

Work today and in the future

Perspectives on Occupational Safety and Health challenges and opportunities for the Nordic labour inspectorates











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Report authored by the Nordic Future of Work Group

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Abstract

This report was commissioned by the Nordic Director Generals at the labour inspectorates to better prepare the labour inspectorates for the future of work. The report is authored by the Nordic Future of Work Group. The purpose of the report is to identify and analyse the occupational safety and health challenges to labour inspectorates in the light of the imminent future of work.

Three main aspects make this report unique. First, the report focusses on occupational safety and health and labour inspection. This perspective is not common in future of work studies and analyses. Second, the report gives practical recommendations for labour inspectorates. Third, the report provides an exclusive Nordic perspective on themes of regional and global importance in the context of labour inspection.

This report delivers a diverse set of perspectives on the future of work and occupational safety and health based on published literature and active engagement with national and international stakeholders as well as the research community.

It is anticipated that the future of work will be influenced by four drivers: the changes attributed to technology, demographics, globalisation, and environmental and climate change. These drivers independently or taken together have an impact on occupational safety and health.

The report concludes with providing general and specific recommendations to better equip the labour inspectorates to meet the challenges of the near and distant future. These practical recommendations form the context for the further development of Nordic labour inspectorates ability to tackle occupational safety and health challenges as they concern the future of work.

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Selvityksen on tilannut pohjoismaisten työsuojelutarkastusvirastojen pääjohtajat, ja sen tarkoituksena on tukea työsuojeluviranomaisia valmistautumisessa työelämän tulevaisuuteen. Selvityksen on laatinut Pohjoismainen työelämän tulevaisuus -ryhmän. Selvitys tunnistaa ja analysoi, millaisia työsuojelun haasteita työsuojeluviranomaiset kohtaavat tulevaisuudessa.

Tämä selvitys on ainutlaatuinen ensinnäkin sen vuoksi, että siinä keskitytään työsuojeluun ja työsuojeluvalvontaan. Tämä ei ole yleinen näkökulma työn tulevaisuutta käsittelevissä tutkimuksissa ja analyyseissa. Toiseksi selvityksessä annetaan käytännön suosituksia työsuojeluviranomaisille. Kolmanneksi selvitys antaa yhteispohjoismaisen näkökulman alueellisesti ja maailmanlaajuisesti tärkeisiin työsuojeluvalvontaa koskeviin aiheisiin.

Selvitys tuo monipuolisesti esiin työnteon tulevaisuutta ja työsuojelua koskevia näkökulmia. Julkaisu perustuu kirjallisuuteen ja kansallisten ja kansainvälisten sidosryhmien ja tutkimusyhteisöjen kanssa käytyyn aktiiviseen vuorovaikutukseen.

Neljän trendin arvioidaan vaikuttavan voimakkaasti työnteon tulevaisuuteen, ja ne ovat teknologian kehitys, väestökehitys, globalisaatio ja ympäristön- ja ilmastonmuutos. Nämä trendit vaikuttavat työsuojeluun sekä yhdessä että erikseen.

Selvityksen johtopäätöksinä esitetään yleisiä ja kohdistettuja suosituksia siitä, miten työsuojeluviranomaiset voivat paremmin valmistautua kohtaamaan tulevaisuuden lyhyellä ja pitkällä tähtäimellä. Nämä käytännön suositukset muodostavat perustan, jonka pohjalta voidaan kehittää pohjoismaisten työsuojeluviranomaisten kykyä vastata työsuojelun haasteisiin työn ja työelämän muuttuessa.

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Referat

Denna rapport har tagits fram på uppdrag av de nordiska generaldirektörerna vid arbetarskyddsinspektionerna för att bättre förbereda arbetarskyddsinspektionerna inför framtidens arbete och arbetsliv. Rapporten har utarbetats av den nordiska gruppen för arbetet i framtiden. Rapportens syfte är att identifiera och analysera utmaningar och möjligheter inom arbetsmiljön för arbetarskyddsinspektionerna i ljuset av det förestående arbetet i framtiden.

Tre aspekter gör denna rapport unik. För det första fokuserar rapporten på arbetsmiljö och arbetarskyddsinspektioner. Detta perspektiv är inte vanligt i studier och analyser om arbetet i framtiden. För det andra ges praktiska rekommendationer för arbetarskyddsinspektionerna. För det tredje har rapporten ett helt nordiskt perspektiv på ämnet, vilket har regional och global betydelse för arbetarskyddsinspektionen.

Denna rapport redogör för olika perspektiv på arbetet i framtiden och arbetsmiljöfrågor baserat på litteraturen och genom aktiv samverkan med nationella och internationella intressenter samt forskarsamhället.

Arbetet i framtiden förväntas påverkasav fyra drivkrafter: förändringar som hänför sig till tekniken, demografin, globaliseringen samt miljö- och klimatförändringarna. Dessa drivkrafter har – både var för sig och sammantagna – en inverkan på arbetsmiljön.

Rapporten avslutas med att presentera både allmänna och specifika rekommendationer för hur arbetarskyddsinspektionerna kan gardera sig mot utmaningar både i den nära framtiden och senare. Dessa praktiska rekommendationer bildar ramen för den fortsatta utvecklingen av de nordiska arbetarskyddsinspektionernas kapacitet att handskas med utmaningar kring arbetsmiljö i förhållande till arbetet i framtiden.

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1 Executive summary

We cannot change our past, but we can certainly shape a better future.

This report was commissioned by the Nordic Director Generals to better prepare the Nordic LIs (labour inspectorates) for the future of work. The report itself has been written by the Nordic Future of Work Group. The group started its work in 2016 and since then the group has given important insights into how each country looks at specific national challenges regarding the future of work and what measures have been taken to deal with them. The present report is a second in the series of two reports published by the Nordic Future of Work Group¹.

This report delivers a diverse set of perspectives on the future of work and OSH (occupational safety and health) based on published literature and active engagement with national and international stakeholders as well as the research community. However, the authors of the report have made conclusions and predictions based on the existing material and are solely responsible for all the claims made in this report.

The report does not intend to be an oracle that covers all possible areas as they relate to the future of work, but it certainly extracts the central themes for LIs as they concern the future of work and OSH.

The purpose of this report is to identify and analyse the challenges to Nordic LIs in the light of the imminent future of work. Furthermore, it provides general and specific recommendations to better prepare the LIs to meet the challenges of the near and distant future.

Three main aspects make this report unique. First, the report focusses on occupational safety and health and labour inspection. This perspective is not common in future of work studies and analyses. Second, the report gives practical recommendations for LIs. Third, the report provides a unique Nordic perspective on themes of regional and global importance in the context of labour inspection.

¹ Nordic Future of Work Group: *Diversity of the future workforce and work tasks - challenges to OSH.* 2016.

It is anticipated that the future of work will be influenced by four drivers: the changes in technology, demographics, globalisation, and environmental and climate. These drivers independently or taken together can potentially impact OSH.

- Digital technologies such as AI (artificial intelligence), robotics, 3-D printers (three dimensional printers) and smart wearables have the potential to enhance productivity and efficiency to produce goods and services. However, these rapidly evolving technologies have associated OSH risks as they concern the physical and psychosocial work-environment. They range from the risk of getting injured by a robotic arm attributed to a sensor failure in an environment where robots and workers are deployed together, to the constant psychological stress of performance reviews provided by customers who utilise digital platform-based taxi services. 3-D printers and smart wearables are significant technological leaps for productivity, innovation and OSH, but these devices are also accompanied by foreseeable OSH risks that need to be carefully addressed.
- In fact, new technologies are evolving at such a rapid pace that it might stretch our biological limits leading to serious health and safety consequences. Certainly, the regulators are unable to keep up to speed with dynamic changes in work-life that may have significant implications for OSH. The advent of the platform economy, its OSH implications, and the difficulties in regulating is a clear example of the pace of newness where LIs have not yet been able to understand and address the phenomenon comprehensively.
- Surveillance in OSH typically was conceived in terms of monitoring worker health through OSH indicators. However, with new forms of work and the technologies at hand, constant visual and digital surveillance of the worker is a reality. This is plausible through video cameras, apps and mobile devices including smart wearables. Although these technologies give the employers the possibility to improve efficiency and monitor the safety of the workers, they also provide the opportunity for constant control and incessant performance evaluations. Such ceaseless intrusion of privacy could be detrimental to the psychosocial health of workers.
- Migrant labour is gradually increasing in the Nordic countries. The proportion
 of elderly is also increasing in the general population. Thus, migrant labour is
 necessary to support the Nordic welfare models and at the same time it is
 necessary to extend the working careers of all people and especially of
 elderly people. It is also necessary to be inclusive of workers with varying
 degrees of work ability. There are some facts that require LIs to take special
 actions to guarantee equal and safe working conditions for women in

particular. There is a large proportion of women workers in the health and social sector, which again sustains a range of OSH exposures at work. Among others, musculoskeletal disorders are and will remain a major challenge for workers in the health care sector, and by default impact disproportionally a large number of women compared to men. Young workers are the ones who will embrace the future of work, but seemingly are lacking the skills and education to meet the new economy in terms of gaining employment. Moreover, much of the data suggest that young workers remain vulnerable to OSH risks, and these risks may be compounded because of the unknown risk of newer technologies and new forms of work that the young workers will encounter. The aforementioned diverse groups of workers are critical to the future of work but remain vulnerable in terms of enduring OSH risks and mandate a better inclusion and protection strategy as we prepare for the future.

- The future of work brings in new ways and means of organising work. This has certainly led to complex employer-worker relationships and a growing tendency toward individual contracts, and through that an individualisation of OSH risks. Consequently, there has been a gradual fall in unionisation among workers, and the concurrent growth of precarious and atypical forms of work. Together these factors are threatening the traditional Nordic model in work-life as the acceptance or rather the space of the traditional social partners is shrinking. This means collective agreements, including those that impact OSH, are increasingly compromised. These developments do not augur well for OSH, and certainly it is an impending challenge for achieving OSH compliance. Not surprisingly, there has been a remarkable rise in malicious phenomena like social dumping, undeclared work and work-related crime in the Nordic countries necessitating broad measures from the governments. However, it must be underscored that these phenomena are in many ways the extension of precarious working arrangements. Although undeclared work and related issues deal with tax evasion, trafficking and fraudulent enterprises, such developments have a direct and deleterious impact on OSH.
- The future of work is bringing in technologies that enable flexibility for the worker and the employer. But this implies in many cases that work could be done in living rooms, kitchens, and bedrooms, and in that sense is boundless and boundaryless. This development has far reaching implications for health and social well-being as it impacts aspects of OSH, but also creates a conflict between work-life and family-life. Long working hours and shift work has been amply documented to have negative effects on health. Technologies paired with new forms of employee-worker arrangements creates situations where working-time is also becoming a challenging proposition. In fact, technological

solutions are such that it is plausible to have the worker on-demand through devices used by the employer, but also the advent of new individualised contracts means the employer and worker could agree on working-times beyond the tripartite agreements. Moreover, globalisation has led to developments suggesting that we are fast becoming a 24/7 society further compromising healthy working-time arrangements.

- Office space is expensive, and there has been a gradual shift to move toward open plan offices, and extended use of home offices as a solution as we move into the future. Both of these approaches to organising work present OSH challenges vis-a-vis psychosocial working environment, but also in terms of productivity and infection prevention. Although open plan office and home office solutions might be intuitively cost saving in the short run, the long-term OSH implications are potentially detrimental given our limited insight into this problem.
- Manual and physically demanding work is gradually receding, and there is a concurrent increase in sitting time, including screen time. These changes to work-life have already manifested in psychosocial and musculoskeletal disorders, but conceivably also conditions like obesity, hypertension and diabetes that are the highest health cost drivers in the Nordic countries. A significant proportion of these aforementioned conditions are increasingly considered to be attributed to work and fall under the category of non-communicable diseases (NCDs). Work-related NCDs will pose significant OSH challenges as we move towards a more automated and digitalised work-life.
- A polarised work-life is harbinger of occupational health inequalities. The drivers influencing the future of work together attribute to the polarisation and fragmentation of work-life, with significant contrasts between the haves and have-nots of the working population. The gradual rise in precarious and atypical work, the decline of tripartism and the non-congruent uptake and application of technological innovations by different groups of workers (young, elderly, migrant) will lead to significant differences in qualifications, competence and incomes. Such differences will perpetuate sub-standard working conditions for the most vulnerable workers and increase the inequalities in occupational health in the working population.
- COVID-19 has launched the LIs into a turbo phase with regard to the level of preparedness vis-à-vis OSH in the Nordic countries. The pandemic revealed significant lack of preparedness among national authorities including OSH agencies for handling such situations. There were areas of concern with

regards to lack of PPE (personal protective equipment), risk assessments for health care workers, swift initiation of home office solutions, and coordination and collaborations with relevant national and international agencies.

• Climate and environmental change have two distinct pathways in terms of influencing OSH. One is the direct impact of climate change such as extreme temperature, floods and natural calamities which entail OSH risks for outdoor workers including emergency responders. The other pathway is the response to climate and environmental change with the emphasis on a circular economy and green jobs. While technologies to support circular economy and green jobs are desirable and much needed, the associated OSH risks must be profiled and addressed. Moving forward, the emphasis on a green economy should also consider including and address aspects of safe and decent work.

Although the Nordic LIs traditionally have very close cooperation and a common value background, the legislation and mandate of the different LIs are rather different. Thus, the recommendations might apply somewhat differently across the five Nordic countries. Given the global nature of the challenges vis-à-vis future of work, the recommendations may also provide an impetus for policy discussions as they concern OSH and labour inspection in the European and global context.

The report concludes with **general** and **specific recommendations** based on the deliberations of the challenges as they concern future of work on OSH. It is a starting point for a Nordic dialogue to collaboratively find solutions for the OSH challenges of the future to secure a safe, healthy, and decent work-life for all.



1 Sammanfattning

Vi kan inte ändra det förflutna men vi kan definitivt skapa en bättre framtid.

