s been seen by most actors as a necessary way to improve the efficiency of public services, reduce costs and mitigate some of the labour shortage in the public sector (although this is mainly within the care sector, see section below). The government has launched several different strategies and initiatives to improve public sector digitalisation (Petersen and Schou, 2020). A core proposition in many of the initiatives is that digitalisation will increase efficiency and reduce costs (at least in the long run), yet this connection may be less straightforward than anticipated in the government strategies. This view was explicitly questioned by participants in the focus group. While digitalisation overall has led to improvements, the road has been bumpy, and has included notoriously failed projects with great cost for the

11. <https://data.oecd.org/gga/general-government-spending.htm>

12. Own calculation based on Statistics Denmark (based on register data, data table [LBESK02](#))

13. Statistics Denmark LIGEDB9: Beskæftigede lønmodtagere efter køn, lønmodtagergruppe og branche. www.statistikbanken.dk/

state, most prominently the digitalisation of the tax authorities, when a large national digital system for collecting tax debts (EFI) ended up being trashed (Christensen and Mortensen, 2018).

The main characteristic of the digitalisation of the public administration is the transformation of administrative paperwork – such as registration, filing and actual case work and management – into digital work, basically 'digital administration'. While initially the focus was on back-office tasks, there has been an increasing focus in the last decade or so on citizens' digital access to the public administration, including widespread - often mandatory - self-servicing online, where the citizens are to handle several tasks previously handled by public administrative workers (Schou and Hjelholt, 2019). In recent years there has also been growing public interest in the use of 'big data', for instance in social work and police work. The use of AI is another issue that has been debated publicly, but so far has been less frequent in practice. However, there are ongoing projects in the public administration, giving AI/machine learning a more prominent role. This technology is therefore expected to become significantly more important in the future. Some of the FG3 participants mentioned AI as having huge potential within the public administration, although it was not fully developed yet, but is in its infancy. Some specific technologies applied are RPA, Robot Process Automation, which can provide standardised administrative solutions, including simple actions such as paying bills, but also more complex solutions, for instance handling aspects of hiring processes or opening applications from citizens to construct additional buildings on their land (byggesager) (BFA, 2019:26).

The increasing digitalisation has been criticised (by both workers and citizens) for producing more bureaucracy and control. Many welfare and health workers, for example, have been required to document and register more information than previously, leaving less time to actively engage with the citizens and, thus, to do their job. The level of information is described by critical observers as overly abundant and bureaucratic. Accordingly, a public discussion has emerged over 'cold' (administrative) versus 'warm' (care/professional/citizen-oriented) hands in the public sector. Some of these discussions have been between groups of workers and to some degree their union: unions representing care and welfare personnel, such as FOA (the union for, in particular, public sector services, such as health and care workers) have called for less administration and more profession-based autonomy, while DJØF, as the main union for university-educated administrative staff, argues that there are significant gains from the system. Overly bureaucratic processes are sometimes mockingly referred to in public discussions as 'DJØF-isation' (DJØFisering).

2.2.3 Work organisation

Overall, the interviews and focus group showed that participants are in favour of new technologies in the public administration, and that technology, when well-functioning, can improve job quality as well as the services to the public. The FG3 participants described the technological development as incremental changes over the years. Most of our interviewees had a positive attitude towards

digitalisation, saying that it saved time by removing monotonous tasks and freed up resources for more interesting issues and professional development. In the DGQS survey, 78% (see footnote 3 for important limitations of the survey) of the respondents from the public administration likewise stated that digitalisation improves the public service they are providing (n=41). However, this does not reflect an uncritical technological optimism, and the interviewees gave some less successful examples of digitalisation (like the Danish tax authorities) to illustrate the need for a critical perspective on digitalisation. FG3 participants identified the need to develop well-functioning systems that could communicate internally to decrease work pressure. Documentation and registration demands were generally described as challenging and time-consuming. FG3 participants attributed this to IT-systems that had 'not followed suit' with technological development. One FG3 participant mentioned around nine different platforms with different documentation requirements, highlighting issues such as double-documentation and working with various interfaces and passwords. She said: 'We would like to have new and better systems that can do it all', highlighting the challenges arising from increased documentation requirements alongside 'old and outdated' systems. However, because public procurers within public services by and large always chose the lowest price rather than the best and most durable solution, the participants felt stuck with old and outdated technologies that caused frustration. Data protection regulation was also described as a core challenge when working across different administrative systems. This technological scepticism and duality are also reflected in the DGQS survey, where 58% of respondents stated that digitalisation has reduced repetitive tasks, but 61% said digitalisation had increased work pace and intensity (n=36).

Moreover, the union representatives interviewed underlined the need to maintain and develop a professional administrative workforce alongside digitalisation (INT3). The unionist from HK (the union for clerical and administrative workers without university degrees) voiced some concerns that their profession was somewhat overlooked in the digitalisation process, since some policymakers seem to think that 'everybody can do administrative work' (INT3). Accordingly, 'do-it-yourself-administration' (where self-time and task-management are outsourced to every individual employer rather than being handled by administrative staff) was thought to be potentially time-consuming as well as threatening to water down the administration profession (INT3). There are also concerns that the increasing use of algorithmic management will lead to reduced autonomy for individual workers (INT2): here, HK emphasized a distinction to be made between algorithmic processes that support human decisions and those which are themselves decisive. In general, the union official we interviewed emphasised that algorithms should be supporting worker autonomy and that there is a need for professionals who can make sense of the algorithmic conclusions (INT3). When used mindfully, however, such technologies were thought to be beneficial for all parties involved. As an example, one FG3 participant said that her tasks had expanded to include more interesting 'micro-investigations' that she was conducting alongside the social workers, thus both moving her professionalism forward and simultaneously saving time for

her colleagues. Another participant mentioned the introduction of machine learning in the police department as a tool to facilitate working procedures.

2.2.4 Working time

The overall picture from the interviews and FG3 in relation to the impact of digitalisation on working time is a dual one: technology can, on the one hand, eat up time, especially time spent on *'do-it-yourself-administration'* and system failure, and it can also blur the lines between personal life and work (as with the increased need to be online). On the other hand, it may free up more time for core tasks and professional and personal development. In general, the focus group participants did not say that digitalisation had increased their working time. Nevertheless, the pace of change has increased. To quote one of our interviewees: *'We are used to the change. It is the pace that is hard to handle'* (INT3). However, whether the technological developments have actually freed up more time than they consume remains an open question. In the DGQS survey, 44% of the respondents from the Danish public administration agreed that digitalisation has *'given me more time to focus on significant aspects of my job'*, while 28% disagreed (n=36).

2.2.5 Health and safety and outcomes for workers

The focus group participants did not find that digitalisation had had much impact on occupational health and safety in general, but a few examples of improvements were given. For instance, the task of pipetting in the labs was now done by robotic technology, greatly reducing the ergonomic wear and tear on fingers and shoulders, thus significantly reducing the work-related health problems caused by this task. Another perhaps less influential example of digitalisation was the elimination of the need to carry around heavy case files (mainly in the police and prison system), as the case files are now digital. Most workers in the DGQS public administration survey had not noticed any changes (positive or negative) in health and safety due to digitalisation (64% for physical health and 60% for mental health) (n=33). The impact report in the DGQS was mainly negative: 27% reported worse physical health and 30% reported worse mental health, while only 6% (for both physical and mental health) reported improvements (n=33).

While FG3 participants were overall in favour of new technologies, challenges were mentioned in terms of the need to provide quicker and better services. One participant said: *'It is definitely easier to provide a better service [with new technology], but there are also increased demands to respond quicker than you are perhaps ready to do (...) so, it is definitely a huge advantage, but it also has some accompanying challenges (...) 'now, I have been waiting for an hour, do I really need to do that?' – it can squeeze the turnip at the other end'*.

The higher expectations from citizens can be stressful for workers in the public administration and may be one of the reasons why stress (according to the FG3 participants) is increasing.

2.2.6 Skills and learning

The general impression given by the unionists and focus group participants is that there is a strong need for further investment in upgrading skills among public sector workers, in particular digital competences, which were not considered to be sufficient in the current context (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. This lack of formal training was also confirmed in the DGQS survey where 64% had not received any formal training on digitalisation (n=33). The need for formal training has also been highlighted by national researchers (Nielsen and Holm, 2020). Skill upgrading and training is therefore a recurring theme for 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 introduced in new areas (INT3). As an example, when new digital systems are introduced in education, this may require instruction and training of teachers from the administrative staff. Representatives from for instance HK stressed the importance of skill development several times during the interview, and the union has launched initiatives 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 fill in their skills and profession and be advised on where their digital skills need improvement, in line with recent technological developments in their sector. Additionally, funds in the 'Competence Funds' (established through the collective agreements; workers can apply to them for funding for upgrading their skills and competences) are earmarked for digital skills.

