smartwork

D2.2 - FIRST VERSION OF CO-DESIGN METHODOLOGY, USER REQUIREMENTS AND USE CASES

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GLOSSARY

ABBREVIATION	DESCRIPTION
FP	FRAMEWORK PROGRAMME
CDC	Cáritas Diocesana de Coimbra
CAT	Municipality of Aarhus

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1. Executive Summary

"Given I use a desktop and a laptop for work and personal recreation and I want to consult my health and wellbeing data. When I open SmartWork application and I select the healthyMe section then the application should display a dashboard with my health and wellbeing information. And I should be able to select the timeline as daily, weekly or monthly, according to what I wish." This is one of the outcomes, this deliverable of identifying user requirements is aiming at.

SmartWork deliverable 2.2, Co-creation methodology, requirements, scenarios and use cases, aims to retrieve what end-users wish and need from an artificial intelligence system. Users in this case are office workers in the age of 55+, employers and/or managers of older office workers and formal or informal caregivers. Taking into account that the field trials in this project take place in Portugal and Denmark, the document mainly focuses on these two countries.

Some statistics

Of the age-group 55-64 of Denmark and Portugal, respectively 71.6 and 61.5% are employed. Compared to the younger age-group (25-54 years, respectively 86.2 and 89.6%) this rate is lower. Within the same age-group the occurrence rate for Denmark is 25-29% for the chronic diseases arthritis, stroke, back disorders, diabetes, COPD and cancer. In Portugal however, back disorders and diabetes are the most reported and far lower occurrences on the other chronic diseases. On the contrary Portuguese workers are more on sick leave (11% in the age-group of 55-59, 6.7% in the age-group 60+); in Denmark the sick leave rates are 3.79% and 3.86% of the same age-groups.

Trends at work

At work several trends are taking place. At first the increasingly competitive marketplaces by developing strategically flexible organisations. In addition to this trend, technologies and techniques used in the current work field are changing and upgrading rapidly in order to keep an organisation up to date, efficient and as competitive as possible. Also there is the trend of a marked rise in the prevalence of contingent or flexible work (no permanent position with one employer, limited in duration). These trends affect older workers directly or indirectly. Older workers have to keep their technology skills updated to be able to follow the trend of technology at work. To be able to perform flexible work tasks even at irregular hours, workers have to be in good health. Health and wellbeing needs to be protected, however, that is often not in line with current common practices of downsizing or restructuring organisations.

In case of office workers, the prolonged sitting and overall sedentary lifestyle may significantly and independently of other factor increase the risk of cardiometabolic diseases and premature mortality, being recommended that people with occupations which are predominantly desk based should progress towards accumulating 2h/day of standing and light activity (light walking) during working hours (e.g. regularly broken up seated-based work with standing-based work, use sit-stand desks, take short active standing breaks). Office work also affects functional abilities of the workers, with particular risk for the development of musculoskeletal pain and computer-related visual symptoms.

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Workability older workers

To maintain or improve the workability of older workers, from scientific literature several results, recommendations or insights reveal that adapted tools, workstations and workplaces contribute to maintain the productivity of older workers. Recognize the fact that older workers attach more importance to intrinsic, job-related aspects such as enjoying and interesting work. The corporate culture is important and mixed age-teams are recommended. Regarding the maintenance of health and functional capacity of older workers, adaptations at the workplace are sometimes needed, but also reduced or flexible hours. Prevention programmes might help too to improve the workers' condition. After the age of 50, the training facilities for older workers drop sharply, however to keep the skills of older workers at appropriate levels, continuously trainings are needed. And older workers appreciate it.

Consultation end-users

Online questionnaires in English, Danish and Portuguese language were used to learn more about work and preferences from older office workers, employers and caregivers. From Aarhus Municipality (Denmark) 49 office workers participated, from Cáritas Coimbra (Portugal) 50 office workers from the appropriate age-group responded. Their results were compared with the 60 respondents from several other European countries. Next to the employees, 12 Portuguese and 10 Danish employers/managers filled in the questionnaire. From both countries 10 caregivers each participated.

Employees

In the Danish and Portuguese samples 70% females and 30% males participated. 84% of them are not living alone and 32% are informal caregivers. Almost 100% have internet at home. Working at a desk and at a computer (desktop or laptop) are the main activities during the day at the office. They consider as attributes of older workers: experience, beneficial to companies, good mentors and maturity to handle customer service issues. The majority of the workers intends to retire at legal retirement age.

Regarding the health of the workers 12% report to have hearing problems and 6% use a hearing aid. 27% of the Danish and 70% of the Portuguese respondents have an eye vision problem. 49% wears glasses. Half of the workers report not to have a chronic disease or condition. Most frequent diseases of the other half are: hypertension, limb using problems, rheumatism, arthritis and diabetes. 93% of them report not to have any difficulties at work due to the chronic disease or condition. 12% of the Danish and 26% of the Portuguese respondents were on sick leave in the last 3 years, mainly less than 5 weeks.

At work Danish employees use laptops and smartphones; Portuguese employees use more desktops and smartphones. Danish workers are almost for 100% familiar with ICT; Portuguese only 64%. Both groups of employees welcome to receive tips and trainings on ICT. This support doesn't have to be invisible. To learn new software, 50% of the employees learns it within 1 hour, 26% learns new software within 2-3 hours and 24% needs more time.

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Consulted on their preferences for the SmartWork AI system, they most value as useful or very useful an application that informs on meetings and events, provides guidance, reminds on appointments, provide training contents, transfers work between devices and manages or organises the work. From the European questionnaire most preferable feature would be to have a device that automatically chooses individual settings. Not very useful or not useful at all Danish and Portuguese employees think are applications that checks the health status every minute, every day or every week. Also this system should not provide company, report about the working time at the computer or inform the boss on the performances. The SmartWork system should prefereably become available on a smartphone or on desktop/laptop. The most preferred interaction should be by keyboard, touch screen, sensor, speech or pictograms.

Employers

Regarding the preferred functionalities of the SmartWork system, Danish employers show quite opposite meanings compared with their Portuguese colleagues. Where Portuguese employers would like to have a system (from most favourite to least) that supports on the fly work practice, identifies training needs, identifies needs for workplace adaptations, supports with optimal employee pairing, reports health and condition of the worker and reports on progress, the majority of Danish employers finds these functionalities not very useful or not useful at all. Only optimal employee pairing, on the fly work practice support and workplace adaptations identification needs are a bit more liked than the rest. The SmartWork system should become available on desktop/laptop or on smartphone. Portuguese employers also opt for tablet. Preferred interaction is by keyboard, touch screen and less by pictograms and speech.

Caregivers

Most caregivers spend 2-3 hours per day on caring tasks. In majority the caregiving affects the personal life of the caregiver, especially to have less time to go out and to do less daily exercise. However caregiving also provides a good feeling. Half of the Portuguese caregivers think the caregiving affects their health (10% of the Danish). Especially feeling stressed, tired and sleeping badly are reported as effects. 40% of the Portuguese and 20% of the Danish caregivers report affects on their own working conditions: more remote work at home, absenteeism, less salary and more flexible hours.

Danish caregivers are more positive than employers on eventual SmartWork system functionalities. They most value a system that provides information on health risks and that monitors the health status of the worker they care for. They do not like to have a system that provides personalized care and intervention plans. Portuguese caregivers are positive about every feature (from most to least): monitor of the health status of the worker they care for, personalised care and intervention plans, information on health risks, support in daily planning of care activities and to continuously monitor behavioural attitudes. Preferred devices for the SmartWork system are smartphone and tablet. Preferred interaction: keyboard and touch screen. Danish caregivers additionally would like to have pictograms (icons).

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Personas

Based on literature and the consultation of the end-users, the SmartWork consortium developed four personas:

António: Portuguese office worker of 55 years of age. New in the office after a mail delivery function within the organisation of Cáritas. Workplace: shared computer at the office. Suffers from back pain and needs to develop ICT skills. He will use the SmartWork services healthyMe, myWorkability, ubiWork and workCoach.

Luísa: Portuguese caregiver of 26 years of age. She is the daughter of António. She will use the SmartWork service iCare.

Maria: Portuguese manager of 42 years of age. She is new on the job and challenged to improve the productivity of the team. She will use the SmartWork service digiTeam.

Birgit: Danish policy officer of 60 years of age. She herself suffers from diabetes and is caregiver for her husband who has heart problems. She needs work flexibility. Birgit will use the SmartWork services: healthyMe, myWorkability, ubiWork and workCoach.

User stories

A day of their lives of the personas has been described in order to define the functional user requirements. Out of these descriptions 12 user stories have been developed to cover 22 identified user needs that set the base for the design and development of the SmartWork system and services. However, the list of requirements identified by the end-users will be subject of a thorough and careful feasibility analysis by all the technical partners participating in the development of the SmartWork project, for validation or identification of any technical constraints that might appear during implementation. Therefore, it is expected, especially after the technical partners start the development of the SmartWork system, that some of these requirements might be relaxed, refined or removed, in order to avoid any risks of implementing functionalities where their applicability could be limited due to technical constraints. Also the needs and expectations of the end-users from the SmartWork system is expected to grow throughout the lifetime of the project, especially after the semi-controlled trial and the larger field trials at the offices of Cáritas Coimbra and Aarhus Municipality. These enhancements/refinements providing the final set of requirements, underlying the final SmartWork system functionality and design, will be included in a follow-up of this deliverable, aligning thus the functional specification, design and development of the final SmartWork system.

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2. Introduction

End-users will only (continue to) use an artificial intelligence system and its services when they value it as supportive, important and easy-to-use. If – for example – the cell phone would have needed at least one additional study to understand the working and maintenance of the system, the cell phone still would be at a kind of proof-of-concept-stage, instead of the current global usage by almost the whole world population. Keywords for successful innovation from a user perspective are "user-friendly", "need to have" and "it really helps". The only way to discover the operational value of these keywords is by exploring the real needs and expectations of end-users and involve them with the development of systems and devices from scratch. End-users in this SmartWork project are: workers aged 55+, managers/employers and informal caregivers of a worker.

The purpose of this document is to explore what end-users think of the workability sustainability of an ageing workforce. It focuses on what the end-users' needs, wishes and constraints are to have or to develop a system to improve the workability and workplace conditions of the ageing workforce, also including those workers who have chronic diseases or conditions or have difficulties to bridge the gap of technology changes.

2.1. Structure of this document

After a brief description of the outlines of the proposed SmartWork system, the methodology to find and analyse the end-users' needs and demands will be explained. This will be followed by a desk research study in chapter 5, including a description of the impact of ageing on work, general statistics about workers in the two pilot countries of the project and a literature study. Thereafter, in chapter 6, the consultation of end-users will be described: The results of the online questionnaires and interviews on older workers, managers and caregivers will be presented and analysed. The results of the desk research and questionnaires will be laid down in the description of 4 personas: 2 older office workers from Portugal and Denmark, a Portuguese caregiver and a Portuguese manager. Their user stories will lead to the functional requirements of the SmartWork system. The document will end with conclusions regarding the end-users' needs and demands regarding the SmartWork system.

2.2. Relationship to other deliverables

The relationship of D2.2 to other deliverables of SmartWork are described in the table below:

TABLE 1: OVERVIEW RELATIONSHIPS OTHER DELIVERABLES

Deliverable	Relationship
D2.4	Initial version of System architecture and specifications. D2.2 is closely related with this deliverable: The desk research, personas and user stories

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	form the base of the use cases and features of the SmartWork system architecture and specifications.
D2.5	Refined version of System architecture and specifications. D2.2 is also closely related to the finalised version of D2.4.
D2.6	Initial version of Intervention strategies. The findings from the desk research and questionnaires/interviews with end-users of D2.2 will be used to define the transdisciplinary intervention approach to be implemented in SmartWork. Especially the recommendations from literature and end-users to improve the workability sustainability will be taken into account.
D2.7	Final version of Co-design methodology, user requirements and use cases. D2.2 is the primary version of D2.7. The overall findings with the development and implementation of the system architecture, features and use cases will be reported in D2.7 in the form of a reference guide for the implementation of SmartWork services.
D2.8	Final version of System architecture and specifications. This deliverable is the result of earlier developed D2.4 and D2.5. D2.2 (and D2.7) are base for deliverable D2.8.
D2.9	Final version of Intervention strategies. As the final result of D2.6 including the results of WP8, D2.2 will be one of the main ingredients of D2.9.
D8.1-D8.8	Workers, caregivers and managers from the pilot sites gave their inputs in the questionnaires and interviews of D2.2 (chapter 6). The internal networks and first acquaintance with SmartWork created and the findings of the end-users, will be the base for the set-up of the semi-controlled and larger field trials at Cáritas Coimbra and the Municipality of Aarhus.

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3. General description User Requirement approach

3.1. Brief summary SmartWork concept

SmartWork, 'Smart Age-Friendly Living and Working Environment', is a European project addressing a key challenge facing today's older generation, as they are living and working longer than their predecessors: the design and realisation of age-friendly living and working spaces.

The SmartWork concept is rooted in the premise that designing age-friendly living and working spaces is key in supporting active and healthy ageing. Specifically, if older workers are happy and supported in their working environment to maintain an active professional life, they will continue to work rather than drop out of the labour market.

The SmartWork system will be comprised of a suite of smart services to support office workers aged 55+, delivering benefits for the workers, their employers and carers.

The system will use Artificial Intelligence (AI) to unobtrusively and pervasively monitor workers' health, behaviour, cognitive and emotional status. Through work ability modelling, it will respond to their needs by, e.g., identifying personalised training support for the employee to learn new skills, suggesting flexible working practices to maintain a work/life balance, while the monitoring data will enable the employee to self-manage chronic health conditions.

The SmartWork system will also feature services for employers and carers. The services and modules for on-the-fly work flexibility will enable employers to flexibly manage the workforce to increase efficiency and productivity. This, in addition to retaining the experience and know-how of their older employees, will give them competitive advantages and enhance their innovation capacity.

Carers of older workers will benefit from an adaptable and accurate smart service to continuously monitor the health status of the worker, supporting their caring tasks. Wider society will gain from the increased workforce in the labour market, as well as increased economic independence and social inclusion for older workers.

In this way, SmartWork will increase the work ability sustainability of older office workers, supporting them to stay longer and happier in their job by tackling the consequences of ageing, sedentarism as well as physical and mental health problems, whilst also delivering benefits for employers, carers and wider society.

3.1.1. Architecture of the system

SmartWork will efficiently combine, in a trans-disciplinary approach, existing and new integrative computational developments, methods and sensing technologies, to build a Worker-Centric AI system for sustaining the working ability of participating individuals. The SmartWork infrastructure is worker-centric, aiming to establish a holistic model of the working abilities of office workers and employ AI-based decision support tools for delivering improved Work Functions. Personalizing this

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model, to account and represent particular attitudes and abilities of the ageing worker, is driven by the effective modelling of functional and cognitive work capabilities, the motivation and values (including emotional satisfaction), other contextual parameters (e.g. tasks, office workspace comfort, etc.) as shown in figure 1. Functional, cognitive work capabilities as well as the individual's motivation are, in their turn, directly linked to the overall health status and well-being of the worker in SmartWork.

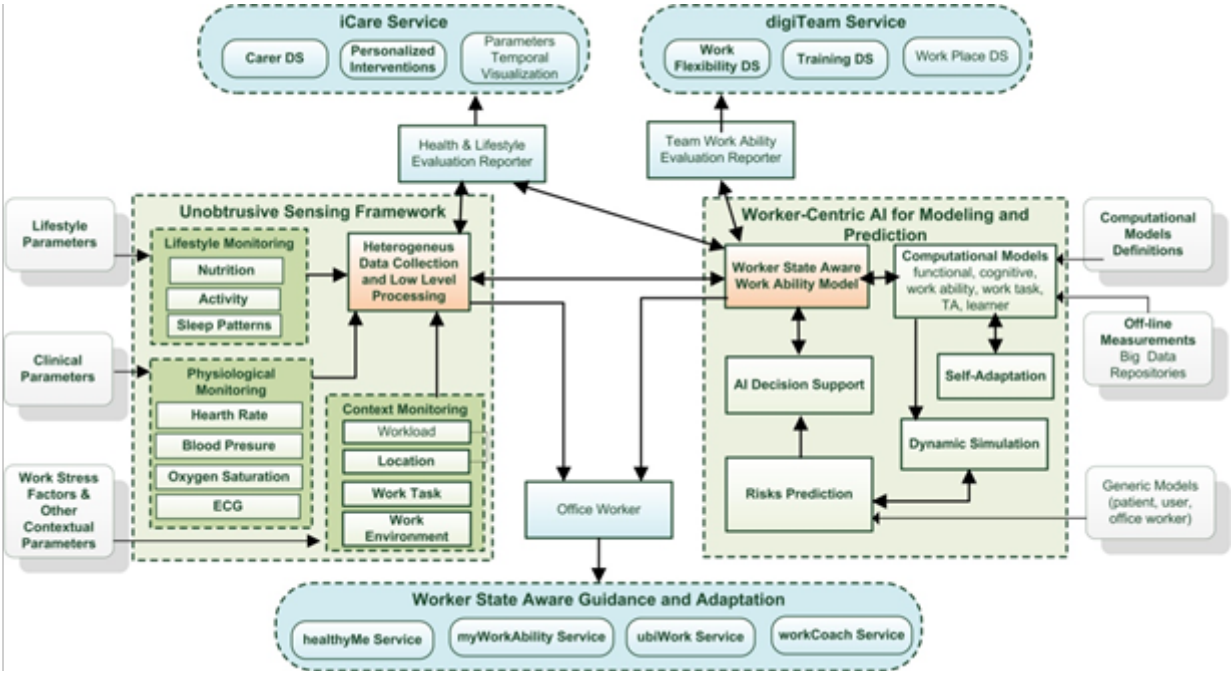

FIGURE 1: SMARTWORK MODELLING FRAMEWORK ARCHITECTURE

Continuous unobtrusive and pervasive monitoring of health and behavioural attitudes of a worker provides the means for efficient modelling of real-world working abilities which lead to the design and implementation of worker-state-aware working ability models. Moreover, these models also allow the early identification of potential health risks or functional/cognitive decline, which can be avoided or delayed through appropriate intervention strategies such as:

i. care management and decision support for personalized health self-management and for encouraging positive behavioural changes;
ii. physical exercise to maintain physical abilities;
iii. mental exercise to maintain mental abilities;
iv. healthy lifestyle (e.g. food, smoking) to better control chronic conditions (e.g. diabetes, asthma) and maintain health status.

3.1.2. Operational characteristics

In the preliminary analysis performed during the conceptualization of the SmartWork solution, we draw some initial assumptions for the operational characteristic of this system.

First, the SmartWork system will integrate a set of specific applications and devices that should be capable of monitoring some user physiological parameters, modelling the worker state and provide

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some assistance and support to specific tasks. This means that all of the system components should be interconnected in order to exchange information and interact with different modules and devices.

Second, and following the trend of digiting the workplace and work tasks, the SmartWork system will be composed by a web-based application that communicates and exchanges data with a cloud-server. To achieve that, we should develop a client application with an intuitive and accessible graphical user interface that allows the user to visualize her/his data. Associated to this, and assuming the widespread adoption of Microsoft Windows as the operational system used by office workers, such client application should at least guarantee to be Windows compatible (ideally, it could be cross-platform).

Third, the SmartWork system will collect and process raw data and be capable of analysing such data in terms of the activities that the user is performing and transmit the results of data classification and aggregation to a central server (i.e. for user modeling).

Fourth, and related to the monitoring devices that will be integrated or developed in the scope of the project, the goal is to perform an unobtrusive sensing of the user vitals on-the go, and for that reason the wireless connection to the platform and portability should be taken in consideration to provide a appealing solution that keeps an eye on workers' health, without compromising the basic functions and functionalities designed for the system.

3.2. Objectives and target groups

The overall objective of the user requirements analysis is to explore and define what the components and outcomes should be of a worker-centric AI system, so that it will be accepted and used by the end-users.

In general, the end-users, or target groups of the SmartWork system, are office workers 55+, employers/managers and caregivers of office workers. The latter group contains for example spouse or partner, child, neighbour, friends or relatives who informally take care of the worker and are concerned about their health and workability.

In the SmartWork project, the main target groups of the field trials are:

- Office workers in the age of 55 years and over at the offices of Cáritas Diocesana de Coimbra in Portugal and at the Municipality of Aarhus in Denmark.
- Employers and managers of office workers from both above mentioned organisations.
- Caregivers (formal or informal) of older office workers from above mentioned organisations.

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4. Methodology of user needs and requirements analysis

4.1. Introduction

In order to define the user needs, information from several sources is gathered. Connections are made and confirmation of the needs found by several methods, convinces working on the most essential needs of the older employees in SmartWork.

Essential elements of this study are the desk reearch and the information of the aged employees themselves collected in online questionnaires. The information gathering is completed by performed interviews or online questionnaires with managers/employers and caregivers.

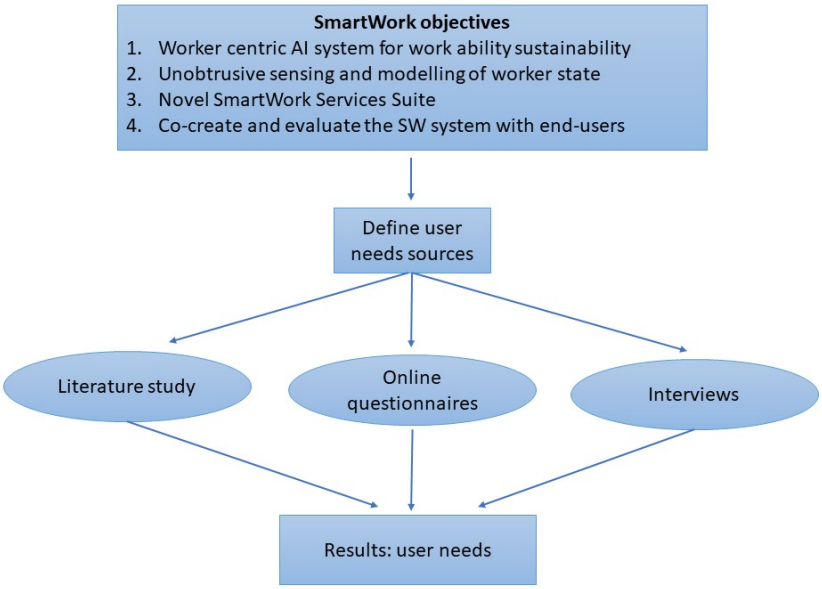

FIGURE 2: FLOWCHART OF ELEMENTS

As is shown in figure 1, the main objective of this deliverable is to gather as many ideas and concepts as possible in order to analyse the needs of older adults in terms of managing their daily professional activities. Moreover, functional requirements for the system can be specified.

4.2. Desk research

Desk research was performed to find statistical information about workers in Denmark and Portugal, such as occupation and sick leaves statistics. In the literature review articles from several databases, such as Science direct, PubMed and Google Scholar are included. Publications have been found by using the following search words; Older workers/employees, training, new technologies in the workplace, older workforce, implementation of innovations, IT solutions. Moreover, articles from

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before 2000 were excluded in the literature research, unless their main points are still valid today. These publications provided theoretical background for the questionnaires.

4.3. Methodology for consultation of end-users

The main consultation tool utilised were online questionnaires in English, Portuguese and Danish language.

Online questionnaires were used to gather information about the topic of older adults at work and their ideas about a technical support system, with workers, caregivers and managers. Questionnaires are easy to use as the participant answers questions on an online form, which is automatically saved. This reduced the possible errors made during the digitalising of the answers. Moreover, it is possible to analyse the results straight away. This makes an online questionnaire user-friendly for the researcher. However, also the participants benefit from this kind of questionnaire as they can fill the form whenever they prefer or have avilable time. Simultaneously, this allowed to ensure absolute anonimyzation of the answers, which was also an objective in this phase of the study.

During the kick-off meeting in Athens (January 2019), the approach of consulting end-users was discussed. It was agreed that for employees an online questionnaire would be developed. CDC and CAT would involve 50 employees over 55 years of age, and the other partners would invite their networks and colleagues to participate in the questionnaire for employees as well. Next to the employees' questionnaire the consortium decided that CDC and CAT each would involve 10 employers/managers and 10 caregivers of older workers.

In February 2019, the draft questionnaire for employees was developed in the English language in MS Word and presented to the SmartWork consortium members for comments. The main comments of the consortium members were about the length of the questionnaire and shared their doubts about the relevancy of questions regarding general information, work and health. Due to the fact that the SmartWork project is part of the work programme regarding adaptive smart working and living environments supporting active and healthy ageing, the questions on general information, work and health remain in the questionnaire. Additional questions, such as the use of monitoring devices and preferences for health monitoring, have been included.

In March 2019, the English questionnaire was created, using the EU Survey tool. This tool is supported by the European Commission's ISA[1] programme, which promotes interoperability solutions for European public administrations. It also provides a privacy statement in English, French and German. After a period of testing, it appeared that question 16 (respondents indicate which activity they performed most in one part of the day), didn't work well and this question was removed.

On behalf of the Portuguese and Danish respondents, the final English questionnaire was translated in the Portuguese and Danish language and were also made available using EU Survey. The Data Protection Officer of Aarhus Municipality, however, found that the privacy of Aarhus' employees was

[1] https://ec.europa.eu/isa2/home_en

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not well guaranteed by EU Survey and to solve this problem CAT used the Danish developed survey tool SurveyXact to provide the questions to employees in Danish online.

In April 2019, the questionnaires for employees were published online and workers of 55+ were invited to join. To invite respondents, the consortium made use of several approaches: personal approach in the case of CDC and Aarhus samples, coming from their own empoloyees; mailing lists and social media invitations, invitations of networks and presentation at the EIP AHA meeting in Krakow for the European samples. The personal approach was by far the best approach to involve older workers to fill in the questionnaire, as there were many invalid questionnaires coming from the other methods.

Also in April 2019, the questions for an online questionnaire for employers/managers and informal caregivers of older workers were developed and approved. During the months of May and June 2019, employers/managers and informal caregivers were personally invited to participate in the questionnaires.

4.4. Methodology to refine and validate user requirements

From the consultation of end-users and desk research, the consortium members jointly created *personas*. A persona, (also user persona, customer persona, buyer persona) in user-centered design and marketing is a fictional character created to represent a user type that might use a site, brand, or product in a similar way. Personas may be used as part of a user-centered design process for designing software and are also considered a part of interaction design. A user persona is a representation of the goals and behaviour of a hypothesized group of users. In most cases, personas are synthesized from data collected from interviews with users. They are captured in 1–2-page descriptions that include behaviour patterns, goals, skills, attitudes, and the environment, with a few fictional personal details to make the persona a realistic character.[2]

After defining the personas of SmartWork, the functional requirements are described, using the technology of user stories, or 'a day of their life'-description. In this way the personas come to life and their routines and challenges will be described in combination with the use of features of the SmartWork system. The user stories lead to description of the functional requirements and the technical requirements in D2.4.

[2] Wikipedia, https://en.wikipedia.org/wiki/Persona_(user_experience), assessed June 12th, 2019.

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5. Desk research

5.1. Introduction

5.1.1. Impact of ageing at work

A combination of a falling birth rate and a higher life expectancy together with the ageing of the baby boomers leads to an increase in the elderly population (age 55+). Literature shows that this increase results in an on average older workforce in industrialized nations [1]. It is known that older people have a higher risk to fall sick or to become chronically ill [2]. Moreover, if workers above the age of 55+ fall sick or suffer from a chronic illness, it takes a longer time for them to recover and get back to work [3]–[5]. This leads to absenteeism and higher health costs for the company. Moreover, due to their age this population is usually less suitable for manual labor or a heavy work load, which means that some of these people need to undergo a career switch.