Föreliggande rapport har tagits fram på uppdrag av de nordiska generaldirektörerna för att underlätta beredningen inför arbetarskyddsinspektionerna för Arbetet i framtiden. Rapporten har utarbetats av den nordiska gruppen för Arbetet i framtiden. Gruppen har verkat sedan 2016 och tagit fram viktiga insikter i hur varje land ser på sina respektive utmaningar på framtidens arbetsmarknad och vilka metoder de har vidtagit för att hantera dem. Föreliggande rapport är den andra i en serie av två rapporter från den nordiska gruppen för Arbetet i framtiden.

Denna rapport redogör för olika perspektiv på Arbetet i framtiden och arbetsmiljöfrågor som inhämtats i litteraturen och genom aktiv samverkan med nationella och internationella intressenter samt forskarsamhället. Slutledningarna och framtidsutsikterna i rapporten bygger visserligen på befintligt material men har tagits fram av författarna, vilka är gemensamt ansvariga för alla påståenden i rapporten.

Avsikten med rapporten är inte att sia om framtiden på alla områden inom arbetet i framtiden, men den tar ändå fasta på de viktigaste ämnesområdena för arbetarskyddsinspektioner i förhållande till Arbetet i framtiden och arbetsmiljön.

Syftet med rapporten är att identifiera och analysera utmaningarna för de nordiska myndigheterna för arbetsmiljötillsyn med avseende på förestående Arbetet i framtiden. I rapporten lämnas också både allmänna och specifika rekommendationer för hur arbetarskyddsinspektionerna kan gardera sig mot utmaningar både i den nära framtiden och senare.

Föreliggande rapport innehåller tre aspekter som gör den unik. För det första fokuserar den på arbetsmiljön och arbetarskydsinspektioner. Detta perspektiv är inte speciellt vanligt i studier och analyser av arbetet i framtiden. För det andra ges praktiska rekommendationer för arbetarsinspektioner. För det tredje har rapporten ett helt nordiskt perspektiv på teman av regional och global betydelse gällande arbetarskyddsinspektionen.

Arbetet i framtiden förväntas avspegla påverkan från fyra drivkrafter, nämligen förändringar som hänför sig till den tekniska utvecklingen, demografin, globaliseringen

samt miljö- och klimatförändringarna. Dessa drivkrafter kan – både var för sig och sammantagna – ha en inverkan på arbetsmiljön.

- Digital teknik, som artificiell intelligens, robotik, 3D-skrivare och smart kroppsnära teknik, kan potentiellt förbättra produktiviteten och effektiviteten i tillverkningen av varor och i tjänster. Dessa snabbt avancerande tekniker medför dessvärre arbetsmiljörisker genom att de påverkar den fysiska och psykosociala arbetsmiljön. Till exempel på arbetsplatser där robotar och människor arbetar tillsammans föreligger en risk för att man blir skadad av en robotarm till följd av fel i en sensor, eller det uppstår konstant psykisk stress på förarna genom prestandabetyg från passagerare som använder digitala taxiplattformar. 3D-skrivare och smart kroppsnära teknik är stora tekniska framsteg med avseende på produktivitet, innovation och arbetsmiljö, men de är också kopplade till förutsebara arbetsmiljörisker som måste undersökas noggrant.
- Nya tekniska lösningar uppkommer i själva verket i en så rasande takt att det kan tänja på våra biologiska gränser och orsaka allvarliga konsekvenser för hälsa och säkerhet. Utan tvekan klarar lagstiftarna inte av att hänga med de dynamiska förändringar i arbetslivet som kan ha betydande arbetsmiljöföljder. Introduktionen av plattformsekonomin, dess följder för arbetsmiljön och svårigheterna att reglera den är ett uppenbart exempel på någonting nytt som arbetarsinspektionerna tills vidare inte har lyckats förstå och hantera på ett övergripande plan.
- Tidigare har arbetsmiljöbevakning gått ut på övervakning av arbetstagarnas hälsa genom arbetsmiljöindikatorer. Med nya arbetsformer och moderna tekniska lösningar är det möjligt att ha konstant visuell och digital övervakning av arbetstagarna. Tillämpliga lösningar är bland annat videokameror, appar och mobila enheter, inklusive smart kroppsnära teknik. Dessa tekniska lösningar gör det visserligen möjligt för arbetsgivarna att höja effektiviteten och övervaka arbetarskyddet, men samtidigt möjliggör de konstant övervakning och prestandautvärdering. Sådant oavbrutet intrång i den privata sfären kan vara skadligt för arbetstagarnas psykosociala hälsa.
- Migrerande arbetskraft håller på att öka i de nordiska länderna. Samtidigt ökar andelen äldre i den allmänna befolkningen. Migrerande arbetskraft är därför nödvändig dels för att upprätthålla den nordiska välfärdsstaten, dels behöver yrkeslivet för för alla människor och i synnerhet för äldre. Samtidigt gäller det att ta hänsyn till arbetstagare med varierande arbetsförmåga. En stor del av kvinnliga arbetstagare arbetar inom hälso- och socialvården där de utsätts för många arbetsmiljörisker. Bland annat muskuloskeletala problem är och förblir

en stor utmaning för arbetstagarna inom hälso- och sjukvårdssektorn; andelen drabbade kvinnor är oproportionerligt mycket högre än drabbade män. Unga arbetstagare är de som kommer att överta arbetslivet i framtiden, men de verkar sakna den skicklighet och utbildning som behövs för att få tillgång till arbete i den nya ekonomin. Dessutom tyder data på att unga arbetstagare är utsatta för arbetsmiljörisker vilka försvåras av hittills okända risker som hänför sig till ny teknik och nya arbetsformer som de unga ställs inför. Den ovan nämnda heterogena gruppen av arbetstagare är kritisk för arbetet i framtiden samtidigt som den är utsatt för arbetsmiljörisker. Den bör ges större delaktighet på arbetsmarknaden, och det behövs en skyddsstrategi inför framtiden.

- Arbetet i framtiden innebär ett nytt sätt och nya metoder för att organisera arbetet. Detta har oundvikligen lett till komplexa relationer mellan arbetsgivare och arbetstagare samt en ökad tendens till individuella kontrakt och följaktligen medfört en individualisering av arbetsmiljöriskerna. Därmed har andelen fackorganiserade arbetstagare gradvis minskat, samtidigt som osäkra och atypiska arbetsformer har ökat. Sammantagna utgör dessa faktorer ett hot mot den hävdvunna nordiska arbetsmarknadsmodellen då acceptansen eller snarare utrymmet för de traditionella arbetsmarknadsparterna minskar. Det innebär att kollektivavtalen, inklusive de som hänför sig till arbetsmiljöfrågor, äventyras alltmer. Denna utveckling bådar inte gott för arbetsmiljöfrågor och utgör utan tvivel en nära förestående utmaning för uppfyllandet av arbetsmiljönormerna. Föga överraskande har det konstaterats en betydande ökning i skadliga fenomen som social dumpning, svartjobb och arbetsrelaterade brott i de nordiska länderna, vilket har krävt omfattande åtgärder av regeringarna. Å andra sidan bör man notera att det handlar i stor utsträckning om en följd av otrygga anställningsformer. Trots att svartjobb och motsvarande problem anknyter till skatteflykt, människohandel och företagsbedrägerier har de också en direkt och skadlig inverkan på arbetsmiljön.
- Arbetet i framtiden introducerar nya tekniker som möjliggör större flexibilitet för arbetstagarna och arbetsgivarna. Å andra sidan innebär det att arbetet ofta kan utföras i vardagsrum, kök och sovrum, i obegränsad mängd och utan gräns mellan arbete och privatliv. Denna utveckling har långtgående följder med tanke på hälsa och socialt välbefinnande genom att den påverkar arbetsmiljön och skapar en motsättning mellan arbetsliv och familjeliv. Det finns gott om dokumentation om de negativa effekter som lång arbetstid och skiftarbete har på hälsan. Ny teknik i kombination med nya arrangemang för anställda/arbetstagare ger upphov till situationer där det blir svårt att hålla fast vid arbetstiden. I själva verket gör tekniska lösningar det sannolikt att hålla

arbetstagaren tillgänglig enligt behov med utrustning som arbetsgivaren tillhandahåller. Dessutom innebär de alltmer vanliga individuella kontrakten att arbetsgivaren och arbetstagaren kan komma överens om andra arbetstider än de som fastställs i trepartsöverenskommelserna. Globaliseringen har också lett till en utveckling där vi håller på att bli ett dygnet-runt-veckan-runt-samhälle vilket äventyrar sunda arbetstidsarrangemang.

- Kontorsyta är dyr, varför det har skett en gradvis övergång mot kontorslandskap och allt mer omfattande utnyttjande av hemmakontor inför utvecklingen mot framtiden. Bägge lösningarna medför utmaningar med tanke på arbetsmiljön, både med tanke på den psykosociala miljön och för produktiviteten och förebyggande av infektioner. Trots att kontorslandskap och hemmakontor intuitivt kan förefalla som kostnadsbesparande lösningar på kort sikt kan arbetsmiljökonsekvenserna på lång sikt vara hälsovådliga med beaktande av den begränsade förståelse vi har av detta problem.
- Manuellt och fysiskt tungt arbete håller på att minska, samtidigt som den tid som tillbringas stillasittande inklusive skärmtid ökar. Dessa förändringar i arbetslivet avspeglas redan som psykosociala och muskuloskeletala störningar, med ytterligare följder som fetma, högt blodtryck och diabetes, som är de största kostnadsdrivande faktorerna i de nordiska länderna. En väsentlig del av dessa tillstånd kan anses bero på arbete, och kan kategoriseras som icke smittsamma sjukdomar. Arbetsrelaterade ickesmittsamma sjukdomar kommer att utgöra betydande arbetsmiljöutmaningar då utvecklingen går mot ett mer automatiserat och digitaliserat arbetsliv.
- Ett polariserat arbetsliv är ett förebud om arbetshälsoskillnader. De faktorer som driver framtiden för arbetslivet bidrar till polariseringen och fragmenteringen av arbetslivet, med en stor kontrast mellan de arbetstagare som har mycket och de om inte har något alls. Den långsamma ökningen av otrygga och atypiska arbetsformer, tillbakagången av trepartsförhandlingar och ojämnt införande och tillämpning av tekniska innovationer för olika arbetstagargrupper (unga, äldre, migranter) kommer att ge upphov till betydande skillnader i kvalifikationer, kompetens och inkomst. Sådana skillnader kommer bara att upprätthålla undermåliga arbetsförhållanden för de mest utsatta arbetstagarna och öka arbetshälsoskillnaderna bland den förvärvsarbetande befolkningen.
- Covid-19 har tvingat yrkesinspektionerna att lägga i en högre växel avseende beredskapsnivån på arbetsmiljöområdet i de nordiska länderna. Pandemin har avslöjat betydande brister i nationella myndigheters, inklusive arbetsmiljömyndigheters, beredskap att hantera dylika situationer. Till

problemområden hör bland annat brist på personlig skyddsutrustning, riskbedömningar för hälso- och sjukvårdsanställda, snabba lösningar för arbete hemifrån, samt samarbete mellan berörda nationella och internationella myndigheter.

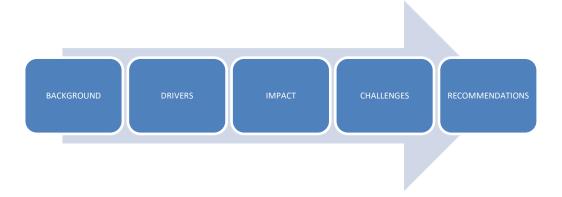
Klimat- och miljöförändringarna kan påverka arbetsmiljön huvudsakligen genom två mekanismer. Den ena är de direkta effekterna av klimatförändringen, det vill säga extrema temperaturer, översvämningar och naturkatastrofer som medför arbetsmiljörisker för dem som arbetar utomhus, inklusive räddningspersonal. Den andra är reaktionerna på klimat- och miljöförändringarna med fokus på cirkulär ekonomi och gröna jobb. Trots att tekniska lösningar för cirkulär ekonomi och gröna jobb är önskvärda och välbehövliga är det nödvändigt att utreda och hantera de arbetsmiljörisker som hänför sig till dem. Framöver bör tyngdpunkten inom miljövänlig ekonomi även omfatta och åtgärda aspekter av sunda och anständiga arbetsförhållanden.

Trots att de nordiska arbetarskyddsinspektionerna av hävd har ett mycket nära samarbete och en gemensam värdegrund finns det betydande skillnader i lagstiftningen och myndigheternas behörigheter. Därav följer att rekommendationerna kan ha något olika tillämplighet i varje land. Med beaktande av att utmaningarna för arbetsmiljön i framtida arbete är globala till sin natur, så kan rekommendationerna eventuellt också ge en impuls till policy diskussioner angående arbetsmiljö och arbetarskyddsinspektion i Europa och internationellt.

I rapporten sammanfattas allmänna och specifika rekommendationer utifrån överläggningar om förutsebara utmaningar för arbetsmiljön som orsakas av de nya arbetsformerna, tekniska lösningarna och oförutsedda kriserna. Rapporten utgör ett underlag för en nordisk dialog för att i samråd hitta lösningar på framtida arbetsmiljöutmaningar och säkerställa säkra, sunda och anständiga arbetsförhållanden för alla människor.

2 Structure of the report

The report follows a structure presented in the flowchart below. First, some **BACKGROUND** information provides context for this work. Second, we delve into the main **DRIVERS**, shaping the world of work and work environment today and in the future. Next, we put forth the **IMPACT** of the drivers on both work-life and OSH (occupational safety and health). The report also presents the **CHALLENGES** the drivers and their impacts bring along for the LIs (labour inspectorates). The report concludes with **RECOMMENDATIONS** to better prepare the LIs for the future of work.



The report covers areas that may seem non-traditional for LIs or OSH in Nordic countries. There are two specific reasons for this.

- First, the different Nordic LIs have somewhat different mandates. This heterogeneity in the mandates is reflected in the report.
- Second, and importantly, the report is meant to provide a perspective to aid LIs in preparing for the future. Smoking at the workplace was not an OSH issue in the 1970s, nor were psychosocial work problems a fundamental OSH and LI issue. The history of OSH illustrates that the field keeps expanding, incorporating many themes over time as technology and society evolves. Hence, it is sensible to include themes in this report that may appear nontraditional for OSH and LIs in some countries today but may be pertinent as we embark on the journey toward the future of work.