While focus group participants identified a need for technological learning and skill development, they also emphasised that not all colleagues were equally 'curious' about attaining new digital skills. Especially elderly colleagues felt less comfortable mastering new skills, and many prefer doing things 'the good old way'. A focus group participant said: '*Those who are not curious [in new tasks] get to do the standard tasks*': although this was said in a semi-joking manner, there is some truth to it. Those workers who do not master new digital skills, may be left with tasks which require lower skills and are more repetitive, potentially reducing these workers' job quality and putting them in a more vulnerable position on the labour market, contributing to labour market dualisation.

Furthermore, HK run a campaign concerned with future jobs in the realm of digitalisation which was launched a few years ago: six so-called 'job spheres' (hence not professions) were selected as places where digitalisation would have a future impact. As an example, these 'spheres' include the handling of complex data. They are thus not restricted to certain professions but serve as overarching skills across professions. HK stress the importance of not restricting digital skill upgrading to certain professions, but also offering training to less qualified workers within the public administration: they contest the narrative whereby digitalisation equals increased

complexity, which in turns requires a higher level of education. The union underlined the importance of respecting the difference between professions, of seeing the important role of all administrative staff irrespective of the length of their education, and of including workers in determining how to bring digitalisation into the professions (INT3).

2.2.7 Reconciling work and personal life

A main concern amongst the unionists interviewed and FG3 participants concerned the increased blurring of private life and work as a direct consequence of digitalisation (INT3; FG3). Most participants reported that their work was performed mainly 'within normal working hours' as their profession required a high level of physical presence. This was also indicated in the DGQS by public administration workers from Denmark: 89% (n=36) stated that digitalisation had not changed the hours they work. However, the COVID-19 crisis had led to greater interest in working from home and other distance-work. Since many aspects of public administration could be handled from home during the lockdowns, the topic of remote work has become more salient for the social partners. Our FG3 participants across professions were all given better options to work from home; this was done either through local collective agreements or in dialogue with management. Many employees see the increased flexibility and reduced transport time as potential gains. While this has positive implications among workers in general as it fosters flexibility, it may also compromise the sharp division between personal life and work. One FG3 participant said: *'People send e-mails out at half past five and expect to have a response at eight in the morning. One cannot expect a response while you are having dinner! We need to find some common guidelines (...) otherwise, it can become too fluffy, and then it is a dangerous road for all of us.'*

This suggests that although participants were overall in favour of increased flexibility, they noted that the 'need to be online' had created undesirable work procedures.

2.2.8 Career prospects and employment security

In general, our interviewees did not support the narrative which claims that digitalisation brings about more employment insecurity. Rather, they said that much work cannot be automated or done by robotics or AI, hence the importance of having qualified professionals (INT3). One FG3 participant (working as a laboratory technologist, but still reflecting the general assessment) stated: *'When new technology has been implemented, it has not meant that the number of jobs has declined. We can assess way more samples, and the laboratory technologist just needs to handle more data rather than performing manual work. Today, it is all about looking at data, handling large amounts of data... in a sense, the professionalism has moved. You need to be a little more (...) focussed on technological understanding.'*

Overall, our FG3 participants did not think of technology as a threat to their job security. Rather, they found that with digitalisation, there was an increased need to *'assure the quality of the work,*

and technology is just a tool to aid this process, as one FG3 participant said. Another elaborated: *‘Personally, I would like to soon quell the statement that when we get a new system, we need less staff. It is really fatiguing listening to! We do not save hands or heads anywhere –sometimes, it is almost quite opposite.’* In this regard, job security was not a concern in our data. Rather, the way professionalism had shifted was emphasised as a positive development which could potentially increase job security. Similarly, in the DGQS survey 53% of the public administration respondents felt that digitalisation had improved their job security and future prospects, while only 10% felt it reduced these (n=40).

2.2.9 Workers’ rights

FG3 participants agreed that ‘the right to disconnect’ was a good idea in theory, but perhaps difficult to implement in practice. One participant said that it was ‘fundamentally a genuinely great idea’ but that he ‘felt a little ambivalent about it’ as it could potentially reduce flexibility. He went on to argue that rather than dealing with *when* the manager was allowed to contact the worker, the discussion should be about *where* – referring to the fact that work-related communication can happen on other digital platforms apart from e-mails. As such the ‘right to disconnect’ is becoming increasingly important, and as one union official expressed it: *‘we, as individuals, need help with defining these borders between private life and work’* (INT3). The union were advocating more regulation, helping their members to draw the boundaries between work life and private life, identifying a need for professional organisations (including the unions) to collaborate with employers and draw up feasible guidelines and statements concerning the right to disconnect. However, the union argued that this should be handled through the collective agreement system. As an example, HK was currently revisiting the 2007 guidelines on remote work, updating them to current needs with the aim of including the guidelines in the forthcoming renewal of the collective bargaining framework (INT3).

Based on FG3, the general impression is that the participants did not see digital surveillance as a central problem (although there are some concerns over who owns the data generated by electronic surveillance of workers and citizens) (INT2). Overall, both the unionists and FG3 participants emphasised that technology might bring about changes in the tasks that need to be accommodated – and that the workers’ voice is crucial in this process (INT3; FG3). The importance of including the workers’ perspective on new technologies was expressed on several occasions, and correlates well with the findings from the literature review in the present report.

2.2.10 Conclusions on the sector

Public administrative work is highly digitalised in Denmark, and the workers (and citizens alike) have a hard time imagining the public sector without such a level of digitalisation. Since digitalisation started early in the Danish public sector, the administrative ICT systems are an integral part of the work, and the ongoing changes are perceived as incremental by the workers,

although quite massive. Self-servicing systems are becoming widespread, which has altered the way public administration workers interact with citizens. AI has the potential to generate a more abrupt transformation of work processes in the sector but is still in its infancy. Workers in the public administration are, based on our results, positive on the whole about the implementation of new technologies, arguing that digitalisation overall has made their work more interesting and has moved their profession forward towards new (and often more interesting) tasks. The unionists interviewed described digitalisation as a recurrent issue: it required the union to take a proactive role to help members see its possibilities rather than its limitations (INT3). Nevertheless, they expressed scepticism as to how, when and where the technology is used. FG3 participants generally identified a need for more intra-technological communication, to ease working procedures and ensure that the different administrative systems can work together. The workers in our data moreover advocated common guidelines on a better work-life balance.

Section 2.3 Hospital sector

2.3.1 Overview of the sector

Denmark spends around 8.5% of GDP on public health care (2018 figures from European Commission ⁽¹⁴⁾). The hospital sector in Denmark is highly dominated by the public hospitals, with very few private, typically specialised providers. In 2021, 132,155 people were employed in public hospitals in Denmark (Sundhedsdatastyrelsen, n.d.), which is around 4.6% of total employment. The majority of the employees are female. The employment is divided into ⁽¹⁵⁾:

- Doctors: 15%
- Nurses: 32%
- Other health professionals: 24%
- Other staff (including doctors' secretaries, support staff, administrative staff, psychologists, cleaning staff, technical staff, porters etc.): 30%

Part-time work is quite widespread, with around 32% of the health care staff in the regions (who operate the hospitals) being part-time workers ⁽¹⁶⁾. This was reflected in our DGQS survey, where 36% of the respondents were employed part time (see caveat on DGQS survey in footnote 3). Recently there has been radical centralisation of the hospital sector, with the introduction of six

14. Source: ECHI Data Tool (<https://webgate.ec.europa.eu/dyna/echi/?indlist=77a>) (accessed 27.4.22).

15. Source: Sundhedsdatastyrelsen, n.d. The figures do not add up to 100 as the calculations are in whole numbers.

16. <https://www.regioner.dk/services/nyheder/2022/oktober/danske-regioner-og-foa-flere-fuldtidsstillinger-kan-fremtidssikre-sundhedsvaesnet>

large new so-called 'super-hospitals'. This will reduce the number of traditional public hospitals from more than 50 hospitals to just above 20 when fully implemented (Mailand and Larsen, 2020).