In case of office workers, the prolonged sitting and overall sedentary lifestyle may significantly and independently of other factor increase the risk of cardiometabolic diseases and premature mortality, being recommended that people with occupations which are predominantly deskbased should progress towards accumulating 2h/day of standing and light activity (light walking) during working hours (e.g. regularly broken upseated-based work with standing-based work, use sit-stand desks, take short active standing breaks). Office work also affects functional abilities of the workers, with particular risk for the development of musculoskeletal pain and computer-related visual symptoms. Other contextual factors related to the office workspace, including illumination and ambient conditioning system, influence office workers' behaviour, comfort and productivity. Furthermore, there is evidence that high-intensity teleworkers are overall more satisfied than office based employees and achieve significant benefits from their work arrangement, with work-life conflict most influential towards job satisfaction. Although there is some evidence that job control decreases with age, other factors such as qualifications and job status may also have grea timpact on the feeling of job security.[3]

However, as the group of older employees is increasing rapidly and is becoming an important group in the workforce, it is important to keep them involved with their work. Moreover, the older workers have built up experience and knowledge which would be wasted if these issues are not addressed and solved [6].

The design and realisation of age-friendly living, recreational and working environments is a huge challenge that we have just only started to address as the number of older citizens who are and want

[3] Otilia Kocsis et al., SmartWork: Designing a Smart Age-Friendly Living and Working Environment for Office Workers, PETRA '19, June 5-7, 2019, Rhodes, Greece, Association for Computing Machinery.

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to continue being active members of society and live independently is constantly increasing. Maintaining an active professional life despite the ageing process and the functionality limitations, health conditions or care needs that this process frequently entails is of paramount importance for active ageing and independen living.[4]

5.1.2. Technology at work

Nowadays, managers should be able to tackle several recent trends, such as the increasingly competitive marketplaces, by developing strategically flexible organisations [7]. In addition to this trend, technologies and techniques used in the current work field are changing and upgrading rapidly, in order to keep an organisation up to date, efficient and as competitive as possible. Systems are relatively easy to upgrade or adapt to a new programme, however, employees that have to work with these programmes are sometimes harder to convince of the effectiveness of a programme. Moreover, training is necessary to allow them to work with new programmes. Especially older employees consider these innovations as difficult and hard to cope and keep up with [8]. Research shows that not only implementing new and emerging technologies are responsible for the efficiency and level of competitiveness within a company; also the way of implementing these innovations plays an important role. Therefore, in order to obtain the most benefits from an innovation, companies should offer training sessions that increase employee's capabilities and knowledge, so that they can adapt their working way to fast emerging new or updated software systems and methods [9], [10]. However, in most of the cases these training sessions are not provided to older workers, due to lack of time or money.

5.1.3. Learning capabilities of older adults at work

Several studies and research on the topic of Age Associated Memory Impairment (AAMI) underline that ageing affects the "fluid" memory [11]. The fluid memory is exactly the type of memory that is needed for learning the use of computers and to be able to adapt to new software or systems (change management).

In addition to the above underlined issues, older adults are also subject to other cognitive degradations like working memory decrease. The working memory refers to a brain system that provides temporary storage and manipulation of the information necessary for complex cognitive tasks, such as reasoning and learning [12]. Several studies underline the importance of the working memory in computerized environments; as such environments require an extensive use of this memory ability to perform cognitive and intellectual tasks. Studies also reveal a close relationship between working memory and other basic cognitive processes of the human mind such as speed of processing, and controlled attention. Speed of processing refers to the maximum speed at which a

[4] Otilia Kocsis, opus cit.

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given mental act may be efficiently executed. In order to elicit speed of processing of individuals, the response time for recognizing a simple stimulus is measured, such as, reading single words or identifying a geometrical figure. Controlled attention refers to cognitive processes that can identify and concentrate on goal-relevant information and inhibit attention to irrelevant stimuli.

5.2. General statistics workers 55+ Denmark and Portugal

In this section, general statistics about older workers, occupation, chronic diseases and sick leaves are presented.

TABLE 2: LABOUR MARKET IN THE EU, 2018 (IN THOUSAND PERSONS)

Eurostat visualisations	Denmark	% DK	Portugal	% PT	EU
Total population	5 800		10 300		512 400
Persons aged 15-74	4 355	75%	7 773	75%	380 432
Economically active persons	3 018	69%	5 167	66%	246 666
Economically inactive persons	1 337	31%	2 606	34%	133 766
Employed persons	2 868	95%	4 801	93%	229 774
Unemployed persons	150	5%	366	7%	16 892
Family workers	11	0.3%	20	0.4%	2 169
Self-employed	220	7.6%	729	15.1%	32 581
Employees	2 636	92%	4 052	84.5%	194 968

The percentage of economically active persons in Portugal who are self-employed is twice as big as in Denmark (15.1%-7.6%). At the other hand: the rate of unemployment in Portugal is higher than in Denmark (7% - 5%).

TABLE 3: PARTICIPATION RATES BY AGE (PERCENTAGES) IN 2017[5]

Age	Denmark	Portugal
15-24	63.3	34.0
25-54	86.2	89.6

[5] OECD, Labour Force Statistics 2018. https://read.oecd-ilibrary.org/employment/oecd-labour-force-statistics-2018_oecd_lfs-2018-en#page1

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55-64	71.6	61.5
65 and over	7.4	11.3
15-64	*78.8*	*74.7*

Looking at the participation rates per population age-group, more Danish people in the age group of 15-24 years and 55-64 are participating in economy than Portuguese people in the same age group. At the other hand, in Portugal over 11% of people over 65 are (still) at work and not retired.

TABLE 4: UNEMPLOYMENT RATES BY AGE IN 2017, OECD[2]

Age	Denmark	Portugal
15-24	11.0	23.8
25-54	5.2	7.9
55-64	3.7	8.6
65 and over	0.7	2.5
15-64	*5.9*	*9.2*

According to OECD the unemployment rate is higher than calculated by Eurostat. Especially the unemployment rate among younger people between 15 and 24 in Portugal is very high: almost 1 out 4 is unemployed. Also in Portugal are the unemployment figures for the target group of this SmartWork project, people of 55 years of age and over, twice as high as in Denmark.

TABLE 5: CENSUS 2011 EUROSTAT, AGE GROUPS, SEX, ECONOMICALLY ACTIVE

Age groups	Denmark		Portugal	
	Male	Female	Male	Female
55-59 years	174 659	174 884	322 095	355 556
Economically active	*101 302*	*101 432*	*226 271*	*182 730*
%	*58%*	*58%*	*70%*	*51%*
60-64 years	180 466	183 462	298 546	336 195
Economically active	*106 474*	*108 242*	*116 907*	*90 752*
%	*59%*	*59%*	*39%*	*27%*
65-69 years	156 375	162 422	253 004	298 697
Economically active	*92 886*	*96 478*	*28 675*	*16 630*
%	*59%*	*59%*	*11%*	*5%*
70-74 years	105 875	117 971	220 461	275 977

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Economically active	*56 113*	*62 524*	*10 779*	*4 392*
%	*53%*	*53%*	*5%*	*2%*
Total population	2 756 582	2 804 046	5 046 600	5 515 578
Economically active	*1 483 161*	*1 365 473*	*2 603 574*	*2 419 793*
%	*54%*	*49%*	*52%*	*44%*

Based on the Census 2011 provided by Eurostat[6] we see that in both countriese women are less economically active than men. Regarding the increase of age, Danish people remain more economically active than Portuguese older people. This differs from the figures provided by OECD.

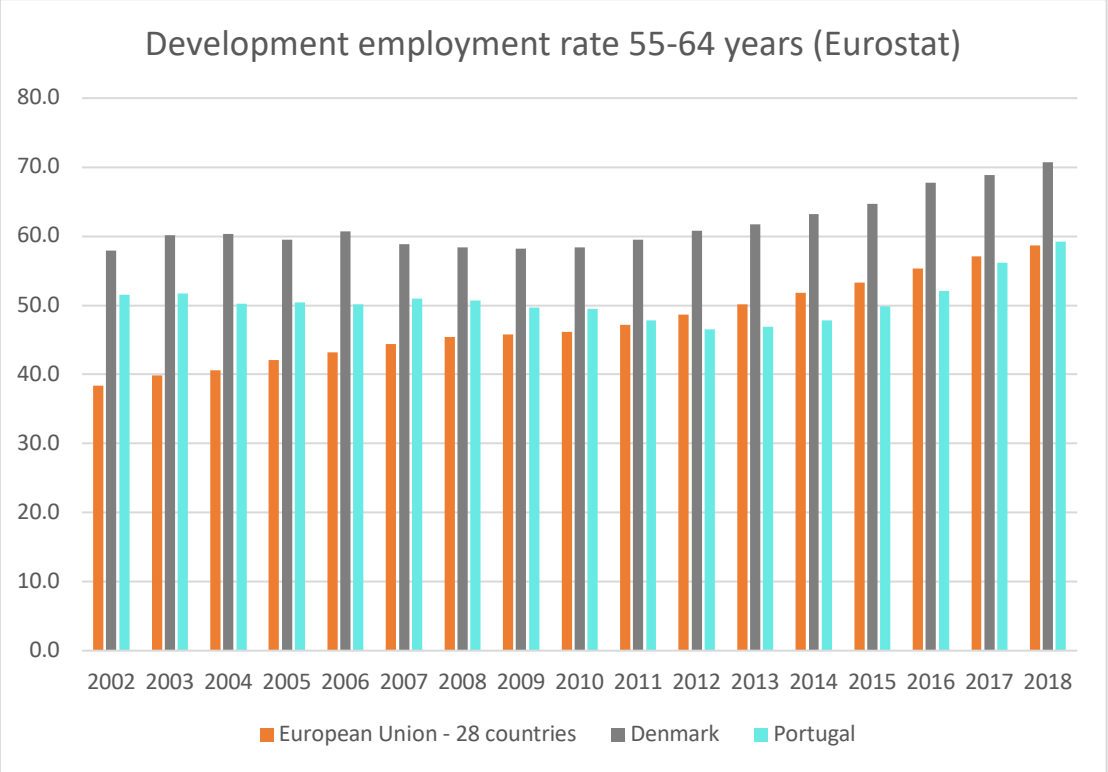

FIGURE 3: DEVELOPMENT EMPLOYMENT RATE EUROPEAN UNION, DENMARK AND PORTUGAL 2002-2018

Looking at the development of the employment rate of people aged 55-64 in both countries, the employment rate in Denmark is much higher than in Portugal. In both countries there was a decrease in employment rates during the past 10 years: in Denmark during the global financial crisis (2008-2011) and in Portugal more recent (2011-2015).

[6] Source: Eurostat, Employed persons aged 15 and over by sex, age group, citizenship and economic activity (NACE Rev.1), http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=cens_01nanac&lang=en, assessed June 13th, 2019.

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TABLE 6: CENSUS 2011 EUROSTAT, AGE-GROUPS BY OCCUPATION OFFICE WORKERS

	55-59 years		60-64 years		65-69 years		70-74 years	
Occupation	DK	PT	DK	PT	DK	PT	DK	PT
Managers	9 640	34 993	3 493	23 438	829	8 319	201	3 576
Professionals	35 382	43 832	12 867	17 741	3 691	5 309	1 134	2 092
Clerical support workers	26 326	34 321	7 008	13 012	1 706	2 049	616	465
Service and sales workers	24 974	67 909	5 610	37 776	1 158	9 312	294	3 304
TOTAL Occupation	*225,604*	*667,651*	*87,666*	*634,741*	*33,104*	*551,701*	*17,750*	*496,438*
%	57.5	32.8	44.4	17.1	28.3	5.2	15.7	2.2

To get an idea about the rate of office workers in Denmark and Portugal, we defined, based on the Census 2011 of Eurostat[7], the target group of the SmartWork project along the categories of managers, professionals, clerical support workers and service and sales workers as office workers. In all age categories, in Denmark the number of office workers is higher than in Portugal.

Chronic diseases

Chronical diseases show a high and increasing occurrence among the SmartWork target group of 55+ office workers. Chronical diseases cover a large group of individual diseases.

Chronical diseases ae assumed significant reasons for many individuals in the SmartWork target group for reduced workability. By the SmartWork services it the intention to ease the consequences of Chronical diseases and sustain workability. The occurrence of chosen chronical diseases in DK are illustrated by the table below.

TABLE 7: OCCURRENCE OF CHRONIC DISEASES IN DK AT THREE AGE GROUPS[8]

Chronic disease or condition	Age		
	45-54	55-64	65-79
Rheumatoid arthritis	21,1%	28,2%	32,2%

Occupation	
Labour active	Retired
49,1%	41,1%

[7] Eurostat, Employed persons aged 15 and over by sex, age group, citizenship and occupation (ISCO-88), http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=cens_01naisco&lang=en, assessed June 13th, 2019.

[8] Source: Statistics Denmark – "Absence due to own disease, sex, sector, time, absence indicator and age" https://www.statistikbanken.dk/10322, assessed June 13th, 2019.

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Osteoarthritis	16,0%	29,8%	37,5%	41,3%	49,1%
Back disorders	21,7%	24,9%	24,0%	54,2%	30,6%
Osteoporosis	8,0%	21,9%	49,1%	21,5%	68,3%
Ischemic heart disease + heart failure	12,6%	23,8%	39,1%	32,8%	53,1%
Stroke	11,5%	24,8%	42,2%	26,4%	58,3%
Asthma	18,9%	21,8%	22,2%	58,6%	23,6%
COPD	14,3%	25,5%	40,8%	30,7%	53,1%
Chronic Lung Diseases	17,3%	19,9%	24,6%	50,6%	32,3%
Diabetes	12,9%	28,3%	41,8%	36,2%	51,8%
Mental illness	19,9%	18,6%	13,8%	56,4%	19,2%
Cancer	13,1%	27,7%	40,8%	40,0%	51,1%
Allergy	20,2%	16,8%	13,9%	69,9%	17,1%

The occurrence of chronical diseases is obtained by questionnaire among 49.806 individuals in 2010. Compared to the registered and diagnosed occurrence these numbers are with 2,5% variance. The occurrence for rheumatoid arthritis, osteoarthritis, back disorders, chronic lung diseases, mental illness and allergy, are higher than registered and diagnosed occurrence.[9]

TABLE 8: CHRONIC DISEASES PER AGE GROUP IN PORTUGAL IN 2017[10]

Chronical disease or condition	Age						
	45-49	50-54	55-59	60-64	65-69	70-74	74-79
Rheumatoid arthritis	0.6%	0.77%	0.94%	1.12%	1.26%	1.31%	1.25%
Osteoarthritis	4.77%	7.68%	11.19%	15.14%	19.1%	22.9%	26.03%
Back disorders	19.27%	20.36%	21.19%	22.38%	22.5%	22.43%	23.88%
Osteoporosis	NA						
Ischemic heart disease	1.04%	1.67%	2.57%	3.78%	5.63%	7.58%	9.64%
Stroke	0.96%	1.43%	2.05%	2.82%	3.7%	4.7%	5.87%
Asthma	8.24%	8.3%	8.43%	8.62%	8.76%	8.8%	8.41%
COPD	3.63%	4.94%	6.49%	8.35%	10.8%	13.9%	17.32%

[9] https://www.regionh.dk/til-fagfolk/Sundhed/Tvaersektorielt-samarbejde/kronisk-sygdom/Documents/Kroniske_sygdomme__metoderapport.pdf

[10] IHME (2016), «Global Health Data Exchange», Institute for Health Metrics and Evaluation, available in http://ghdx.healthdata.org/gbd-results-tool

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Chronic Lung Diseases	NA						
Diabetes	16.02%	20.3%	26.86%	34.66%	41.6%	48.3%	56.44%
Mental illness	17.63%	16.86%	16.3%	15.78%	15.3%	14.89%	14.43%
Cancer	NA						
Allergy	NA						

In Portugal back disorders and diabetes are the most common diseases in the projected age groups of 55 till 79. Striking is the number of people with diabetes in the older age groups in Portugal, it increases from 41.6% in the age 65-69 till 56.4% among people of 75-79. At older age also more people suffer from osteoarthritis.

TABLE 9: SICK LEAVE IN DENMARK 2017

2017 Statistics. **Sick leave c**aused by own disease i.e. not caused by work injury, maternity/adoption leave or children's illness			
All business sectors	**50-54 YoA**	**55-59 YoA**	**+60 YoA**
Sick leave pct.	3,49	3,79	3,86
Average number of absentee days per week full-time employee	8,23	8,89	9,00
Average number of absences periods full-year employee	2,04	2,01	1,77
Average number of calendar days per. period of absence	5,49	6,05	6,67
No. of Full-time employees	254.590	208.457	175.779
No. of Full-year employees	270.159	222.872	201.401
Sick leave periods	551.587	446.945	356.064
Sick leave days	2.095.637	1.852.695	1.582.605

Municipal sector	**50-54 YoA**	**55-59 YoA**	**+60 YoA**
Sick leave pct.	5,52	5,73	5,77
Average number of absentee days per week full-time employee	12,45	12,82	12,75
Average number of absences periods full-year employee	2,46	2,35	1,99
Average number of calendar days per. period of absence	6,73	7,30	8,19
No. of Full-time employees	53.612	51.653	43.680
No. of Full-year employees	61.158	59.005	53.382
Sick leave periods	150.441	138.370	106.203
Sick leave days	667.353	662.044	556.890

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In Denmark the sick leave rate is almost .4 higher for people above 60 compared to those of 50-54 years of age. In the municipality sector the sick leaves rates are 2% point higher than national average.

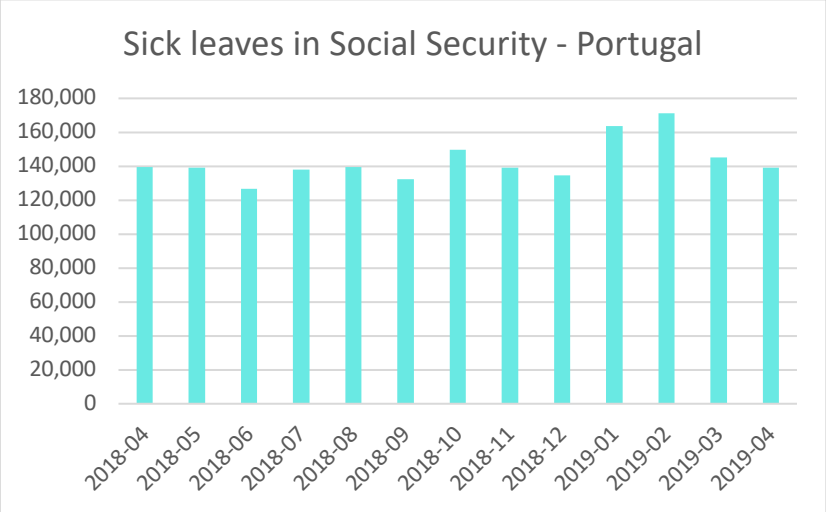

FIGURE 4: SICK LEAVES IN PORTUGAL APRIL 2018-APRIL 2019[11]

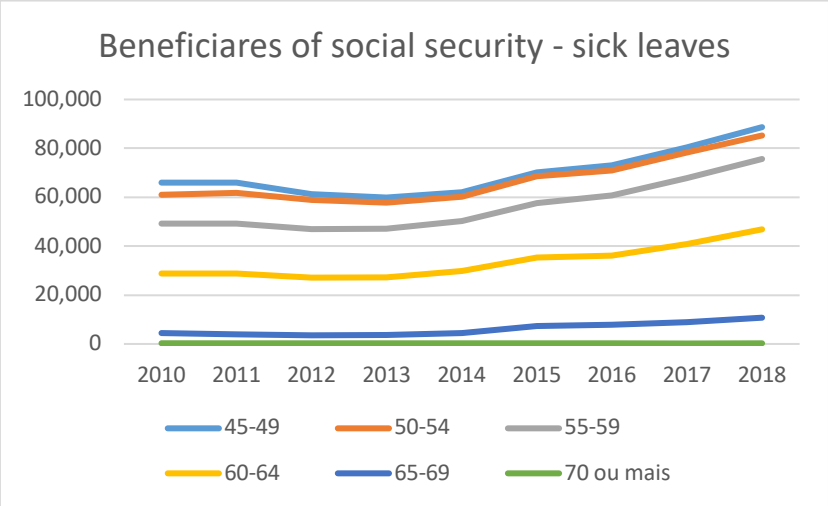

FIGURE 5: BENEFICIARIES OF SOCIAL SECURITY IN CASE OF SICK LEAVES[12]

In Portugal the age groups of 45-49 and 50-54 years are more often absent due to sick leaves than older age groups.

[11] SEGURANÇA SOCIAL. (2019) Síntese de informação estatística da Segurança Social. Lisboa: Gabinete de Estratégia e Planeamento. Available in: http://www.seg-social.pt/documents/10152/1864931/SIESS201904.pdf/d1a762a9-dbdf-42dd-a535-1074376a9108 Retrieved in 07.06.2019

[12] PORDATA: MINISTÉRIO DO TRABALHO, SOLIDARIEDADE E SEGURANÇA SOCIAL (MTSS). (2019) Beneficiários da Segurança Social do subsídio por doença: total e por grupo etário. Lisboa: Pordata. Avaliable in: https://www.pordata.pt/Home Retrieved in 07.06.2019

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TABLE 10: SUMMARY SICK LEAVE % PER AGE-GROUP DK AND PT

	50-54		55-59		60+	
National figures	DK	PT	DK	PT	DK	PT
Sick leave %	3.49	12.4	3.79	11	3.86	6.7

5.3. Literature study

The main goal of the literature study was to find recommendations, results or solutions from scientific literature on how to improve the workability of older workers and eventual occurring chronic diseases or conditions.

This literature study was performed in Spring 2019 and used the databases from ScienceDirect, PubMed and Google Scholar. Search tags used were: older workers; older workforce; self-esteem workers; managers and older workers; chronic disease and work; workplace and chronic disease; older workers learn ICT; work and chronic condition; workability older workers; older workers and health check; older workers and working conditions; social networks older workers; employer and older employee.

5.3.1. The view of employers

To enable older workers to continue their work until pensioning or beyond or to be recruited as older applicant, also depends from the attitude and given opportunities by employers and organisations.

In 2009, a survey among employers was executed within the EU FP7 funded project 'Activating Senior Potential in Ageing Europe'[13]. Part of this survey was the expected consequences of an ageing workforce and employers were asked for ten items what they think will be the effect if the average age of the personnel increases by 5 years. Labour costs, knowledge base, sick leave and resistance to organisational changes are most often expected to increase with the ageing of the workforce, whereas labour productivity, conflicts in the organisation and enthusiasm for new technologies are least expected to increase. Many European employers acknowledge an increase in know-how which firms will enjoy when their personnel ages. However, the increase in know-how apparently does not translate into higher productivity as most employers do not associate an ageing personnel structure with a higher productivity level. Employers were also asked to rate characteristics of older workers. This resulted in the following findings: older workers are considered to be more loyal, more reliable

[13] https://cordis.europa.eu/project/rcn/88423/factsheet/en

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and are supposed to have better social skills. On the other hand: older workers are rated most negatively with respect to the capacity to deal with new technology and their willingness to learn.[14]

A more recent research report on case studies conducted with 50 employers in England, Scotland and Wales[15] found that employers had largely positive views of older workers. They appreciated traits believed to be prevalent among older workers, such as experience, reliability, loyalty and stability. Health concerns, adaptiveness and relationships with younger line managers were recognised as challenges likely to be associated with employing older workers. Employers were not overly concerned about the ageing workforce and did not make efforts to actively monitor the age profile of their workforce. The employers were also asked to reflect on the challenges they thought were more commonly associated with older workers. These challenges are:

- Increased likelihood of long-term health conditions;
- Increased likelihood of staff being unable to cope with the physical elements of their job;
- Difficulty or unwillingness to adapt to the need for new skills; and
- Potential difficulties due to older workers being managed by younger managers.

5.3.2. Older workers and work in general

In parallel with the ageing of the labour force there has been a marked rise in the prevalence of contingent or flexible work.[13] This kind of work is defined as work that does not entail a permanent position with one employer, consists of under 35 hours per week with one employer and is limited in duration. These flexible work arrangements are often promoted as appropriate for older workers and may help in facilitating their continued engagement in paid work. However, to be successful, these arrangements require a related framework of regulation and policy to protect health and well-being of older workers. But regulation and policy are not in line with current common practices of downsizing or restructuring in many organisations, and these practices are likely to affect older workers more than younger workers. Similarly, a continuing trend towards work intensification in combination with longer and more irregular working hours is likely to have particularly negative effects on older workers. Therefore, it is suggested that the concept of workability might have potential to assist in finding appropriate accommodations for older workers.[13]

The concept of "workability" was developed in Finland during the 1980s. It has been defined in terms of workers' capacity to meet the physical, mental and social demands of their jobs.

The key factors predicting workability can be divided in four categories[14]:

1. Work demands and the physical environment, including muscular work, poor work postures, sitting work and work content, physical climate, changes;

[14] Wieteke Conen, Harry van Dalen, Kène Henkens, Joop Schippers, Activating Senior Potential in Ageing Europe: an Employers' Perspective, NIDI, The Hague 2011.
[15] IFF Research on behalf of the Department for Work and Pensions, Employer experiences of recruiting, retaining and retraining older workers, Qualitative research, 2017.

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2. Work organisation and the work community, including management, lack of freedom, dissatisfaction with worktime system, utilization of work experience;
3. Health and functional capacity, including physical exercise during free time, hobbies, smoking, alcohol, fatness
4. Maintenance of work-related skills, including possibilities for development and influence at work, job retraining, studying hobbies.

The authors Tuomi and colleagues found that workability was poorer among older workers doing physical work than those doing mental work, for both women and men. Workability has been linked to various attitudinal, health, and organizational outcomes. There are positive associations between workability scores and productivity, work quality, enjoyment of work and life satisfaction. Workability has also been associated with a lower interest in retirement.[14]

Taking the above-mentioned workability categories into account, in scientific literature on older workers we found the following recommendations/requirements. The third category of health and functional capacity will be discussed in a separate paragraph.