3 Background

The Nordic countries have long been leading the global indicators for OSH (occupational safety and health). The latest estimates for injuries and illnesses confirm the fact that Nordic countries tend to have safer and healthier work environments compared to other high-income countries in Europe and North America. Nordic countries are doing reasonably well in OSH indicators as they concern fatalities, injuries and diseases.² This development in Nordic countries is largely attributed to a proactive preventive approach, a robust tripartite framework, effective communication efforts, a strong tradition for OSH research and an inclusive social welfare model.

Despite the significant progress in terms of OSH attributed to regulatory interventions and technological advances, the data suggests that workers are still getting injured, sick and dying at work as result of hazardous work environments. Some estimates have put the cost of work-related diseases and injuries at 4% of GDP. In fact, the cost of poor work environments in Finland has been estimated to be 22 billion euros annually, and a similar analysis in Norway projected a figure of about 7 billion euros. ^{3,4}

The ILO (International Labour Organization) estimates of work-related diseases explain that cancers still dominate the mortality statistics followed by circulatory diseases (cardiovascular).² In contrast to diseases, fewer number of workers are involved in fatal and non-fatal injuries at work. These estimates suggest that Nordic countries are still a fair distance from reducing the societal costs of traditional occupational injuries and work-related diseases.

Sickness absenteeism in particular is an area of concern because of the economic burden it bears on the employer and social security systems. A large proportion of sickness absenteeism is ascribed to diagnosis groups with psychosocial and musculoskeletal disorders. There is little doubt that these disorders will remain a prevalent problem in the future as well. The causal mechanisms for musculoskeletal

² Takala J. et al.: *Global Estimates of the Burden of Injury and Illness at Work in 2012*. 2014. Journal of Occupational and Environmental Hygiene. May; 11(5): 326–337. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4003859/

³ Ministry of Social Affairs and Health, Finland: *Occupational Safety and Health in Finland*. 2016. https://stm.fi/documents/1271139/1332445/STM_esite_Tyosuojelu_suomessa_verk-koonUK.pdf/a2bd9c8c-6de8-43c7-8516-c149840498e1

⁴ Oslo Economics: *Samfunnsnytten av bedriftshelsetjenesten. 2018.* https://osloeconomics.no/wp-content/uploads/Samfunnsnytten-av-bedriftshelsetjenesten.pdf

and psychosocial disorders attributed solely to work environment remain an issue of persistent debate because of the complex causal mechanisms involved.

Nevertheless, there is a recognition of the fact that the workplace is a vital arena for targeted interventions to reduce work-related sickness absenteeism in general, but specifically those attributed to psychological and musculoskeletal disorders.

Although the subject of interest in this report is the future of work and OSH, traditional OSH risks continue to exist. The costs incurred by these traditional OSH problems still are a burden on labour-market competitiveness and social security budgets. The past gains vis-a-vis OSH therefore need to be consolidated by reaffirming the regulatory mechanisms, targeted guidance and the tripartite approach to resolve OSH challenges.

The OSH risks are a mix of the old, and the emerging. Asbestos provides a case in point. Asbestos is conceivably 'a thing of the past' and is prohibited in most Nordic countries. However, asbestos is still present in old structures and buildings where workers in renovation are exposed if proper abatement procedures are not followed by the employer. The advent of new forms of employment like platform work and precarious work arrangements make the traditional OSH protections for workers in such circumstances tenuous. For example, asbestos related jobs administered through digital platforms could potentially circumvent the regulatory regimes for safe abatement of asbestos.

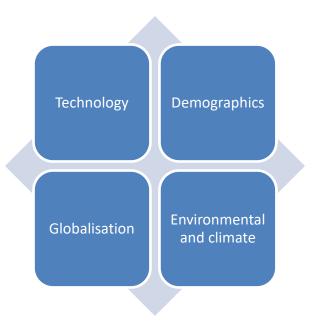
This example provides an insight in to how the cocktail of the old and emerging risks could be deleterious to OSH and patent challenge for Lls. There are also OSH risks related to Al, robotics, and climate change, which may be seemingly new issues for the Lls (labour inspectorates). Briefly, Lls will have to deal with both contemporary, evolving and emerging risks all at the same time as we move in to the future of work.

This report aims uniquely at the implications for LIs whose prime responsibility remains ensuring employers' OSH compliance and protecting the workers in order to prevent and reduce work-related disease, injuries, sickness absence and fatalities.



4 Drivers

It is anticipated that four main drivers will influence the future of work. These are changes attributed to technology, demographics, globalisation, and environmental and climate change.



Globalisation together with technological change has an enormous impact on how, when, where, and what kind of work is performed. The Nordic labour market continues to be extremely competitive. Technology is digitalizing cognitive as well as manual tasks, disparity between decent and precarious jobs, constantly changing conditions of employment, and continuous need of reskilling generate a labour market that is inherently polarised and fragmented. These factors taken together or separately have a direct and significant impact on the safety and health of workers.

Nordic countries are concurrently facing a significant drop in the working age population and a rise in the share of the elderly. The Nordic countries are running short of labour to support their social security systems and remain competitive in a globalised economy.⁵ In order to supply adequate labour, the working life of elderly workers needs to be extended, and migrant labour has to be included to supplement

⁵ See e.g. Statistics Finland: *Number of young people in danger of diminishing considerably due to the decrease in birth rate*. 2018. https://www.stat.fi/til/vaenn/2018/vaenn_2018_2018-11-16_tie_001_en.html

the workforce. This development needs adjustments in work and work-life and will conceivably modify the demographic constitution of the Nordic workforce.

Environmental and climate change is already making a distinct mark in the world of work today and it will affect both the society and workplaces even more so in the future. This will require a change in production procedures and consumer behaviour. Fossil energy-related work could potentially decline, and a definite emphasis on renewable energy sources is foreseen. Because of such developments, some jobs will cease to exist, and much work will either transform or adapt. The curb on global emissions would also lead to a substantial increase in green jobs and hazards related to such jobs will need careful consideration. Climate change affects the global environment and ecology (flora and fauna) which may be a contributing factor to natural disasters or pandemics in the future.

The abovementioned drivers of the future of work have been widely discussed by many global institutions and scholars in the context of the future of work.^{6,7,8,9,10} Very limited information, however, is available on how the preventive efforts of LIs (labour inspectorates) vis-à-vis OSH (occupational safety and health) would be impacted by these drivers. The purpose of the following chapter 5 is to illustrate the impact of these drivers on work-life and OSH.

It is anticipated that four main drivers will influence the future of work; changes attributed to technology, demographics, globalisation, and environmental and climate change. These drivers independently or taken together have also an impact on occupational safety and health.

⁶ Dølvik JE and Steen RS: *The Nordic Future of Work*, Nordic Council of Ministers. 2018. https://norden.diva-portal.org/smash/get/diva2:1265618/FULLTEXT01.pdf ILO: *Safety and Health at the Heart of Future of Work.* 2019. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms 686645.pdf

⁷ Schulte P et al. Potential Scenarios and Hazards in the Work of the Future: *A Systematic Review of the Peer-Reviewed and Gray Literatures*. 2020. https://academic.oup.com/annweh/advance-article/doi/10.1093/annweh/wxaa051/5877004

 ⁸ CISRO, Australia: Six megatrends that shape future workplace safety and health.
 https://www.csiro.au/en/News/News-releases/2018/Six-megatrends-workplace-health-safety
 9 IOSH, UK: Shaping the future, A review of 2016–2017 and our new strategy for 2017–2022.
 https://iosh.com/media/4560/shaping-the-future-spreadsreview.pdf

¹⁰ Jesnes K, Oppegård SM: *Platform work in the Nordic models: Issues, cases and responses*. 2020. https://pub.norden.org/temanord2020-513/

5 Impact of drivers on work-life and OSH

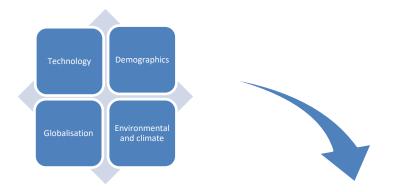
In this section, we enumerate and elaborate on how the drivers pertaining to the future of work are influencing work-life and OSH (occupational safety and health). Many factors that will shape the future of work have positive attributes in terms of productivity, safety and health. Much has been published in terms of the benefits of new technologies and new ways of organising work to improve productivity and OSH.¹¹ However, there has been limited amount of information or focus on the implications of future of work on labour inspections.

This report aims uniquely at the implications for LIs (labour inspectorates) whose prime responsibility remains ensuring employers' OSH compliance and protecting the workers in order to prevent and reduce work-related disease, injuries, sickness absence and fatalities. Moreover, some LIs are also working to promote an inclusive work-life, improve work ability and well-being, and to ensure a competitive market free of undeclared work. 12 Many of these aforementioned themes discussed in the following text seem overlapping as the drivers impact various parts of the work environment and OSH in many different ways.

There has been limited amount of information or focus on the implications of future of work on labour inspections.

This report aims uniquely at the implications for labour inspectorates whose prime responsibility remains ensuring employers' OSH compliance and protecting the workers in order to prevent and reduce work-related disease, injuries, sickness absence and fatalities.

¹¹ Moore P. OSH and Future of Work: Benefits and Risks of AI in Workplaces. 2018. https://osha.europa.eu/en/publications/osh-and-future-work-benefits-and-risks-artificial-intelligence-tools-workplaces/view ¹² Any work that is lawful by nature but not declared to the relevant public authorities.



- 5.1 Digitalisation and Al
- 5.2 Pace of newness
- 5.3 Constant worker surveillance
- 5.4 Diverse workforce
- 5.5 Employer and worker relationships
- 5.6 Tripartism
- 5.7 Precarious work and atypical work
- 5.8 Undeclared work
- 5.9 Workplace well-being
- 5.10 Working-time
- 5.11 Open plan offices
- 5.12 Non-communicable diseases at work
- 5.13 Polarised work-life and occupational health inequalities
- 5.14 Pandemics
- 5.15 Work from home office
- 5.16 Environment and climate change



RECOMMENDATIONS



5.1 DIGITALISATION AND AI

In work-life, digitalisation translates to software and algorithms in automated machines, robots, AI (artificial intelligence), platform applications, 3-D printers (three dimensional printers) all of which are designed by ICT (information, communication, and technology) specialists.

Digitalisation creates newness at an accelerating pace and keeping up with this dynamic development is crucial in order to participate in work-life in a safe and healthy way.

The digital world provides both opportunities and challenges for workers, especially in vulnerable groups. Digitalisation helps in many ways the consolidation of work tasks, working-time and place of work. It also gives new possibilities to find work that is best suited for one's needs and to readjust work so that it is accessible to all. But the benefits of digitalisation and AI also come with some caveats that could compromise the safety and health of all workers.

5.1.1 Al applications

Algorithms in the platform economy or Al (artificial intelligence) applications dictate how work is organised and managed.

The users (employers, workers, independent contractors) are not involved in the development and deployment of AI technology and thus not able to ensure compliance with OSH (occupational safety and health) requirements, working-time and work-life balance.¹³ Further, there is a limitation in the EU (European Union) safety legislation as it only apply to products utilising AI technology, but not necessarily to services such as health, financial or transport services.¹⁴

The software program coding utilized in these technologies is not accessible to outsiders or inspectors; only the coding personnel who design these technologies have access to it and know how it works. Thus, assessment, evaluation and decision making based on AI is not necessarily transparent.

¹³European Commission: WHITE PAPER, *Artificial Intelligence - A European approach to excellence and trust.* 2020. https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020 en.pdf

¹⁴ European Commission: *EU Artificial Intelligence High-Level Expert Group, Policy and In-vest-ment Recommendations for Trustworthy AI, 26, Brussels.* 2019. https://ec.europa.eu/digital-single-market/en/news/policy-and-investment-recommendations-trustworthy-artificial-intelligence

Another emerging concern with AI is the real threat of systematic bias and discrimination because the human input processes that steer these intelligent devices might be inherently biased themselves. This could potentially exclude workers from gainful employment or even career advancements if such technologies are utilised for recruitment and evaluations without due diligence and transparency. Furthermore, the use of AI to analyse big data and its iterative deep learning methods could potentially lead workers to behaviours that are unpredictable and unsafe because productivity could incentivized by compromising safety. The European Commission's expert group on AI have suggested that the AI poses definite challenges to worker health and safety¹⁵.

Online platform work has a different set of hazards than offline platform work ¹⁶. The workers in a platform economy (drivers, food delivery, construction) are at the behest of the algorithms in terms of obtaining work as well as the remuneration and amount of work that would be performed. They are also under the constant surveillance of cameras, sensors and rating systems – something that is not necessarily a characteristic that promotes the psychosocial aspects of the work environment. The ETUI (European Trade Union Institute) report states the concerns about AI related to workers' privacy and data protection, non-transparent surveillance, tracking and monitoring, safety and autonomy of workers in human-machine interactions. ¹⁷

5.1.2 Robotics

Working with robots or collaborative robots (cobots) and systems that are driven by human-independent commands, such as sensors, image recognition, etc. present a specific set of physical and psychosocial hazards. The EU (European Union) report on the safety and liability implications of AI (artificial intelligence), the Internet of Things and robotics notes that while the current product safety legislation covers machines and products, there is a need to cover new risks potentially caused by stand-alone software. New risk assessments are necessary due to the autonomous behaviours of AI, mental health risks related to collaboration with humanoid robots, quality of data impacting privacy and lack of transparency.