2.3.2 History and patterns of digitalisation in the sector

The strategy of the Danish state, at least since the 1990s, has been to digitalise the public sector (Hoeyer and Wadmann, 2020). Hence the hospitals and public health care have a long history of introducing new technologies, resulting in various successes, but also failures or at least less successful cases; an often-mentioned example is the health platform, 'Sundhedsplatformen', that was to replace 30 or so other IT systems, but faced severe criticism and problems (Røhl and Nielsen, 2019). This platform is a highly used digital tool alongside the Electronic Patient Journal System (EPJ): the two systems are used in different regions of Denmark (INT7; INT 9; FG1).

Regardless of problems with interaction between the two systems, the overall situation is highly digitalised in the public hospitals. A recent research-based report suggests that all occupations within health care will be affected by digitalisation and technological development (KPMG and VIVE, 2022). Moreover, the increasing amount of data available has resulted in an approach involving comparisons (and hence benchmarking) between the different Danish hospitals (Triantafillou, 2014).

A variety of technologies are currently being introduced in the hospital sector, and increased attention, strategies and debates are focused on their implementation. These technologies include robotics in the broadest sense: robots that sort, move and deliver biological samples or cut tissue samples, but also those used for cleaning, lifting and carrying and even eating. Other technologies are tele-medicine and monitoring systems to reduce the time the patients are hospitalised, AI and machine learning and image recognition (e.g. with PET and CET scans). For laboratory work, machines have taken over the sorting, archiving, cutting etc. (INT4). Moreover, technologies to turn patients over in bed, hence reducing heavy lifting, and electrical wheelchairs to move the patients, are important in the hospitals. Danish authorities are also overall positive about the use of AI in the health care sector, and it is used in hospitals for digital pathology, analysing pictures and scans (INT4). Another concrete example is the introduction of a common information-sharing app for all staff during the COVID-19 pandemic, when all workers were given information through the app, rather than emails (which some workers may not access at all times) (INT7).

In the digital health strategy, the use of new technologies such as AI is a central theme, and it is predicted that prevention, diagnosis and treatment will be more precise in the future due to AI and big data analysis (of large-scale research data and personal data) (Sundhedsdatastyrelsen, 2018: 46; Ministry of Finance and Ministry of Industry, Business and Financial Affairs, 2019). One aim is, therefore, to implement AI to enhance consistency of patient treatment, provide targeted diagnoses and ensure efficiency within the Danish health sector. As an example, the emergency

medical services in the Capital Region have developed an AI solution that can identify symptoms of heart failure by listening when a citizen calls the emergency number. In such cases, the healthcare staff receive alerts and recommendations on their screen so that they can react quicker (Ministry of Finance and Ministry of Industry, Business and Financial Affairs, 2019: 64).

To accommodate the increased digitalisation within the hospital sector, the Ministry of Health published a strategy for digital health from 2018-2022, with five focus areas: public involvement, knowledge, prevention, data security and digital propulsion (Sundhedsdatastyrelsen 2018: 18). The report emphasises the importance of developing transparent IT systems enabling citizens to be involved and access their health data. It takes the app-based 'Joint Medicincard' (Fælles Medicinkort) as a prime example of successful data transparency and public involvement (as information from all relevant health actors can be accessed by the citizen within the same online platform). Similar initiatives are currently being developed by a variety of actors, which engage in joint discussions and provide recommendations (including regional municipal representatives, local level actors and the Ministry of Health) (Sundhedsdatastyrelsen, 2018: 40). The health authorities underline the implementation of new technologies in the health care sector and highlight the importance of data-driven technologies for automatization, prediction, and decision-making-support to health professionals. As an example of the latter, a project has been initiated to implement the so-called CAVE register for medical allergies, to provide doctors with an overview of allergies and prevent medication errors (Sundhedsdatastyrelsen, 2018: 49-50). In this vein, a broad range of technologies are applied in the hospital sector.

2.3.3 Work organisation and tasks

Along with the increasing digitalisation have come growing demands for documenting the workflow, actions and decisions of hospital workers, and the challenges with this increased documentation demand and coordination took up a lot of space in FG1. While most actors acknowledge the need for data, to increase accountability, ensure better allocation of resources and improve the quality of health services, there are increasing complaints of overly bureaucratic practices and, to quote Hoeyer and Wadmann (2020: 433), even a 'yoke of Kafkaesque idiocy' among health care professionals. The critique reflects a shift experienced by health care workers from patient-centred work to data-centred work, due to what the authors call 'data intensification' (Hoeyer and Wadmann, 2020: 435). This was a recurrent theme in our interviews, for instance when one shop steward said: *'Sometimes, you get the feeling that you could leave your brain on the stairs before you go in [to see the patient]. We are of course still concerned with the patient, but sometimes there is a clash [between patient contact and increased bureaucratic practices]'* (INT7).

Yet, all focus group participants stated that it is not the technology in itself that is the problem, but rather that the amount of '*continuous changes*' was a core challenge (FG1), again illustrating that

digitalisation is as much about organisation and management as it is about the actual technologies. Furthermore, it was highlighted, as in the other focus groups, how breakdowns and malfunctions (such as updates, restarts or slow uploading) are a source of frustration, causing stress in an already busy everyday, with a participant saying, *'It is when the technology is not working, we notice how central it has become'*. Interviewees as well as focus group participants moreover emphasised the need for technical solutions to match and be tested by the end users. As an example, when lifts and similar helping-equipment cannot be made to work together, the respondents felt unable to benefit from it. Consequently, they stated, it would *'end up in the basement'*. This calls for inclusion of staff to determine what new digital tools to select and acquire, in dialogue with management (FG1).

The worry among professionals as to whether new technologies will reduce patient contact was also echoed by the workers and worker representatives (NT5; INT8; INT9; FG1) partly due to an increased need for documenting more aspects of the workflow. This was supported by evidence from the DGQS survey, where only 11% of the health workers found that digitalisation had led to a closer relationship with patients, while 44% disagreed or strongly disagreed with this (n=75). However, 56% stated that digitalisation has improved the *public service* the respondents give, with only 15% disagreeing (n=105). The focus group discussion blurs this sharp division between documentation and patient care, as participants highlighted, on the one hand, how immediate digital documentation requirements are a challenge that decrease patient contact and cause *'breaks in the conversation'*, while, on the other hand, stating that it *'made so much sense as a time saver'*. However, the increased documentation possibilities also have an inherent risk of over-documenting and repeating. This requires increased attention and self-reflexivity around what to document and when (INT7).

While technology might reduce some monotonous tasks, these may be replaced by other similarly monotonous tasks in relation to, for instance, technological maintenance (FG1). This was seen as problematic if workers are unable to see the new duties as opportunities and professional development. For instance, the medical laboratory technologist reported that some of them reportedly feel like *'blood sampling robots'*, since the actual robot cannot take blood samples (with the needle in the patient's arm), unlike most of the other monotonous tasks. This highlights the ambiguity between increased technological implementation alongside the need for human professionalism to check for potential technological errors or delays (FG1). This may result in a strong increase in time spent looking at a computer screen instead (INT4). Accordingly, there is a need to strike a balance between professional skills in cases where they are needed, and the introduction of technological solutions in cases where tasks lack variety and can be relieved by technological tools (INT4). The heterogeneity of the sector further requires inclusion of many workers at a multitude of levels when new technologies are implemented.

For some professionals, such as nurses, digitalisation touches upon almost all their daily tasks, 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 (FG1; INT8; INT9). While such technologies were seen as indispensable in everyday work practices, our interviewees articulated that it may be problematic if such technologies influence the intra-human and emotional aspects of the profession and result in reduced patient care. We found this aspect to be especially referred to by nurses, who expressed how their professional identity is intimately linked with caregiving and close relations with patients (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 they were too intrusive to their professional identity (INT9). This point was also expressed in the focus group by a participant: *'I think there is also an element of culture here... we keep hearing that 'this is about human lives!' – this is not just a factory. This lives on, and rightly! ... we don't dare trust the technology'*.

Nevertheless, the vice chair of the Nurses' Union also emphasised the importance of abandoning normative ideas about good practice of care as a non-technologically embedded phenomenon. She used a research project as an example, where patients from the remote island Ærø had been diagnosed with cancer over Facetime. Those patients had preferred an online consultation where they could sit comfortably in their home surrounded by their family rather than having to take the ferry, bus and train to the hospital, and thus possibly not be accompanied by relatives to the consultation (INT8). This experience was confirmed by participants in FG1. In this vein, reflexive practices are needed around when technologies are used and for what purposes, to avoid normative ideas around 'right' forms of care (INT8).