5.3.2.1. Ad.1: Work demands and physical environments

- From an ergonomic point of view it is necessary to ultimately address the necessary design requirements for adjusting the work environments, such as tools, workstation and workspace for the use of both older and younger users.[15] Another study also confirms that age-specific work requirements and specific equipment in workplaces for old employees are associated with a significantly higher relative productivity.[16]
- Using sit-stand workstations among office-workers sorts effect for 18 months, with concomitant improvements in cardio-metabolic and possible trend towards higher productivity outcomes. However, no effects were shown on presenteeism.[17]
- Flexible working times for older workers and inclusion of older workers in trainings are not associated with differences in age-productivity.[16] In the UK there exists a significant and increasing proportion of older workers who would prefer to work more hours. The research also shows that overemployment is a significant predictor of early retirement. In contrast, underemployment of older employees delays retirement, perhaps because this group wish to enhance their incomes and/or pensions.[18]
- Retrospectively assessed high cognitive demands, high and medium emotional demands, low influence at work, low recognition from management, medium role clarity, and high role conflicts predicted long term sickness absence and/or disability pension.[19]
- Caregiving increases the odds of exiting the workforce, however caregiving and workers' preferences to remain employed was stronger for men. [20]

5.3.2.2. Ad.2: Work organisation and the work community

- Older workers attach more importance to intrinsic, job-related aspects such as enjoying themselves in the job and having interesting work. Also social atmosphere, possibilities for good cooperation and fair treatment are important to older workers.[21] Fair treatment and

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being respected are also found critical for the well-being of older workers in a study after the level of resources in relation to employee stress.[22]

- Person-job fit was associated with the preference to remain in employment. Greater attention to fit during recruitment, focusing on redesigning jobs to improve job-holder fit and/or engaging in training to improve the skills, knowledge and abilities of the job-holder to ensure a better fit. To improve job-holder fit may in particular benefit women and those experiencing less financial pressure to remain in employment.[20]
- Age effects on participants' preference for familiar over new teams could only be observed after considering occupational future time perspective as a mediating variable. The application of age-mixed teams is the only measure found to be positively related to job duration of older employees.[23] This finding complements existing evidence on the relationship between the application of age-mixed teams and the relative productivity of older employees. Not only older workers have a higher productivity in mixed-age teams, but also young employees.[16]
- Whether workers can choose a team or are allocated to an existing team, they have their preferences and these preferences are crucial for team members' motivation and commitment. Awareness of age and time-related preferences for teams might help to better understand workers' differences in motivation and commitment as members of occupational teams.[24]
- Ageist stereotypes and perceptions about older workers present barriers to maintaining and attaining employment for the older age-group.[25] However, an Australian study found that for females and those in financially adverse circumstances, age discrimination marginally increased the likelihood of being in employment.[20]
- According to a European research project RESPECT[26] from 2005, is the existing corporate culture and work organisation in general not adjusted to the needs and competences of older workers. The project introduces 12 new models concerning corporate culture, leadership, professional competence, qualification, health and work organisation. For example measures to improve the competences and workability of older workers are: intergenerational teams, train the trainer, age-related workplace design and improvement, age-awareness workshops for managers.
- Electronic Performance Management (EPM) is increasingly used to monitor the performances of workers. Older workers are potentially vulnerable to such performance evaluations. Although EPM provides objective and hence more valid measures of individual performance, it still may not guard against the occurrence of age stereotypes or attributional bias in performance appraisal. Appropriately positioned HRM can prevent unintended discriminatory practices or biased managerial perceptions.[27]

5.3.2.3. Ad.3: Health and functional capacity: will be examined in the following subsection.

5.3.2.4. Ad.4: Maintenance of work-related skills

- Participation rate of workers in training decreases sharply after workers turn 50 (35% of 60 years old workers participate – against 53% before 50). Factors that affect managers' decisions regarding training opportunities for older workers are: 1) workers close to

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retirement and less healthy get less opportunities, 2) older workers who perform well and have a positive attitude are more likely to receive training. There are no differences found in aim or costs of training.[28]

- On the job training increases the employability of older workers and will keep older workers employed. The effects on productivity are higher than the effects on wages.[29] However, another study found that inclusion of older workers in trainings are not associated with differences in age-productivity.[16]
- Older workers are less likely to receive training than other workers, but those that do are satisfied with the training offered[16].
- Training programmes were effective in prolonging employment for women on lower wages. Also there is a positive association between training and job satisfaction.[20]
- Early-life investments may reduce the risk of long-run digital exclusion, in terms of increased functioning, social participation and wellbeing.[30]

5.3.3. Older workers and chronic diseases and conditions

According to the World Health Organization, chronic diseases include heart disease, stroke, cancer, chronic respiratory diseases and diabetes. Visual impairment and blindness, hearing impairment and deafness, oral diseases and genetic disorders are other chronic conditions that account for a substantial portion of the global burden of disease.[31] As a consequence of having a chronic disease or condition, people could need to take daily medication, follow healthy diets, performing physical activity or exercises, to take extra rests, have medical check-ups regularly or need to have aids to improve walking, vision or hearing. Having a chronic disease or condition also may impact work in all its assets or the conditions for the workplace. In the section below the impact of chronic diseases and condition on work and workplace will be described. At first, we will focus on the most common chronic diseases and condition people can have, based on the general statistics and questionnaires from Denmark and Portugal.

Lessons from literature: impacts on work caused by chronic disease or condition

- Ageing and problems to remain in work are mainly related to the International Classification of Function components body functions, activities and participation and work-related environmental factors. To provide a preventive and tailor-made intervention it is worth to focus on (work-related) problems, obstacles and personal development opportunities and the work-related environmental factors and adaptations based on the individual worker.[32]
- Poor physical health is consistently associated with unemployment, transition to disability pension and early retirement. Additional analyses show the importance of gender (men who are in better health) and finances (workers experiencing greater financial pressure) are more likely to remain in employment.[20]

[16] National Institute of Economic and Social Research (NIESR) on behalf of the Department for Work and Pensions, Older workers and the workplace, Evidence from the Workplace Employment Relations Survey, 2017.

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- Depression and diabetes mellitus are not directly related to work functioning, however more vulnerable to losses in functioning of the worker: higher risk on need for recovery and social participation restrictions and concentration problems or lower levels of physical functioning. It is recommended for workers with depression to avoid problems associated with mental functioning by managing and lowering the work demands. For workers with diabetes it is recommended to support the need for recovery and social participation.[33] Another study found that people in Canada with diabetes mellitus may not work optimally due to cognitive impairment and should be screened on it (and on functionally impairment).[34]
- People with type 1 diabetes live in tension between competing logics linked to diabetes and to work life. The research reveals a hidden burden of disease carried by working people with type 1 diabetes, however further research is recommended.[35, p. 1]
- Experiencing a first acute health shock (stroke, cancer, infarction) doubles the risk of an older worker to leave the labour market. Men cope differently than women: men prefer retraining programmes and job accommodation to lower the barriers of work. On the contrary, women have an increased preference for leisure above work, however financial constraints seems to play an important role.[36]
- A positive relationship was found between disability and part-time work. Policy makers are advised to encourage part-time employment as a means of increasing employment opportunities for older workers with disabilities, and support gradual retirement opportunities with flexible and reduced working hours.[37]
- Many employers offer workplace wellness programmes with the expectation that they will reduce health care costs. A study after the effects of the Be Fit programme demonstrated improvements in cardiovascular risk factors, but no evidence for reduction in healthcare costs of participants one year after the programme.[38]
- 90% of patients with Inflammatory Bowel Disease (IBD) require work accommodations. They need time to go to medical appointments and easy access to a suitable toilet. Fewer people needed a chance to take a break when not feeling well, a flexible or reduced work day, flexibility in start time and work hours or reduced days of work each week.[39]
- To facilitate remaining at work with a chronic musculoskeletal condition or returning to work after a musculoskeletal injury primary care professionals and clinicians play an important role to empower individuals.[40]
- Chronic knee pain and work research indicates that 14% of the participants reported one or more days off work, while 79% reported reduced productivity while at work. Effective strategies to increase productivity should focus on reducing knee pain.
- To enhance work productivity and to remain in work of people with ankylosing spondylitis or axial spondylarthritis (causing pain in the spine) physiotherapists and occupational therapists form an important part of the necessary support. Also employers need to adopt a flexible approach and proactively engage with healthcare professionals to enable these workers.[41]
- Research on the impact of allergic rhinitis, found that a small group missed work time and 1 out of 3 had impairment in at-work performance due to allergic rhinitis. Pharmacologic treatment showed a beneficial effect on work productivity.[42]
- Social function intervention may improve the ability to work of people with chronic pain.[43]
- A brief menopause awareness training may be a feasible and effective way to help managers become more knowledgeable about menopause-related problems and more confident in discussing and exploring solutions with their staff.[44]

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- Insomnia is more common in women, smokers, obese individuals, those living alone and those in financial hardship. Work-related determinants are unemployment, shift working, lack of control and support at work, job insecurity, job dissatisfaction and several of its determinants such as feeling unappreciated, difficult colleagues. Employment policies may benefit from focusing on job-person fit, job security and relationships in the workplace.[45]
- Arthritis causes considerable problems with absenteeism and presenteeism at work. Leaves of absence of 3 months or more are relative common. Diabetes leads to indirect costs that exceed direct costs with 2:1, by reduced productivity, absenteeism, early retirement and the use of social benefits. Workers whose accommodation needs were met, reported better job outcomes.[46]
- It may be promising to address perceived health and psychosocial factors in strategies and interventions towards a sustainable working life of workers with a chronic health conditions. Work conditions play a less important role is the findings of this study from 2013.[47]
- Age-related musculoskeletal changes increase the risks on injuries for older adults. Therefore it is recommended to occupational health nurses to conduct a fall risk evaluation of older workers, to assess for adverse medication reactions and to record the onset of chronic conditions to calculate workers' injury risks. Health issues that reduce physical activity increase the risk of musculoskeletal injury.[48]

5.4. ICT technology and workability sustainability

The Information and Communication Technologies (ICT) play a very important role in todays developed society, and have been implemented in a majority of companies. Recent statistics performed in EU by Eurostat in 2010, show that 93% of all companies have internet access in their facilities/offices. If we extend that interval up to 2018, the percentage rises up to 98%, which indicates that a large majority of companies use ICT.

On the other hand, if we consider the EU-25 employment rate of people with ages between 55 and 64 years, it is comprised in 42%, and have increased about 5.9% from 2000 to 2005 [49]. Relatively to the population stratification in the European Union, it is expected to decrease radically by 2020, according to [50]. The same study refers that by 2050 it is expected a 18% decrease of the population that will be in its working age (15-64), and an increase up to 60% of the number of people with 65+ years. This leads to a projected ratio of retired versus active people of about 1:2 in 2050.

In a society marked by the fast growing of new technologies, devices and processes, the aging of employees and the high ICT use lead to a great challenge for a majority of today's companies of try to combine these to paradigms. This can be difficult, because when compared with younger employees, older workers are less likely to use information and communication technologies (ICT) [51], [52], which might lead to reduced productivity, in companies optics, because the easy access to people and information that ICTs help create is implicated in increased workplace productivity [53].

Having this in mind, the EU suggests some aspects to make the technological project more global, enabling the permanence of older workers at work, consisting in work organization and safety improvements, permanent learning and adoption of flexible work plans.

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The implementation of some of the mentioned guidelines can have positive impact in work sustainability of older workers using ICTs.

5.5. Summary

From literature it becomes clear that recently the following trends occur. First of all, the average age of the work population increases, which means that the percentage of older workers is climbing. Second, new technologies, techniques and innovations are being implemented in companies on a regular basis. A third trend is the marked rise in the prevalence of flexible work conditions.

Together, these three trends create a problem that needs to be solved in order to keep employees up with the implemented or soon to be implemented upgrades.

However, employers are positive about the experience, reliability, loyalty and stability older workers bring to the workplace, they consider the main challenges of an ageing working population as follows:

- Increased likelihood of long-term health conditions;
- Increased likelihood of staff being unable to cope with the physical elements of their job;
- Difficulty or unwillingness to adapt to the need for new skills; and
- Potential difficulties due to older workers being managed by younger managers.

Recommendations and found solutions from literature are divided in four categories for workability:

1. Work demands and physical environments

Adapted tools, workstations (such as sit-stand workstations) and workspace are recommended to maintain productivity of older workers. Avoid the combination of high cognitive and emotional demands with low influence and low recognition.

2. Work organisation and the work community

Older workers attach more importance to intrinsic, job-related aspects such as enjoying and interesting work. The corporate culture is important. Mixed age-teams are recommended. Ageism barriers maintaining and attaining employment for older workers.

3. Health and functional capacity

To tackle issues of older workers with chronic diseases and conditions, adaptations at the workplace are sometimes needed, such as available toilets, adjusted working stations, social functioning trainings and flexible hours to return to work. Job-holder fitness could be beneficial, including wellness programmes to improve heart condition.

4. Maintenance of work-related skills

Training of older workers is the best way to increase the employability of older workers and to bridge an eventual gap of technology skills.

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6. Consultation of end-users

In Chapter 4 the methodology of the consultation of end-users has been described. Here we provide the results of the consultation of employees, employers and caregivers.

6.1. Results of the consultation

6.1.1. Employees

The consultation of the employees started with the invitation of 110 office workers of Aarhus Municipality offices and 195 office workers from Cáritas Coimbra. This resulted in a response of a total of Denmark (Danish version - 50 respondents, from which 49 were in the right age-frame) and Portugal (Portuguese version – 52 respondents, from which 50 were in the right age-frame). Other office workers aged 55+, were invited by personal approach and LinkedIn from other European countries. As a result 81 workers responded, from which 60 were in the right age-frame. Most respondents came from The Netherlands, Finland, Greece and the UK.

The explored information was divided into 5 main sections: (a) Demographic and general information on personal habits, needs and preferences at workplace; (b) Health status; (c) System functionalities (d) System interface and wearables and (e) Privacy.

This document presents the quantitative analysis of the results of the questionnaires applied. Considering the final aims of the study, as eventual differences expected between these samples, the final poll was analysed separately, within Portugal, Denmark and European samples.

However, particular attention was given to Portuguese and Danish samples, considering 3 main reasons: (1) they proved to be individually and in comparison to each other, more homogeneous than the third sample, which in turn presents much more heterogeneous general features; (2) most of the same Danish and Portuguese respondents will probably also participate in the iterative requirement country pilot trials, respectively, within the organisations they work to; (3) since the questionaires were disseminated online, through several European countries, in the context of a voluntary participation request, the reliability of some responses may be questioned – namely one of the major criteria: participants age and active working condition.

Data analysis will then be presented considering the main trends of the Danish and Portuguese samples (as a whole), then graphically detailing and explaining eventual differences, in case they exist and whenever relevant. The analysis of the third sample will also be provided, to reinforce the results in agreement to the main previous tendency or, at the opposite, to discuss eventual significant differences.

PART A – Demographic and General Information on Personal Habits, Needs and Preferences at Workplace

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Portuguese sample is composed by 50 respondents over 55 years of age. In turn, Danish sample gathers 49 respondents over 55, making a final sample of 99 respondents in total, which will be analysed together as a whole, only highlighting eventual relevant differences between the 2 pilot trial countries or in comparison to the third sample, composed by 60 English questionnaire respondents.

A1. In which EU-country do you reside?

A2. Are you male or female?

The overall sample of Portuguese and Danish respondents is composed by 70 women and 29 men. In detail, the respective gender distribution in each country is: Denmark 35 female, 14 male; Portugal 35 female and 15 male.

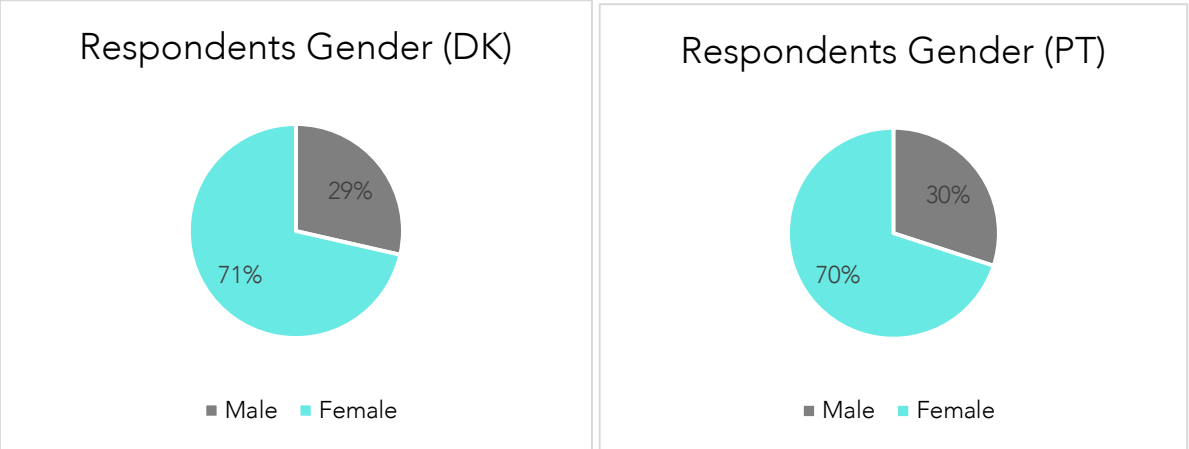

FIGURE 6: GENDER OF EMPLOYEES

As for the third sample of European questionnaires (English version), more men than women responded on the questionnaire (52% male; 48% female).

A3. What is your age?

As for the respondants age range, most of them have over 55 and under 60 years old (53%), followed by a second age group that lies between 60 and 65 years (40%). In detail, the respective age distribution in each country is according to the following graphics:

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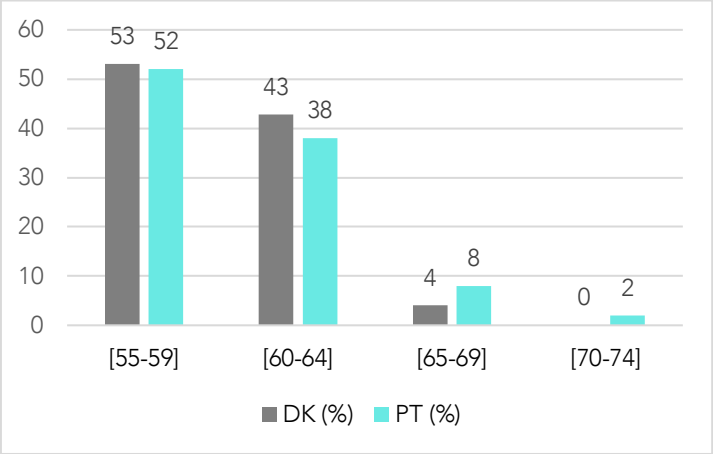

FIGURE 7: AGE OF EMPLOYEES

In the sample of European questionnaires the group consists almost half of 55-59 years (N=29), followed by the group of 60-64 years (N=22).

A4. Are you currently living alone?

A4.1. If you answered "no", who are you currently living with?

The majority of respondants (84%) is not living alone, but rather with "spouse or partner only" or with "spouse and child". Only (16%) refer to live alone.

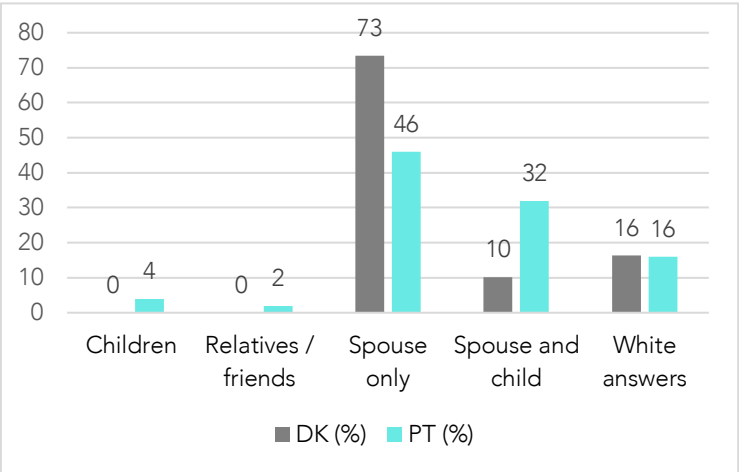

FIGURE 8: EMPLOYEES' HOUSEHOLD

As for the English questionnaires sample the number of people living alone equals 23% and is a bit higher.

A5. Are you a caregiver for someone with special health or wellbeing needs?

A5.1. If yes, please tick all answers that are appropriate:

The majority of respondants (68%) does not take care of anyone with special health or wellbeing needs. However, (32%) refer to have someone at charge, mainly "parents" (16%) or "spouse" (10%).

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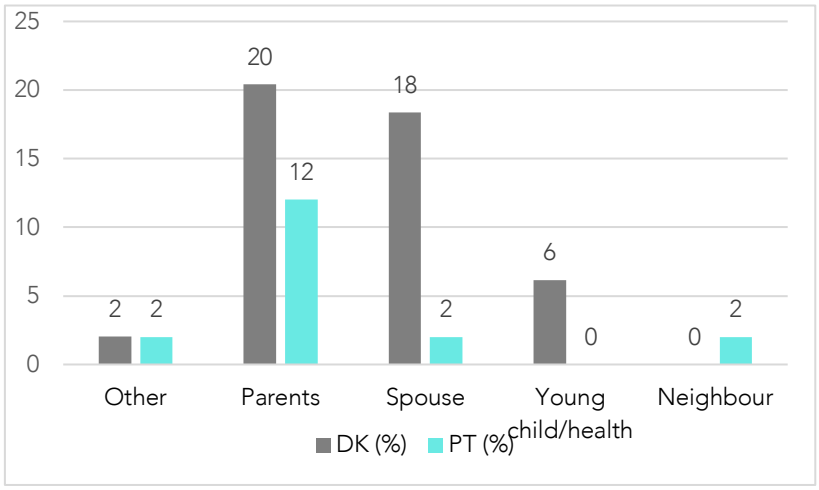

FIGURE 9: EMPLOYEES BEING CAREGIVER

As for the English questionnaires sample the number of caregivers is lower: 18% (N=11).

A6. Do you have internet or wireless access connection at home?

A6. If yes, please specify: attachment?

The large majority (98%) of Portuguese and Danish respondents do have internet or wireless at home.

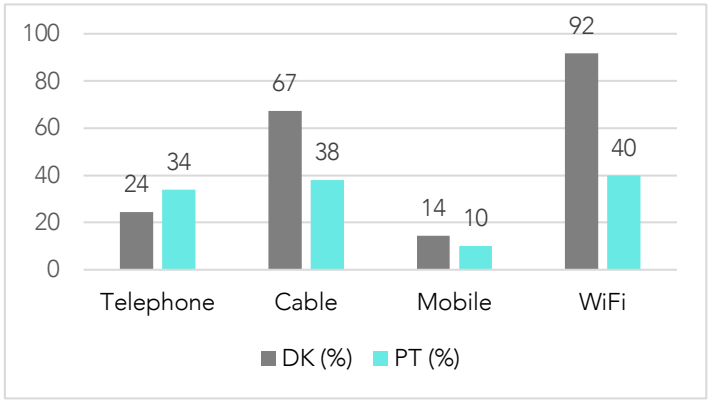

FIGURE 10: EMPLOYEES: INTERNET CONNECTIONS AT HOME

Your Work and Organization

A7. My organisation employs:

Data analysis shows that this question raised some misunderstandings. Some respondents did not answer according to the reality, as they confused the number of global workers in their organisation with the number of workers to their specific sectors/departments.

With this being said, most of the respondents (75%) referred to be working in an organisation employing more than 500 people.

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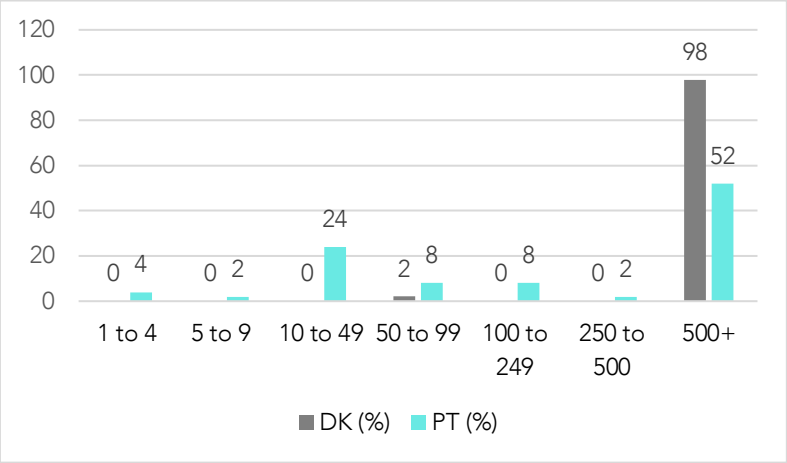

FIGURE 11: EMPLOYEES: SIZE OF THE ORGANISATION

As for the English questionnaire, more variety in organisation-size has been found. Almost half (45%) is employed in an organisation with more than 500 employees, 23% works in organisation with a size from 50-249, and 25% in a company with 10-49 employees.

A8. In which sector do you work?

The majority of respondents (62%) refer to work on the public sector, followed by the charity sector (24%) and finally the private sector (14%). Once again evidence suggests some misunderstanding from the respondents when it comes to the comprehension of the question.

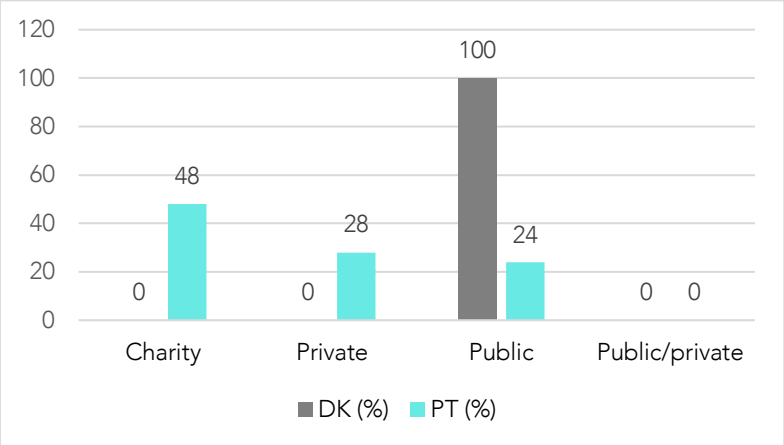

FIGURE 12: EMPLOYEES: ORGANISATION SECTOR

As for the English questionnaires sample 42% works in the private and 38% in the public sector.

A9. In which function area do you work at the moment?

In terms of functional area, most of the respondents mentioned to work in "administration" (38%), followed by "social care" (25%) or "other" (19%).

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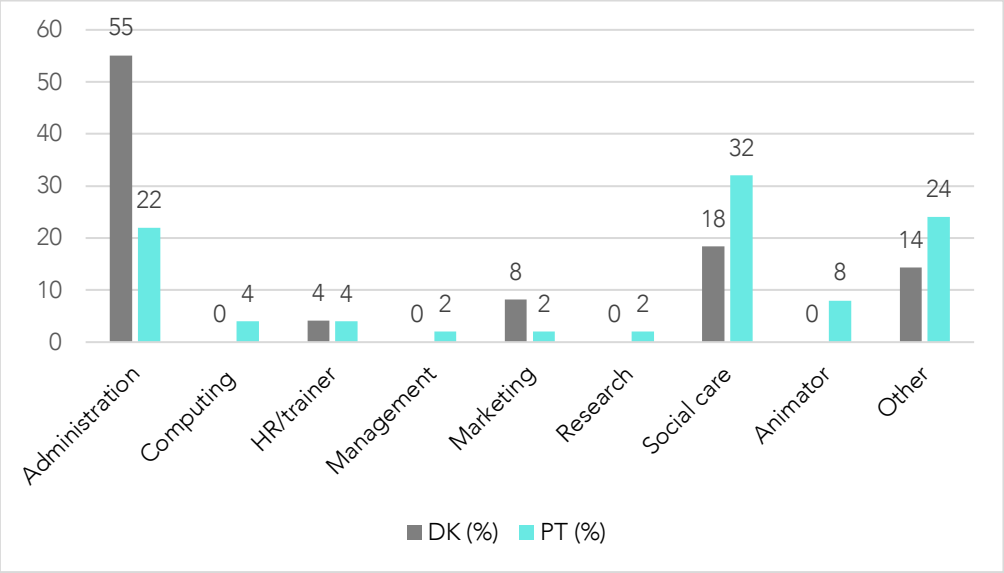

FIGURE 13: FUNCTION OF EMPLOYEES

As for the english questionnaires sample there is large diversion of functions to be found, of which the most mentioned are: 22% in computing, 20% in research and 18% in management.

A10. Did you always work at an office?

The main trend of responses is positive (56%), against a similar proportion of negative answers (44%). However, there is a difference between the Danish and the Portuguese samples, with the majority of Danish people being more stable when it comes to always having worked in an office. In turn, the majority of the Portuguese sample referred to have changed to work at an office at some point.

As for the English questionnaire sample the number of office workers is higher: 73%.