¹⁵ European Commission. *Policy and Investment recommendations for trustworthy AI.* 2019. https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=60343

¹⁶ Samant Y. *The Promises and Perils of the Platform Economy: Occupational Health and Safety Challenges, and the Opportunities for Labour Inspection.* 2019. https://www.ilo.org/global/top-ics/safety-and-health-at-work/events-training/events-meetings/world-day-for-safety/33think-pieces/WCMS 681619/lang--en/index.htm

¹⁷ ETUI: Foresight Brief, Labour in the age of Al: why regulation is needed to protect workers. 2020. https://www.etui.org/publications/foresight-briefs/labour-in-the-age-of-ai-why-regulation-is-needed-to-protect-workers

Traditionally, workers and sophisticated machines like CNC (computerised numerical control machines) have been working together, but in a segregated fashion. With robots the level of sophistication is in another league and these machines now work together with workers in the same workspace. Robotics technology is closely associated with developments in prosthetics. This potentially enhances human performance. BCIs (brain–computer interfaces), prostheses coupled to the human nervous system, artificial vision, ICT (information, communication and technology) implants and even neurochips are some recent developments. Workers by and large have no experience of interacting with robots, but this is bound to change as human-machine interaction at work increases. The presence of a robot and a human worker in the same work area however raises a number of safety issues, primarily collision control as the sensors may malfunction or misread a human for material due to a malfunction resulting in unintentional injuries or fatalities.

Impact on psychosocial factors related to robotics still remains an unknown area. Working alone with robots who possess both physical strength and emotional intelligence might be a challenging proposition for workers who would be collaborating with such machines.

5.1.3 3-D printers

There are intrinsic OSH (occupational safety and health) risks related to the 3-D printer (three dimensional printers) itself and also from its emissions. Risks related to the printers are known and resemble those associated with working with other types of machines, and may include electrical injury from damaged power cords, scalding from touching hot surfaces, and traumatic injury due to contact with moving parts. At this time, our understanding of risks from particle and chemical vapor emissions from 3-D printers is limited, and it remains an uncertain though potential threat. If this technology is used in combination with CNT (carbon nanotubes) it could further potentiate the health risks. 3-D objects printed with CNT could present a respiratory hazard if not performed properly under controlled conditions. Although we lack human data, there are indications that CNT could lead to inflammatory outcomes like that of asbestos. 18

5.1.4 Smart wearables and the workplace

The workplace is a common setting in people's lives, and it is also one of the main potential application fields for intelligent wearables (smart wearables). Smartwatches

¹⁸ Zandwijk NV and Frank A: *Potential toxicities of carbon nanotubes: time for a reminder.* 2020. https://www.tandfonline.com/doi/full/10.1080/17476348.2020.1715213

and fitness bracelets are wrist devices that could be used for GPS tracking, sleep quality detection, and heart rate measurement; smart glasses, could be used for information display. Smart wearables can be used as personal protective equipment in the workplace that could aid in monitoring and detecting hazards in the environment (e.g. sensor technology), as well as sending warning notifications automatically.

The pervasive nature of smart wearables allows them to uninterruptedly monitor workers' physical and psychological conditions, such as stress under duress during high hazard operations (for e.g. divers, pilots, law enforcement, firemen). The safety benefits in hazardous situations are certainly a huge positive. Functioning as an extension of human bodies, the wearable devices are able to improve information presentation, management and exchange, as well as enhance workers' performance capability. For example, exoskeletons can considerably reduce physical load on human bodies by enhancing their power. An exoskeleton is also a smart wearable that combines the physical energy of a human being with machine-enhanced prosthetics. Such technologies may reduce the burden of mechanical stress on muscles and joints especially in labour-intensive occupations such those of painters, carpenters and construction workers.

As this technology is still evolving, and rapidly so, the risk scenarios are also at an evolutionary stage, but certainly could be classified into physical and psychological risks. Physical risks emanating directly from failure of technology could expose the workers to hazards. For example, smart glasses could give dizziness or visual impairment, smartwatches may create distraction for professional drivers leading to accidents, and accidents could also occur in the event of sensor failures on intelligent wearables used as PPEs (personal protective equipment). Exoskeletons by some measure tend to increase chest pressure which negatively affects workers with preexisting conditions, such as chronic obstructive pulmonary disease. The weight of the device could result in a load on the spine or on the skeletal system that might not be proportional, possibly resulting in debilitating effects on the worker. Exoskeletons that are not a perfect fit could put undue pressure on nerves or even provoke pressure wounds.

The psychological risks pertain particularly to the intrusion of privacy and the constant surveillance. Thus, these devices improve safety and productivity, but they potentially compromise the privacy and confidentiality of the workers. These issues have been also addressed in some detail in section **5.3** of this report.

Another critical issue is the potential of such wearables to induce dependence on the technology to the extent that workers may have a false sense of security. A sensor malfunction on a wearable PPE device might not be detected by the person using such a device and consequently lead to an injury or fatality. PPEs today require the

worker to actively put on the device and check it for fit testing. With wearables, a risk for the worker is an overdependence on smart technology which could result in the lowering of the human instinct to actively protect oneself from a hazard.

Smart wearables have shown great application value and still have much potential to be developed for work-life. ¹⁹ As these wearables become more commonplace, more employers will include such technologies at their workplace in principle to improve productivity and safety. However, the knowledge that we possess on the health implication of these technologies is evolving and we are certainly not fully aware of all the occupational risks inherent to smart wearables. The LIs (labour inspectorates) definitely need more insight into the evolving OSH (occupational safety and health) risks and benefits of smart wearables.



¹⁹ See e.g.: https://www.safetyandhealthmagazine.com/articles/18093-ready-to-wear-wearable-technology-could-boost-workplace-safety-but-concerns-remain

5.2 PACE OF NEWNESS

"Newness" is no longer a phenomenon that happens every decade; the pace of change seems to be on an exponential scale. In the US, it took 30 years for electricity and 25 years for telephones to reach 10% adoption in the population, but less than five years for tablet devices to achieve the 10% rate.²⁰

With the accelerating pace of newness, there is non-stopping pressure to adapt quickly to changes. Adaptability is core to human survival and development, but there are limits to our biological capacities. We have been mastering the art of adapting to changing natural and social environments, but our biological limits could be seriously strained by the demands of new technologies on us to adapt constantly.

A work-life that demands perpetual adaptability to newness, technological and otherwise, has far-reaching implications for both physical and psychological health. With the high pace of technological change (newness), OSH (occupational safety and health) research and regulation will be under duress to catch up with the technological developments, in turn reducing OSH protections provided by regulations.

With the contemporary rapid pace of changes, the acquisition of new knowledge and new skills comprises an integral part of daily work. There is a need to learn fast new ways and means to organise and perform work, new programs and new ways to communicate. Workers will be required to quickly apply new technological innovations and be creative. They must be prepared to act in an environment where the contents of work is dynamic and fluctuating.

The newness of the constantly changing workplaces is a risk factor to consider as an example in terms of the temporary nature of the employment. Workers in temporary work arrangements are continuously exposed to new work environments, which demand they adapt to new circumstances. Rapid change leads to instability, stress and anxiety. New technologies with new forms of work further add to the cumulative OSH risk of people employed in such circumstances.

In fact, at this time there is conceivably an increased risk of technology-induced stress (technostress) as systems and digital solutions will provide 24/7 access to workers, with the implicit or explicit demand placed on workers to remain accessible.

Moreover, there are many workers already feeling that existing digital tools do not work satisfactorily. Instead of improving existing systems and tools, new tools are

²⁰ See e.g.: https://hbr.org/2013/11/the-pace-of-technology-adoption-is-speeding-up

introduced that take time to learn and have shortcomings. The need for technical support to do work tasks is increasing. Lack of access to simple technical support means higher demands on the worker to solve a situation without having the opportunity to control the situation. Thus, the accelerating pace of newness driven by rapidly changing technologies is creating some unintended consequences affecting the health and safety of workers.

5.3 CONSTANT WORKER SURVEILLANCE

The increased power, intensity and scope of electronic data collection in combination with sensitive personal data is affecting all spheres of life, including work-life. Big data and machine learning with the possibility to monitor workers and benefit worker safety raises questions of personal integrity and privacy.

While increased monitoring can benefit worker safety and speed up emergency responses, it can be misused. Micro-monitoring of workers, rapid and misguided conclusions on worker efficiency, simplistic and inaccurate health surveillance and predictions of accidents that might happen, can all be used in extreme cases for termination of work contracts. This would suggest a misuse of worker surveillance and big data.

Commercial use of big data is already threatening personal integrity also in relation to the workplace. The lowering of personal integrity at work has been readily demonstrated in illegitimate monitoring cases, in the misuse and leaking of personal data. In the future, sustained electronic surveillance will increase the occurrence of such cases.

The use of big data for quasi-evaluations and predictions of workers' physical and mental health to assess their capabilities for certain work tasks is also a form of excessive surveillance invading individual space and may have implications for psychosocial well-being. Digitalisation can be used to relieve workers of boring routine work, but in-built hidden algorithms may be used to evaluate the user's (worker's) personalised "effectiveness" and "service-mindedness". The ways and means to monitor worker productivity and behaviour is developing quickly into sustained surveillance, for example through the use of wearables, image capturing and sensor technologies such as smartphone apps, smart watches and drones. Constant digitalised monitoring and performance evaluation, which the worker is unable to influence, is a clear source of stress negatively impacting the psychosocial working environment. Workers being incessantly informed of how their performance compares

with that of others — or possibly with that of machines — could experience pressure, anxiety or even low self-esteem.

Particularly in the platform economy, the worker is rated in terms of how satisfied the client is with the quality, quantity, and efficiency of the service. Such ratings determine not only whether the worker continues to receive work or is able to acquire reasonable compensation for the assignment. Customer ratings from clients in the platform economy leave workers very vulnerable and unprotected. Combined with new aggressive tools to hack institutional and personal computers, surveillance could be used to stalk and harass workers for example in service and educational sectors.



5.4 DIVERSE WORKFORCE

Nordic countries are facing a shortage of labour supply that will impact the efficient running of welfare systems in these countries. The share of people over 65 is increasing and various methods for extending work-life are on the table. The amount of people in vulnerable groups is growing. ²¹ Migrant workers in particular are much needed in the Nordic economies for maintaining a sustainable work-life. Additionally, young people should have better, easier and faster access to work-life after school. This all entails four generations, many nationalities, ethnicities, and cultures working together – with differences both in knowledge, experience and expectations vis-a-vis work-life and working environments.

People belonging to vulnerable groups should be able to participate in the labour market to a greater extent. People whose work ability is affected by an illness or injury can often return to work or remain in their job if appropriate modifications and flexibility is applied. Fortunately, there are a lot of effective ways that work and work-environments can be adapted and modified according to each worker's abilities and needs. ²² It is easier to modify the work, adjust the working conditions and work environment, and arrange alternative work than to regain the lost work ability. ²³ Varying work ability is thus a normal situation in all workplaces, and this will increasingly be the case in the future.

A diverse workforce with varying needs, characteristics and work ability in the Nordic countries is an imminent fact, and OSH (occupational safety and health) policies along with workplace accommodation need to ensure an inclusive, safe and healthy work-life for the diverse set of workers.

People whose work ability is affected by an illness or injury can often return to work or remain in their job if appropriate modifications and flexibility is applied.

 $^{^{21}}$ As an example, in the EU area, there will be 120 million people with disabilities in the year 2020.

²² Nevala N, Pehkonen I, Koskela I, Ruusuvuori J, Anttila H.: *Workplace Accommodation Among Persons with Disabilities: A Systematic Review of Its Effectiveness and Barriers or Facilitators*. 2015. Journal of Occupational Rehabilitation 2015; 25(2): 432-448. http://link.springer.com/article/10.1007/s10926-014-9548-z/fulltext.html

²³ Mattila-Wiro, Päivi, Tiainen Raija: *Involving all in work-life; Results and recommendations from the OTE key project 'Career opportunities for people with partial work ability'*. 2019. Reports and memorandums of the ministry of social affairs and health, Finland 2019:27. http://julkaisut.valtioneuvosto.fi/handle/10024/161516

5.4.1 Young workers

Generally, young workers have been shown to have higher risk of injuries, possibly due their lack of experience and knowledge in work-life.²⁴ As young persons are increasingly offered atypical and precarious work as part of the trend towards growing amount of precarious and platform work, the hazards are aggravated, and stable work and a living wage becomes less attainable.

A worker entering the labour market for the first time in her/his life is most likely a young worker, but also a "new worker". A young worker who is "new" on a job may not have the experience needed to perform the job and is therefore vulnerable to certain hazards – occupational accidents and diseases – more than other workers are. Importantly, young workers entering the workforce in the future will encounter technologies and forms of work that are quite different from their parents. The OSH (occupational safety and health) challenges that the young workforce of the future is bound to encounter remains an unknown and complex terrain.

Efforts have been made to integrate young people in work-life through different job bank experiments, work placements and apprenticeships. Despite these efforts, too many young people have not been able to gain employment. A significant number of young people do not attend secondary or higher education and are excluded from the labour market. The ever-changing needs of the labour market in terms of expertise has created challenges for young people moving into work-life after their education. Young people also suffer increasingly from mental health problems, partly due to insecure work and some of the young workers stay on disability pension due to mental disorders.²⁵

An obvious challenge for the LIs (labour inspectorates) is taking preventive action to prepare young people to enter the workforce right after school and offer appropriate professional help for integration to the labour market. Critically, better preventive approaches should be devised to keep young workers in safe and healthy environments.

²⁴ Hanvold Therese N. et al.: Occupational Safety and Health Among Young Workers in the Nordic Countries: A Systematic Literature Review. 2019. Safety and Health at Work Volume 10, Issue 1, March 2019, Pages 3-20. https://www.sciencedirect.com/science/article/pii/S2093791118301264

²⁵ Nordregio: *From Migrants to Workers, International migration trends in the Nordic countries*. 2018. https://www.nordregio.org/publications/from-migrants-to-workers-international-migration-trends-in-the-nordic-countries/

5.4.2 Migrants workers

Migration continues to be a reality for the modern world, including Nordic countries, because of globalisation, climate change and conflicts. Migrant workers are often found in low-paid, high-risk sectors and are overrepresented in precarious work and undeclared work. It is fair to say that most migrant workers often are employed in industries characterised by a poor work environment. This might be the case on purpose or by design, since jobs in manual occupations such as cleaning tend to be both hazardous and poorly paid.