2.3.4 Working time

A general impression from the focus group and the interviews is that the hospital sector is busy with very high workloads, but that respondents generally found that technology was a major time saver in everyday working practices. However, this overall positive view did not ignore the pros and cons: On the positive side, professionals can 'treat a higher number of patients than previously' and have a more efficient everyday routine. On the other hand, technology placed increased pressure on health care professionals and sometimes compromised breaks and 'small-talk' with colleagues (which was emphasised as important in order to hand over correct information). One participant said: *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 phase. 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.

The ambiguous relationship between increased and decreased task pressure can also be seen in the DGQS survey: 39% of hospital workers agreed that digitalisation has increased their work pace, while 34% disagreed (n=90). There were the same mixed results on repetitive tasks, where in the DGQS survey only 34% agreed that digitalisation had reduced the time needed for repetitive tasks, while 50% disagreed (potentially indicating an increase in repetitive tasks, n=88).

As a direct consequence of technological development, work that used to be restricted to the hours of nine to five can now be done over a longer time span. As an example, certain samples can be taken and analysed by intelligent technology during the night-time: more employees therefore need to be present to monitor and ensure quality, leading to more working hours outside the traditional nine-to-five with heavier workloads than previously (INT4).

Importantly, our interviews suggested that not all professions within the hospital sector were equally affected by the introduction of electronic systems. While the Medical Laboratory workers had mixed experiences with the implementation of new digital tools (for instance, increased workloads during the night-time), a shop steward interviewed representing care and service assistants highlighted the positive impact of digitalisation as a time-saver (INT7). In this case, new technology made it possible, for instance, to wash entire sets of bedding in large washing machines rather than washing them by hand, hence releasing time for more important tasks such as patient care (INT7).

2.3.5 Health and safety and outcomes for workers

New technology in the health and hospital sector have helped reduce heavy lifting and recurring work postures, patient-lifting and cleaning tasks, which of course is mostly relevant for certain groups of workers engaged in caring and cleaning for the patients, improving overall OHS in the industry (FG1; INT7; INT8; INT9). Another example of improved OHS was given by the medical laboratory technologist (in Danish bio-analytics): machines and robots have reduced many of the repeated tasks that often resulted in strain on fingers and arms in this profession, since most of this was related to the process of taking samples and conducting analyses (INT4). While digitalisation may result in better working conditions and more healthy work, as suggested by several interviewees, it may also just shift the burdens to new tasks. For example, the union representative for medical laboratory technologists assessed the occupational health and safety to be roughly at the same level, with some improvements, yet with new demanding and repetitive tasks (INT4). Furthermore, while lifts and similar digital assistance tools are implemented and in use at the hospitals, they may still require more workers to operate them, for instance when patients are severely obese (FG1; INT9). Finally, stress arising from time pressure in the hospitals

was mentioned several times during the focus group and the interviews. Several focus group participants mentioned so-called 'capacity screens' which made it possible to see the number of patients in a ward, but neither the conditions of the patients nor the competences of staff. While this was overall viewed as positive in terms of capacity, it could potentially simultaneously increase the work pace, workload and reduce communication, potentially resulting in errors and increased psychological constraints on workers, including stress (FG1). The changes in health and safety were however, somewhat contradictorily, not reflected in the DGQS survey: most workers had not noticed any changes (positive or negative) in their physical (67%) or in their mental (72%) health (n=79).

2.3.6 Skills and learning

A recent report highlights the need for constant updating and developing of new skills for all groups of employees in the health care sector, so that the workers feel confident about the technological changes and can develop their skills alongside the technological development. The researchers find a consensus among the actors in the sector that skill updating is already taking place, but some interviewees ask for a more systematic skill upgrading (KPMG and VIVE, 2022). In the DGQS survey 56% of the hospital workers had received formal training, while 30% had not (n=81). Therefore, there is also a need for additional training in digital tools and new technology, particularly in the vocational schools, where many of the care staff including the nurses are educated (INT2). Furthermore, 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 (INT5; INT9). As one interviewed shop steward said: '*It is important not to create an A and a B team, digital-wise*' (INT9). This fosters a need for ongoing skills upgrading and equal opportunities to develop digital competences, which again requires time and practical solutions (INT8; INT9). One FG1 participant had been helped by so-called '*resource persons*' whose tasks were to implement new technological changes and educate co-workers. However, a recurrent issue was management's failure to allocate the time and resources needed for implementation. 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 needed for the specific technology. Both spoke of the need to teach '*technology understanding*', the ability to understand digitalisation and new technology in the relevant context (FG1; INT8). One concrete example of increased attention to digitalisation is a so-called digi-tech apprenticeship for health care assistants, where extra attention was devoted to some chosen students' digital skills. A shop steward we interviewed, representing health and service assistants in the hospitals, stated that they feel their members are often forgotten and left out of the additional training and skills upgrading (INT5).

A digital onboarding sequence for new health and service assistants has been implemented in certain hospitals, alongside a mentorship agreement with a more experienced colleague (INT7). 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 (INT7). Another example is e-learning (for instance fire safety courses) that have been introduced for more flexibility at one hospital unit, which had also set up an educational department specifically to develop e-learning modules. Nevertheless, it is still important, our interviewees emphasised, to maintain some physical courses, such as cardiac arrest training (INT9). For medical laboratory technologists, in-service educational training is not an integral part of a formalised system, as is the case with nurses. Employers find this problematic, as the medical laboratory technologists engage very much with digital technologies, fostering a need for technological development (INT4). However, for instance the Union for Medical Laboratory Technologists has developed its own union-run courses for additional training, which the hospitals and other employers then buy in for their members. Occasionally some of these courses are on various aspects of technology and digitalisation.

2.3.7 Reconciling work and personal life

Focus group participants and interviewees identified an increased need to be online after work so they can respond to e-mails and help colleagues out (for instance covering shifts during illness and the like) (FG1; INT7; INT8). Yet, 60% of the health care workers who responded to the DGQS survey stated that there was no pressure or no need to connect outside of business hours, while 16% stated there was pressure (n=88, multiple answers). The focus group provided some further insights into why the work-life balance could be challenging, by emphasising how the job is *'saving human lives'*. One participant said: *'we are talking about humans. We cannot just leave at 11.30 if a family is sitting there and the child is not breathing'*. 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. Further, the blurred lines between professional and personal life, such as work-related Facebook-groups, makes this even more difficult, as messages about shifts, illness and the like are sometimes conveyed on private platforms (INT8). As a counterreaction, this fosters an increased need to disconnect to better reconcile work and personal life, but as one unionist argued, it is also about *'daring to disconnect'* (INT8). In *'the good old days'* it was possible not to be home to pick up the phone if work called, while today, it is impossible not to be disturbed, as everyone is constantly online and carries their phone with them – which arguably makes it hard not to be disturbed (INT8). Moreover, technology has changed the everyday routines for some professionals - particularly analysts, as tasks previously restricted to daytime can be conducted at night. This may make achieving a good work-life balance difficult for instance for parents and single parents, as there are more evening and night shifts (INT4).

One joint shop steward was debating implementation of *'the right to disconnect'* in the local cooperation committee and argued against the expectation that certain professions should be online to respond to e-mails every day (for instance the social health care assistants). Rather, this

interviewee emphasised that important information should be given face-to-face to avoid the stress of being constantly online, and called for guidelines that explicitly stated how often e-mails were expected to be checked. That could, for instance, be once a week (INT7). FG1 participants were not entirely in favour of set-in-stone rights (such as the right to disconnect). Rather, they said that the issue of accessibility was a matter of personal boundary setting rather than something for clear-cut rules and regulation. In the DGQS survey, 19% replied that they logged in in their off-time due to personal behavioural choice.

2.3.8 Career prospects and employment security

Technological development and digitalisation mean that most professions in the hospitals are being constantly reshaped, as one participant (a radiographer) explained: 'The professionalism has been moved. Now, we need to describe more, we are assisting the radiologists, helping them out...'. Most workers felt this was a welcome development as it brought new challenges and required new skills, but some were a bit more cautious about the changes, basically worrying about their professional identity (FG1). For certain professionals in the hospital sector, a processual workflow approach (where tasks overlap with co-workers' professions) was emphasised, to ensure variety and future work prospects. Management's willingness to allocate time and resources to such changes was argued to be key to achieving better results from digitalisation (FG1; INT8; INT9).