A10.1. If no, what was your former function area before you moved to office work? (in attachment)

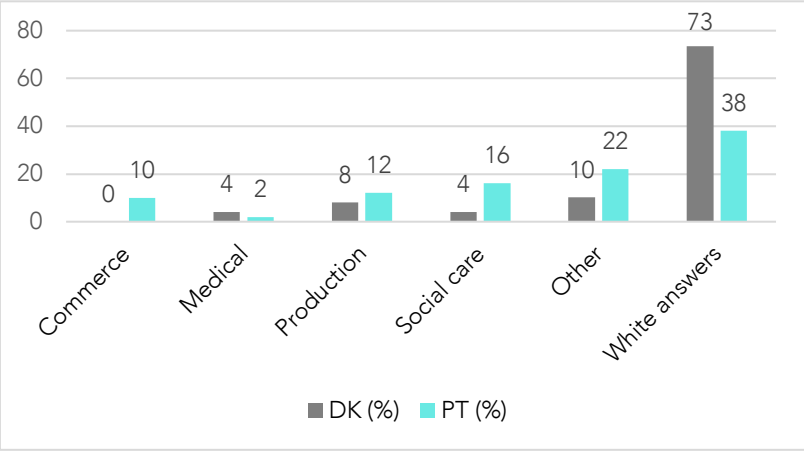

FIGURE 14: EMPLOYEES: FORMER FUNCTION BEFORE OFFICE WORK

A10.2. Did you move from another organisation to your current job? (in attachment)

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From the respondents that had another function before office work, the majority earlier worked at another organisation: Denmark 10 out of 13, Portugal 22 out of 31.

A10.3. What was/were the reason(s) to move to work at the office? Please tick all that apply.

The search for "better job opportunities" was mentioned by a major group (9.1%) as the main concrete reason for changing to work at an office, as evidenced by the following graphic:

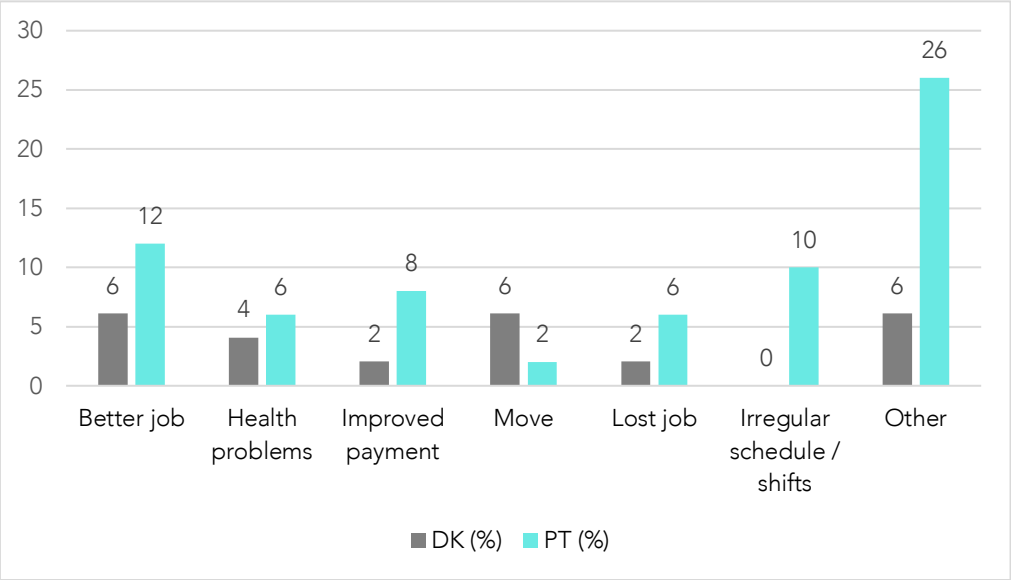

FIGURE 15: EMPLOYEES: REASON TO MOVE TO WORK AT THE OFFICE

As for the English questionnaires sample the main reason to move jobs was the same.

A10.4. Did you encounter problems during the transition from one job to the other? Please describe shortly if any.

Most of the respondents (41%) do not acknowledge any problem associated to the transition from one job to the other. However, there was a significant number of white answers (56%).

One Danish respondent indicated to have back problems. One Portuguese respondent indicated that it was difficult to learn digital skills.

One respondent from the EU faced age-discrimination while transferring from one job to the other.

A11. Do you always start working at the same time?

Most of the respondents (68.7%) confirmed they start working at the same time, against 31.3% who do not.

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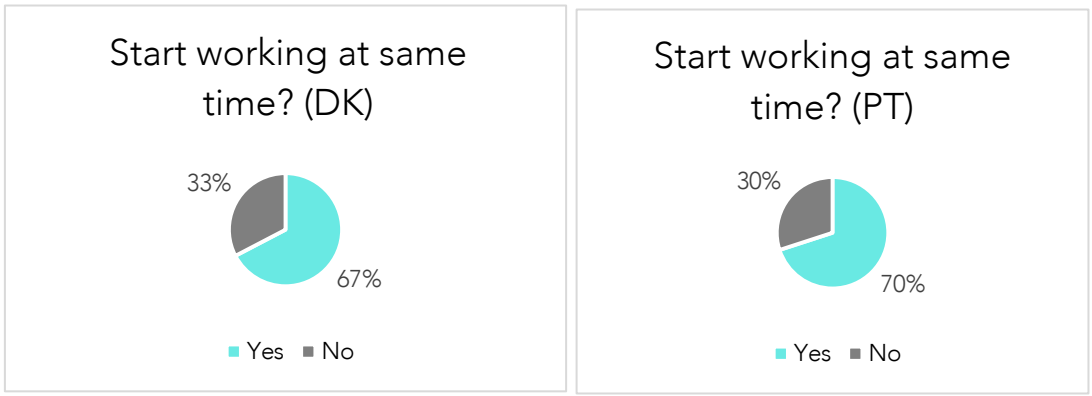

FIGURE 16: EMPLOYEES START TO WORK AT THE SAME TIME

As for the English questionnaires sample more than half (56%) starts at the same time; 44% use more flexible start times.

A12. How many hours do you work a week, according to your contract?

The majority of the Danish and Portuguese respondents together (92%) refers to work between 26 to 40 hours a week.

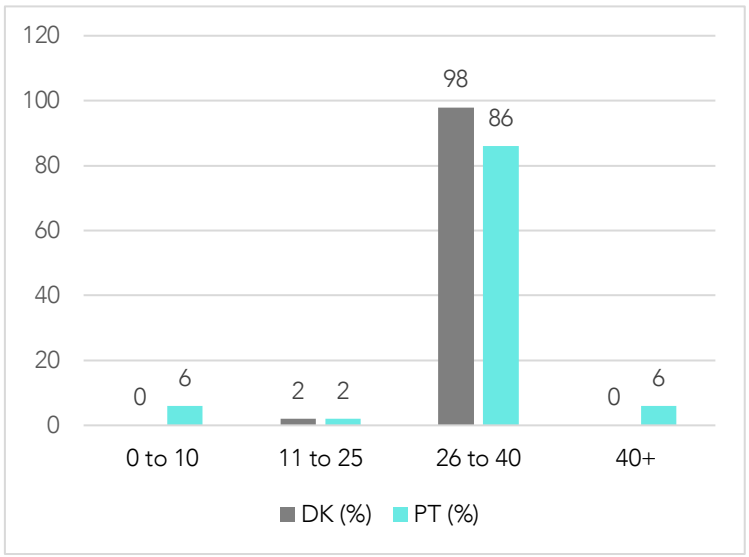

FIGURE 17: EMPLOYEES: NUMBER OF HOURS IN CONTRACT

As for the English questionnaires sample 66% works 26-40 hours per week. 20% works more than 40 hours per week.

A13. How many years have you been working in this job?

Most of the participant workers to the questionnaire refered to have been working in the actual job for more than 25 years (37%), followed by a second major group (16%) that is in this job for up to 5 years.

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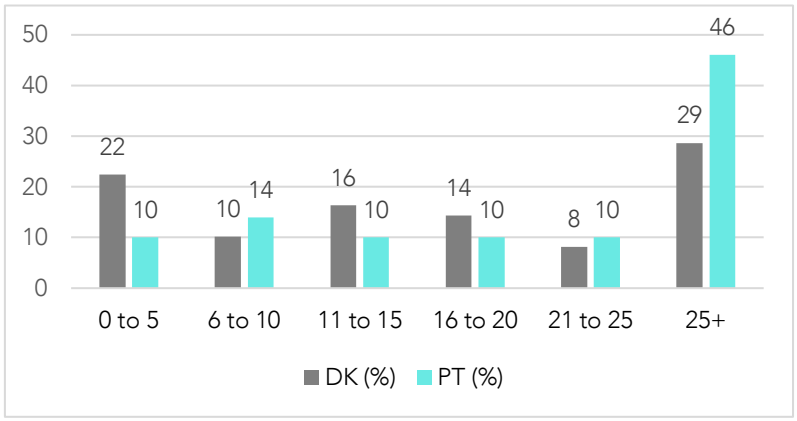

FIGURE 18: EMPLOYEES: YEARS IN CURRENT JOB

As for the English questionnaires sample the biggest group also works for more than 25 years in the actual job (37%). Followed by the group 16-20 working years (17%). Overall, 3 out of 4 workers work in their current job more than 10 years.

A14. Do you have repetitive tasks (same task everyday or several times a day)?

Although in a quite similar proportion (55% against 45%), most respondents acknowledged not to perform repetitive work tasks.

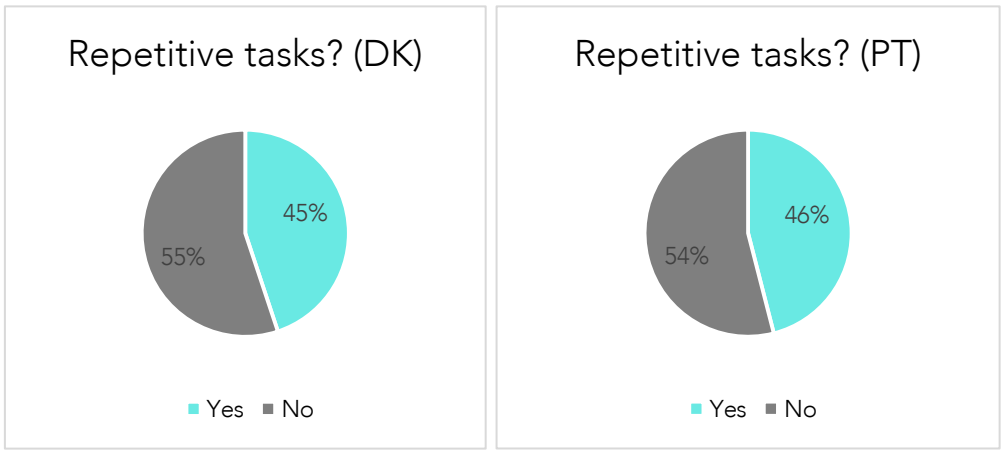

FIGURE 19: EMPLOYEES AND REPETITIVE TASKS

As for the English questionnaires sample the same numbers were found: respectively 57% non repititive against 43% repititive tasks.

A15. Do you have routine down time daily activities (such as coffee or tea breaks, lunch break, walks)?

The majority of responses (89%) confirm to have routine break time daily activities. However, a lower percentage (11%) refers they do not.

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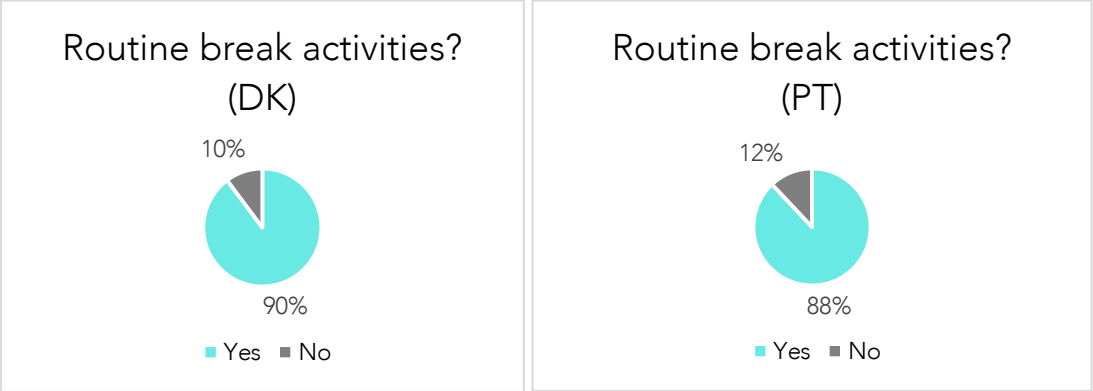

FIGURE 20: EMPLOYEES HAVE ROUTINE BREAK ACTIVITIES AT WORK

As for the English questionnaires sample 68% of the respondents indicate to have daily breaks.

A16. Question A16 has been deleted. (See section 4.3)

A17. Can you please indicate below how many hours per day you perform these activities?

Most respondents, both in Danish and Portuguese samples spend most of their time (4 8 hours pers day) working "at desk" (62%), at the "computer" (54%) and on the "internet" (22%). They also mention to spend up to 1 hour a day on activities related to "smartphone app (90%), "meetings" (85%), "reading" (81%) and "telephone calls" (73%).

Maybe it is worth mentioning the possibility that some workers have responded to "reading" during work as the time they spend reading in the computer. Another important aspect is that they refer to take "breaks" or "walks" up to an hour a day, during work, in similar proportions (Danish – 96%; Portuguese - 91%).

TABLE 11: DANISH EMPLOYEES: ACTIVITIES AT WORK

Activities in % Denmark (N=49)	0 hour	1 hour	2-3 hours	4-5 hours	6-8 hours	More than 8
Work at desk	4	16	8	10	57	4
Work at computer	0	4	24	24	45	2
Telephone calls	0	71	22	2	4	0
Meetings	10	71	16	0	2	0
Breaks	12	86	2	0	0	0
Walking	37	59	4	0	0	0
Reading	22	51	18	2	6	0
Visiting internet	16	24	29	10	16	4

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Activities in % Denmark (N=49)	0 hour	1 hour	2-3 hours	4-5 hours	6-8 hours	More than 8
Using email	4	41	35	10	10	0
Using smartphone apps	65	29	0	0	6	0

TABLE 12: PORTUGUESE EMPLOYEES: ACTIVITIES AT WORK

Activities in% Portugal (N=50)	0 hour	1 hour	2-3 hours	4-5 hours	6-8 hours	More than 8
Work at desk	22	12	14	28	22	2
Work at computer	20	16	28	16	18	2
Telephone calls	34	40	12	10	4	0
Meetings	34	54	12	0	0	0
Breaks	10	78	12	0	0	0
Walking	44	48	8	0	0	0
Reading	32	56	6	2	2	2
Visiting internet	18	48	20	6	6	2
Using email	26	46	14	8	4	2
Using smartphone apps	56	30	10	2	2	0

As for the English questionnaires sample at the office most hours are spent on working at the desk (almost half of the respondents (48%) works more than 6 hours at the desk. Further, most hours are spent on working at the computer (4-5 hours: 32%; 6-8 hours: 38% and more than 8 hours: 12%). No hours are spent on walking and using smartphone apps.

A18. Do you think there are positive effects of being an older adult worker? If yes, could you please provide an example?

49% of the Danish and 80% of the Portuguese respondents think there are positive effects of being an older adult worker. (87% of the EU respondents.)

Experience, and in line with that respect, seniority, leadership, are the most given answers on the question if there are positive effects of being an older adult worker (DK 41%, PT 52%). The Portuguese respondents additionally answered that older workers are able to train and coach other colleagues, and also have more patience (23%). Danish workers didn't mention that asset at all.

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In the broader context of the EU, 59% answered experience as the main advantage of older adult workers. Also they mention training/coaching (11%) flexibility and freedom as an important asset (10%). Additionally 2 out of 60 respondents mentioned that older workers are less ill than younger workers.

A19. Do you think there are negative effects of being an older adult worker? If yes, could you please provide an example?

4 out of 5 Danish respondents did not mention any negative effect of being an older worker. Portuguese respondents relatively found more negative effects: 3 out of 5 answered 'none' or did not provide any answer. Portuguese respondents mentioned the matter of being slower and more tired as the main negative effect (24%), followed by lower technology skills (14%). Three percent of the Danish workers gave the same answers. They added generation gap and age-discrimination as well (4% each).

The respondents from the EU also mentioned being slower, tiredness and needing more rest as the main effect (33%), followed by less technology skills (13%) and age-discrimination (4%).

A20. Opportunities in my organisation:

Most of the respondents "agree" or "strongly agree" that there are "opportunities for older workers" in their organization (75%). Interestingly, they "disagree" or "strongly disagree" (57%) that their organisation keeps working "people on retirement age". Also when it comes to being careful on "planning for succession" at the older workers' due retirement age, 49% of respondents tend to "disagree" or "strongly disagree".

TABLE 13: EMPLOYEES: OPPORTUNITIES IN THE ORGANISATION

In % N: DK=49, PT=50	Strongly agree		Agree		Disagree		Strongly Disagree	
Country Opportunities	DK	PT	DK	PT	DK	PT	DK	PT
Opportunities for the older worker	18	22	51	58	24	10	6	10
No people at retirement age	4	10	39	34	43	32	14	24
Careful to plan for succession	4	10	33	56	49	20	14	14

As for the English questionnaires sample most respondents also think that there are opportunities for older workers in their organisations (73% agree or strongly agree). In line with above the majority also (strongly) agrees with people on retirement age in their organisation (58%). The meanings are rather equally divided between yes or no carefull planning of succession by the organisation (47-53%).

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A21. Attributes of the older worker

As for the attributes of the older workers, the majority of respondents "agrees" or "strongly agrees" that they "bring experience to the workplace" (96%), are "beneficial to the company to retain their skills and experience" (89%), "make good mentors" (88%) and "have maturity to better handle customer service" (69%).

Interestingly, the Portuguese and Danish samples equally split, when it comes to older workers being "less adaptable to technological change", with half being in agreement against half that clearly disagree. Once again, it can be questioned the eventual influence of social desirability to the answers, since people were judging at their own cause.

On the other hand, most respondents "disagree" or "strongly disagree" that older workers "tend to take longer terms of sickness leave" (82%), "cost more" to the company (75%), are "less adaptable to general change" (65%), "are often less interested in re-training" (59%) and "tend to be more reliable than younger workers" (56%).

TABLE 14: EMPLOYEES: ATTRIBUTES OLDER WORKER

In % N: DK = 49, PT = 50	Strongly agree		Agree		Disagree		Strongly Disagree	
Country Attributes older worker	DK	PT	DK	PT	DK	PT	DK	PT
Bring experience to workplace	57	48	41	48	0	2	2	2
More reliable	12	10	43	22	43	52	2	16
Better to handle customer service issues	6	22	57	52	33	24	4	2
Less adaptable to general changes	0	6	16	46	76	42	8	6
Less adaptable to technology changes	6	12	18	62	67	22	8	4
Good mentors	29	44	57	48	12	6	2	2
Less interest in re-training	2	8	24	46	57	26	16	20
Cost more	0	8	16	24	63	58	20	10
Longer sickness leave	0	6	0	28	57	44	43	22
Beneficial for organisations	24	36	67	52	6	10	2	2

When it comes to the English questionnaires sample all respondents agree (32%) or strongly agree (68%) that older workers bring experience to the workplace, that older workers are good mentors

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(97%) and are beneficial for companies (98%). At the other hand the respondents strongly indicate to disagree (90%) with the fact that older workers need longer sickness leaves than younger workers.

Additionally the EU respondents think that older workers are more reliable than younger workers (72%), are better in handling customer service issues (73%) and cost more (60%). For the other questions the meanings are rather equally divided.

A22. Attributes of the younger worker (in attachment)

A23. My own retirement aspirations

The majority of the respondents have the intention to retire at normal retirement-age (DK: 31; PT: 42). Regarding leave before retirement-age, more Danish respondents strongly disagree on that suggestion (15 to 6). Portuguese respondents far more strongly agree to retire. Compared to the Danes, much more Portuguese respondents will need to have work after retirement due to financial reasons. The Danish respondents are more in favour to think that they will be allowed to stay in their own jobs. Portuguese respondents are more in favour of the question to work giving a sense of identity (37 to 22).

TABLE 15: EMPLOYEES: RETIREMENT ASPIRATIONS

In % N: DK=49, PT=50	Strongly agree		Agree		Disagree		Strongly Disagree	
Country Retirement aspirations	DK	PT	DK	PT	DK	PT	DK	PT
Intend to retire at normal retirement-age	10	46	53	38	22	12	14	4
Need work after retirement due to financial reasons	0	6	2	38	45	46	53	10
Like to think to be allowed to stay in my job	10	14	71	38	12	38	6	10
Like to think physically able to stay post-retirement	22	22	63	56	10	20	4	2
Want to work for social inclusion reasons	6	4	39	38	45	48	10	10
Plan to retire before normal retirement-age	10	14	39	30	20	44	31	12
Working gives a sense of identity	12	20	33	54	51	26	4	0
Flexible working post-retirement is of great interest	31	20	51	54	16	22	2	4

As for the English questionnaire 58% of the EU respondents intends to retire at normal retirement age. 33% of the respondents needs to have work after retirement for financial reasons. For after retirement the respondents like to think to be physically able to continue to work (88%) and are in favour of flexible working opportunities (78%). 60% of the respondents would like to retire earlier than the normal retirement age if finances allow it.

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A24. My views about retirement and the older worker

Danish respondents think differently about the retirement of older workers at retirement age: Danish respondents disagree (39), where in contrast the majority of Portuguese respondents agrees or strongly agrees (31). Their opinions also strongly differ on the fact that retaining older workers would lead to less opportunities of younger workers. Danish disagree (80%), Portuguese agree (68%). Both groups also disagree on the thesis that it is time that older workers move on to enjoy their retirement (68% Portuguese agree, 67% Danish disagree). Both groups think rather similar about the own choice of workers and that it is not unsettling to have semi-retired colleagues. They don't agree on retaining older workers to pass on experience. At the other hand they indicate to like to consult retired colleagues.

TABLE 16: EMPLOYEES: RETIREMENT AND OLDER WORKERS

In % N: DK=49, PT=50	Strongly agree		Agree		Disagree		Strongly Disagree	
Country **Retirement and older workers**	DK	PT	DK	PT	DK	PT	DK	PT
Older workers should retire at normal retirement-age	0	20	20	42	49	32	31	6
Older workers should be given the choice to retire or not	12	32	73	56	10	8	4	4
It is unsettling for employees to have semi-retired colleagues	0	12	8	30	71	48	20	10
Older workers to retain post-retirement to pass on experience	0	6	37	34	51	56	12	4
We would like to consult retired colleagues	22	10	63	58	12	24	2	8
Older workers don't affect promotion younger workers	12	8	53	48	35	34	0	10
Older workers give less opportunities to younger employees	2	16	18	52	57	26	22	6
Times move on and older workers best leave to retire	0	30	37	58	49	6	14	6
Like employer who actively supports the needs of older workers	35	46	63	48	2	4	0	2

As for the English questionnaire the vast majority (97%) of the respondents think that older workers should be given the choice whether to retire or not. Almost an equal figure (95%) is to be found in favour of an employer who actively supports the needs of the older worker. The respondents disagree

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(87%) that it is unsettling for full-time employees to have semi-retired colleagues still involved in the business.

Further, the EU respondents are more in favour of older workers retained post-retirement to pass on experience to younger colleagues (70%), to consult with retired colleagues for their knowledge and experience (75%) and retaining older workers post-retirement does not affect the promotion of younger employees (73%). They rather disagree on the thesis that older workers should be retired at the normal nationally agreed retirement age (65%) and if older workers are kept on post-retirement, there are less opportunities for younger people (67%).

They almost equally agree or disagree (47-53%) on the thesis that times move on and retired colleagues are best left to enjoy their retirement.

A25. Please specify below any other useful information regarding your work, that you believe is important to be considered during the development of the SmartWork system and IS NOT covered above: (in attachment)

This question was answered by 19 persons in total (6 DK, 4 PT, 9 EU). Answers varied from the need of having mixed-age teams, keep experience at work and don't spoil it, managers and older workers are important to understand each other, retirement age should be reduced, more flexibility is needed, in case it is needed shift older workers to other jobs or departments and there is no difference between older and younger workers.

PART B – Health Status

B.1. Do you have a hearing problem?

Most of the two countries respondents (88%) refer not to have hearing problems, against 12% that say they do.

FIGURE 21: EMPLOYEES HAVE HEARING PROBLEM

Regarding the English sample 13 % of the respondents reports to have a hearing problem.

B.1.1. Do you use a hearing aid?

B.1.2. How do you classify your hearing problem (using the hearing aid, if applicable)?

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However, only 6% refer to wear a hearing aid. A slightly larger group (10%) considers their hearing problem as "moderate".

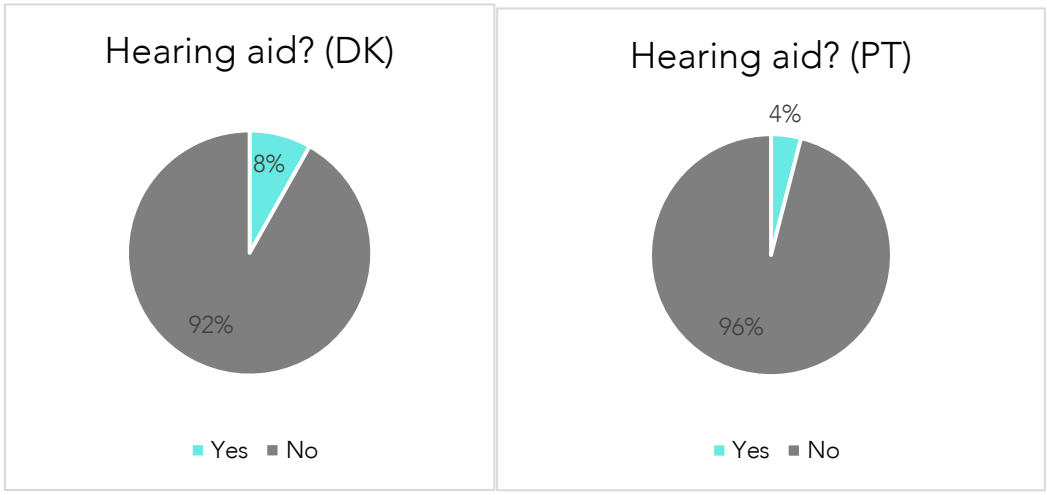

FIGURE 22: EMPLOYEES HAVE HEARING AID

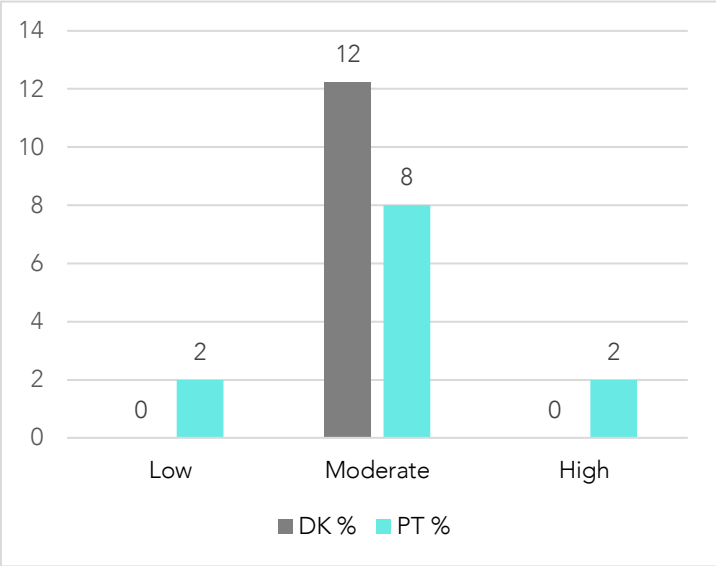

FIGURE 23: EMPLOYEES: CLASSIFICATION HEARING PROBLEM

Regarding the English sample 1 out of 8 respondents report to use a hearing aid. 50% of the respondents indicate to classify their hearing problem as low, 25% as moderate and 25% as high.

B.2. Do you have an eye vision problem?

When it comes to vision problems, the global sample splits almost equally between "yes" (49%) and "no" (52%). However, Portuguese workers refer much more often they have vision difficulties (70%) than Danish workers (27%).