Consequently, there has been a gradual shift of occupational risks from Nordic workers to migrant workers in certain sectors like construction and cleaning in the Nordic countries. Unfortunately, much of the data globally and in Europe indicates that migrant workers have a higher risk of injury at workplaces compared to host-country workers. ^{26,27,28} This is therefore not uniquely Nordic, but is rather a global phenomenon fuelled by globalisation and precarious working arrangements.

There are critical issues to be addressed with regard to the inclusion of migrant workers in the labour market. Workers who voluntarily settle in the Nordic countries need the opportunity and infrastructure to be integrated into work-life, the culture and the society. The inability to provide such opportunities will lead to further marginalisation of migrant workers and likely push some of them into undeclared work because of the difficulty in acquiring living wages along with gainful, decent and legal employment.

The lack of language skills, the inability to understand cultural codes and, in certain instances, non-compliant employers will continue to create potentially hazardous working conditions for migrant workers. Such factors will make induction training and day-to-day safety guidance more challenging.

The combination of atypical work and emerging technologies such as platform work would make the situation of migrant workers more precarious in terms of their job security, social protections, health and safety. The trends towards precarious conditions of employment will further aggravate the risks to these workers.

²⁶ Sterud T. et al.: A systematic review of working conditions and occupational health among immigrants in Europe and Canada. 2018. https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-018-5703-3

²⁷ Biering K. et al.: *Work injuries among migrant workers in Denmark*. 2016. https://oem.bmj.com/content/74/4/235

²⁸ Samant Y.: Social dumping, health, and hygiene. 2015. https://www.researchgate.net/publication/284878991_Social_Dumping_health_hygiene_and_safety_Norwegian

The risks related to migrants are increasingly challenging the LIs' (labour inspectorates) ability to handle diversity in the workforce.

The combination of atypical work and emerging technologies such as platform work make the situation of migrant workers more precarious in terms of their job security, social protections, health and safety.



5.4.3 Women workers

Risk assessment at the workplace should aim at providing safe and healthy working conditions for all workers, including women and men, the disabled, the young and elderly, etc. However, there are some facts that require LIs (labour inspectorates) to take special actions to guarantee equal and safe working conditions for women in particular. The data shows that, in many ways, women and men are treated differently in workplaces and they face different kinds of risks based solely on their gender.

There are biological differences, differences in tasks, in working conditions and in how women and men are treated at the workplace. Such gender-based differences affect the measures that need to be taken to assess and control these hazards.²⁹

The exposure of men and women to physical risks differs markedly, pointing to sectoral and occupational segregation in the workplace. Men are more likely than women to suffer accidents at work. However, according to Eurofound, more women than men report exposure to adverse social behaviour. Women also suffer from mental health problems more than men do. Gender differences occur particularly in the rates of common mental disorders such as depression, anxiety and somatic complaints.

There has been an increase in workplace harassment, threats and violence during the last couple of years. Most people who are exposed to threats and violence at work are women, 32 and two out of three injuries at work due to threats and violence affect women. Most injuries at work due to threats and violence are among assistant nurses, care assistants and personal assistants. Social workers are among the most vulnerable occupational groups. This also concerns workers in schools and preschools. 33

In all Nordic countries, women do more part-time work than men. This can partially explain the gender-pay gap³⁴ but it also increases the psychological burden for

²⁹ EU-OSHA: *Women and safety and health at work*. https://osha.europa.eu/en/themes/women-and-health-work

³⁰ Eurofound: *Sixth European Working Conditions Survey*. 2015. https://www.eurofound.europa.eu/surveys/european-working-conditions-surveys/sixth-european-working-conditions-survey-2015

³¹WHO: Gender and women's mental health. https://www.who.int/mental_health/prevention/genderwomen/en/

See e.g.: https://www.arbetarskydd.se/arbetsmiljo/hot-och-vald-ett-konstant-problem-6976518
 Swedish Work Environment Authority. 2017. Threat and violence. Short work injury facts (in Swedish). Nr 3.

³⁴ OECD: Family Database LMF1.6: Gender differences in employment. 2019. https://www.oecd.org/els/soc/LMF_1_6_Gender_differences_in_employment_outcomes.pdf

women if the part-time employment is non-voluntary. ³⁵ Women are also underrepresented in top management positions in work-life. This is a fact that is true all over the world. ³⁶

Demographic changes include the growing number of elderly people, a big part of which are expected to live at home and are in need of home care. Home care is primarily performed by women, often under difficult working conditions with great physical and mental stress and time pressure. Working in other people's homes is very different from working in traditional workplaces and needs special attention. Women also face heavy musculoskeletal loads at their work, for example in health care, service sectors and cleaning. The burden of elderly care is bound to increase as we move into the future. Home care and nursing home care has to be much better prepared both in term of professional competence and OSH (occupational safety and health) protections to bear the amplified burden of elderly in the Nordic countries.

Gender-sensitive approaches to risk assessment and prevention should result in reduced risks to female workers. Although Nordic countries are doing exceedingly well in gender equality indicators, much more is desired in terms of gender parity in compensation, workload and gender-sensitive risk assessments.

Gender-sensitive approaches to risk assessment and prevention should result in reduced risks to female workers.

5.4.4 Elderly workers

There is a pronounced effort to prolong the work-life of elderly workers given the challenges of social security for newer generations and shrinking working populations. Elderly workers will form a substantial part of the workforce in the future. Elderly workers in some occupations have both the desire and ability to continue working past the official retirement age, whereas the physical and psychological stress in other occupations puts limits on full-time work, even before the official retirement age. The experience and tacit knowledge of elderly workers, if utilised to its full potential, is a resource for all workplaces. This is especially true if their experience could be applied

³⁵ According to Eurostat, the gender pay gap in Nordic countries was on average 14.1% in the year 2018. The lowest number was in Sweden (12.2%) and the highest in Finland (16.3%).
³⁶ The most recent figures from Finland: Ministry of social affairs and health. 2020. http://julkaisut.valtioneuvosto.fi/handle/10024/162163

in induction training of young workers, who experience a higher risk of accidents during the first working years.

There is unfortunately some reluctance to employ elderly workers as they are seen to have less career development potential and fewer years left in their working career. However, the family situation of elderly workers often allows more flexibility compared to younger workers and the experience of elderly workers can compensate for the agility of younger workers.

Although the health of the elderly in general is improving, the fact remains that non-communicable diseases like diabetes and hypertension among the elderly is still a major factor for morbidity. Given that the elderly may have one or multiple health morbidities, they would certainly be a risk group in a range of occupations just due to their age. Hearing, vision and cognitive skills start gradually declining and therefore the risks of an accident or long-term sickness absence because of work-related exposures remain imminent. Moreover, there are issues related to a lack of sleep, muscular strength and thermoregulation that evolve with age and may have OSH implications for elderly workers.

Integration of elderly workers can be achieved by assigning suitable tasks corresponding to their experience, physical and mental capabilities through workplace adaptations. Flexibility at work can lessen the risk for injuries by taking into account the physical characteristics of elderly workers. The future of work with new technologies and creative ways of organising work is bound to challenge the ageing workforce. Adaptations and flexibility accounting for individual characteristics of the elderly and inclusive policies at workplaces will enable the elderly to realise a productive, healthy and long work-life.

5.5 EMPLOYER AND WORKER RELATIONSHIPS

Various types of precarious work contracts or work relations, such as the zero hour contract, on-demand contracts, various platform arrangements, forced/fake entrepreneurship or self-employment, etc. are causing a blurring of the employer-worker relationship, including issues related to tax and social security payments, avoidance of OSH responsibilities and related labour law requirements.

Fragmentation of work organisation and avoidance of OSH responsibility has grave implications for the work environment. When the roles of employer and worker are

changing, people have to manage their work themselves. The organisation of work and control over work, working-time, work procedures etc. are transferred from the supervisors to individual workers. Even the risk assessment and risk control can be transferred from the traditional employer or supervisor to individual workers.

Furthermore, as the mandate of LIs (labour inspectorates) is based on a clearly delineated employer-worker relationship, it contributes to the needs to reformulate the labour legislation to avoid persons doing the same work with differing contracts to be treated unequally. LIs typically regulate a trade sector based on the risks that are inherent for that sector. This problem can be elucidated by the new platform-based work, which seems hidden in the traditional trade sectors. For example, a digital platform-based taxi service may classify itself as a transport service, which is correct. However, it might be inappropriate to apply the same regulations for regular taxis and platform-based taxis because of how the work and the workers are organised. The same is true for other platform-based work, which operates within traditional sectors like food delivery, plumbing, cleaning, and similar trades. Consequently, future regulation of such sectors might require a more nuanced approach to cope with inherently different risks for platform and non-platform workers within the same trade sector

LIs have dealt with workplaces with single employers and clearly defined employer-worker relationships. New forms of work combined with digital technologies is challenging LIs' traditional methods and tools to address OSH risks. The LIs therefore need to sharpen the tools to monitor and capture both the extent and nature of atypical work in work-life. The attempts to blur the role of employers poses a legal challenge for LIs as the legal mandate even today is mostly based on a clearly defined employer-worker relationship.

Fragmentation of work organisation and avoidance of occupational safety and health responsibility has grave implications for the work environment.

5.6 TRIPARTISM

The same developments that are changing employer-worker relationships (rise in precarious work contracts, forced entrepreneurship, fake self-employment) are decreasing the amount of trade union membership and weakening tripartism. To some extent, this trend can be beneficial for some employers. However, there is evidence suggesting that the lack of unionisation of workers and the lack of organisation among employers hampers tripartite processes to ensure safe and healthy working conditions. Such consensus-based tripartite processes have been fundamental for better worker protections, effective regulations and a productive work-life. In fact, tripartism is a cornerstone and a uniquely Nordic approach to work-life. Cooperation with social partners, or tripartism, continues to be crucial for ensuring safe and healthy working conditions.

The steady fall of unionisation in some Nordic countries points toward an increase in individual incentive-based agreements, which will foster individualisation of contracts, compensation and OSH (occupational safety and health) risks. These developments clearly hamper Lls' (labour inspectorates) ability to work together with social partners to identify and address OSH problems through a consensus-based tripartite process.

The increase of such precarious work contracts where the role of the employer is blurred is further challenging the traditional tripartite arrangement for improving working conditions. It also brings new stakeholders to the tripartite or multipartite mechanism aiming to provide adequate working conditions.

There are groups of workers who do not have a voice in employer-worker cooperation, such as platform workers, freelancers, migrant workers and the self-employed. There is also a significant increase in micro-enterprises who also lack a voice in the tripartite process. The lack of representation in the tripartite process leaves these stakeholders vulnerable to OSH risks.

The LIs traditional approaches to tripartism are under duress as a result of new and emerging work-life. New ways and means to engage with the new stakeholders is desired. Direct communication between LIs and new stakeholders are critical, though they do not diminish the need for effective traditional tripartism. While maintaining traditional tripartism, increased cooperation with self-employed, digital and globalised partners (organisations) can assist in increasing awareness of the social and economic benefits of safe and healthy working conditions.



5.7 PRECARIOUS WORK AND ATYPICAL WORK

The free movement for labour and capital in Europe, which includes the Nordic countries, is a useful and productive policy for European citizens. However, this freedom is fostering new ways of organising work, "creative" contracts and compromising sound OSH (occupational safety and health) paradigms in which employers have the OSH responsibility.

At least in the Nordic countries, permanent jobs have been a hallmark of work-life, but this is bound to change in the coming years and decades. We are already witnessing growth in the work offered by temporary agencies in certain sectors like construction where several enterprises, including the self-employed, are involved in separate phases of building projects.

While recognising that employment contracts and fixed workplaces are still dominant in work-life, a worrying trend is the rise of atypical work. Even more troubling is the advent of precarious work, vaguely defined work sites and the complex organisation of work. To some extent, precarious work and atypical work are seemingly overlapping concepts, but essentially both have negative implications to varying degrees on OSH.

An extreme form of an atypical work contract is the zero hour contract where the employer can call in the workers at any time or not at all. This may become the norm in the platform economy. This is the digitalised equivalent of the practice of day-hiring labourers at the corner and nooks along the road from the early 1900s, which in all likelihood would be called precarious work today given the lack of stability along with social and health protections offered to these workers.

An atypical worker can have more than one employer because s/he may be employed through a temporary agency that hires out workers to companies across Europe. The responsibility of companies in different countries is not understood in a uniform manner, especially with regards to OSH responsibilities. These developments are likely to continue in the future, creating a further fragmentation of OSH protections in the case of atypical work.

Part-time work has been gradually increasing in recent times.³⁷ Part-time work does not necessarily offer job security or a steady income, but rather incomplete OSH and

³⁷ Statistics Finland: *Part-time and fixed-term employment*. 2020. https://findikaattori.fi/en/53

social protections in some cases. Nevertheless, digital tools, the internet and platform technology can, by interacting with a globalised labour market, provide benefits like extra income and flexible work hours when performed as voluntary work for students, low-income groups, and others.

Employers increasingly favour part-time employment relationships due to their desire to balance out seasonal fluctuations in the need for labour. The use of part-time employment relationships varies by industrial sector and is much more common among women than men.

The tendency to avoid employers' duties and payment of social dues is seen in forced entrepreneurship and fake self-employment within the realm of precarious work. This distorts the level playing field and puts a higher burden on non-voluntary workers and the self-employed. Such developments are fostering undeclared work and further compromising the OSH of vulnerable workers. In the worst cases, workers can lack collective bargaining agreements, social insurances, a steady income, employment stability and a future pension.

There is also a legitimate concern among young workers that employment in recurrent temporary contracts will become the new "normal". This manifests itself in low expectations of permanent work contracts or paid holidays and an unsecure future pension.

The evidence for OSH risks vis-a-vis atypical and precarious work in Nordic countries is not yet conclusive, but there are nonetheless strong indications that suggest that temporary work is associated with higher OSH risks. ³⁸ It is not only the temporary nature of the employment but rather the constant temporariness of the work/task that might contribute to enhanced OSH risks. Persistent precarious work, constant temporariness and a lack of regular income causes, in addition to an uncertain life situation, psychosocial stress for the worker and the family, disrupting their health and work-life balance.