2.3.9 Workers' rights

As in other sectors, there are concerns about the increasing surveillance and control of workers following the increasing digitalisation. A logistics IT system that can log workers' activities has recently been implemented in certain hospitals and has sparked debates around the use of personal data and the degree of surveillance of workers (INT7; FG1). While overall guidelines are in place on a regional level, it is up to the individual hospitals to implement them in practice. One shop steward interviewed had specifically asked management to discuss a more transparent use of the system to ensure workers' rights and mentioned a case where a hospital porter had been dismissed based on the tracking in the system (INT7). On the other hand, FG1 participants found GPS-tracking positive as it became possible for the rest of the staff to contact the closest service assistant directly, rather than having to call around randomly for help. One participant further said that the service assistants in her hospital felt that tasks were assigned more equally to everyone following the introduction of the GPS-tracking system. This has generated less mistrust (as the situation had become more visible to everyone who takes care of the tasks) and fostered a better working environment. This suggests that ethical dilemmas around tracking are not one-sided but acceptance depends on the incentives provided by the manager and the ways the systems are used. When managers use these systems to put staff under surveillance, the FG1 participants agreed it was abuse. They argued that good practices, on the contrary, made such systems meaningful. However, it is worth noting that none of the workers in FG1 were themselves under

GPS surveillance (but, rather, service assistants in the hospitals). A different example was given in an interview. In this case, a patient had died due to over-medication (which potentially was given intentionally), whereupon video cameras had been set up in the medicine room. In this situation, the nurses had welcomed the increased surveillance as this could remove suspicion about mishandling of medication, and hence, provide some sort of personal security for those who were mistakenly under suspicion (INT8). All examples suggest an increased need for transparency and information and consultation around when surveillance can be introduced and how, as well as how data can be accessed and used (INT7; INT8).

2.3.10 Conclusions on the sector

The findings show that respondents in the hospital sector are positive (more so than in the public administration and the electricity supply sectors) towards digitalisation and find that digitalisation has improved overall productivity in the sector and helps meet the high requirements of busy daily work. The effect on job quality is mixed, as both positive and negative effects were reported by the respondents, who furthermore tend to have varying views on this. Nevertheless, most respondents welcomed technological development, which helps to enhance the professions and skills required. Moreover, digitalisation has in many cases also improved the work environment, mainly the physical work environment, for instance by reducing heavy lifting, repetitive tasks and strenuous postures. The impact on the mental work environment is less clear, as digitalisation produces many benefits, but also an increased risk of stressful working conditions. So, digitalisation should be seen as a double-edged sword, as it requires careful consideration and reflexive practices on implementation and application and on the interaction with professional standards in the sector. Worries were often repeated, for example, about the autonomy of care professionals and about professional standards, for instance in balancing care and human-centred ethics with the demands of digitalisation.

Section 2.4 Overall sectoral cross-cutting conclusions

While the process of digitalisation, and in particular the growth of ICT systems, is seen as inevitable by workers in the public sectors scrutinised in this study, they in general perceive digitalisation as positive. The workers reported that digitalisation has overall improved the quality of public services, and in many cases increased productivity. Although the overall picture is positive it is not rosy: rather, it is often best described as ambiguous, as many aspects of digitalisation can have both positive and negative effects, particularly on job quality. The main problems raised relate to work organisation, where digitalisation in some cases has generated more time-consuming administration, with some workers describing high demands for documentation that felt unnecessary. Other groups of workers reported that digitalisation has led to more rigid work systems, and hence reduced workers' autonomy, which ultimately may reduce job quality. The problematic aspects highlighted by the workers (besides when the technology is not working, which was a constant source of frustration for them), mainly concerned the

implementation and managing of digitalisation. So, digitalisation projects whose benefits and sometimes even purpose were unclear to workers were seen as problematic, as well as digitalisation that removes worker autonomy (mainly reported in the electricity sector, but also in the two other sectors). This points to the important role of managing and organising digitalisation, for instance by allocating time and resources to implementing new technologies; this makes it possible to mitigate these problems, but also to include the workers in the processes so that the solutions are adapted to their work life and make sense to them. Failing this, there is a serious risk that otherwise well-designed projects and technology could be unsuccessful.

An important finding from this study is that the impact of digitalisation on job quality is subjective and that the impact varies across professions, jobs and tasks as well as depending on personal preferences. Accordingly, what for some workers is a welcome development is seen by others as highly problematic and challenging. It is therefore important to assess the impact in different contexts. While it is difficult to highlight any patterns in who perceives digitalisation as positive and negative, there is a tendency for older workers to be more insecure in adapting to the new technologies.

Digitalisation has in general had a positive effect on occupational health and safety, yet mainly on the physical work environment, where it has removed heavy lifting, repetitive tasks and strenuous work postures for some workers, although not resolving all issues. The effect on the mental and psychosocial work environment was more disputed. While digitalisation has removed tasks, it has also created new ones, with many related to administration and documentation, and for many workers this has reportedly resulted in an increased work pace and/or workload. So, digitalisation may lead to stress and lower autonomy for some workers. Moreover, the ability to be online 24 hours a day and receive work-related information was stressful for some workers, whereas others enjoyed the flexibility it creates.

Digitalisation has, in some sectors such as logistics and private services, been associated with increased monitoring of workers and the labour process. While there were numerous technologies in place that could monitor the workers, there were only very few concerns about this among the workers in this study. The implementation of monitoring technologies was in general designed for practical purposes such as route and task planning, rather than for generic surveillance of workers and labour processes. Many workers reported that public sector management is very aware that surveillance and monitoring is a 'red flag' for the workers. So here the three public sectors in Denmark may deviate from findings in, for instance, the logistics sector. This may also reflect the fact that workers in the studied sectors remain highly organised and are in a strong position to oppose close monitoring of their labour process. Another concern often raised in the social sciences - that digitalisation could result in fewer (and worse) jobs - was not encountered among any of the workers (or the union representatives) in the study. Rather, they felt that digitalisation

was needed to resolve future tasks in the public sector, but that this also requires more formal training and updating of existing skills. Both workers and unions stressed that skills upgrading should be improved and made more formal and systematic to fully achieve the potential gains of digitalisation. For most workers, the changing tasks and work context were welcome, as they presented them with new opportunities and new tasks in their working life. They also acknowledged that jobs and hence working lives are dynamic, and that the skills they acquired when they first started working now needed updating.

SECTION 3. DIGITALISATION AND SOCIAL DIALOGUE

Section 3.1 Introduction: contextualizing the national system of industrial relations

Social dialogue is a term mainly coined at the European level and is in general not applied in the Danish industrial relations (IR) system. Rather, scholars and labour market representatives often refer to the 'Danish model of industrial relations' (see for instance Andersen et al., 2014; Høgedahl, 2020). This is a more encompassing term, which includes both the formal collective bargaining system, where wages and working conditions are negotiated and labour market disputes are settled, and the more informal daily cooperation at all levels of the industrial relations system. The Danish labour market model is typically referred to as consensual in the sense that cooperation and joint gains are generally very high on the agenda (Hvid and Falkum, 2018). Nevertheless, the Danish IR model is also a conflict model, based on a relatively equal distribution of power resources between the unions and employers, but with industrial conflicts being highly regulated and institutionalised.

The Danish IR model is generally described as voluntaristic, with strong labour market partners, limited direct impact of legislation, high unionisation rates (67% in 2020) and hence strong unions, rather high employers' association membership and high collective bargaining coverage (>80%). Moreover, there is a widespread presence of unions and shop stewards at the workplace level, with union representation typically at the local level. There is a long tradition of cooperation and employee involvement, which is formalised and remains functional, very much so in the public sector. The Danish collective bargaining system has been described as 'centralised decentralisation' (Due and Madsen 2006), with substantial scope for making local agreements, within the framework set out by the sectoral negotiations. The strong local partners ensure that the local negotiations actually reflect the preferences of social partners (Ilsøe, 2012).

While the Danish industrial relations model is characterised by voluntaristic regulation, the state also plays an active role in facilitating and legitimising the enduring self-regulation by the unions and employers' associations. One policy issue that falls somewhat between the voluntaristic and state-led regulation is occupational health and safety and the work environment, which is regulated by law in order to ensure that all workers are covered, but where the partners still play a prominent role, for instance in implementing the regulation. The social partners are typically involved in most of the policy development through the bipartite Work Environment Council (Arbejdsmiljørådet) (see more in section 3.1.2. below).