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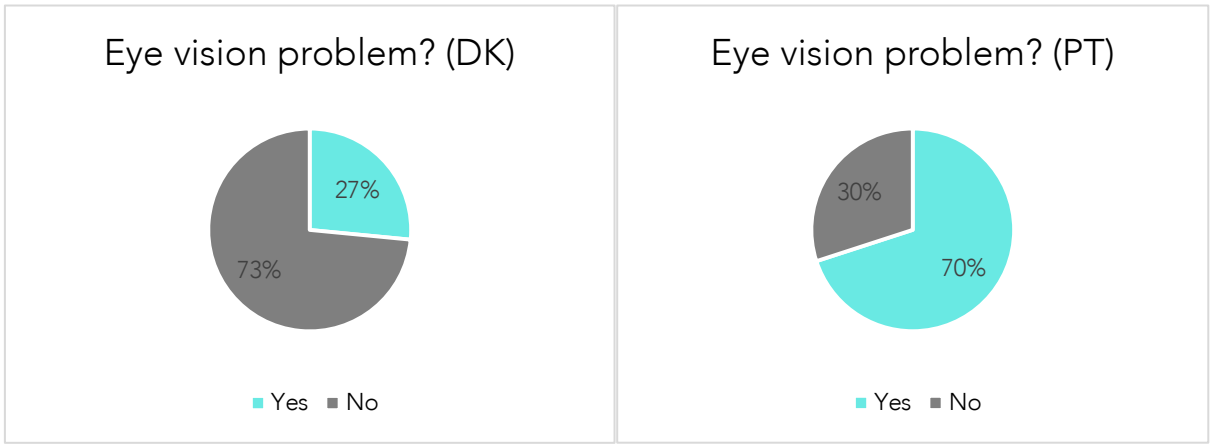

FIGURE 24: EMPLOYEES HAVE EYE VISION PROBLEM

Regarding the English sample, 23% of the respondents report to have an eye vision problem.

B.2.1. Do you use glasses?

B.2.2. How do you classify your vision problem (using glasses, if applicable)?

Most of the respondents (49%) refer to wear glasses, with 31% considering to have "moderate" vision difficulties and 15% considering them "low".

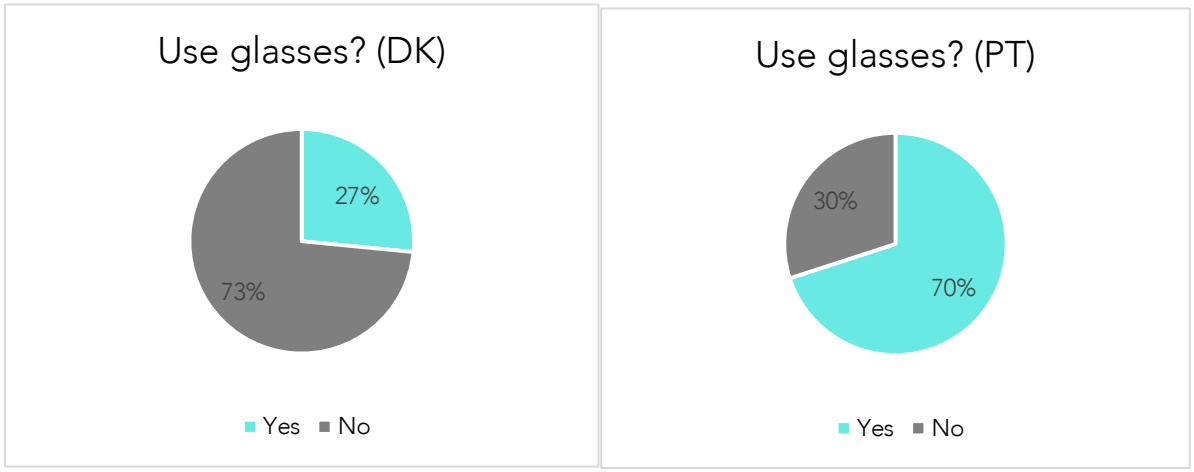

FIGURE 25: EMPLOYEES USE GLASSES

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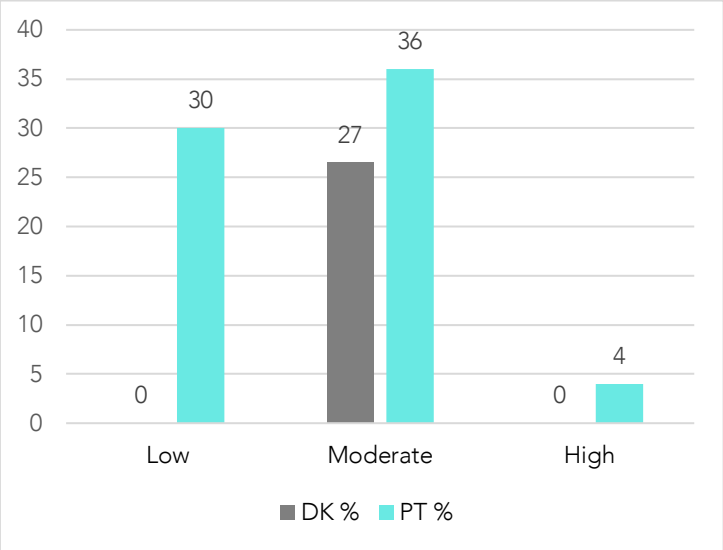

FIGURE 26: EMPLOYEES: CLASSIFICATION OF EYE VISION PROBLEM

In the English sample, 13 out of 14 respondents with an eye vision problem wears glasses. 64% of them classifies their eye vision problem as low, 36% as moderate.

B.3. Do you have to take daily medication?

Most of the respondents (59%) refer they do not "take daily medication", against 41% who say they do. However, from these, Portuguese workers refer much more often to taking medication daily (28%) than Danish workers (13%).

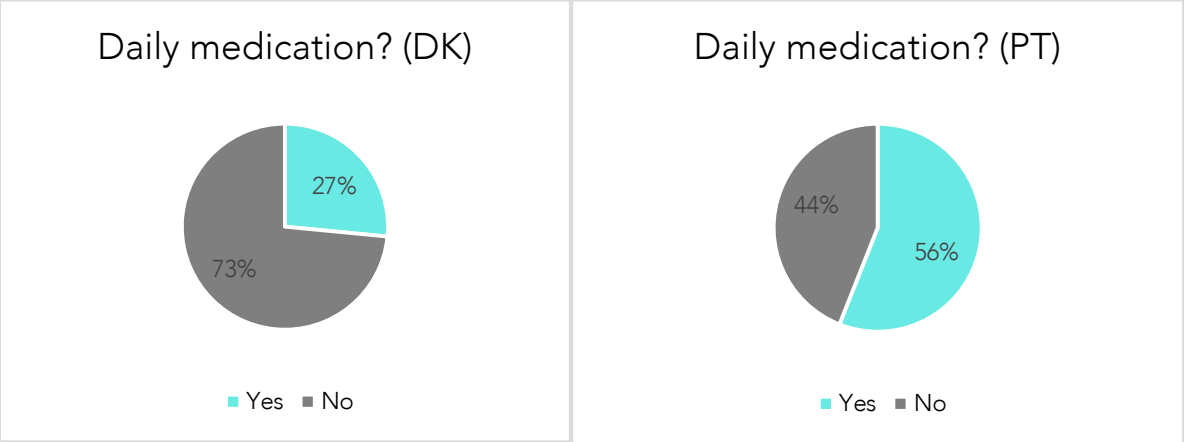

FIGURE 27: EMPLOYEES: DAILY MEDICATION

Regarding the English sample, 50% of the respondents take daily medication.

B.4. Do you suffer from any chronic disease or condition (or not)? Please tick what is applicable.

In the Portuguese and Danish global sample, the most frequent answer from the older workers corresponds to no existant chronic disease or condition (50%). Then, the most mentioned chronic

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diseases are "hypertension" (22%), "rheumatism" (10%) and "diabetes" (8%) in both countries. Interesting to mention that Portuguese workers refer 9 times more frequently further conditions (as "other).

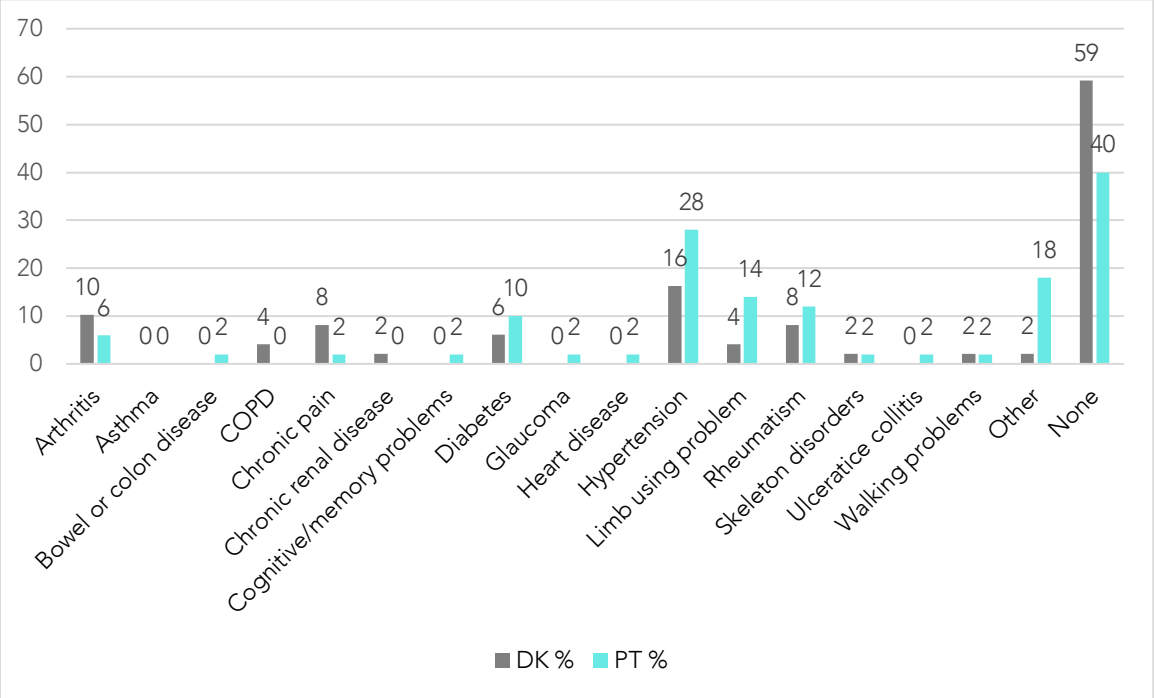

FIGURE 28: EMPLOYEES: CHRONIC DISEASE OR CONDITION

53% of the respondents on the English questionnaire report not to have any chronic disease or condition. The other 47% report the following (multiple) chronic diseases or conditions (N=28): hypertension (10), followed by diabetes (7), arthritis, asthma, heart disease or chronic pain (each 3). Other reported diseases are obesity (2), rheumatism, COPD, limb using problem, walking problems (each 1). 4 respondents report to have (additional) chronic disease or condition.

B.4.1. Other chronic disease or condition. Please specify.

18 respondents from the 3 questionnaires answered the question (4 DK, 9 PT, 5 EU). In both countries the major other chronic disease or condition is thyroiditis (4 respondents of both countries). Further single answers contain: Scheuermann, Spondylosis, Fibromyalgia, Gastritis, Depression (2x), Allergies/allergic rhinitis (2x), Stroke, Osteoporosis, Chronic Lipoedema.

B.5. If you have any chronic disease or condition, does this cause you any difficulties at work?

The majority of respondents (93%) does not acknowledge any difficulties at work, caused by existent chronic disease or condition, against 7%, who say they do.

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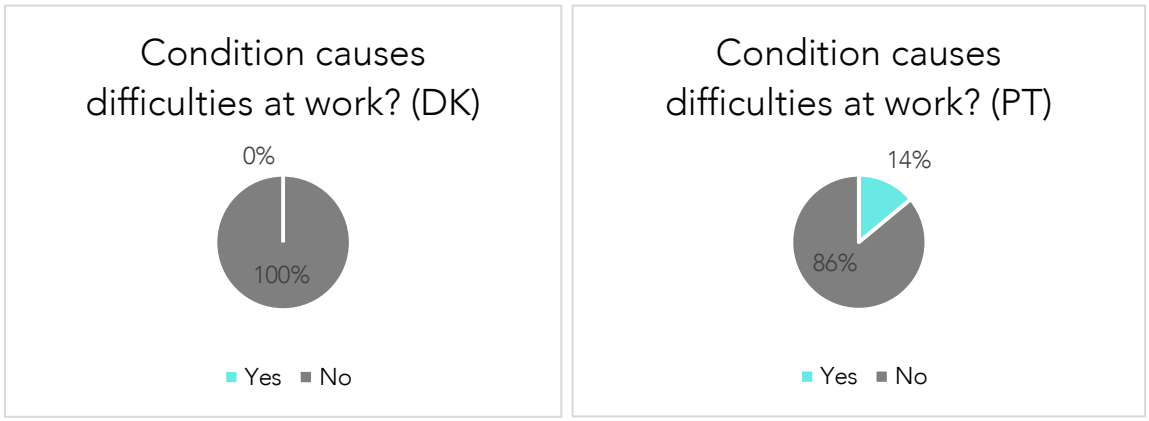

FIGURE 29: EMPLOYEES: DISEASE OR CONDITION CAUSE DIFFICULTIES AT WORK

The EU respondents report that for 13% of them the chronic disease or condition causes difficulties at work.

B.5.1. Please describe how the chronic disease or condition affects your work.

Danish respondents with a chronic disease or conditions didn't find that it affects their work (no answers). 14% (N=7) of the Portuguese respondents indicated that troubles with moving are the most found effects (4 out of 7), further, vision problems causes difficulties to perform certain tasks. Portuguese respondents further mentioned: having chronic pain, tiredness, problems with walking, overall performance and memory lapse.

Eight respondents from the EU questionnaire indicated that they need to rest more (3), having troubles with moving and walking (3) and having chronic pain (2). Single respondents indicated that their stress level is lower, sometimes are not able to go the office, having sleeping problems and are not able to stand for a long time.

B.6. What would you recommend to employers or managers to enable employees with chronic diseases or condition to (continue to) work?

From the Portuguese respondents 44% recommends to employers or managers to introduce individual action plans that meets the needs of the worker and to perform workplace assessments. 22% advises to allow workers flexible working hours or reduced working hours. 37% of the Danish respondents recommend the same options (26 and 10%). Portuguese respondents further recommend to put older workers under health surveillance or to provide a masseur for sitting behind a computer for 7 hours per day, provide trainings, prevention and to send older worker on early retirement.

From the EU respondents 37% also recommends individual action plans, workplace assessment and 33% chooses for more flexible or reduced number of hours.

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B.7. Have you been on sick leave (a week or more) during the last three years?

The majority of respondents (81%) does not acknowledge any difficulties at work caused by existent chronic disease or condition, against 19%, who say they do.

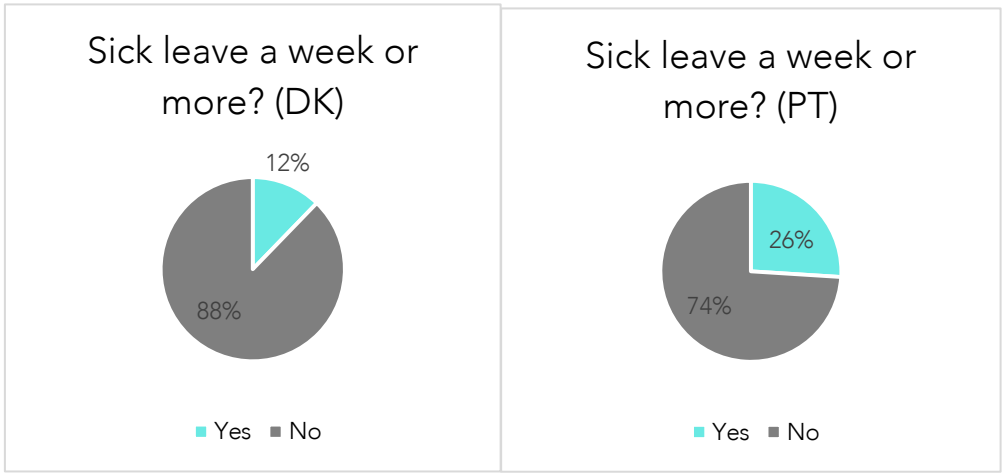

FIGURE 30: EMPLOYEES ON SICK LEAVE

Regarding the English sample, one third (33%) has been on sick leave in the last 3 years.

B.7.1. If yes, for how long in the last three years (as a whole)?

B.7.2. How many times were you on sick leave, during the last three years?

Most of the answers confirm the workers have been on sick leave for up to 2 weeks (10%) and once or two times during the last three years (14%).

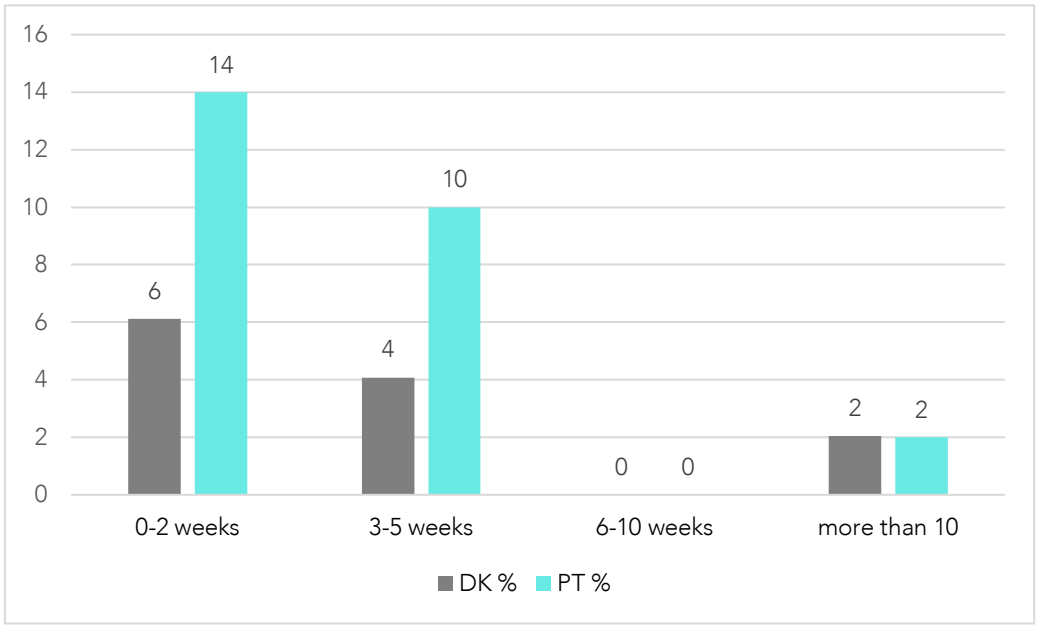

FIGURE 31: EMPLOYEES: DURATION SICK LEAVES

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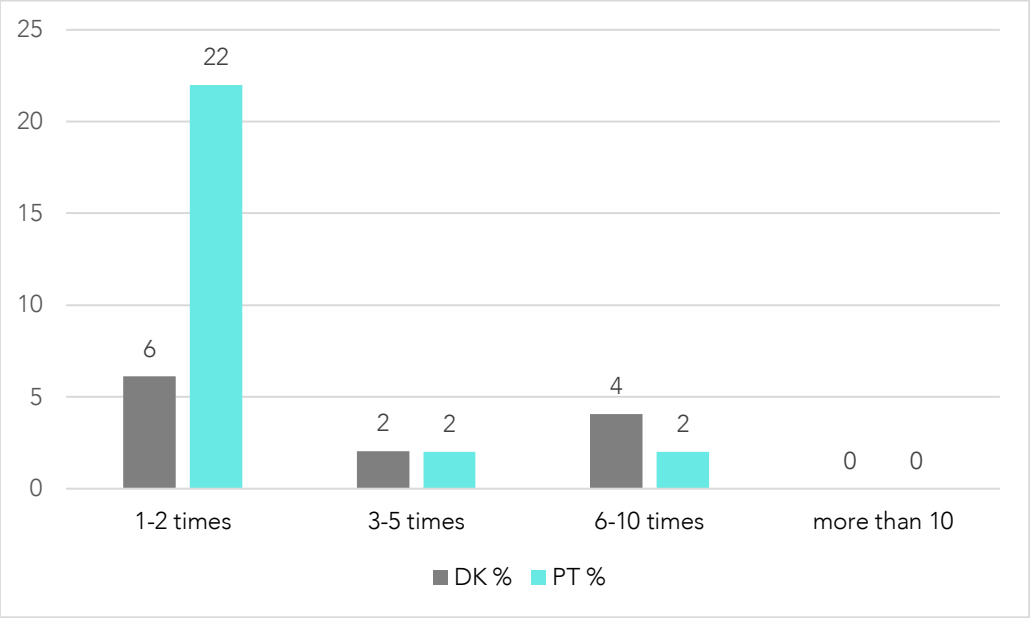

FIGURE 32: EMPLOYEES: HOW MANY TIMES SICK LEAVE IN PAST 3 YEARS

Regarding the English sample, half of them (10 out of 20) had sick leave between 0-2 weeks. 25% had sick leave between 6 to 10 weeks. 75% was on sick leave 1 or 2 times, followed by 15% 3-5 times.

B.7.3. If you had different working conditions or equipment, could you have shortened or avoided the absence?

Most of the respondents (17%) feel they would not had been able to shorten or avoid their absence to work, despite different working conditions or equipment.

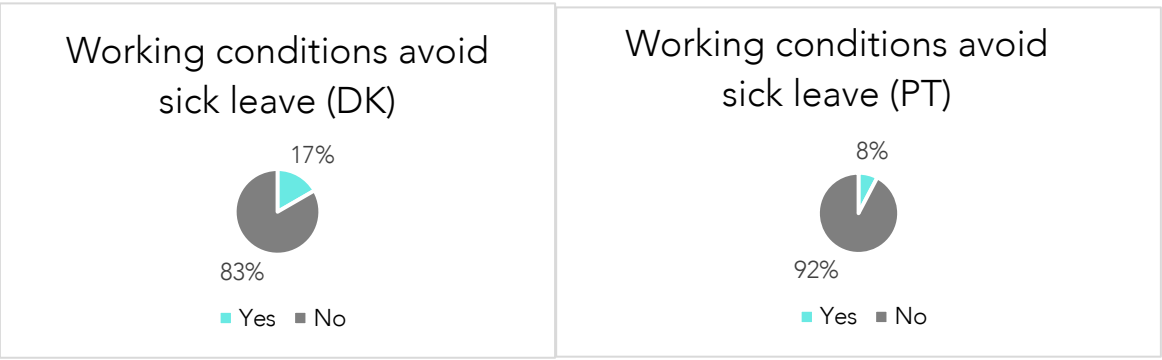

FIGURE 33: EMPLOYEES WORKING CONDITIONS TO AVOID SICK LEAVE

Regarding the English sample, 20% of the respondents that they could have avoided sick leave if the working conditions were different.

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B.7.4. Please can you describe what exact conditions/equipment would have shortened or avoided the absence?

10 respondents answered this question. Most of them (3) indicated that working at home opportunities would have helped to shorten the sick leave. Also 3 respondents pledge a better working equipment: better seat, speech recognition equipment and technical aids. A lower workload and less stress is indicated by 2 of them. Additionally is mentioned: moral support from work (1) and flexible working hours (1).

B.8. Please specify below any other useful information regarding older workers and their health status that you believe is important to be considered during the development of the SmartWork system and IS NOT covered above:

On this question 13 respondents provided an answer (4 DK, 4 PT, 5 EU). The main focus is on to make personal arrangement and agreements for work and workplace adaptations (7 responses). Two respondents pledge for more healthy measures and to ban smoking. Equal treatment is also mentioned by two respondents. One respondent from the EU points out that still many workers want to early retire. And one respondent from Denmark indicates that caregiving is taking a lot of energy.

PART C - System Functionalities

C1. Please indicate which device(s) you use at work and how often:

TABLE 17: DANISH EMPLOYEES: DEVICES USED

Devices used by Danish respondents in % (N=49)	Every day	1x week	1x month	Just once	Never
Desktop	49	0	0	4	47
Laptop	92	4	0	0	4
Tablet	18	22	0	16	43
Smartphone	96	0	0	0	4
Ordinary mouse	63	8	0	4	24
Adapted mouse	37	0	0	2	61
Headset	22	24	0	8	45
Touch screen	4	2	0	0	94
Ordinary keyboard	94	0	0	0	6
Adapted keyboard	6	0	0	0	94
External speaker	2	0	0	35	63

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TABLE 18: PORTUGUESE EMPLOYEES: DEVICES USES

Devices used by Portuguese respondents in %, N=50	Every day	1x week	1x month	Just once	Never
Desktop	64	4	0	2	30
Laptop	38	10	2	6	44
Tablet	8	12	6	12	62
Smartphone	62	0	0	2	36
Ordinary mouse	68	4	0	4	24
Adapted mouse	4	0	0	0	96
Headset	8	10	0	4	78
Touch screen	34	0	0	4	62
Ordinary keyboard	74	4	0	0	22
Adapted keyboard	2	0	0	0	98
External speaker	6	6	2	2	84

Regarding the English sample, the desktop (72%), laptop (68%), smartphone (82%), ordinary mouse (85%) and ordinary keyboard (93%) were used every day. Adapted mouses and keyboard, external speakers were never used.

C2. Are you familiar using a desktop computer or laptop at work?

Most of the respondents (80%) refer to be "very much" familiar with using desktop or laptop computer at work, with Portuguese workers presenting a more heterogeneous distribution, evidencing some general less using of the computer at work.

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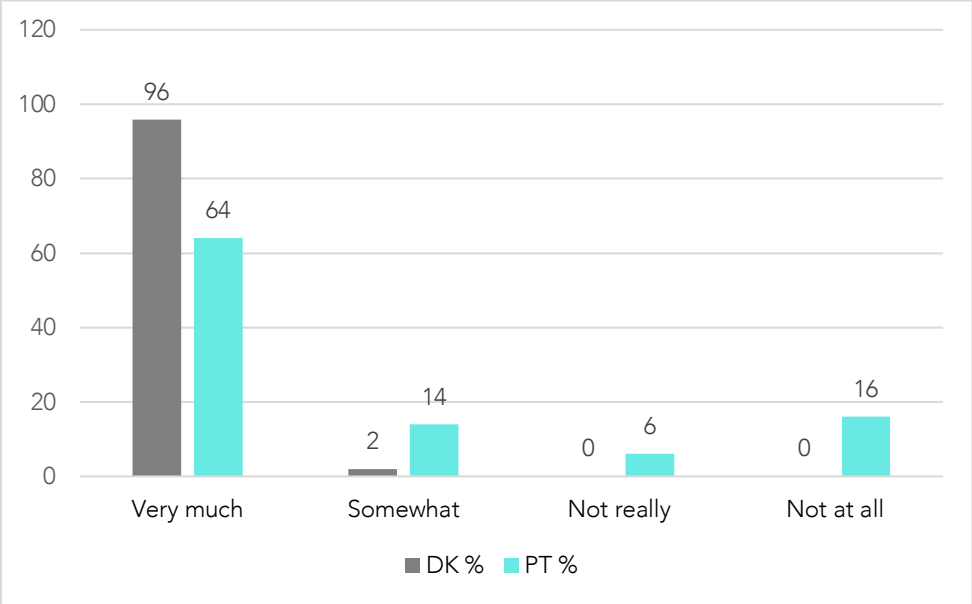

FIGURE 34: EMPLOYEES FAMILIAR WITH DESKTOP/LAPTOP AT WORK

Regarding the English sample almost everyone (98%) reports to be familiar with using a desktop or laptop at work.