It is not only the temporary nature of the employment but rather the constant temporariness of the work and work tasks that might contribute to enhanced occupational safety and health risks.

³⁸ EU-OSHA: *Temporary workers*. 2013. https://oshwiki.eu/wiki/Temporary_Workers

5.8 UNDECLARED WORK

Undeclared work is any work that is lawful by nature but not declared to the relevant public authorities. It is often known informally as 'cash-in-hand' work and is common in sectors such as construction, agriculture, childcare, and in hotels, restaurants and cafés (HORECA). By some estimates³⁹, it accounts for 15% of the EU (European Union) economy and is considered a significant challenge in the Nordic countries as well.

Globalisation and migration are drivers that directly influence undeclared work. Globalisation enables the free flow of labour (migrant labour), services and capital in the EU region, which is positive. However, there are also costs that affect the most vulnerable in the shared work market. Undeclared work often entails low pay (usually below the statutory minimum wage), excessive or irregular working hours; OSH (occupational safety and health) hazards, poor or unsafe working conditions and a low quality of work; a lack of employment rights, such as to holiday and paid sick leave; a lack of access to pensions and unemployment benefits; less job security and fewer opportunities to upskill or find a formal job.

Digitalisation and new types of technology facilitates consumers' access to services such as carpentry, painting, plumbing etc. and for workers to gain employment opportunities. However, such working arrangements also often mean cash-in-hand payments and that other essential elements, such as health and safety, are overlooked. This is often the case when already-vulnerable people such as asylum seekers and undocumented refugees are exploited as cheap labour and exposed to hazards without protection.

From undeclared work via the shadow economy to work-life criminality, there is an accelerating exploitation of people and other problems like tax fraud and bogus self-employment. To combat all of this, prevent OSH hazards, safeguard our joint welfare and protect the workers, the work must be undertaken by different authorities and organisations with different sets of tools.⁴⁰

³⁹ European Commission: *An evaluation of the scale of undeclared work in the European Union and its structural determinants: estimates using the Labour Input Method.* 2018. https://op.europa.eu/en/publication-detail/-/publication/8c3086e9-04a7-11e8-b8f5-01aa75ed71a1/language-en

⁴⁰ OSH is not within the scope of European Labour Authority (ELA) but it is well known that undeclared work usually is performed under very poor OSH standards.

5.9 WORKPLACE WELL-BEING

Workplace well-being relates to all aspects of work-life: the quality and safety of the physical environment; how workers feel about their work, their work environment, working-time arrangements and work organisation; and maintaining a healthy work-life balance. According to the World Health Organization (WHO), a healthy workplace is one where workers and managers collaborate to continually improve the health, safety and well-being of all workers, and by doing this sustain the productivity of the business. Workplace well-being has largely been linked directly to increasing the productivity of workers. ⁴¹

Workplace well-being complements OSH (occupational safety and health) measures to make sure workers are safe, healthy, satisfied and engaged at work. Workplace well-being is therefore an overarching concept that includes both traditional OSH aspects including psychosocial and organisational factors as well as measures concerning return-to-work and work ability.

The main drivers described at the beginning of this report and the changes they introduce to work and work-life challenge the workplace well-being for all workers. As an example, certain new and disruptive technologies cause workers to be in constant fear of job loss, automation of some highly cognitive jobs, and mobile technology, while the Bring Your Own Device (BYOD) mentality causes many workers to overengage with work and have less free time – leading to the 'always online' culture. This can lead to permanently high levels of alertness, and an inability to relax when away from work – in other words, a perpetually stressed state of mind. These circumstances have adverse effects on psychological and physical health, including well-being.

Furthermore, despite improved technological assistance in health care, the increase of the ageing population, the increase in the numbers of patients and the demand of individual care is adding to the time pressure of the workers and compromising their well-being. This is also true for workers in service sectors like restaurants and cleaning where technology has improved efficiency but has likely compromised worker well-being because of increased reporting requirements and constant digital surveillance.

All these issues together need more attention and investment with regard to workplace well-being. To address these issues comprehensively, employers and LIs

⁴¹ WHO: Healthy workplaces: a model for action For employers, workers, policy-makers and practitioners. https://www.who.int/occupational_health/publications/healthy_workplaces_model_action.pdf

(labour inspectorates) must possess the skills and competence to address issues not only with the physical contours of the workspace, but also with emotional management at workplaces.

Healthy workplace is one where workers and managers collaborate to continually improve the health, safety and well-being of all workers, and by doing this sustain the productivity of the business.



5.10 WORKING-TIME

Given technological progress, production of goods and service is not tied to a physical workplace anymore and even less so in the future. Services are produced either in an office without a fixed place, in a home, in a train (commuting from one place to another) or in any location in the world where a person might find herself or himself. This also translates into no fixed working-times/days. The same can partly be applied to jobs in the platform economy, the renting economy, and other sectors.

The ESENER-3 report⁴² indicates that a large part of workers work from home on a regular basis (Denmark 25%). The COVID-19 pandemic has increased distance work and is likely to substantially increase it in the near future. A Eurofound report notes that, on average, people working from home (telework) are working more hours than workers who do not work from home.⁴³

The organisation of work and, to some extent, the control over work – including, for example, the ability to make quick and independent choices involving potential risks – have largely been transferred from supervisors to the workers themselves because of enabling digital technologies. In a sense, there is a pulverisation of the traditional OSH (occupational safety and health) responsibilities, but safeguarding OSH still is the employers responsibility.

Flexible working hours are part of the work anywhere/anytime dynamic and, if applied correctly, it could enhance worker well-being and work-life balance. Flexible working arrangements can be positive because it allows workers to adjust their working hours according to their own needs. It might well provide more work-life balance. However, some of these working-time arrangements blur the lines between traditional distinct spheres of personal and professional life.

The possibility to work anytime and anywhere due to new technology could potentiate work-related stress when personal life gets intricately intertwined with professional life. The intrusion of work emails and other professional work during family time — enabled by smart phones and tablets present in the middle of family space (living rooms and bedrooms) — certainly has implications for the psychosocial health of the workers, but also might put a strain on family relationships. This may result in work

⁴² EU-OSHA: Third European Survey of Enterprises on New and Emerging Risks (ESENER 3). 2019. https://osha.europa.eu/en/publications/third-european-survey-enterprises-new-and-emerging-risks-esener-3/view

⁴³ Eurofound: *COVID-19 unleashed the potential for telework – How are workers coping?* 2020. https://www.eurofound.europa.eu/publications/blog/covid-19-unleashed-the-potential-for-telework-how-are-workers-coping

overload and stress, and negatively affect health, family life, leisure time and social life.

Work, especially desk work aided by modern technological devices, can become endless, with no limits, inconvenient working hours, and constantly being 'on call'. This is not a healthy proposition in the long-term. Reported risks relate to ergonomics and isolation, intensified work, stress and family conflicts. Work is now both boundless and borderless, cutting across continents and the confines of national regulations, including working-time regulations. Moreover, there is an increased risk of non-communicable diseases linked to excessive working hours and particularly shift work suggesting that employers should consider how to better manage the demands of balancing work and the family life of all workers.

In a sense, the very technologies that provide flexibility are the ones that might create a conundrum in the work-life balance, placing pressure on both personal and professional relationships.

5.11 OPEN PLAN OFFICES

Open plan offices have been around for a long time, and the transition from a manufacturing to a knowledge-based economy has only promulgated this development. The idea of open offices has been popular because of the economic savings deriving from the effective use of space, and the possibility of increased interaction between workers improving productivity. The economics of the open plan office is not debatable as cost savings on rental property are significant if more people can be accommodated in much lesser space.

However, the science on productivity is far from conclusive, as it really depends on the type of work one is doing, not to mention individual preferences or differences among the workers. Recent research suggests that the use of open offices or shared plan offices is a risk factor for medically certified sickness absence. A study in fact concluded that providing employees with the opportunity to work in cellular offices may reduce sickness absence rates.⁴⁵

⁴⁴ STAMI: Arbeidstid og helse. 2014. https://stami.brage.unit.no/stami-xmlui/bitstream/handle/11250/2411025/STAMI-rapport-nr-1-2014.pdf?sequence=1&isAllowed=y
⁴⁵ Nielse M, Knardahl S: The impact of office design on medically certified sickness ab-sence.
2020. https://www.sjweh.fi/show_abstract.php?abstract_id=3859

Open and shared office plans may not be as cost-effective as originally suggested. In fact, in some cases the risk of sickness absence would mean that these solutions are economically inefficient for the workers, employers and society given the total costs of health problems and higher absence rates among the workers. Moreover, there is research suggesting that the more people working in a single open space office, the lower their sense of well-being.⁴⁶

The recent COVID-19 pandemic has only prompted further debate in terms of space efficiency, productivity and OSH (occupational safety and health) risks by adding a new dimension pertaining to the prevention of contagious infections at workplaces. The particular issue of a home-based office in relation to the pandemic is addressed separately in more detail in section **5.15**.



⁴⁶ Otterbring T et al.: *The relationship between office type and job satisfaction: Testing a multiple mediation model through ease of interaction and well-being.* 2018. https://www.sjweh.fi/show_abstract.php?abstract_id=3707

5.12 NON-COMMUNICABLE DISEASES AT WORK

There is increased recognition of the links between safety and health at work and the cause and prevention of psychosocial disorders and non-communicable diseases – such as hypertension, cardiovascular disease, gastrointestinal disorders, diabetes and other leading causes of mortality⁴⁷. Over the past few decades, non-communicable diseases (NCDs) have been responsible for the majority of the health burden in Europe, including the Nordic regions, and worldwide. Poor health fundamentally limits opportunities for people to transform their functional capabilities into social and economic activity – and it especially impacts their work ability.

Among a long list of NCDs, cardiovascular disease and cancer have become the most common causes of premature death and the main cause of disability in the European region. Other NCDs, such as diabetes, depression, and musculoskeletal disorders, have also taken a toll on workforce participation and labour productivity, and have more generally undermined quality of life – particularly in later stages of life.

Traditionally the focus of the LIs (labour inspectorates) has been on prevention of accidents and protection against hazardous chemicals. Chemicals and carcinogens attribute to work-related cancers. That is something the LIs will continue working on since the largest proportion of work-related fatalities are still attributed to work-related cancers. The LIs will continue their efforts to prevent NCDs such as psychosocial and musculoskeletal disorders and rightfully so, as major challenges today as they impact sickness absenteeism and burden the social security system.

Nordic countries have been pioneers in tobacco prevention at workplaces which essentially is a lifestyle factor⁴⁸. In that sense we have tackled issues of noncommunicable diseases like cancers attributed to tobacco smoking (second-hand smoke) in an effective way. Despite the success of tobacco campaigns, chronic diseases attributed to lifestyle, like diabetes, and hypertension, have conventionally been outside the sphere of workplace preventive strategies. For example, in Norway there is data indicating that among others professional drivers have a much higher incidence of being treated for cardiovascular diseases than other occupations.⁴⁹

⁴⁷ ILO: Safety and Health and the Heart of the Future of Work. 2019. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms 686645.pdf

⁴⁸ Hakala K, Waller M, editors.: *Towards Smokefree Societies*. 2003. Copenhagen: Nordic Council of Ministers. Nordic Tobacco Control

⁴⁹ NOA, STAMI: Cardiovascular disease evaluation among 37-46-year-old patients by occupation. 2013. https://noa.stami.no/tema/helseutfallarbeidsskader/sykdom/hjertesykdom/

Direct attribution of cardiovascular diseases to the workplace is difficult to prove in terms of causality, but there is certainly an association. But there is little focus on workplace health promotion to prevent cardiovascular disease among drivers. This lack of focus on workplace health promotion is not necessarily only true of Norway, but conceivably also for the other Nordic countries.

Increasingly the literature is referring to overlap between lifestyle, workplace and cardiovascular diseases, hypertension, obesity and diabetes. At least in parts some of these morbidities are attributed to work and could be prevented. This could be achieved through workplace interventions in terms of more physical activity, access to healthier food options and occupational health services advise to employer on how the risk for example, cardiovascular diseases could be mitigated with system-level health promotion interventions at the workplace.

New technologies and globalization have led to a decrease in manual labour (less physical activity at workplace) and a concurrent increase in sedentary work (desk jobs). Sedentary work is likely to increase even more given automation of jobs and the concurrent outsourcing of manufacturing (manual jobs) to other parts of the world. In fact, sedentary work has been around for a while, but this development should be seen as an emerging trend with the growth in both professional and private use of screen time. Screen time could have significant effects on vision, body posture and ergonomics leading to musculoskeletal disorders and a negative impact on psychological and physical health. Sedentary work also translates into less physical activity and will add to the total burden of non-communicable diseases at the workplace.

The confluence of occupational safety and health, and workplace health promotion seems imminent given the developments in work-life, and the costs incurred by NCDs in the general population. The LIs certainly need to be cognizant of these developments and better prepare to adapt to this evolving scenario. LIs will have to deal with prevention of NCDs such as hypertension, diabetes and obesity as part of the broad working environment challenges.

The confluence of occupational safety and health and workplace health promotion seems imminent given the developments in work-life, and the costs incurred by non-communicable diseases in the general population.

5.13 POLARISED WORK-LIFE AND OCCUPATIONAL HEALTH INEQUALITIES

The link between socioeconomic status and health inequalities is partially attributed to working conditions including forms of employment. ^{50,51} In a future of work context among other factors, both technological development and a diverse workforce (migrants, women workers) could fuel polarization of the labour market and the consequent rise in occupational health inequalities. As an example, a technologically enabled worker will be capable of skilfully navigating the digital terrain for acquiring more jobs and securing positive reviews from customers. Conversely, a digitally less skilled worker is bound to lose out on digitally administered work such as those ordered through digital platforms. This will give better income opportunities to the digitally enabled worker, while concurrently will lead to loss of income, or even job loss for those workers who are less enable in terms of digital skills.