3.1.1 Public sector IR-model

The Danish industrial relations model was developed in the private sector, with the 1899 'September agreement' forming much of the basis for the collective bargaining system. It was not until after 1969 that collective bargaining spread to the public sector, and the public sector as an

employer became obliged to negotiate with the trade unions (Høgedahl, 2019). As the collective bargaining system is based on the private sector, there are challenges associated with the way it works in the public sector: here public employers have a double role as employers (responsible for the budget) and at the same time as legislators, since the state (and hence public employers) can ultimately end industrial conflicts through state/government intervention. They have done this in recent public sector conflicts, in line with the Danish tradition of governmental intervention. This dilemma moreover reduces the effectiveness of strikes. The private sector mechanisms cannot be transferred directly to the public sector, and strikes are not as harmful to employers, which basically save on wages, while the costs mainly are borne by citizens (through lower/no service) rather than the public employer (Høgedahl and Ibsen, 2017). This has led to discussion over whether the public sector collective bargaining system needs to be revised to bring it up to date, as it could be argued that the basic power equilibrium characteristic of the Danish industrial relations system is out of sync in the public sector (Høgedahl, 2019). This is particularly the case when the public employers use offensive industrial relations strategies such as lock-outs of public workers, as they did in a 2013 industrial conflict with the state school teachers (Høgedahl and Ibsen, 2017). Public sector conflicts, to a greater degree than private sector conflicts, become a struggle for public sympathy, hence making political intervention less popular among the voters. Nevertheless, the public sector has seen increasing levels of industrial conflict, and unionism is growing among public sector workers such as teachers and nurses. Since 1998, no larger industrial conflicts have taken place in the private sector, whereas the public sector has had two major conflicts and accounted for 80% of the working days lost due to strikes between 2000-2019 (Knudsen et al., 2023: 22).

Collective bargaining in the public sector takes place at three levels: state, regional (mainly covering hospitals), and municipal. The main unions are organised into two confederations: FH (the Danish Trade Union Confederation, mainly manual and skilled workers) and AC (the Danish Confederation of Professional Associations, mainly workers with an academic education). FH and AC have established joint bargaining bodies in the public sector: the Central Bargaining Unit (CFU, Centralorganisationernes Fællesudvalg, the Central Organisation's bargaining unit) for state government, and the United Bargaining Body (Forhandlingsfællesskabet) for the regions and municipalities (Knudsen et al., 2023: 11). They negotiate collective agreements directly with the Ministry of Finance (for the state), Local Government Denmark (Kommunernes Landsforening, KL) for the municipalities and Danish Regions (Dansk Regioner), for the regional organisations, which again are mainly the hospitals. On the three levels (state, region, municipalities), collective agreements by the bargaining bodies (cartels) set the overall framework, particularly for wage increases: collective bargaining then takes place with the individual trade unions over issues directly linked to specific occupations. Additionally, there may also be local negotiations, for instance at the institutional level, between the local union branch or union shop steward and the public institutions, on issues such as training and senior employment policies (Mailand and Larsen,

2020). While several issues such as working time etc. can be agreed locally, there are no options for wage derogations: the sectorally agreed wages act as the main wage mechanism. While there have been some initiatives to individualise wages, with room for (smaller) wage differentiation in the public sector, this approach is not very influential and widespread (Knudsen et al., 2023).

3.1.2 Cooperation and work environment (OHS) in the public sector

In Denmark much of the cooperation between the social partners takes place locally, mainly at company or workplace level, and in the public sector the formal system of cooperation (SU/MED-system) remains prominent and works well, but with local variations. Therefore, much of the discussion on local and regional adaptation has taken place at the decentralised level, where there is a long tradition of employee involvement and discussions of job design (Hasle and Sørensen, 2013; Hvid and Falkum, 2018). Alongside the system of cooperation, there is a state-mandated corporative system on occupational health and safety (OHS) and the work environment (in Danish *arbejdsmiljø*, a wider category than just OHS, since it also includes the psychosocial work environment and safety, and hence also elements of work organisation). All companies are obliged to have structures to handle issues broadly related to OHS, companies with more than nine employees must have an OHS worker representative, and companies with more than 34 employees must set up an OHS committee with worker representatives and management present. These OHS (AM) organisations also have a prominent role in discussions on digitalisation between workers and management, and thus also in the practical implementation of digitalisation and the consequences thereof. It is for instance mandatory to discuss risk assessment; this is important for new technologies that may reduce risks but at the same time introduce new risks; there is also a requirement to check that workers are properly instructed and have the necessary skills, which obviously is very important for new technology. In practice there is typically very close cooperation between the cooperation committee (MED/SU) and the OHS committee, and active union members tend to be elected as worker representatives in both.

At the national level, five cooperation committees for five broad economic sectors discuss the work environment and OHS, and there is also a national Working Environment Council (*Arbejdsmiljørådet*), which is a strong bipartite corporative council (one of the remaining prime examples of Danish corporatism (Refslund and Lind, 2021)). The sectoral councils also play an important role when it comes to digitalisation. They discuss the technologies, implementation and the consequences thereof; one of these councils, the Council for Welfare and Public Administration (*BrancheFællesskab for Arbejdsmiljø for Velfærd og Offentlig administration*) has for instance published several guidelines and reports on digitalisation and technological adjustment in the public sector. These include the reports 'Digitalisation and good work: On worker involvement and work environment' (BFA, 2019) and 'Remember the work environment, when you apply new technology' (BFA, 2021), which provides practical guidance on how to involve the workers as well as the OHS representatives and the OHS organisation when new welfare technology is introduced.

Section 3.2 Trade unions' position on digitalisation at national level

Generally, both historically and nowadays, Danish trade unions have taken a positive stance on digitalisation and on technological transformations in the labour market (INT1; INT2). The unions have from quite early on been attentive to technological development and tried to address the challenges associated with it. Nevertheless, it is difficult to foresee such development, so some new technologies and their consequences have to be discussed on the go, so to speak (INT2). Consequently, Danish unions take a positive attitude towards technological change and in general perceive it to be important for maintaining high levels of competitiveness in the global economy and to achieve cost reductions and handle increasing workloads, for instance in public and welfare services (see also Alsos and Dølvik, 2021).

Already in 1986, the Confederation of Danish Employers (DA) and the main union confederation (LO, the Danish Trade Union Confederation, nowadays FH) reached an agreement on technological development (which later became part of the general 'Cooperation agreement' between the partners). The agreement compelled the employers to discuss the consequences of new technologies with local union representatives (Kamp et al., 2007). There have not been many disputes in the IR system at the national level on how to deal with such technologies, but there have been various discussions over the national implications, and on how different groups of workers may be affected differently. A main finding from The Future of Work in the Nordic countries project was that both management and workers see the Nordic industrial relations model not as a hindrance but rather an advantage when Nordic companies have to implement technology associated with the 'fourth industrial revolution'. Moreover, it suggests that management and worker representatives see close cooperation and mutual respect as a prerequisite for successful adaptation to increased digitalisation and to achieve its potential gains (Rolandsson and Dølvik, 2021).

Thus, the union movement seeks to have a constructive approach, while at the same time also taking the potential challenges, pitfalls and worsening of working conditions seriously. In particular, this includes assessing and discussing the potential implications of digitalisation to avoid an overly optimistic view of digital elements (INT2). Here, the broad influence of the Danish union movement comes into play, and, according to the trade unionist interviewed, the unions should try to keep a broad perspective, focusing on what is best for 'society at large', and seeking to achieve equality in digital development, not only benefits for the members (INT2). This also includes contributing as a legitimate actor to the public debate on digitalisation of the labour market, as well as in a broader societal perspective. Hence, the unions seek to act as a responsible actor with an enduring legacy by contributing to discussions on broader societal developments. Additionally, the union movement also see it as their task to inform their members about digitalisation and its potential implications for their working life and working conditions (INT2).

Overall, this indicates that digitalisation as such is not causing serious disagreement between trade unions and employers in Denmark. However, different perspectives and policy positions can be found between unions and employers, as well as across different trade unions. Some technological developments may affect certain groups of workers more strongly than others and may result in discussions and disagreements in the union movement as a whole. Nevertheless, the trade unions and employers have a positive stance and seek to cooperate regarding new technology, reflecting the consensual and cooperative approach characteristic of the 'Danish model' (Hasle and Sørensen, 2013; Hvid and Falkum, 2018). While the unions may emphasize different aspects and risks of digitalisation, there is a broad consensus across the unions that digitalisation in general is a positive thing.