C3. Do you find the tasks on your computer at work difficult?

The majority of respondents (58%) find computer tasks at work not difficult at all. A second group of workers (25%) answers with "not really".

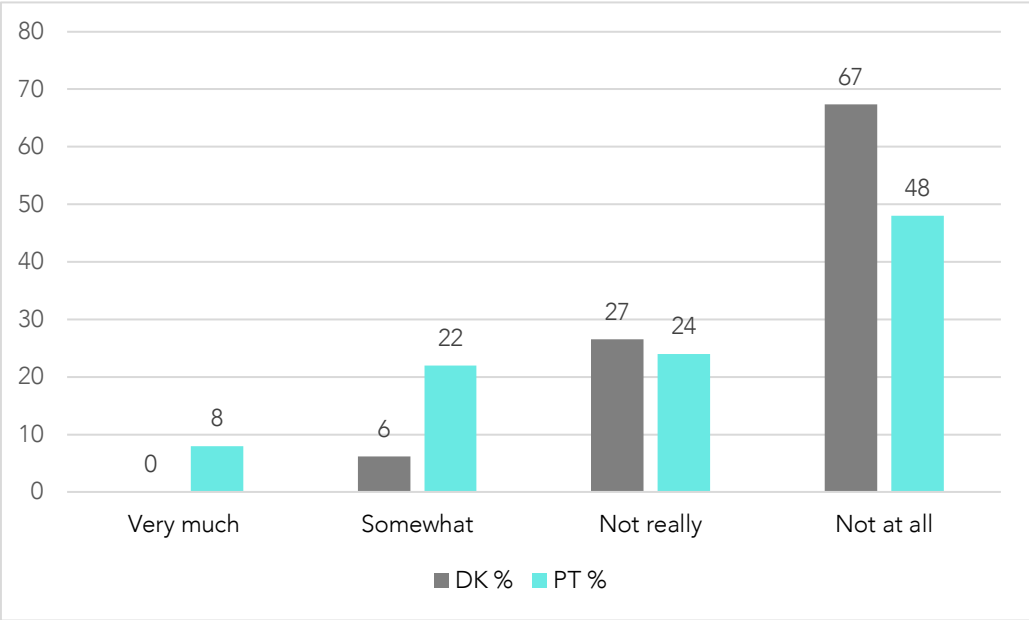

FIGURE 35: EMPLOYEES PERCEIVED DIFFICULTY COMPUTER TASKS

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Regarding the English sample, 73% finds it not at all difficult to use, followed by 22% not really difficult.

C4. How much of your daily / weekly working tasks have to be done with a desktop computer or laptop?

Most of the respondents (52%) refer that more than 75% of their working tasks demand computer use. However, 20% of the sample (Portuguese workers, exclusively) still mention less than 25% of their working tasks demand computer use.

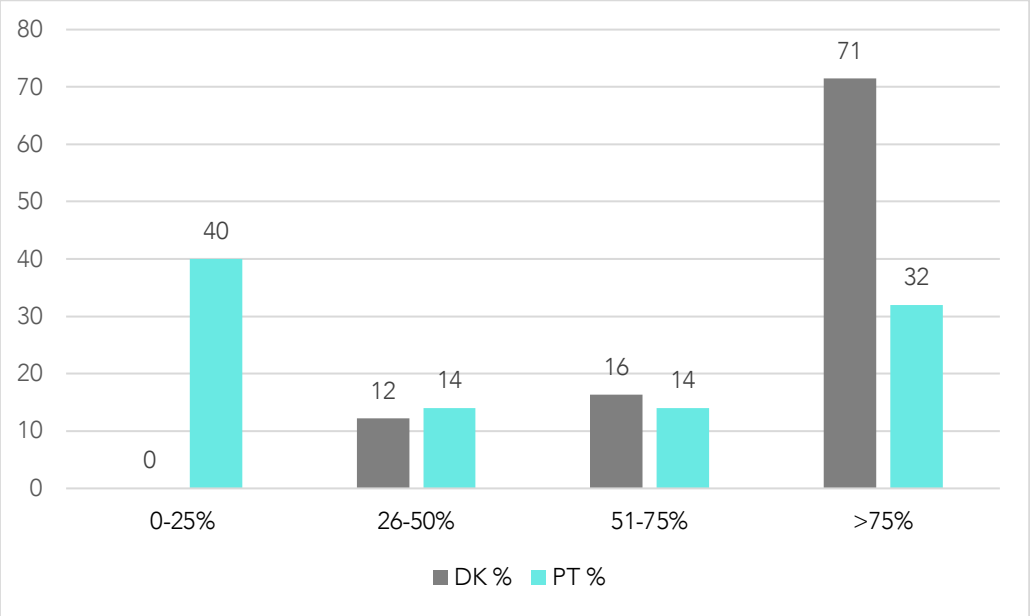

FIGURE 36: EMPLOYEES DAILY TASKS ON COMPUTER/LAPTOP

Regarding the English sample, 68% reports that more than 75% of the day is spent on the computer. 20% spends more than half of the working day at the computer.

C5. Does someone assist you in the daily use of the computer?

The majority of respondents (89%) refer not to need assistance while using computer daily. Portuguese sample, however, acknowledges some more need for assistance (9 persons) than the Danish one (2 persons).

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FIGURE 37: EMPLOYEES HAVE ASSISTANCE WITH COMPUTER

Regarding the English sample, only 1 person (2%) gets assistance with the computer.

C6. Does someone give you general recommendations/tips in using your computer?

Following the same tendency, most of respondents (67%) refer not to need any tips or recommendations while using computer at work. However, 33% of the workers still acknowledges to use them.

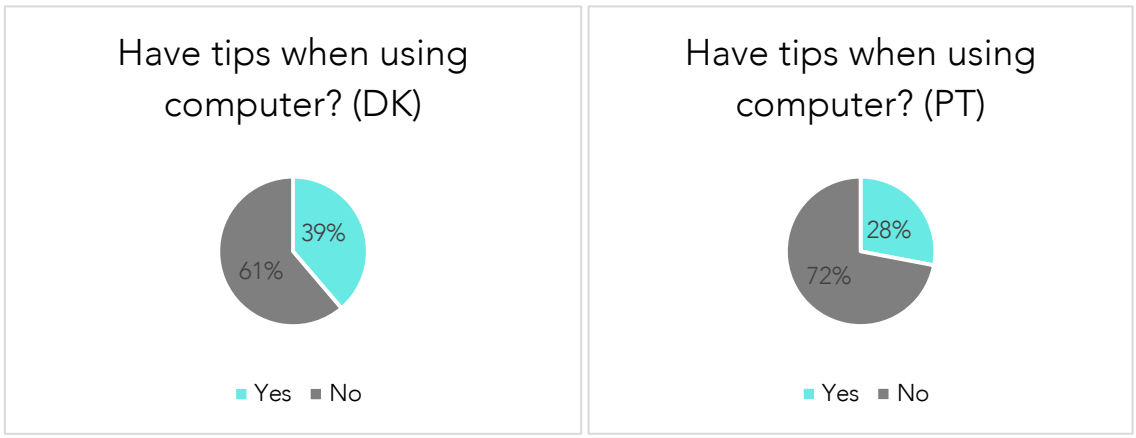

FIGURE 38: EMPLOYEES TIPS WHEN USING COMPUTER

Regarding the English sample, 20% receives general recommendations/tips in using their computer. 80% not.

C7. How long do you usually need to get familiar with new techniques or programmes, such as MS Word, Excel or PowerPoint?

Most of respondents (49%) refer to need up to an hour to get familiar with MS programmes. Secondly, 26% of older workers say they need between 2 and 3 hours to the same purpose. Both Danish and Portuguese samples with similar distribution.

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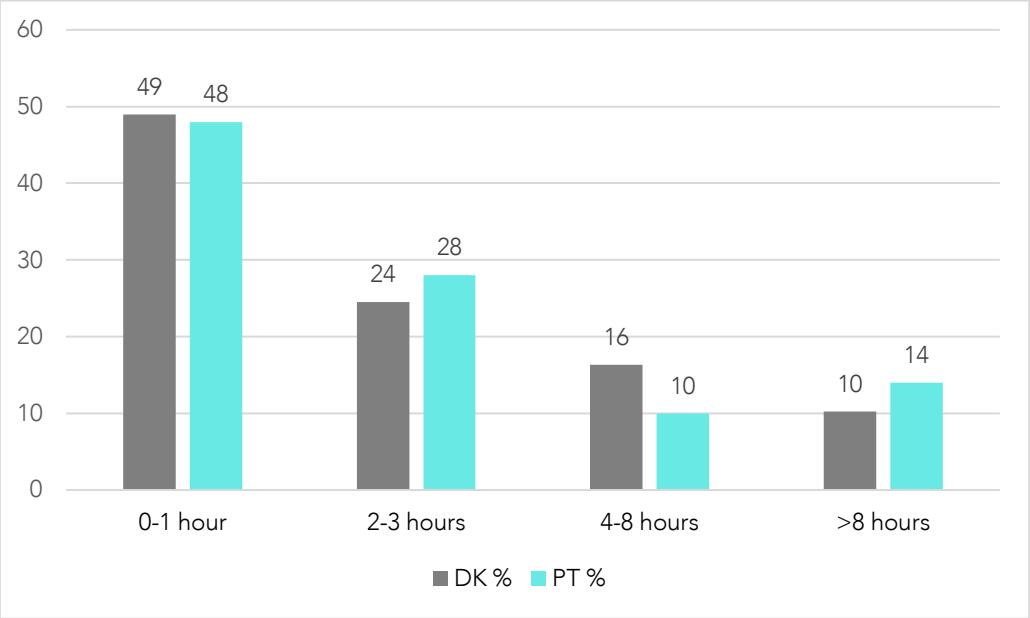

FIGURE 39: EMPLOYEES: FAMILIARITY WITH MS OFFICE

Regarding the English sample, 48% reports to get familiar with new software in less than 1 hour. 33% within 2 till 3 hours, 10% within 4-8 hours and 8% needs more than 8 hours.

C8. If it is possible to receive training or support in the use of a new technical device or programme, would you use it?

When it comes to the possibility of receiving training or support in order to use a new technical device or programme, the majority of respondents (84%) confirm they would use it, within a very similar distribution between Danish and Portuguese samples.

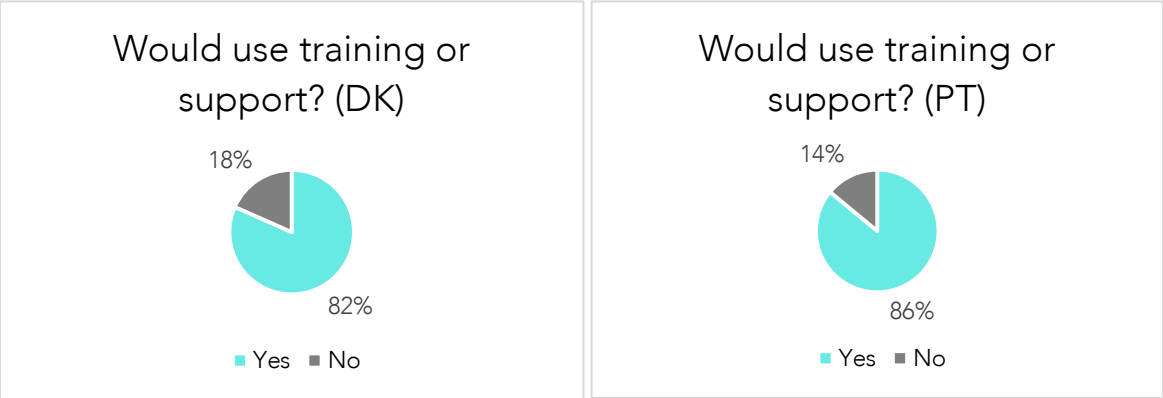

FIGURE 40: EMPLOYEES TRAINING OR SUPPORT ON COMPUTER

Regarding the English sample, 77% of the respondents confirm to use training facilities.

C8.1. If yes, what would you like to have?

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From those 84% who responded "yes", most prefer having support through a "group training by a person" (34%), a "tech-literate colleague" (26%) as a second option and "individual training by a person" (12%).

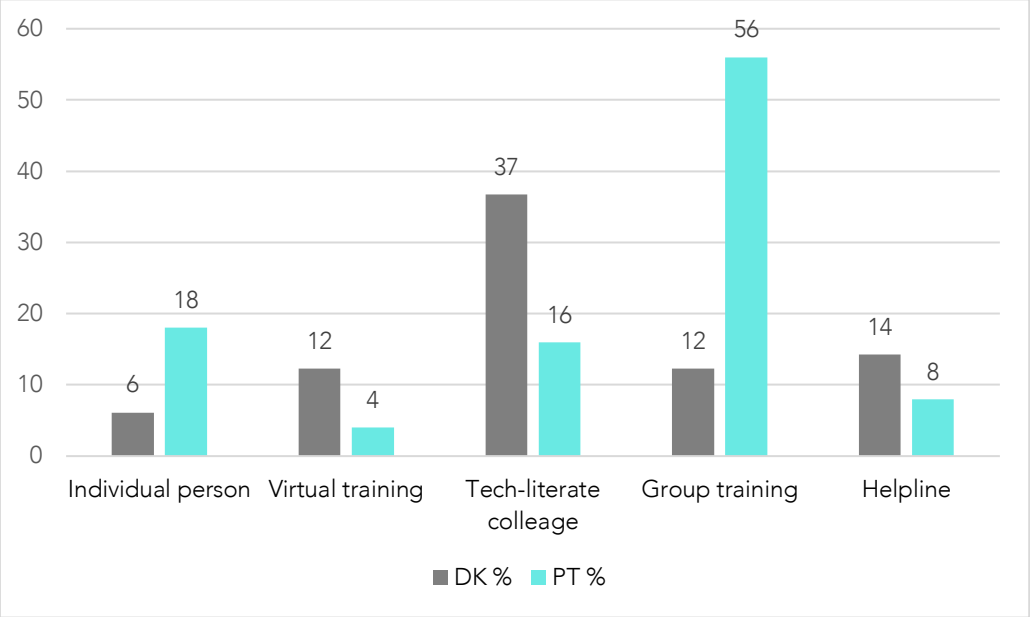

FIGURE 41: EMPLOYEES: TRAINING SUPPORT PREFERENCES

Regarding the English sample, 35% of the respondents prefer individual training, followed by 24% who would like to have a virtual training. Group training is favourite for 22% of the respondents.

C8.2. Should the support be invisible to colleagues while working in an open office?

Most respondents (74%) consider the tech support provided should not be invisible to work colleagues at the office, within a very similar distribution between Danish and Portuguese samples.

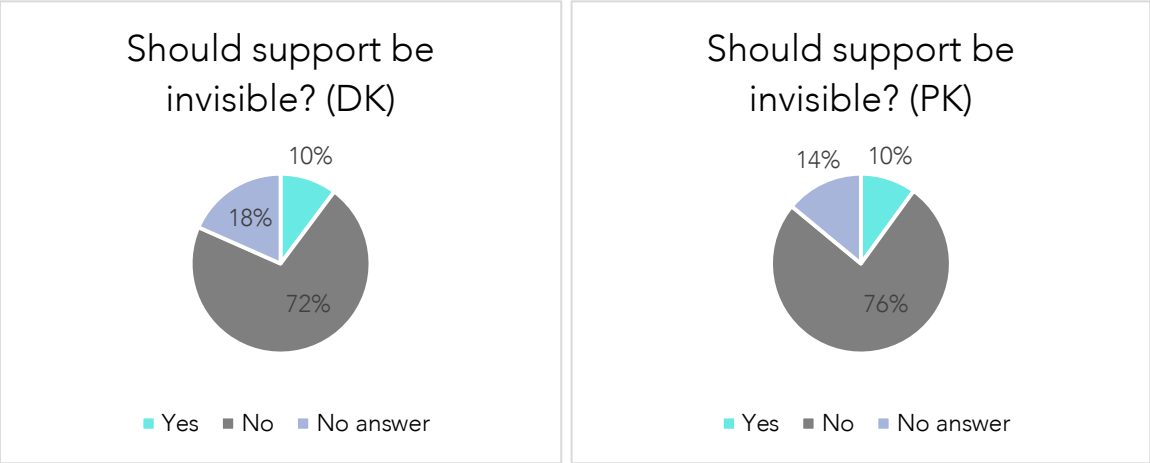

FIGURE 42: EMPLOYEES: VISIBLE SUPPORT COMPUTER TASKS

Regarding the English sample, 83% of the respondents don't mind that the training is visible for colleagues.

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C9. According to me, support in performing complex computer tasks is:

The majority of older workers mention support in performing complex computer tasks as "welcome" (77%) and "necessary" (19%), with only few Portuguese respondents finding it "embarrassing" (4 persons).

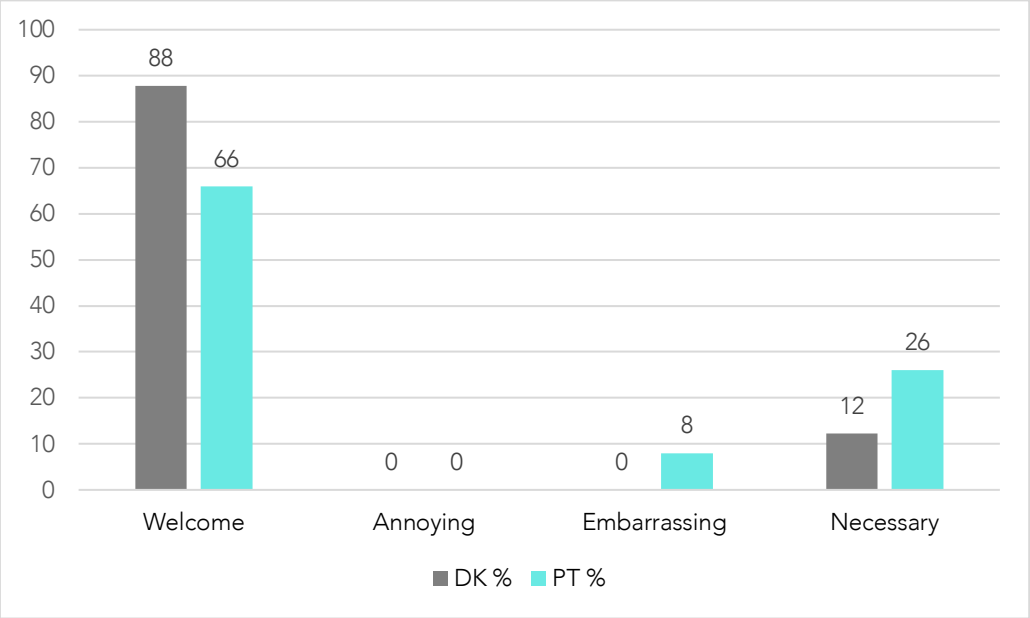

FIGURE 43: EMPLOYEES: PERCEIVED SUPPORT WITH COMPUTER TASKS

Regarding the English sample, 82% welcomes support in complex computer tasks. 8% finds it annoying, 5% necessary and 2% embarrassing.

C10. How useful would you consider a system or device that could…

As for the utility of an eventual system or device provision of specific features or services, the majority of Danish and Portuguese respondents "agrees" or "strongly agrees" with "informing on meetings and events" (81%), "providing guidance" (79%), "reminding on appointments" (78%), "training contents" (78%), "transfering work between devices" (77%), "managing and organising work" (73%), "offering alternative ways to work" (72%), "automatically choosing individual settings" (71%), "personalised work learning opportunities" (69%), "automatically applying interface on devices" (67%), "advicing on filing and archiving" (64%), "physical advicing on performing work" (62%), "establishing telephone/video conversation" (60%), "informing on internal vacancies" (58%), "motivating to walk or lunch" (57%), "advicing on healthy lifestyle" (57%) and finally "checking the worker health status every year" (55%).

Interestingly, the Portuguese and Danish samples equally split, when it comes to the SmartWork system possibility of "informing boss on worker availability", with half being in agreement against half that clearly disagree. Exact same tendency happens regarding "providing coaching on job performance" and "interactive games to train memory". Similar phenomena occurs in the global sample, although with a slight trend to disagreeing with "monitoring the worker's cognitive capacity"

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and "monitoring and guiding the worker during physical activity". Additionally, also a similar phenomena, but now drawing slight tendency to Danish and Portuguese workers agreeing with "giving overview competences and skills" and "external vacancies relevant competences".

On the other hand, most respondents "disagree" or "strongly disagree" with the system possibility of "checking health status every minute" (85%), "checking health status every day" (80%), "providing company" (77%), "checking health status every week" (74%), "informing about time working on computer" (62%), "informing boss on worker performances" (61%), "checking health status every month" (57%), "sitting at your desk" (57%) and "reminding on taking medication" (53%).

TABLE 19: DANISH EMPLOYEES: USEFULNESS FUNCTIONALITIES

Denmark in % (N=49)	Very useful	Useful	Not very useful	Not useful at all
Providing guidance	39	37	14	10
Training contents	24	43	22	10
Remind on taking medication	12	27	29	33
Remind on appointments	35	47	8	10
Establish telephone/video conversation	24	35	22	18
Provide company	0	6	37	57
Check health status every minute	4	8	39	49
Check health status every day	6	12	31	51
Check health status every week	6	16	29	49
Check health status every month	8	24	24	43
Check health status every year	10	33	24	33
Manage and organise work	16	59	14	10
Meetings and events info	29	51	14	6
Info about time working on computer	4	24	49	22
Sitting at your desk	8	27	43	22
Motivates to walk or lunch	12	37	24	27
Advice on healthy lifestyle	6	31	39	24
Personalised work learning opportunities	12	57	18	12
Physical advices on performing work	10	39	22	29
Advice on filing and archiving	12	45	27	16
Automatically choosing individual settings	31	51	8	10
Transfer work between devices	47	33	10	10

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Denmark in % (N=49)	Very useful	Useful	Not very useful	Not useful at all
Automatically apply interface on devices	31	41	8	20
Inform boss on worker performances	6	10	41	43
Inform boss on worker availability	6	27	33	35
Give overview competences and skills	12	16	45	27
Monitor your cognitive capacity	12	10	43	35
Monitor and guide during physical activity	4	20	27	49
Provides coaching on job performance	4	27	37	33
Interactive games to train memory	4	24	20	51
Internal vacancies info	12	33	20	35
External vacancies relevant competences	14	20	24	41
Offer alternative ways to work	18	51	12	18

TABLE 20: PORTUGUESE EMPLOYEES: USEFULNESS FUNCTIONALITIES

Portugal in % (N=50)	Very useful	Useful	Not very useful	Not useful at all
Providing guidance	40	42	14	4
Training contents	42	46	10	2
Remind on taking medication	6	50	16	28
Remind on appointments	22	52	16	10
Establish telephone/video conversation	12	48	22	18
Provide company	8	32	28	32
Check health status every minute	6	12	40	42
Check health status every day	8	14	38	40
Check health status every week	8	22	38	32
Check health status every month	10	44	26	20
Check health status every year	16	50	20	14
Manage and organise work	14	56	18	12
Meetings and events info	22	60	10	8
Info about time working on computer	12	36	34	18
Sitting at your desk	8	44	26	22

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Portugal in % (N=50)	Very useful	Useful	Not very useful	Not useful at all
Motivates to walk or lunch	14	50	20	16
Advice on healthy lifestyle	20	56	10	14
Personalised work learning opportunities	16	52	14	18
Physical advices on performing work	24	50	16	10
Advice on filing and archiving	20	50	14	16
Automatically choosing individual settings	12	48	20	20
Transfer work between devices	14	60	12	14
Automatically apply interface on devices	14	48	16	22
Inform boss on worker performances	10	52	18	20
Inform boss on worker availability	8	58	12	22
Give overview competences and skills	8	72	10	10
Monitor your cognitive capacity	12	60	14	14
Monitor and guide during physical activity	14	52	18	16
Provides coaching on job performance	10	58	18	14
Interactive games to train memory	26	46	12	16
Internal vacancies info	10	60	14	16
External vacancies relevant competences	10	62	16	12
Offer alternative ways to work	18	56	20	6

The respondents on the English questionnaire most value a device that automatically chooses individual settings (75%), that supports information on meetings and events (72%), reminds on appointments (72%), transfers work between devices (73), provides training contents (70%) and guidance (68%).

Most negative perceived features are: a device that checks their health status every minute (97%) or every day (83%), provides company (90%) or informs the boss on the performances of the worker (88%).

C11. Do you have any further information you would like to share regarding system functionalities?

Only 5 respondents gave an answer to this question. The main concern is that the system should not take over individual choices and being (4x). Another suggestion is to have a system that should "talk" with each other so that duplication of work is minimized.

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PART D – Interface

D.1. Do you use health monitoring devices or apps?

In this study, most of the respondents (92%) refer not to use health monitoring devices or apps, against (8%) who say they do.

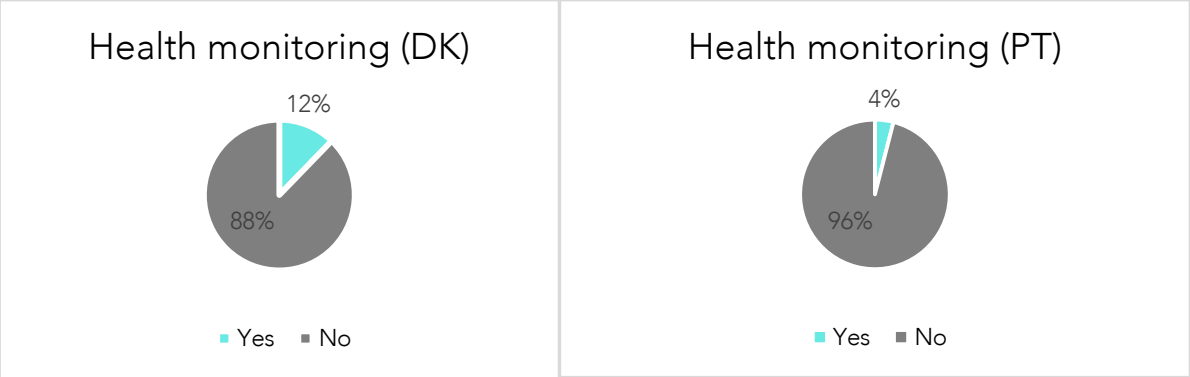

FIGURE 44: EMPLOYEES: HEALTH MONITORING DEVICES OR APPS USED

Regarding the English sample, 22% of the respondents uses a health monitoring device or app.

D.1.1. If yes, please specify which devices or apps you use and who is the manufacturer?

D.1.2. Which of these devices or apps you consider as useful?

19 respondents use devices or apps that monitor their health. The respondents use Sony Smartband, Apple Watch, Blood-pressure, glycaemia equipment, SNS, Charge 3, I got life, Samsung health and food monitor, Polar Sports Watch, Pedometers, Ouraring and Fitbit. On the question which they find useful, most respondents indicated to find all of them useful.

D.2. On what kind of devices the SmartWork services should become available? Please tick what is applicable:

The most mentioned devices that older workers think SmartWork should become available through are: "desktop/laptop" (69%), "smartphone" (67%) and "tablet" (29%), with both Portuguese and Danish respondents drawing a very similar distribution.