Disruptive technologies such as the platform economy will lead to the gradual erosion of skills and job losses for low-status non-tech workers. For example, traditional cleaning workers unable to adapt to acquiring jobs through platform technology will likely be thrust into precarious jobs with even lower wages and non-existing or tenuous OSH (occupational safety and health) protections. In the long run such developments will polarize not only wages but also employment conditions in the cleaning sector. Subsequently this will impact physical and psychological health of certain groups in the working population attributing to occupational health inequalities ⁵². Therefore, workers now and, in the future, will need constant upskilling and education to remain competitive and secure gainful employment in a digitally driven work-life.

The occupational health inequalities in the Nordic and European context are perhaps better analysed in terms of the diverse workforce, and specifically in relation to migrant workers. We already have systematic overview from a Nordic study implying that migrant workers sustain more injuries compared to native workers suggesting unequal exposures and outcomes confirming occupational health inequalities in the

⁵⁰ Bench J et al.: Employment, Work and Health Inequalities: A Global Perspective. 2013. https://www.researchgate.net/publication/265777111_Employment_Work_and_Health_Inequalities A Global Perspective

⁵¹ Mehlum I.: Betydningen av arbeidsmiljø for sosiale ulikheter i helse Underlagsrapport til Sosial ulikhet i helse: En norsk kunnskapsoversikt. 2013. http://www.hioa.no/content/download/58380/915131/file/Mehlum%20Betydningen%20av%20arbeidsmilj%C3%B8%20for%20sosiale%20ulikheter%20i%20helse.pdf

⁵² Giammarioli AM.: *Working Conditions and Health Inequalities*. 2019. https://www.intechopen.com/books/safety-and-health-for-workers-research-and-practical-perspective/working-conditions-and-health-inequalities

labour market ⁵³. In fact, data from Norway suggest that majority of cleaners sustain more hazardous exposure at work and are at the bottom end of life expectancy compared to other occupations. ^{54,55} It is migrant workers (migrant women) who constitute the majority of cleaning workers in Norway. The inequality in occupational health outcomes attributed to occupation, gender and immigration status is not necessarily a Norwegian trait but has been seen in other studies as well.

Skills training might be something the LIs could be obligated to consider as a significant number of traditional low-status workers in certain occupations will face a real threat of job loss in the future due to deskilling, and consequently a polarized labour market. Social dumping, undeclared work and work-life criminality are all manifestations of a polarized labour market. Exclusion of workers from decent work and fair wages will only catalyse the polarisation of the workforce, and exacerbate the occupational health inequalities between the haves, and have nots of the labour market.



⁵³ Sterud T.: *Arbeidsmiljø og helse blant innvandrerpopulasjoner.* 2019. https://norden.divaportal.org/smash/get/diva2:1282148/FULLTEXT02.pdf

⁵⁴ Vrålstad S.: *Levekår blant innvandrere i Norge*. 2016. https://www.ssb.no/sosiale-forhold-og-kriminalitet/artikler-og-publikasjoner/_attachment/309211?_ts=160ea9e4890

⁵⁵ Borgan JK et al.: *Levealder i Ulike Yrker*. 2016. https://www.ssb.no/befolkning/artikler-og-publikasjoner/hoy-utdanning-og-godt-arbeidsmiljo-bidrar-til-et-langt-liv#:~:text=N%C3%A5r%20inndelingen%20i%20NOA%2Dgrupper,leger%2C%20tannleger%2C%20farmas%C3%B8yter%20m.

5.14 PANDEMICS

Because of globalisation, the world is more interconnected and interdependent than ever before, pandemics are likely to occur more often now than before. Pandemics now and in the future will remain a potent threat because of the rapidly changing environment affecting the flora and fauna, which in turn impacts the survival and spread of pathological organisms. The plausibility of rapid transmission of infections across the globe is significant given the extent of travel and logistics today and in the future. In fact, pandemics seem to be the unintentional outcome of the very drivers of the future of work, namely globalisation, technological change and climate change.

Pandemics are bound to have a lasting impact on the world of work in general and OSH (occupational safety and health) in particular. Unemployment, loss of income and income inequalities will intensify in such a scenario as countries and continents will lock down businesses and travel as much as possible.

But some workers will continue to be employed and perform their duties even in such crises, such as workers in health care, emergency response, law-enforcement, cleaning services, retail trade and other essential services. These workers will be exposed to disproportional risk of hazardous biological exposure compared to other workers during pandemics. Within these groups of workers, health workers are clearly the front-line and the challenge with regard to OSH would be developing and implementing preventive strategies in tandem with the phases of the pandemic.

The development and implementation of preventive strategies remains a tough task because in a pandemic, knowledge evolves and changes very quickly, especially in the initial phases. Uncertainty regarding the transmission of infections and effective preventive strategies could create hazardous situations for the workers.

A case in point is the COVID-19 pandemic, which took some time to be recognised. Even after being recognised, countries applied diverse strategies based on their understanding of the available knowledge. From an OSH perspective, there are several pressing issues during a pandemic, but we will only address some critical issues for the sake of brevity. An enduring problem has been availability or lack of PPE (personal protective equipment), and more so the correct type of PPE to provide adequate protection from hazardous biological material (COVID-19 virus).

The pandemic is revealing aspects of the lack of preparedness where the global community is likely unable to provide adequate protection for health workers. This is a logistical supply-chain issue rather than just a "knowledge issue" of deliberating the science behind transmission and adequate PPE. The challenge is the inability to

produce the volume and quality of PPE needed in a short amount of time. Pandemics now and in the future are bound to put enormous strain on supply lines of PPE and other safety equipment that are required to adequately protect the workers in such situations. Given the lack of PPE, pandemics could have grievous consequences for the health workers in Nordic countries and globally.

Another challenge with pandemics is the fact that market surveillance must facilitate quicker assessments to approve PPE produced by new companies in the EU (European Union) region so that an uninterruptable supply of PPE is maintained. This is a commendable aim, but it could potentially mean a lowering of quality standards and hence compromise the protection of workers. Many workers buy PPE privately as the employers are unable to provide the necessary PPE because of the acute shortages. This has again led to an adverse development in the times of the pandemic, as the lack of PPE has also given impetus to the production of contraband PPE. This provides a false sense of security to workers who have secured such gear from internet-based providers.

These facets of the pandemic situation illustrate that in times of global crisis, the protection of workers could be compromised in the event of an inferior product getting approved by the authorities or the worker themselves buying PPE privately without verifying its authenticity. Thus, market surveillance of PPE and other safety equipment remains an area of critical concern for OSH in times of pandemics.

LIs today are far from equipped to handle situations of this magnitude, and their pandemic preparedness is likely an area that needs both more attention and investment moving forward.

Pandemics seem to be the unintentional outcome of the very drivers of the future of work, namely globalisation, technological change and climate change.



5.15 WORK FROM HOME OFFICE

The pandemic has also fast-tracked the world of work into the future because it has unintentionally escalated the use of digital tools and increased the use of home offices exponentially. Risks that likely applied to a smaller population of workers in 2019 are now something that a large part of the working population is experiencing.

Working from home is the right measure to prevent community spread of infections, but it challenges employers and workers with regards to risk assessments. This especially concerns the mitigation of psychosocial and organisation risk factors while working from home. Working alone, ergonomic adjustments, long working hours, inability to log off from work and imbalance in work-life causing strains within the family relationships are some of the issues that may impact the health and safety of workers. Although many of these issues are known OSH (occupational safety and health) challenges, it is the magnitude of this problem that present a challenge in times of pandemics to the LIs (labour inspectorates).

Particularly, the idea of moving workers permanently to home office set-ups might gain more traction as it will save valuable resources spent on rent. It might also be a preferred way of working for many workers who desire more flexibility for a variety of personal reasons (childcare, long commutes, work ability etc.). As the risks of home work are well known, the LIs need to follow closely what this might entail in the long run for OSH and work-life balance for the workers, and the employers' OSH responsibility in the workers' private homes.

5.16 ENVIRONMENTAL AND CLIMATE CHANGE

There are at least two distinct ways that the changes in the environment and the climate impacts OSH. Firstly, climate change and environmental degradation together will lead to more natural catastrophes (floods, landslides) which will require a range of workers to respond to such emergencies. Workers such as firemen, rescue workers and emergency responders will be exposed to such situations at higher frequencies than before. Thus, the extent of physical and psychological hazards that these workers may sustain will rise.

Cold work environments are a reality in Nordic countries for outdoor workers like construction workers, fishermen, road maintenance workers and farmers. Climate change exacerbates the number of extreme cold days. Climatic change is also inducing temperate weather in northern regions of the world, including the Nordic countries. It has been suggested that changes in the climate in the northern regions

are creating conducive environments for pathogenic organisms. For example, tick distributions are closely linked with the climate, and there is a growing concern that tick-borne diseases such as Lyme disease and tick-borne encephalitis will increase in Northern Europe.

While the relationship between the new coronavirus and climate change are tenuous at best, a change in climatic conditions will accentuate the emergence of other novel infectious diseases leading to pandemic in the future. Pandemics and OSH (occupational safety and health) have been dealt with as a separate issue in section **5.14** of this report.

Secondly, the emphasis on reduction of carbon footprints is leading to a gradual increase in green technologies and the emergence of a circular economy. Green jobs are not necessarily hazardous, but the use of new ways of working or new materials have the potential to negatively impact safety and health. Solar panels, wind energy, energy-efficient houses, a greater emphasis on recycling and electrical cars are some of the sectors where workers are likely to be exposed to health hazards.

One of the strategic responses to climate change is the growing emphasis on a circular economy. A circular economy includes a range of issues, but recycling, remanufacturing, refurbishment and reuse of products and components in particular may directly have a bearing on OSH. Occupational injuries and accidents, along with hazardous exposures, are well documented in this industry. Certain materials that are recycled or reused, such as scrap metal, electronics, batteries, used oil and other chemicals, directly pose hazards to workers. In addition to those hazards, there are some hazards that are common across various types of recycling, such as traffic safety, moving machine parts, unexpected machine start-up, lifting injuries, and slips, trips, and falls. Given the growing emphasis on recycling as a core element in the circular economy, one may find a definite increase in injuries and disease attributed to exposures at work in the recycling industry.

In general, these health and safety conditions related to climate change and the environment will change workplaces fundamentally. LIs (labour inspectorates) have traditionally been able to address issues of outdoor workers or emergency responders as some of the hazards in these occupations are known. However, the relationship of climate and environmental change with regards to OSH challenges is not necessarily clear for LIs.

6 Scope and challenges for the Nordic labour inspectorates

The LIs (labour inspectorates) in the Nordic countries are more alike than they are different in their scope of work, but some salient differences in their mandates remain.

Essentially, improving the work environment and addressing OSH (occupational safety and health) concerns remains at the core across the Nordic Lls. However, there are nuances in their approaches and in the target groups between the countries. Moreover, in Denmark, Norway and Sweden, there is considerable emphasis on issues related to undeclared work, which is comparatively limited in Iceland and Finland. Similarly, Finnish authorities emphasise the social well-being aspects in work-life to a greater extent than the other Nordic countries.

Another difference is the efforts that concern the reduction of sickness absenteeism. In Norway, Sweden, and Denmark these efforts seem to have a larger emphasis on improving the working conditions that may potentially reduce sickness absenteeism in the long run. However, though not all Nordic LIs are as heavily invested in the reduction of sickness absenteeism, the intention is however very much in place.

The Nordic LIs typically apply tried and tested methods developed over a century to ensure OSH compliance, which mainly include physical and postal inspections including guidance related activities. The inspections typically follow a risk-based approach across the inspectorates. The efforts are targeted towards a workplace and largely based on a clear employer-worker relationship in a limited geographical area governed by national OSH regulations. The Nordic LIs all have a tripartite council where the social partners are represented, and they try to resolve challenging OSH issues based on consensus.

The traditional approaches for LIs' operations are becoming tenuous with rapid changes in work-life, employer-worker relationships, the globalised workforce and businesses models, and technologies that are evolving at a pace far beyond that of the development of robust OSH regulations. The myriad of contemporary OSH problems is already challenging the traditional models and approaches of the Nordic LIs. It would be fair to say that the resources across the Nordic LIs are somewhat limited, while the demands for more effectiveness and inculcating a broad range of competencies seems to be ever increasing. Together these concurrent developments are certainly burdening the operations of the Nordic LIs.

Traditionally the Nordic LIs dealt with physical, chemical, biological and psychological exposures that were identifiable in a delimited geographical and physical space. Thus, actionable preventive efforts using traditional inspection methods were plausible. The future of work brings into play virtual and digital space, algorithms and means of production and services that go far beyond national borders challenging LIs traditional ways of ensuring compliance.

It seems that the traditional processes of LIs will remain relevant also in the future. However, new ways of regulating, communicating and developing consensus-based policies with stakeholders are inevitable if LIs are to remain relevant, robust institutions for ensuring a safe and healthy work-life.

The future of work brings into play virtual and digital space, algorithms and means of production and services that go far beyond national borders challenging labour inspectorates' traditional ways of ensuring compliance.



7 Recommendations

The recommendations are closely linked with each other and at times overlapping. However, the organisation of the recommendations below has been chosen by the authors for the purpose of clarity and precision. We start with some general recommendations, and then provide specific recommendations for future actions.

7.1 General recommendations

- Develop and evaluate new methods and legal frameworks for inspectors to reach out to web-based work including work organised through a digital interface. For example, video-based real time inspections and guidance.
- Use new technology (virtual reality, video and drone technology) to enhance the competence, efficiency and impact of labour inspections as well as the safety and health of inspectors.
- Enhance better utilisation of new technologies such as machine learning, big data and Geographical Information Systems to target businesses for riskbased inspections.
- Increase the visibility of LIs (labour inspectorates) on digital fora and social media by providing tools, resources, and training to inspectors in on-line communication.
- Utilise social media influencers to communicate OSH (occupational safety and health) messages effectively.
- Develop approaches that account for the diversity of gender, age and culture while addressing OSH problems.
- Consider strategic collaboration between LIs and agencies of data protection, environmental, food hygiene, emergency preparedness and public health on issues related to the future of work and OSH.
- Strengthen research institutions by supporting funds for future of work and OSH projects that would yield knowledge for LIs' policy and practice.