Section 3.3 Electricity production and distribution sector

3.3.1 Collective bargaining in the sector

A variety of workers from different professions are employed in the electricity production and distribution sector, including office workers, academics, craftsmen and electricians. To encompass the diversity within the sector, collective bargaining is divided into different agreements: for electricians and other craftsmen these will mainly be either worker-specific agreements or a more general industry collective agreement (INT6). While the former type of agreement has a specific focus on end-user service, the latter embraces different professions including carpenters, factory workers and electricians. Regardless of the agreements under which workers are entitled, the shop stewards typically bargain locally and can therefore potentially transfer aspects from one collective agreement to another, in order to ensure consistency and context-specific coverage of work tasks (INT6). The electricians have a broad range of local agreements (amendments to the collective agreements), which regulate, for instance, working time etc. (INT6). Previously, many distribution companies were following the municipalities' collective agreements, but in recent years an increasing share have moved to the private industry collective bargaining system. However, this does not make a substantial difference for the workers. Overall, the collective bargaining rate remains very high (de facto close to 100%, as in the public sector in general).

3.3.2 Role and importance given to digitalisation in the national industry-wide agreements

Given the fast pace of the work in the sector, and especially as digital tools have increasingly been introduced in the form of apps, work pressure and practical solutions are currently being discussed at collective bargaining rounds. The Danish Trade Union Confederation (INT6) speaks for those who are employed under an electrician-specific collective agreement, the employers' association TEKNIQ represents the employers, while the Confederation of Danish Industry represents those employed under the more general industrial collective agreement. Along with the Danish Working Environment Authority, the social partners have had tripartite discussions on the work

environment. One of the main topics for these discussions is the effects of the working environment on psychological wellbeing, initiated by a 2020 update of the legislation on the psycho-social work environment. On the basis of this agreement, practical solutions and guidelines explaining the legal requirements and offering suggestions have been developed by the Danish Employers' Confederation and the Electricians' Union (while the Danish Trade Union Confederation and the Danish Employers' Association are negotiating the agreements) (INT6).

3.3.3 Trade union approaches and priorities for the collective bargaining agenda on digitalisation

The unions take digital and technological development seriously and seek to address the challenges it causes, for instance in terms of work organisation (see above). However, it is mainly addressed in various cooperative fora, and at the workplace level (cooperation committees and daily interactions) rather than in collective bargaining. The shop steward also said; 'We don't discuss digital and technological development; when we negotiate wages, we don't want that to interfere with the potential wage increases' (INT10).

3.3.4 Conclusions on the sector

There is good cooperation between the employers and workers (through the unions) in the electricity production and distribution sector, also on digitalisation. This topic is addressed both at the national level in bi-partite (employers and unions) and tripartite bodies (together with the State in the Working Environment committee), as well as locally through daily contact between shop stewards and management and more formally through the cooperation committees.

Section 3.4 Public administration sector

3.4.1 Collective bargaining in the sector

The Danish public sector ⁽¹⁷⁾ has a de facto 100% collective bargaining coverage, of all workers (Knudsen et al., 2023); however, a few workers are covered by individual agreements (mainly top managers) and a few by legislation (Mailand and Larsen, 2020). The collective agreements are negotiated at three levels: the state, the regions (mainly covering hospitals), and the municipal level, covering local public workers. The main collective agreements covering the public administration are concluded either between the unions and the Ministry of Finance (for the state-level public administration) or by Local Government Denmark (Kommunernes Landsforening, KL) for municipal workers. A smaller share of workers, for instance in the hospitals, are covered by regional agreements. Mailand and Larsen (2020: 75) state that the rate of unionisation in the public administration was around 89% in 2011. Historically, public administration employees were civil servants; they were hence not allowed to strike and had no collective organisation or

17. See section 3.1.1 above for further details on the IR-system in the public sector.

collective agreements until the end of the 1960s. As a trade-off for this, the civil servants had good wages and working conditions and were more or less guaranteed life-employment in the public sector. There is still a very minor share of employees who are working under the Civil servant act, but since the 1970s, the public workforce has become workers in the traditional meaning of the word, rather than civil servants, starting for instance with postal workers (Knudsen et al., 2023). So, while early trade unionism in Denmark was only a private sector phenomenon (Knudsen, 2011) it has increasingly become a public sector phenomenon as well, particularly in recent decades. As the prestige of public work has been eroded and cost and efficiency pressures have increased, public sector workers have become much more interested in unionism and more willing to engage in industrial conflict.

3.4.2 Role and importance given to digitalisation in the national industry-wide agreements

The unionists interviewed stressed that the collective agreements in the sector and hence industry-wide are generally not used to address issues related directly to digitalisation. However, some issues have been addressed (but more indirectly), such as the 'Competence Funds' mentioned in section 2.2.6, which enabled workers to apply for funds for upgrading their digital skills (13% or so of the funds were earmarked for digitalisation issues). In other words, digitalisation remains a challenge that is mainly debated between the social partners, mainly at local level, but also occasionally at sector level. However, it is not integrated in the collective bargaining system as such (INT3).

3.4.3 Trade union approaches and priorities for the collective bargaining agenda on digitalisation

Again, the unions stressed that digitalisation should be discussed within the cooperation system, rather than directly through collective bargaining.

3.4.4 Conclusions on the sector

Overall, the public administration unions, and particularly, for the purposes of this project, HK, have a positive view on digitalisation, but are still seeking to examine critically the potentially negative aspects for their members. These challenges are often associated with local implementation, and for this reason the impacts of digitalisation on union members are something to be discussed and assessed as part of the local formalised cooperation between employers and unions.

Section 3.5 Hospital sector

3.5.1 Collective bargaining in the sector

Collective agreements in the hospitals are concluded between Danish Regions (Dansk Regioner, who manage the public hospitals) and the United Bargaining Body (Forhandlingsfællesskabet) on behalf of all unions in the sector, in bi- or triannual collective bargaining (Mailand and Larsen, 2020). These collective agreements set the framework (mainly for wage levels and development) for further negotiations between the individual unions. However, the overall wage framework is settled in higher-level negotiations, which means that the individual union cannot increase their own wage share through direct negotiations. This system was originally developed to increase the negotiating strength of the unions, but recently it has led to some frustration, as the nurses' union (DSR, Danish Nurses' Union) in particular have tried to increase wages for their members, arguing that nurses are paid too little and have not been sufficiently recognised (also financially) for their efforts during the COVID-19 crisis. As the overall wage sum is negotiated for the whole sector, an increase for nurses would (at least in the current model) imply that other groups of workers (like care workers and health assistants) would get less. This has resulted in some direct confrontations between unions, with the nurses being accused of not showing solidarity. It remains to be seen whether the longstanding good relations between the public sector unions will be challenged by these developments.

Generally, the individual unions then negotiate local agreements setting local standards. Since there are collective agreements for basically all the different occupations in the hospitals, the overall picture is quite complex, and may also be challenging for management, since some workers may have one agreement on for instance working time, while other workers have a different one. Overall, the collective bargaining coverage in public hospitals in Denmark is in practice 100% (Mailand and Larsen, 2020: 79). There have been industrial conflicts in the health care and hospital sector involving particularly nurses, but also health personnel. A general tendency for white-collar and public workers to be more active and militant in industrial relations can be seen in recent decades (Knudsen et al., 2023). In combination with the problems in public sector industrial relations previously mentioned, this has made public sector hospitals, and particularly the nurses, more prone to industrial conflict, which seems to be largely resolved at the time of writing. It will be surprising, however, if the next rounds of collective bargaining do not stir up confrontations and industrial unrest. Fractions within the nurses' union (DSR) have called for a more aggressive, and basically wild-cat approach, including joint and planned job terminations to stress the management and ultimately increase wages.

3.5.2 Role and importance given to digitalisation in the national industry-wide agreements

The national collective agreements do not directly deal with digitalisation, and the local agreements in general tend not to include issues related to digitalisation (INT8). But a more general co-agreement from 1986 between FH (the Danish Trade Union Confederation) and the Confederation of Danish Employers (DA) grapples with the issue. Under this agreement, new technology, when implemented, needs to be assessed for potential issues and outcomes such as working conditions. This requires the management and the shop stewards to enter into dialogue when new technology needs to be implemented.