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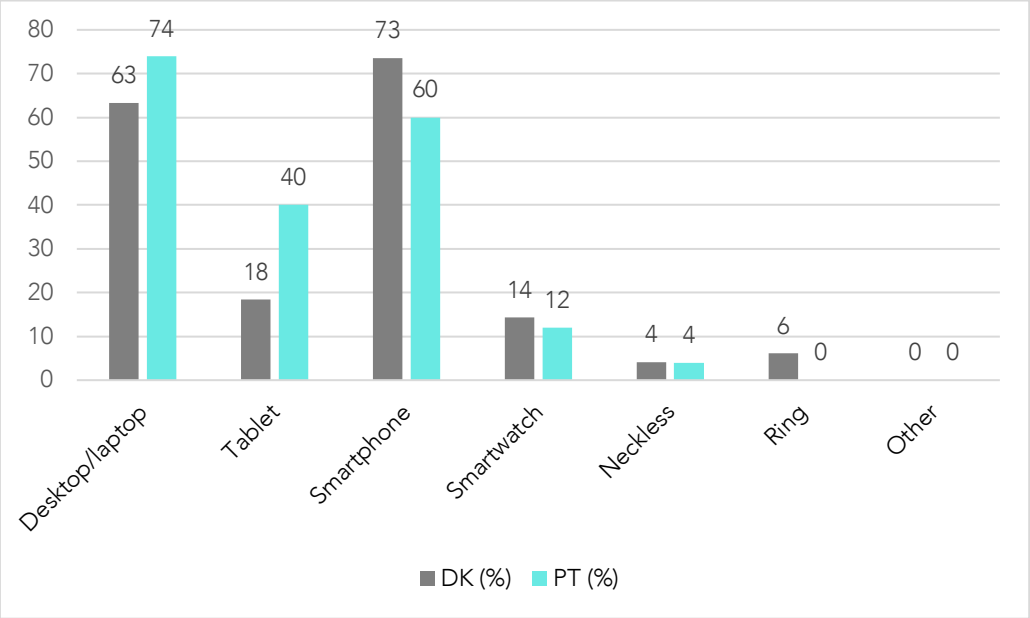

FIGURE 45: EMPLOYEES: AVAILABILITY OF SMARTWORK SYSTEM

Regarding the English sample, the most favourable device to work with the SmartWork system is the smartphone (72%), followed by the desktop computer or laptop (63%). The other devices are not of much interest for the resepondents: 32% tablet, 18% smartwatch.

D.3. I prefer to interact with my device by (please tick all options that you would prefer):

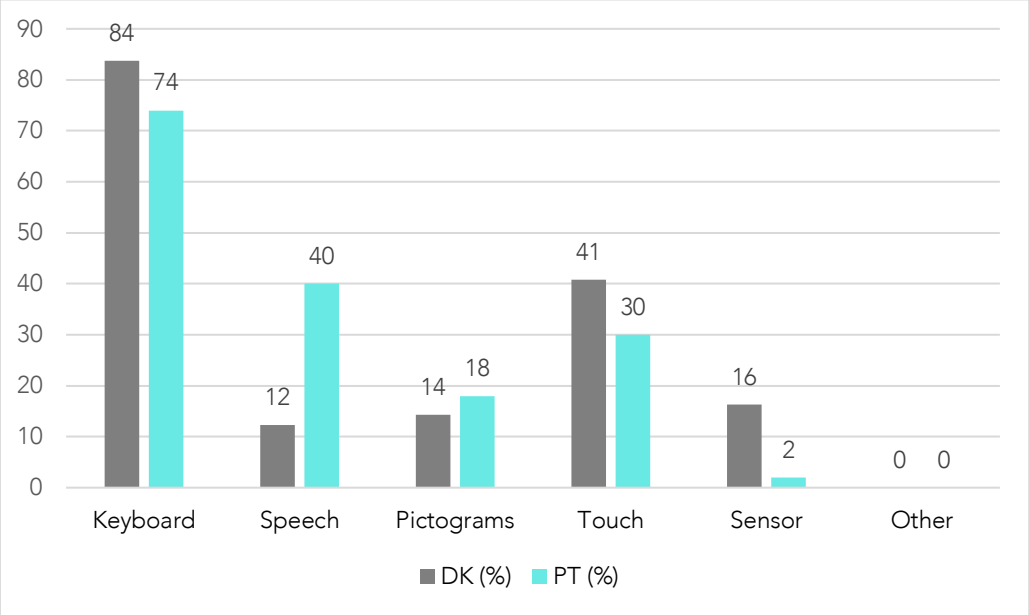

FIGURE 46: EMPLOYEES: INTERACTION PREFERENCES

Regarding their interaction preferences with the device, the majority of respondents mention "keyboard" (79%), "touch" (35%) and "speech" (26%) as the most frequent options.

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Regarding the English sample, keyboard (67%) and using touch sceen (50%) are the most favourable ways of interacting.

D.4. How would you like the device to draw your attention?

When it comes to the better way for the SmartWork device to draw their attention, most of the older workers mention "flashing" (31%), "vibrating" (25%), "music" (21%) and "calling" (14%), as main preferences.

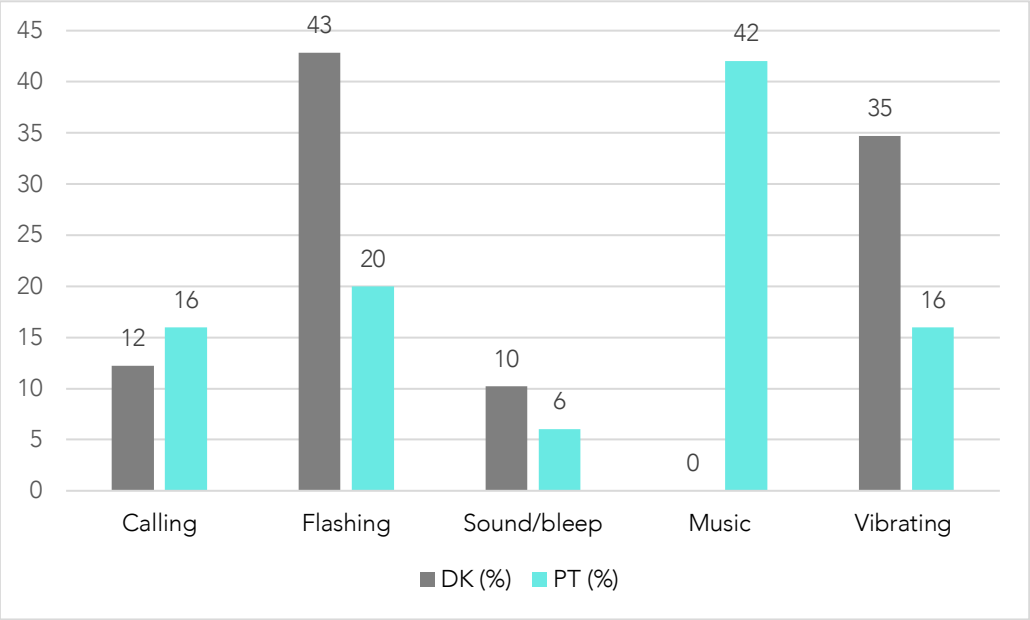

FIGURE 47: EMPLOYEES: PREFERENCES TO DRAW ATTENTION

Regarding the English sample, a sound of bleep is by far the most preferred (58%). Vibrating scores 25%, flashing a light 10%.

D.5. Do you have any further preferences about the interface or wearables that you would like to share?

Five respondents answered this question to share their preferences. Two respondents indicated that it must be simple and easy and light to wear/unnoticeable. One respondent indicated not to want mix health and work. One respondent doesn't like wearables and another doesn't want them.

PART E – Privacy

E.1. Does your organisation have a privacy policy regarding the employees?

Most of the respondents (68%) recognize there is a privacy policy to their organisation, but in Denmark overall there is still a significant number of older workers that do not (28%).

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FIGURE 48: EMPLOYEES: PRIVACY POLICY IN ORGANISATION

Regarding the English sample, 93% of the respondents have a privacy policy in their organisation.

E.2. Do you know who the Data Protection Officer is in your organisation?

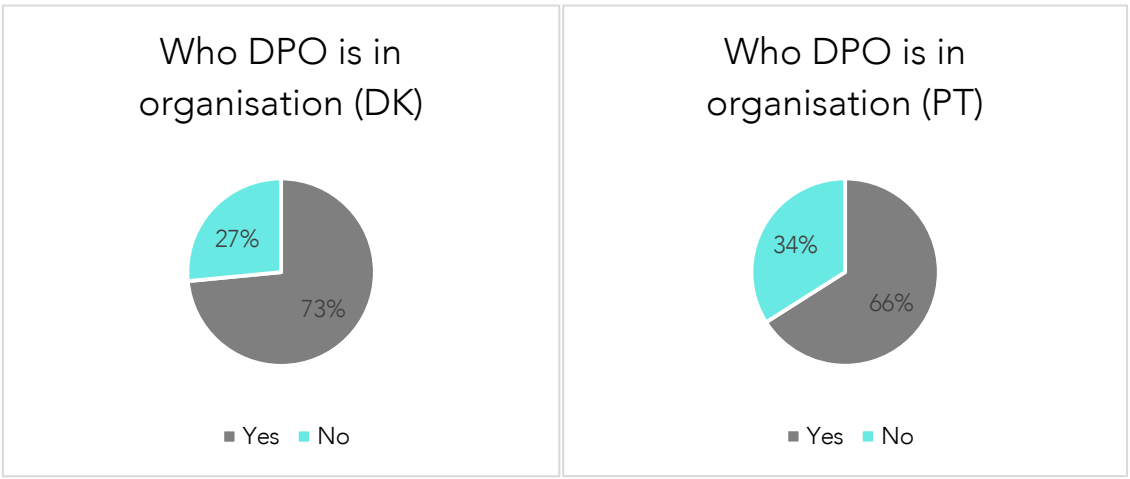

FIGURE 49: EMPLOYEES KNOW WHO DPO IS IN OWN ORGANISATION

82% of the respondents on the English questionnaire know who the Data Protection Officer in their organisation is.

E.3. Do you know how to contact the Data Protection Officer in your organisation?

The majority of the respondents (70%) confirm they do know who the Data Protection Officer is at their workplace and also how to contact him/her (66%). Surprisingly, there is still a smaller group of older workers who does not (30% and 34%, respectively).

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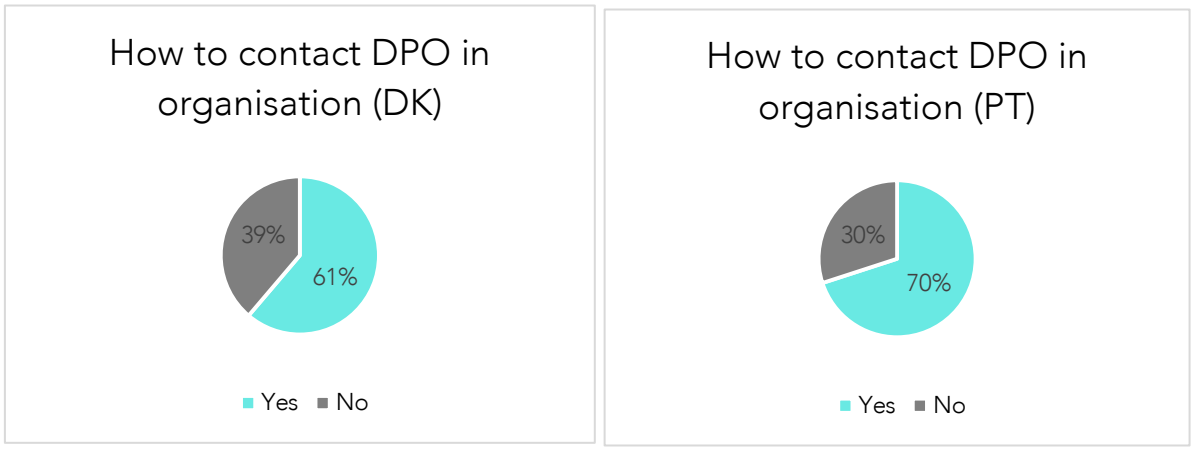

FIGURE 50: EMPLOYEES KNOW HOW TO CONTACT DPO

Regarding the English sample, 82% of the respondents know how to contact the DPO.

E.4. Do you have any concerns regarding the privacy policy in our organisation?

E.4.1. If yes, can you give an example of your concern?

Most respondents (91%) don't have any concerns regarding the privacy policy in their organisation. Meanwhile, another smaller proportion assumes they do (11%).

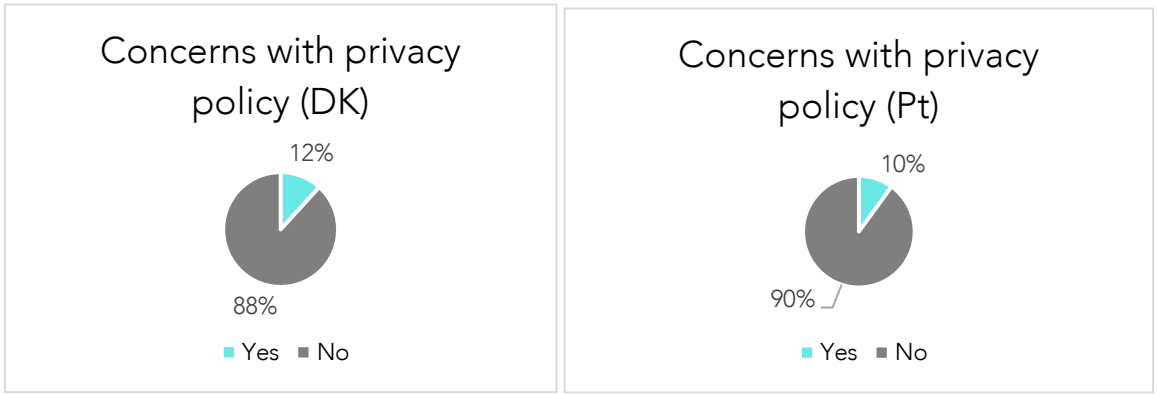

FIGURE 51: EMPLOYEES' CONCERN WITH PRIVACY POLICY

Regarding the English sample, 7% of the respondents have concerns regarding the privacy policy.

Nine respondents gave an example. Privacy and personal data protection are the main concerns (7x). One respondent is concerned about the abuse of SmartWork and another respondent pledges more awareness of ethics issues.

E.5. Do you have any further recommendations regarding the privacy policy of employees that you would like to share?

Nine respondents answered this question. Privacy and personal data protection are the main concerns (7x). One respondent is concerned about the abuse of SmartWork and another respondent pledges more awareness of ethics issues.

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6.1.2. Employers

In May and June 2019 CDC and CAT approached respectively 12 Portuguese and 10 Danish employers/managers. In both countries the managers responses were obtained from an online questionnaire. The responders in Denmark are managers of the departments from where employee responses were collected earlier; in Portugal there was a combination of Cáritas managers with others from organisations on the region. The approach implies that the managers were informed about SmartWork because they were asked for acceptance to forward a mail (containing link to employees questionnaire) to the employees of their department for their participation – all accepted. The managers from other organisations were contacted by email also with all the project information and the link to the questionnaire. All responses were anonymous.

1. My organisation is...

The Danish respondents are all involved with the public authority Aarhus Municipality. The Portuguese respondents represent a bigger variety of organisation' sectors: half of them come (50%) from a private for-profit organisation; the others represent a public authority (25%), NGO (17%) and 8% from a private non for-profit organisation.

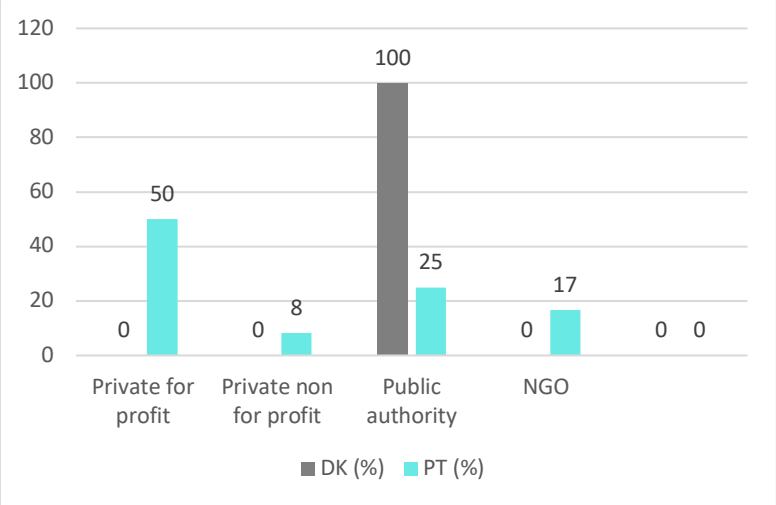

FIGURE 52: DIVISION OF ORGANISATION EMPLOYERS

A2. What is the main target/mission of the organisation?

Not surprisingly, the same variety is to be found for the targets or missions of the organisation of the employers or managers. The Danish respondents have health and social care as their mission. From Portugal the largest group has profitable growth of the company as their mission, followed by quality service delivery and protection and sustainable development of jobs.

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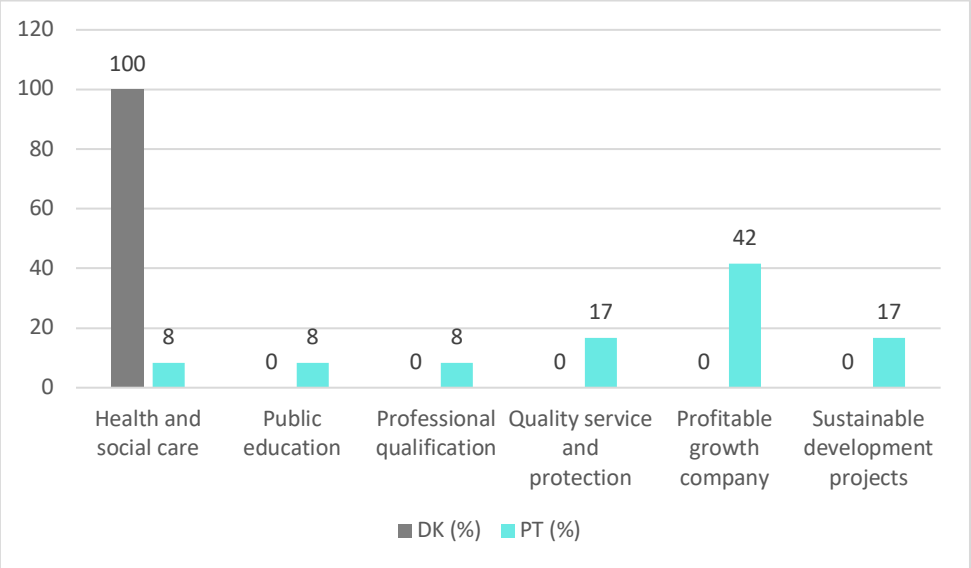

FIGURE 53: MAIN TARGET OR MISSION OF THE ORGANISATION EMPLOYERS

A3. How many employees your company/organisation has?

500+ organisations are best represented: 50% from Denmark and 25% from Portugal. Danish employers further represent medium-sized organisations (30%) and 20% come from a small organisation. Portugal involved 58% from small sized enterprise/organisation and 16% from a medium-sized organisation.

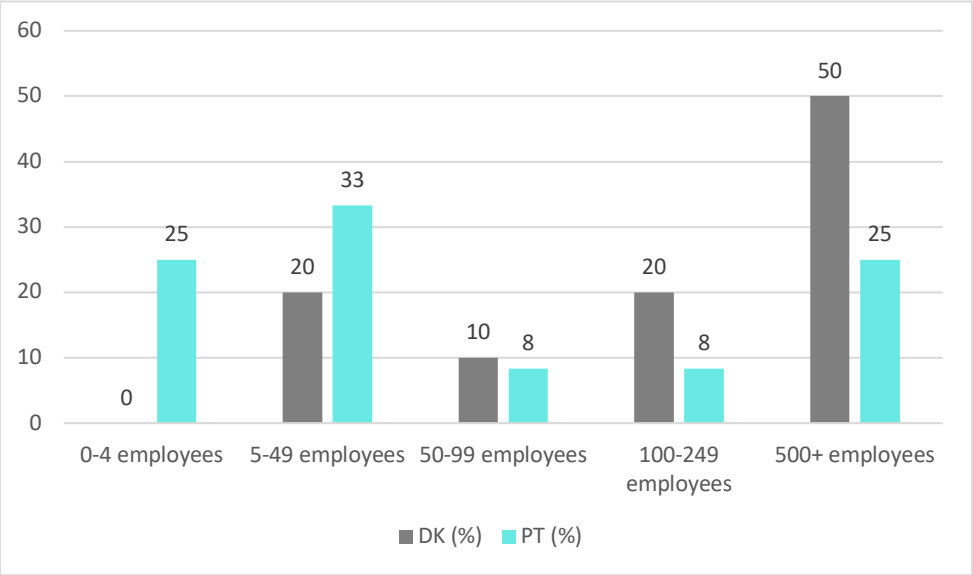

FIGURE 54: EMPLOYERS: NUMBER OF EMPLOYEES

A4. What is the average percentage of older workers (over 55 years old) in your organisation?

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In Portugal the different organisations give a diverse picture of older workers in their organisations: varying from 0% to over 50%. The Danish organisations are relatively young: they all indicated to have less than 10% of the workers over 55 years of age.

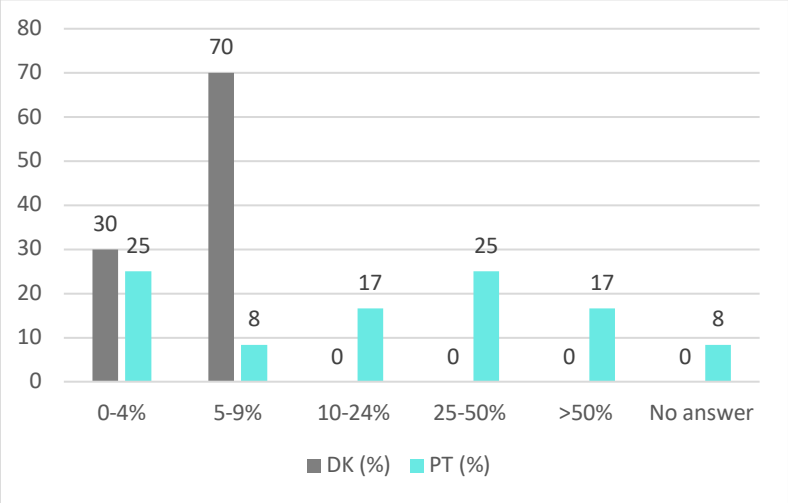

FIGURE 55: EMPLOYERS: PERCENTAGE OF OLDER WORKERS

A5. What is the official retirement age in your sector and/or your country?

The question about the official retirement age in the sector or country shows that people retire at the earliest when they are 65 years of age until the age of 70 years.

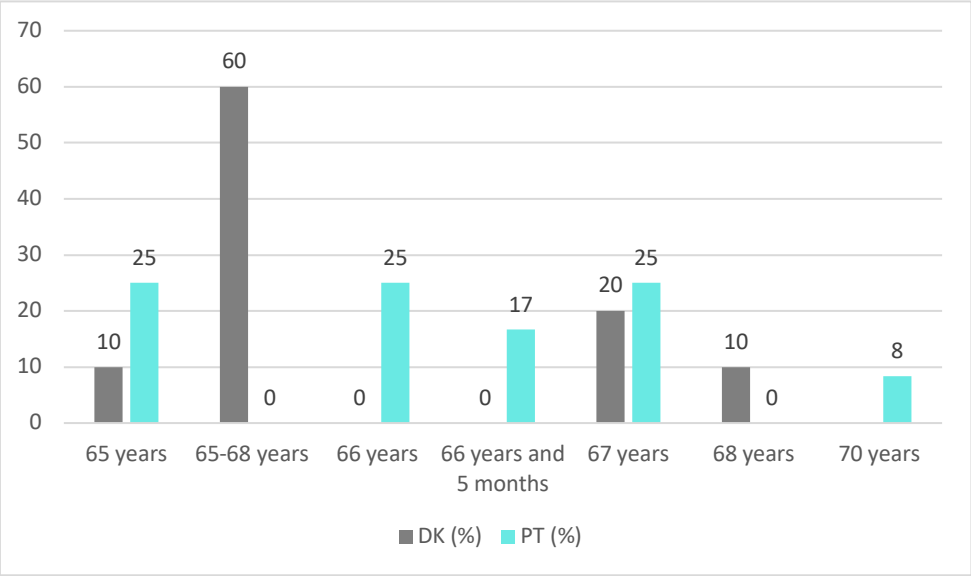

FIGURE 56: EMPLOYERS: OFFICIAL RETIREMENT AGE SECTOR OR COUNTRY

A6. Does your organisation have a policy regarding older employees and work after retirement?

If yes, please specify.

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Compared to the Portuguese, far more Danish organisations do have a policy for older workers and work after retirement. This policy includes: reduced working time, specific equipment, mixed-aged working teams and specific equipment.

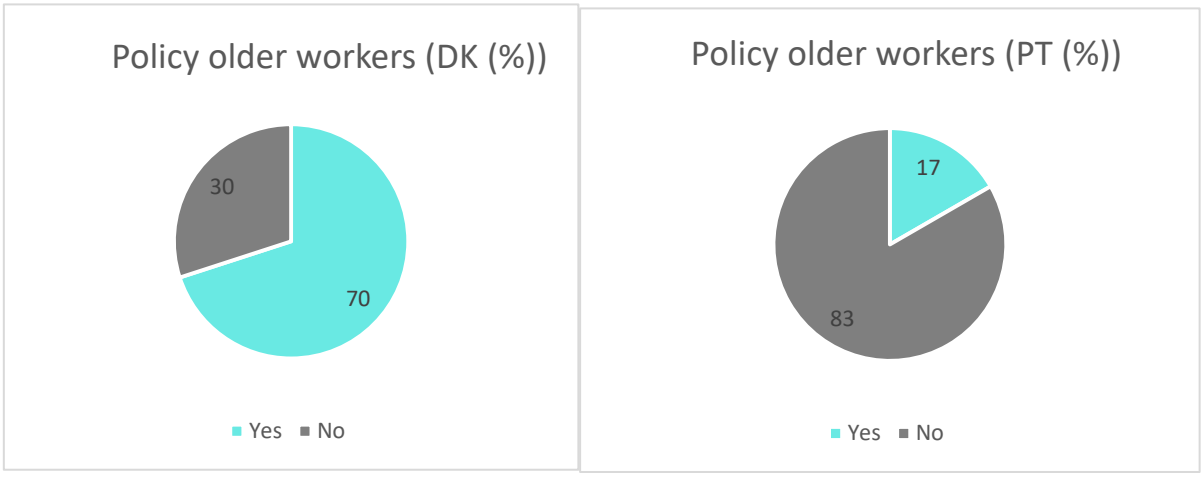

FIGURE 57: EMPLOYERS: ORGANISATIONAL POLICY ON OLDER WORKERS

A7. Does your organisation/department employ workers after their retirement age?

If yes, please can you explain why you employ workers after retirement age and how you enable them to (continue) to work?

25-30% of both groups of employers/managers employ older workers. The reason to employ older workers is because of their experience in financial markets, mutual interest of both employer as employee and according to HR policy.