- Increase awareness about the future of work and OSH among occupational health services and occupational safety and health personnel through seminars and webinars.
- Develop, jointly with EU-OSHA (European Agency for Safety and Health at Work), cost calculation methodologies for the cost of lost labour input due to poor working conditions, which take into account precarious and new forms of work, including platform work.
- Consider taking initiative at national, Nordic, European and global levels to develop leading and lagging OSH indicators with regards to the future of work as it concerns AI (artificial intelligence), platform work, robotics, climate change etc.
- Continue to create consensual Nordic positions on OSH strategies and regulations at European and global levels as they relate to the future of work. This could be achieved through existing structures like EU-OSHA (European Agency for Safety and Health at Work), ACSH (Advisory Committee on Safety and Health), ELA (European Labour Authority), SLIC (Senior Labour Inspectors Committee), ILO (International Labour Organization) and/or ad hoc arrangements such as the Nordic Future of Work Group.
- Develop a dynamic Nordic expertise and analysis capacity by establishing
 The Nordic Future of Work Group as a strategic concept informing OSH policy and practice for the coming years.

7.2 Specific Recommendations

7.2.1 Adapting to Digitalisation and Al

- Train and provide resources for specialised professionals at the LIs (labour inspectorates) who would support counter-intelligence activities that requires sophisticated analytical and investigative skills.
- Increase the competence of technology specialists at inspectorates to address hazards related to digitalised equipment, robotised machinery and programming software.

- Facilitate consultations with platform-based businesses to make agreements on acceptance of OSH (occupational safety and health) responsibilities.
- Prepare a review of the national OSH and related legislation to evaluate the
 extent to which it places designers' responsibilities on digitalised equipment,
 platform designers and AI (artificial intelligence) with the aim of updating the
 relevant EU (European Union) directive.
- Reaffirm that the hierarchy of controls for hazard prevention is considered pivotal in the development of new technological innovations.
- Engage with the EU authorities to include AI, the Internet of Things and robotics systematically in harmonised safety and health legislation.

7.2.2 Adjusting to the pace of newness

- Cooperate with designers of AI (artificial intelligence), the Internet of Things
 and robotics in early phase developments to ensure that safety and health
 risks are addressed at the design stage. This could be achieved by initiating
 Memorandum of Understandings with technological advisory councils at the
 national level.
- Establish an ad hoc Nordic group of interdisciplinary experts with a mandate
 to develop strategic communiqués which provide biannual scoping reviews
 and forecasts of future trends as they concern OSH. These communiqués
 should be routinely included in the LIs' (labour inspectorates) annual strategic
 plans and be a reporting requirement to the concerned ministries.

7.2.3 Countering constant worker surveillance

- Safeguard worker privacy and data protection by limiting unnecessary worker surveillance, tracking, and monitoring.
- Cooperate with national- and European-level data protection agencies to secure transparency and fair utilisation of data collected by employers under the pretext of enhancing customer service and productivity.
- Review the current OSH legislation to evaluate whether there is adequate
 protection of workers' psychosocial health from imminent risks of new forms of
 work such as constant worker surveillance including rating systems and
 technostress.

7.2.4 Catering to the needs of a diverse workforce

- Consider judiciously the varying work ability of workers in all workplaces during inspections so that every worker gets equal access to healthy and safe working conditions.
- Pay special attention to the evaluation of OSH (occupational safety and health) risk assessments of women, migrants, the elderly and young in vulnerable working situations so that they are able to maintain a long, safe and healthy work-life.
- Include the risk of violence, harassment and threats at work in the risk
 assessments, especially for the service and care sectors and other sectors in
 which women are the majority.
- Establish inspection and information campaigns targeting threats and violence in specific sectors to minimize risks.
- Prepare the health care workforce to handle the burden of elderly care, especially in terms of professional competence and OSH. Special attention must be given to protecting women workers who typically sustain a disproportional share of musculoskeletal disorders in the health care sector especially in nursing homes and home care.
- Support curriculum development and implementation of obligatory OSH training in primary schools and vocational training. Integrate new forms of work and technology into the traditional health and safety curriculum.
- Make efforts to assure that remote, home based, posted and migrant workers are all included under the purview of occupational health services.

7.2.5 Addressing complex employer and worker relationships

 Evaluate OSH (occupational safety and health) regulations, labour law and demands for decent working conditions to adequately cover all workers, including those in new forms of employment, such as platform work, forced self-employment, and all new workers.

- Bear in mind that the employer still has obligations (for example, as outlined by the Framework directive); methods and training should be developed on how remote, home-based and net-based workers can be assisted to perform self-risk assessments, follow the working hours and report potential stress and strain to the employer.
- Initiate efforts at the EU and Nordic level for proper classification of employers and workers such that OSH regulations can be applied in a precise and efficient manner.

7.2.6 Strengthening tripartite dialogue

- Continue to work together with the traditional social partners to find ways and means to reach out to employers and workers in the digital world and new forms of work.
- Increase direct communications between Lls (labour inspectorates) and new on-line work stakeholders without diminishing the cooperation with traditional tripartism.
- Increase cooperation with self-employed, digital and globalised partners and
 their organisations in sharing information on the social and economic benefits
 of safe and healthy working conditions. This concerns in particular groups of
 workers who do not have a voice in traditional employer-worker cooperation,
 such as gig workers, freelancers, platform workers and the self-employed.

7.2.7 Reducing the extent of precarious work

- Formulate a Nordic review of OSH (occupational safety and health) legislation
 to assess the extent to which it covers situations of precarious work. The goal
 should be to define new worker/self-employed categories for the purpose of
 better OSH protection.
- Include in risk assessments the short- and long-term impact of continuous, repeated precarious work contracts.

- Initiate efforts to better implement the EU recommendation (2003)⁵⁶ on protection of health and safety at work for self-employed workers.
- Work together as a Nordic consortium within the EU for a more inclusive EUframework OSH directive to include more types of workers (precarious work and atypical work).

7.2.8 Prohibiting undeclared work

- Establish and strengthen continuous mutual cross-border collaboration including joint cross-border actions and/or inspections for sharing knowledge and best practices.
- Explore new ways of co-operation, with other national governmental agencies such as Tax authorities.
- Develop information campaigns as they concern undeclared work and OSH risks aimed at migrant workers – in several languages.
- Train inspectors in detecting signs of undeclared work and how to forward the information to relevant authorities.
- Contribute actively to increase competencies and expand collaboration with relevant authorities and organisations regarding migrant labour and workers' rights in sending and receiving countries.
- Utilize risk-based approaches to target the sectors and companies in which undeclared work and OSH risks are most prevalent.
- Encourage ELA and SLIC (Senior Labour Inspectors Committee) to establish
 a proactive collaboration for joint inspections performed under the auspices of
 ELA with the intent address identified OSH risks.
- Consider establishing a Nordic liaison office to promote common Nordic interests with regards to reducing undeclared work, OSH risks and coordinate efforts for practical (inspection) activities.

⁵⁶ https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32003H0134&from=EN

7.2.9 Promoting workplace well-being

- Ensure implementation of workplace policies to maintain an adequate worklife balance in order to enhance the well-being of workers.
- Invest, nurture and develop, along with social partners, workplace interventions that minimise and prevent workplace stress induced by new forms of work and new technologies.
- Emphasise the link between good working conditions, worker well-being and the economic benefits for the business and the society.
- Develop models that support small and micro enterprises in implementing workplace well-being programmes.

7.2.10 Securing healthy working-time arrangements

- Evaluate the risks of working-time vis-a-vis irregular and flexible working-time (online and offline) arrangements.
- Assess if the current working-time regulations are calibrated with regard to flexibility, but at the same time protecting the health of workers in new forms of work.
- Consider developing, together with social partners, working-time arrangements that reduce work-life versus family-life conflicts.

7.2.11 Developing norms for open plan office solutions

- Invest in research and expand the knowledge base for OSH and optimal office space solutions.
- Seek a common Nordic approach along with social partners regarding standards for office space requirements for safe, healthy, and productive work-life.

7.2.12 Preventing work-related non-communicable diseases

- Guide workplaces in designing interventions for protecting and promoting the health of workers to prevent musculoskeletal and psychosocial disorders including NCDs (non-communicable diseases) such as obesity, diabetes and hypertension.
- Facilitate system-level interventions at workplaces to improve physical activity, reduce tobacco use and improve work-life balance at the workplace.
- Assess the role of traditional occupational health services in the prevention of NCDs that may be attributed to or aggravated by work.
- Prioritise close strategic collaboration with national public health agencies to reduce the work-related burden of NCDs.

7.2.13 Reducing the polarisation of work-life and occupational health inequalities

- Encourage training and upskilling of all workers in new digital technologies to ensure necessary competence and understanding that would reduce polarisation in work-life.
- Develop and implement policies that ensure fair wages and decent working conditions for all workers regardless of age, gender, nationality and occupation.

7.2.14 Preparing for pandemics

- Initiate collaborations with national emergency preparedness agencies so that OSH (occupational safety and health) aspects are considered fundamental in planning in the local, national and global emergency preparedness plans.
- Facilitate the availability of quality approved PPE (Personal Protective Equipment) to secure a sufficient supply for all workers at risk. Especially for those workers who are employed in critical sectors (for e.g. health care, transport, cleaning) during pandemics.

7.2.15 Accommodating home office solutions

- Evaluate the current working environment regulations with regards to the health and safety protection it offers to workers working from home on longterm or permanent basis.
- Develop a framework based on evaluations for pragmatic home office OSH regulations for long-term or permanent work from home. Special attention should be paid to employers' responsibility while regulating workspaces in the workers home while still ensuring the privacy of the workers.

7.2.16 Coping with environmental and climate change

- Facilitate research and reviews through Nordic OSH (occupational safety and health) research institutes to expand knowledge on climate change and environmental change and its impact on OSH practices and policy.
- Implement awareness-raising campaigns targeted towards workers, employers, regulatory agencies and occupational health services to make the relationship between climate change and OSH risks evident.
- Emphasise the inclusion of environmental and climate change's impacts on OSH in risk-assessments wherever relevant, such as risk assessments for outdoor workers including ambient temperature, exposure to UV rays, etc.
- Initiate new efforts to develop "green products" as "decent-work products". For example, the Nordic Swan brand could include elements that also safeguard OSH.

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Glossary

Algorithm - a set of instructions designed to perform specific tasks. One application of an algorithm is making supply and demand meet through digital platforms.

Artificial intelligence (AI) - the ability of a computer program or a machine to think and learn. It mimics human cognition and attempts to correctly interpret external data, to learn from such data, and to use those lessons to achieve specific goals and tasks. All can be applied in robots, smart devices and platform work.

Atypical work - employment relationships that do not conform to the standard or 'typical' model of full-time, regular, open-ended employment with a single employer over a long time span. The latter, in turn, is defined as a socially secure, full-time job of unlimited duration, with standard working hours guaranteeing a regular income and, via social security systems geared towards wage earners, securing pension payments and protection against ill-health and unemployment.

Big data - a phrase used to mean a massive volume of both structured and unstructured data that is so large it is difficult to process using traditional database and software techniques.

Elderly workers - those workers between 55-64 years of age in the European Union.

Migrant worker - a person who is to be engaged, is engaged or has been engaged in a remunerated activity in a state of which they are not nationals.

Non-communicable diseases - a group of conditions that includes cardiovascular diseases, cancer, mental health problems, diabetes mellitus, chronic respiratory disease and musculoskeletal conditions.

Occupational health inequalities - differences in occupational health status or in the distribution of occupational exposures between different occupational groups.

Platform economy - business models where activities are facilitated by collaborative **platforms** that create an open marketplace for the temporary usage of goods or services provided by private individuals or employed workers. These include both online services such as coding or designing or offline services such as transport and carpentry.

Precarious work - a combination of a low level of certainty over job continuity, poor individual control over work (notably working hours), a low level of social and health protection, and little opportunity for training and career progression.

Smart wearables - are smart electronic devices (electronic device with microcontrollers) that are worn close to and/or on the surface of the skin, where they detect, analyze, and transmit information concerning e.g. geographical position, body signals such as vital signs, and/or ambient data and which allow in some cases immediate biofeedback to the wearer.

Tripartism - collaboration based on tripartite contracts between employers' organisations, trade unions, and the government of a country. Each is to act as a social partner to create economic and OSH policy through cooperation, consultation, negotiation and compromise.

Undeclared work - any paid activities that are lawful as regards their nature, but not declared to public authorities, taking into account differences in the regulatory systems of the Member States.

Vulnerable groups - people with disabilities or chronic diseases, elderly people, young people, migrant workers, pregnant workers and atypical workers. People in vulnerable groups have some difficulties, sustained OSH risks and special needs in work and work-life.

Workplace well-being - an overarching concept that includes both traditional OSH aspects including psychosocial and organisational factors as well as return-to-work and work ability promotion.

Work ability - the interaction of several person-related and workplace factors: 1. General company conditions and objective working conditions, e.g. physical strain and environmental influences; 2. Social environment, e.g. executives, direct supervisors, work colleagues; 3. Individual training and competencies; 4. Individual state of physical and mental health.⁵⁷

Young workers - those under the age of 24 years.

⁵⁷ European Network for Workplace Health Promotion: *Healthy Work in an Ageing Europe, Strategies and Instruments for Prolonging Work-life*. 2016. http://www.ageingatwork.eu/resources/health-work-in-an-ageing-europe-enwhp-3.pdf

Abbreviations

Al Artificial Intelligence

ACSH Advisory Committee on Safety and Health

BCI Brain-Computer Interface

CNT Carbon Nanotubes

CNC Computerised Numerical Control machines

3-D printers Three dimensional printers

ELA European Labour Authority

EU European Union

EU-OSHA European Agency for Safety and Health at Work

ICOH International Commission on Occupational Health

ICT Information, Communication and Technology

ILO International Labour Organization

OSH Occupational Safety and Health

LI Labour Inspectorate

MSD Musculoskeletal Disorder

NCD Non-communicable disease

PPE Personal Protective Equipment

SLIC Senior Labour Inspectors Committee

WHO World Health Organization