3.5.3 Trade union approaches and priorities for the collective bargaining agenda on digitalisation

While digitalisation did not feature prominently in the national collective agreements, a few interviews mentioned local negotiations on related issues, for instance a local policy paper agreed between the unions and management in one of the hospital units (INT7). The interviewees in the hospital sector in general highlighted that digitalisation was handled in the local cooperation committees, rather than through the collective bargaining system. However, there may be variations in how far-reaching the cooperation actually is, since it depends also on the local actors and the local context. As described, this is a highly institutionalised and formalised setting for the consultation of workers and for cooperation between workers and management. The local cooperation councils (samarbejdsudvalg/medarbejderudvalg) have a prominent role in relation to digitalisation, since they serve as a local forum for discussing implementation, advantages, challenges, and policies in the local context.

3.5.4 Conclusions on the sector

Overall, the union representatives interviewed in the hospital sector were quite happy and positive about the impact of digitalisation and the opportunities to influence it, yet they would like to be even more included. Often when workers did not feel sufficiently included it was typically because things had been rushed. They generally stated that it is important to acknowledge that digitalisation requires time and resources, and that there is no inherent productivity gain (although there may sometimes be).

Section 3.6 Overall cross-cutting sectoral conclusions

In sum, there is a consensus in the Danish IR system (both in the private and the public sector) that digitalisation is a positive development, yet with some possible negative aspects, which should be addressed and handled. Only very few aspects of digitalisation are directly addressed in the nation-wide sector collective bargaining, but policy and national level implications and developments are discussed among the social partners at national level – for instance through the various corporative and bilateral structures described above. Most elements of digitalisation are

handled in local or union-specific negotiations or at the workplace level, if the social partners feel this is relevant. For instance, unions and shop stewards can bring up issues they feel are important for discussion with the local management and the cooperation committees in the public sector.

SECTION 4. RECOMMENDATIONS TO NATIONAL AND EU STAKEHOLDERS

Based on the research conducted for the project, we now make a range of recommendations to national and European stakeholders. The recommendations are a mix ranging from more general, policy-oriented suggestions to more practical recommendations concerning daily work processes. However, there are three overall, main components in the recommendations that we think should be taken into consideration. The **first** is that for digitalisation to achieve its full potential, the organisation and management of the processes of digitalisation and implementation of technologies are vital. The vast majority of problems reported by the workers in this study related to malfunctioning systems, a lack of coordination and cooperation between systems and technologies, insufficient time and resources to implement the digital technologies, digitalisation not adapted to the workers' job and tasks, and sometimes seemingly without a clear purpose for workers, along with digital overburdening through excessive projects and what feels like excessive documentation and handling of digitalisation. **Second** there is a general need for involvement of the relevant actors – workers, end users, citizens and managers – if digitalisation processes are to be effective and successful. This echoes the literature, which also highlights the involvement of a variety of actors such as educational institutions, unions, employers' associations and employers as key to successful digital policy implementation (Nielsen et al., 2021b). **Third**, and finally, we emphasise the need for continual skills development for the *entire* workforce. It is important to stress the inclusion of the whole workforce, ranging from support workers (such as service assistants in hospitals), care workers, to craftspeople (such as electricians and technicians in the electricity distribution sector), to administrative workers and management. The skill upgrading should include both generic digitalisation skills such as 'understanding technology', basic digital skills and digital communication, and training in specific technologies and systems etc. The skills upgrading is important in the sectors, workplace, educational system and in society as a whole. Below we have some more specific recommendations.

Section 4.1 Recommendations to national stakeholders

- Allocate the needed time and administrative resources to fully implement digital changes:
 - Make sure the purpose and benefit of digitalisation is clear to workers.
 - It is typically not the technology that is problematic but the implementation and organisation, so focus on these processes.
- Design for worker involvement in the development, selection and implementation of new technologies, which can improve efficiency.
- Adapt the technology and digital tools to end users:
 - Design the technologies for the end user, for instance design the interfaces so they can work for the different groups of workers.

- Emphasise policies and initiatives that provide solutions across systems, professions and localities to improve cross-sectional coordination and communication, which is often problematic.
- Prioritise skills upgrading both specifically aimed at the task or profession and more general upgrading of digital skills for all workers:
 - Increased formal skills training and upgrading.
 - Utilise the different venues for skills upgrading.
- Improve the decision-makers' understanding of the impact of technology at multiple levels for everyday practitioners, in order to implement successful digital tools. This can for instance be through onsite visiting, joint meetings and workshops.

Section 4.2 Recommendations to European stakeholders

- Prioritise skills upgrading, both specifically aimed at the task or profession and more general upgrading of digital skills for all workers:
 - Increase formal skills training and upgrading.
 - Utilise the different venues for skills upgrading.
- Set clear priorities on where digitalisation can be most successful and efficient and prioritise thorough and high-quality implementation in these policy areas and of these technologies, rather than broad implementation of various technologies across multiple areas.
- Prioritise training in digital management to ensure better implementation of digital technology.
- Create a framework for policies on monitoring workers and labour processes that ensure decent and humane monitoring of work, rather than excessive monitoring that results in unhealthy work and poor working conditions.
- Identify further the potential problems associated with digitalisation in terms of job quality and occupational health and safety and address these actively in policies.

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Annex 1. List of interviews

ID	Gender	Age	Institution*	Sectors**	Occupational Group ***	Position****	Date	Method*****
INT1	One male and one female	NA	OAO: Organisations of Public Employees	Collaborative organisation between public sector unions	Public employees	Consultants	14.2. 2022	Online, Zoom
INT2	Male	NA	Danish Trade Union Confederation (FH)	Confederation		Political consultant (specialising in digitalisation in the public sector)	26.4. 2022	Online, Zoom
INT3	One male and one female	NA	HK/Stat, union for salaried employees, section for state employees	Public administrations		Chairperson and Analytical chief officer	17.5. 2022	Online, Zoom
INT4	Female	NA	Danske Bioanalytiker, union for Medical Laboratory Technologists	Health and hospitals	Medical Laboratory Technologist	OHS and work environment specialist	19.5. 2022	Online, Zoom
INT5	Female	NA	FOA, union for in particular public sector services, like health and care workers	Mainly Health and hospitals		Health policy specialist	23.5. 2022	Online, Zoom
INT6	Male	NA	Dansk El-	Electricity	Electricians	Elected	10.6.	Online, Zoom

			forbund, Danish Electricians' union			national union representativ e (Forbundssek retær)	2022	
INT7	Female	NA	FOA, union for, in particular, health and care workers, but also hospital cleaners and service personnel	Health and hospitals		Joint shop steward	27.6. 2022	Online, Zoom
INT8	Female	NA	Danish Nurses Unions/DSR	Health and hospitals	Nurses	Vice-chair	30.6. 2022	Online, Zoom
INT9	Female	NA	Danish Nurses Unions/DSR	Health and hospitals	Nurses	Joint shop steward	7.7. 2022	Online, Zoom
INT10	Male	NA	Dansk El- forbund, Danish Electricians' union	Electricity	Electricians	Joint shop steward	5.10. 2022	Online, Zoom

FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union / or 3F	Electricity production and distribution	Electrician/technician
FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union / or 3F	Electricity production and distribution	Electrician/technician
FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union / or 3F	Electricity production and distribution	Electrician/technician
FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union / or 3F	Electricity production and distribution	Electrician/technician
FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union / or 3F	Electricity production and distribution	Electrician/technician
FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union / or 3F	Electricity production and distribution	Electrician/technician
FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union / or 3F	Electricity production and distribution	Electrician/technician
FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union / or 3F	Electricity production and distribution	Electrician/technician
FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union / or 3F	Electricity production and distribution	Electrician/technician
FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union / or 3F	Electricity production and distribution	Electrician/technician
FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union / or 3F	Electricity production and distribution	Electrician/technician
FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union / or 3F	Electricity production and distribution	Electrician/technician
FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union	Electricity production and distribution	Unionist
FG2	Male	Unknown	Dansk EI-forbund, Danish Electricians' union	Electricity production and distribution	Unionist
FG3	Male	31	HK/Stat, union for salaried employees, section for state employees	Public administration	Shop steward for the police
FG3	Female	59	HK/Stat, union for salaried employees, section for state employees	Public administration	Laboratory technician and former shop steward
FG3	Female	53	HK/Stat, union for salaried employees, section for	Public administration	Public administration in prison service

			state employees		
FG3	Female	58	HK/Stat, union for salaried employees, section for state employees	Public administration	Public administration in prison service
FG3	Female	Unknown	HK/Stat, union for salaried employees, section for state employees	Public administration	Vice Chairperson in HK/Stat, union for salaried employees, section for state employees
FG3	Male	Unknown	HK/Stat, union for salaried employees, section for state employees	Public administration	Analytical chief officer in HK/Stat, union for salaried employees, section for state employees