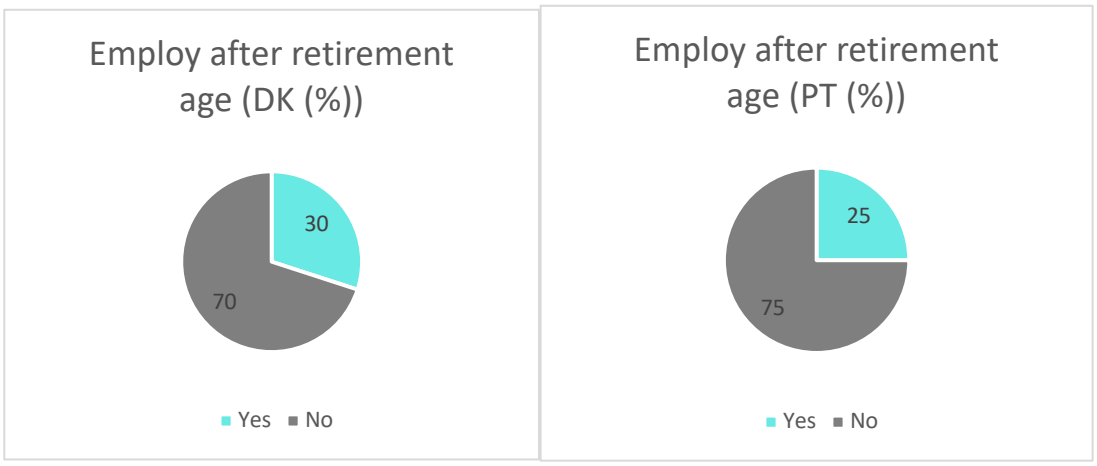

FIGURE 58: EMPLOYERS: WORK AFTER RETIREMENT AGE

A8. Attributes of the older worker

Of the ones that filled in the question, employers/managers of both countries for 100% agree or strongly agree that older workers bring experience to the organisation. They also think that older workers are good mentors (DK 80%-PT 100%) and are beneficial to the organisation (DK 80%-PT

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82%). After this found similar thinking about older workers in both countries, the opinions between Portuguese and Danish managers is going to differ. Portuguese managers think that older workers are better in handling customer service issues, are less adaptable to changes in general and technology changes in particular. Less explicit, but still in majority, Portuguese managers think that older workers are more reliable than younger workers and that they cost more. Also, they in majority disagree that older workers are not interested in re-training. At the other hand, Danish managers disagree on the attribute that older workers cost more, are more reliable than younger workers and that they are better in handling customer services issues. They also more disagree than agree that older workers are less adaptable to changes.

TABLE 21: DANISH EMPLOYERS: ATTRIBUTES OLDER WORKERS

Denmark in %, N=10	Strongly agree	Agree	Disagree	Strongly disagree	No answer
Bring experience to workplace	60	40	0	0	0
More reliable than younger workers	0	0	70	10	20
Better in handling customer service issues	0	20	60	20	0
Less adaptable to changes	20	0	60	10	10
Less adaptable technology changes	0	40	50	0	10
Good mentors	20	60	20	0	0
Less interest in re-training	0	40	50	0	10
Cost more	0	0	90	0	10
Longer sickness leave	0	20	40	20	20
Beneficial for companies	0	80	20	0	0

TABLE 22: PORTUGUESE EMPLOYERS: ATTRIBUTES OLDER WORKERS

Portugal in %, N=12	Strongly agree	Agree	Disagree	Strongly disagree	No answer
Bring experience to workplace	83	8	0	0	8
More reliable than younger workers	8	50	25	8	8
Better in handling customer service issues	25	50	17	0	8
Less adaptable to changes	42	33	17	0	8
Less adaptable technology changes	42	33	17	0	8

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Good mentors	42	50	0	0	8
Less interest in re-training	25	8	33	25	8
Cost more	17	42	17	17	8
Longer sickness leave	8	42	8	33	8
Beneficial for companies	58	17	8	8	8

A9. Attributes of the younger worker (in attachment)

A10. As CEO or manager, do you approach older workers differently than younger workers?

If yes, please can you specify what you do or think differently?

In majority employers or managers don't approach older workers differently than younger workers. In case they do, they take the seniority of older workers in mind or they take more care of the physical component of older workers.

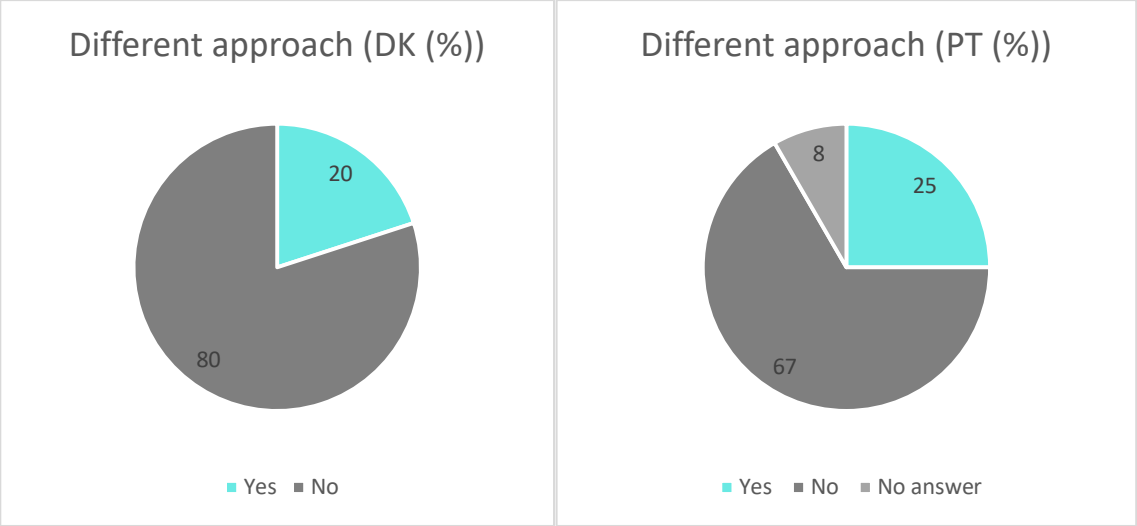

FIGURE 59: EMPLOYERS: DIFFERENT APPROACH YOUNGER AND OLDER WORKERS

A11. What is your opinion about the technological skills of older workers?

On this open question, 60% of the Danish employers didn't provide any answer. The other 40% indicate that technological skills of older workers are sufficient (20%), are very good (10%) and varies from person to person (10%). The Portuguese employers and managers for 50% judge the technological skills of older workers as insufficient (resistance to learn, has to be improved). 17% think the technological skills are sufficient and 25% mention that it varies from person to person.

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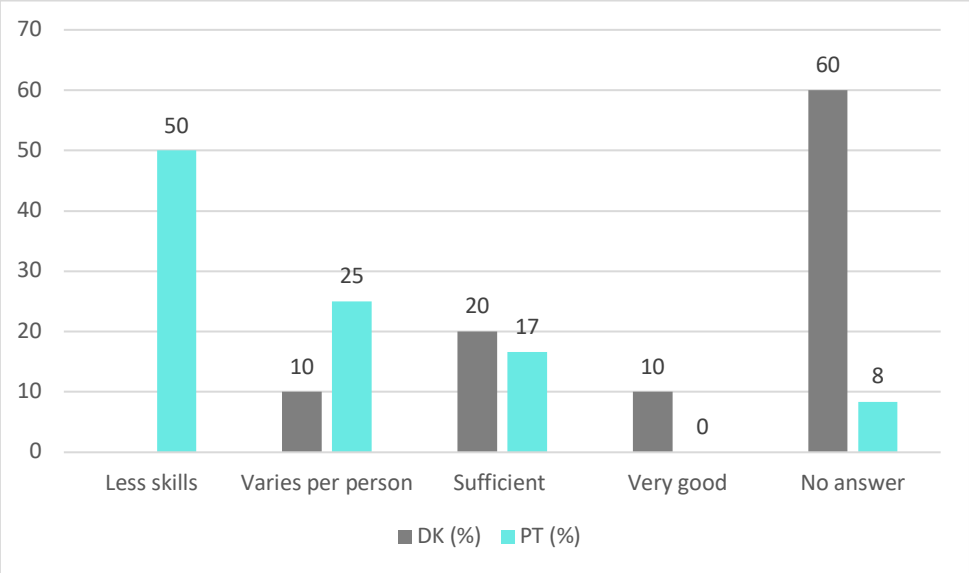

FIGURE 60: EMPLOYERS: OPINION TECHNOLOGICAL SKILLS OLDER WORKERS

A12. What is to your opinion needed to keep the technological skills of older workers up-to-date?

To keep the technological skills of older workers up-to-date the managers from Portugal answered uni-sono: training, training, training. That answer was also given by 20% of the Danish managers. 20% of the Danish managers find no differences between the ages, and 60% of the managers didn't provide any answer.

A13. Do your older employees mainly work in teams or do they work individually mostly? Please specify

Older Danish and Portuguese workers work in teams (32%), individual (9%) or in both (36%) situations. 14% of the Danish managers indicated that there is no difference between age groups.

A14. How do you divide the tasks/work the older office workers have to perform?

Performance management (targets and evaluation) and team meetings were most mentioned by both groups of employers/managers. In Denmark most older workers arrange the work themselves.

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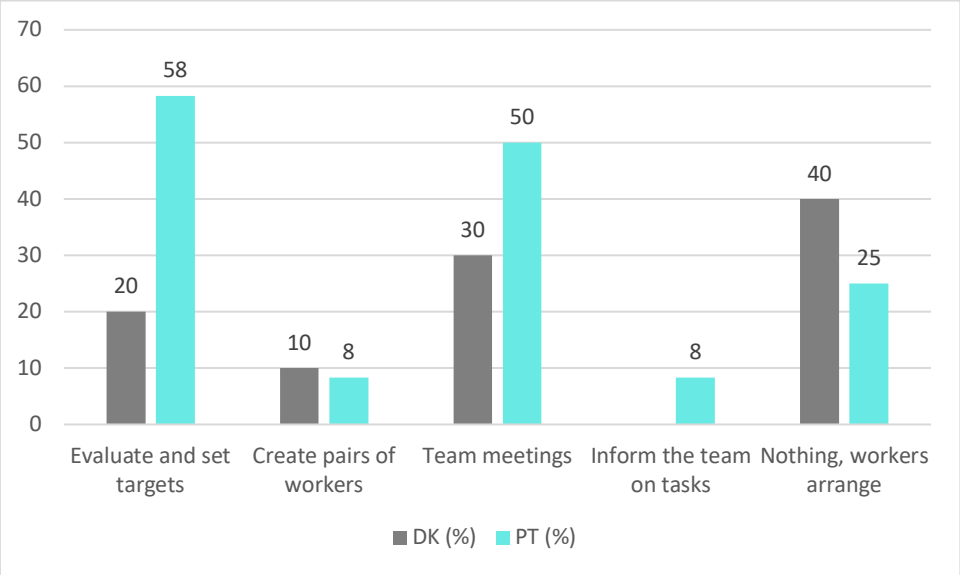

FIGURE 61: EMPLOYERS: DIVISION OF WORK FOR OLDER WORKERS

A15. Do you use a different approach to divide tasks/works to younger workers?

If yes, please can you provide an example?

Just 8% of the Portuguese employers answered to use a different approach to divide tasks/works to younger workers. This to divide tasks within their capabilities.

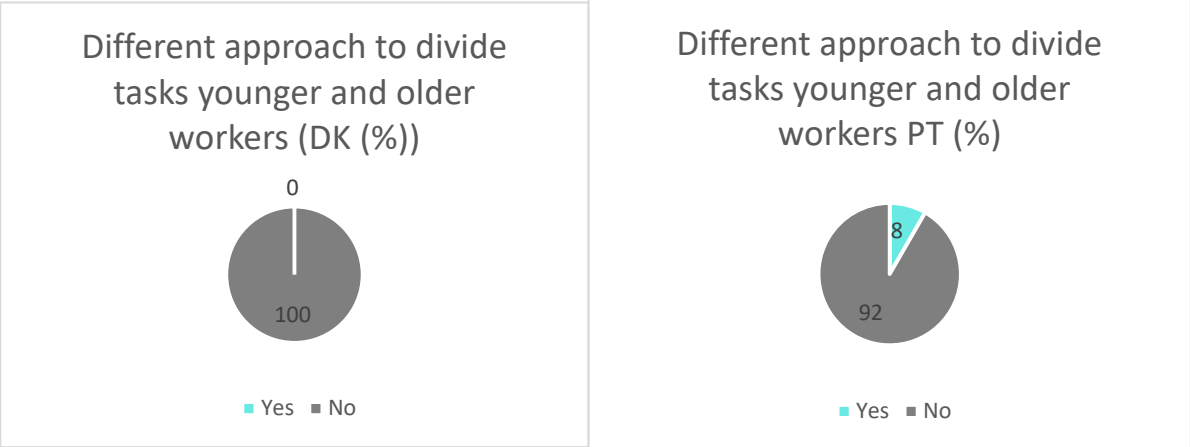

FIGURE 62: EMPLOYERS: DIFFERENT APPROACH TO DIVIDE TASKS TO YOUNGER WORKERS

A16. How do you monitor progress on the tasks of your older workers?

To monitor progress on the tasks of the older workers, the employer organises performance evaluations (32%; DK:10%, PT:50%), bilateral meetings (9% DK) or team meetings (5% PT). 23% of the employers (20% DK, 25% PT) indicated that the work of older workers is monitored in the same way as of younger workers. 27% of the employers didn't provide an answer.

A17. Do you use a different approach to monitor progress of the tasks/works of younger workers?

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If yes, please can you provide an example?

On this question all employers answered: no.

B1. Does your organisation have a health prevention policy for workers?

If yes, please specify.

In Denmark 60% and in Portugal 50% of the organisations have a health prevention policy for their workers. Occupational health provision, health insurance (Portugal), hygiene and safety, sabbatical leaves and personalized policy are the given examples.

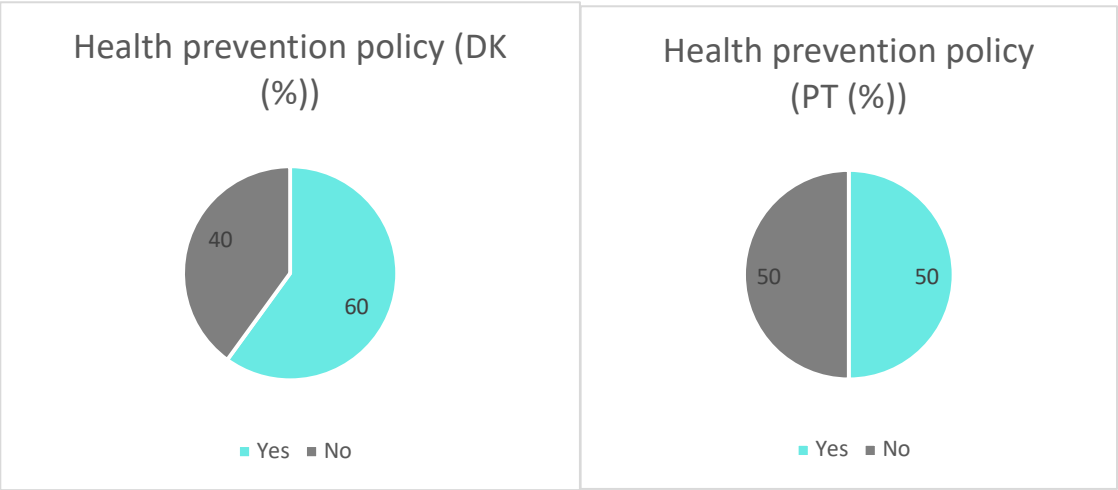

FIGURE 63: EMPLOYERS: HEALTH PREVENTION POLICY FOR WORKERS

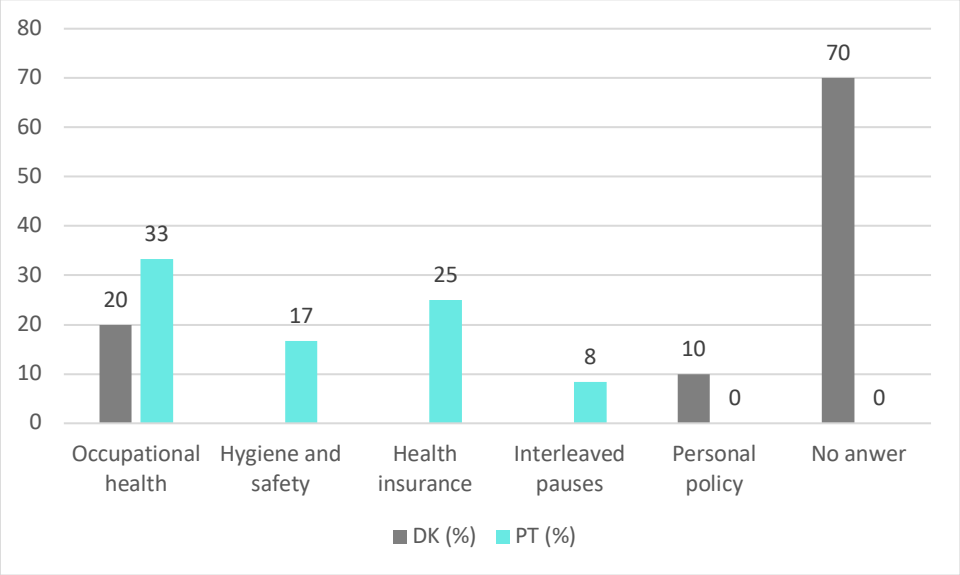

FIGURE 64: EMPLOYERS: SPECIFICATION HEALTH POLICY WORKERS

B2. Do you manage workers of whom you know or suspect that they suffer from one or more chronic diseases or condition (such as diabetes, heart failure, arthritis, physical impairment, bad vision)?

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If yes: in your opinion, this chronic disease or condition negatively influences the work of the employee?

If yes, do you and the worker manage the disease or condition to maintain the work and productivity in any way?

How?

The majority of the employers/managers indicate to manage workers who have chronic diseases or conditions. In Denmark 60% of the managers have, and in Portugal 58%. From the Danish managers 60% think that the chronic disease or condition of the worker doesn't negatively influence the work of the employee. Portuguese managers think for 57% the same. To maintain the work and productivity of the worker, three Portuguese solutions are: adapting work rhythms, resources and availability; regular medical appointments and control of the chronic disease and realistic deadlines and positive coaching.

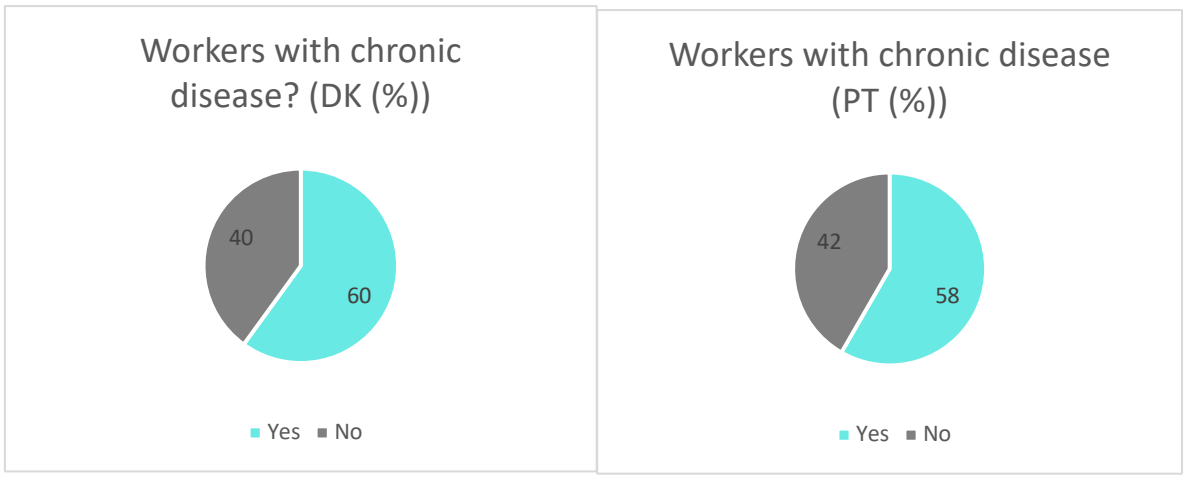

FIGURE 65: EMPLOYERS: WORKERS WITH CHRONIC DISEASE AT WORK IN ORGANISATION

C1. What is your opinion to have a system that...

Eventual differences between the two involved countries Portugal and Denmark became very clear on this question. Portuguese employers or managers in big majority find the suggested functions of the device useful or very useful. They all like the functionality that it identifies training needs, offer optimal employee pairing, supports on the fly work practice and advises on workplace adaptations. Also, the other functionalities are welcomed: reports on progress and on health and condition of the worker, however 17% of the managers don't find this useful.

Danish employers/managers don't find above mentioned functionalities useful. Reports on progress and on health and conditions, and the identification of training needs are the least liked.

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TABLE 23: DANISH EMPLOYERS: USEFULNESS FUNCTIONALITIES

Denmark in %, N=10	Very useful	Useful	Not very useful	Not useful at all
Reports on progress	0	20	40	40
Identifies training needs	0	20	40	40
Optimal employee pairing	0	40	20	40
On the fly work practice support	0	40	20	40
Identifies needs for workplace adaptations	0	40	20	40
Reports health and condition of the worker	0	20	40	40

TABLE 24: PORTUGUESE EMPLOYERS: USEFULNESS FUNCTIONALITIES

Portugal in %, N=12	Very useful	Useful	Not very useful	Not useful at all
Reports on progress	17	67	17	0
Identifies training needs	58	42	0	0
Optimal employee pairing	33	67	0	0
On the fly work practice support	67	33	0	0
Identifies needs for workplace adaptations	50	50	0	0
Reports health and condition of the worker	33	50	8	8

D1. Do you already use digital tools or services to perform your management tasks?

If yes, what apps or devices?

If yes, who is the producer of the apps or devices?

If yes, what is your opinion on the usability and user-friendliness?

All Danish managers and 75% of the managers in Portugal use digital tools or services to perform management tasks. They use applications both for computer as on smartphone. 17% of the Portuguese managers use internal management systems. 42% Portuguese managers/employers answered that the producer of the apps or devices is private or confidential. 8% of the Portuguese managers answered that the programme was made by students. Danish employers/managers are more willing to share the information: Apple, HP Lenovo, KMD, Microsoft were the answer. 30% of the Danish managers indicate to use many different systems.

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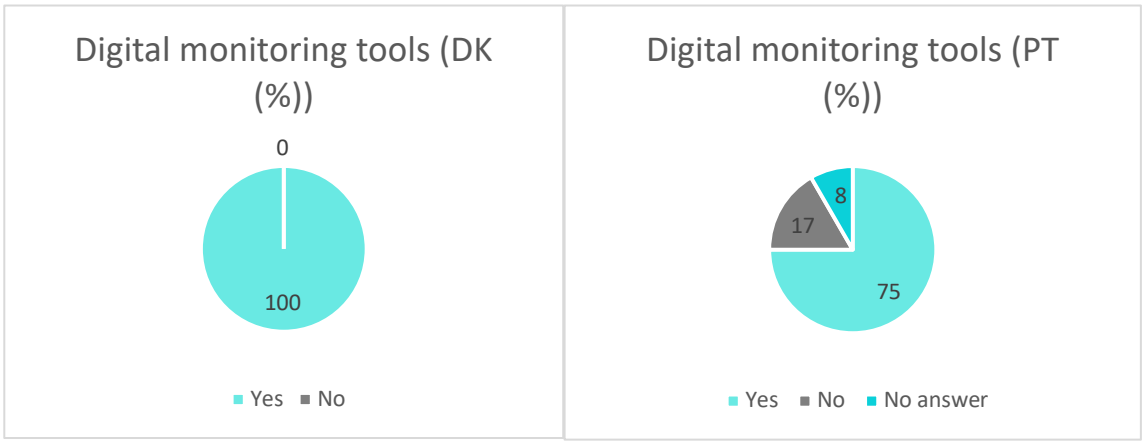

FIGURE 66: EMPLOYERS USE DIGITAL MONITORING TOOLS

D2. On what kind of devices would you say the SmartWork services should become available? Please tick all applicable.

The Danish managers prefer the smartphone (70%) above the desktop/laptop (30%). The other kind of devices aren't indicated by them.

The Portuguese managers are equally in favour of SmartWork on the desktop/laptop as on their smartphone (92%). Also the availability of SmartWork on tablet is indicated (58%).

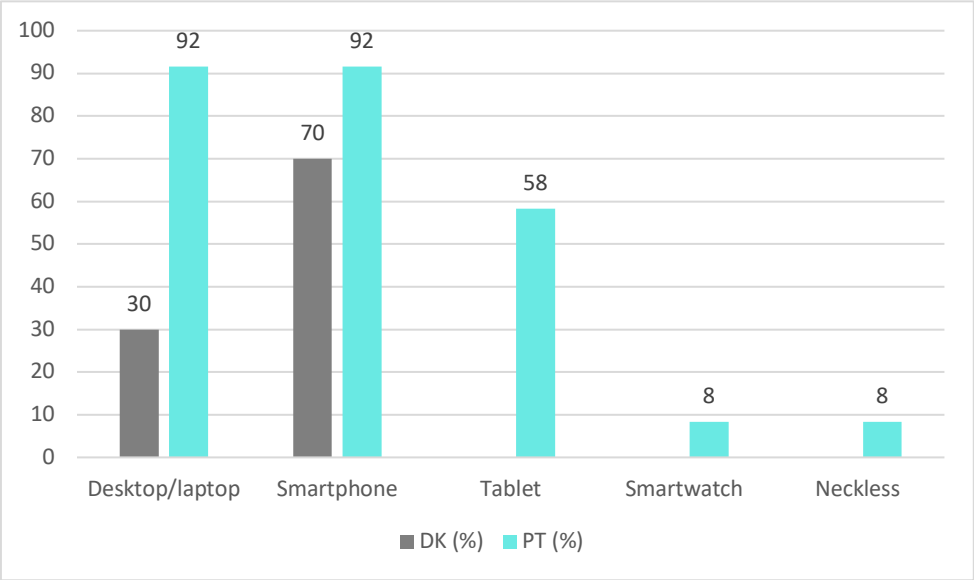

FIGURE 67: EMPLOYERS: DEVICES FOR SMARTWORK SYSTEM

D3. I would prefer to interact with my device by...

Interaction of the employer/manager with the SmartWork device is most wanted by using touch screen (DK 100%, PT 83%). Keyboard interaction is wanted by all Danish managers, and by 33% of the Portuguese managers. The other options are less favourable.

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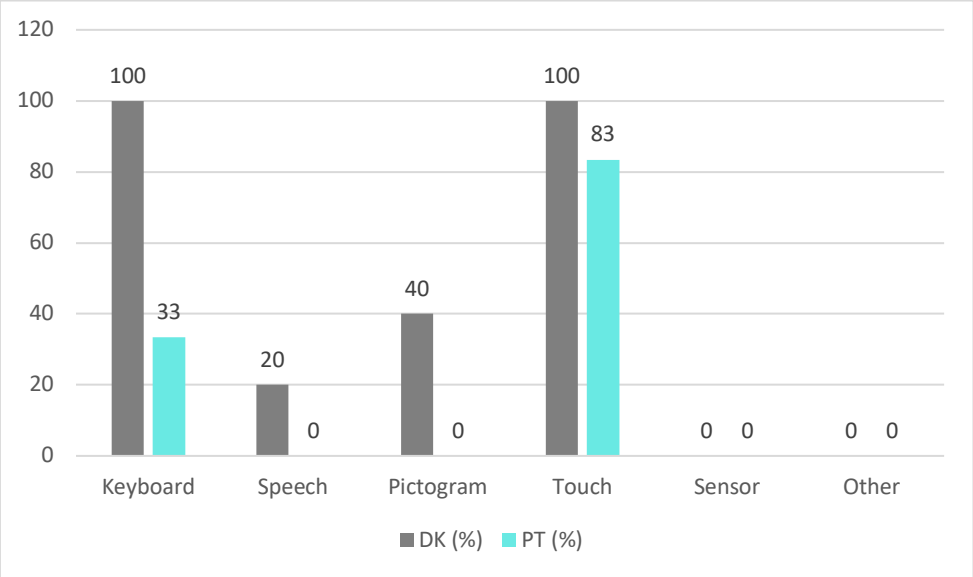

FIGURE 68: EMPLOYERS: PREFERRED INTERACTION WITH DEVICE

D4. How would you like the device to draw your attention?

Sound of bleep is found the most attractive way to draw the attention of employers/managers (60% for the Danish managers and 50% of the Portuguese). Vibrating is mentioned equally by 40% of the Danish managers and 33% of the Portuguese managers. The Portuguese also opt for a flashing light (33%).

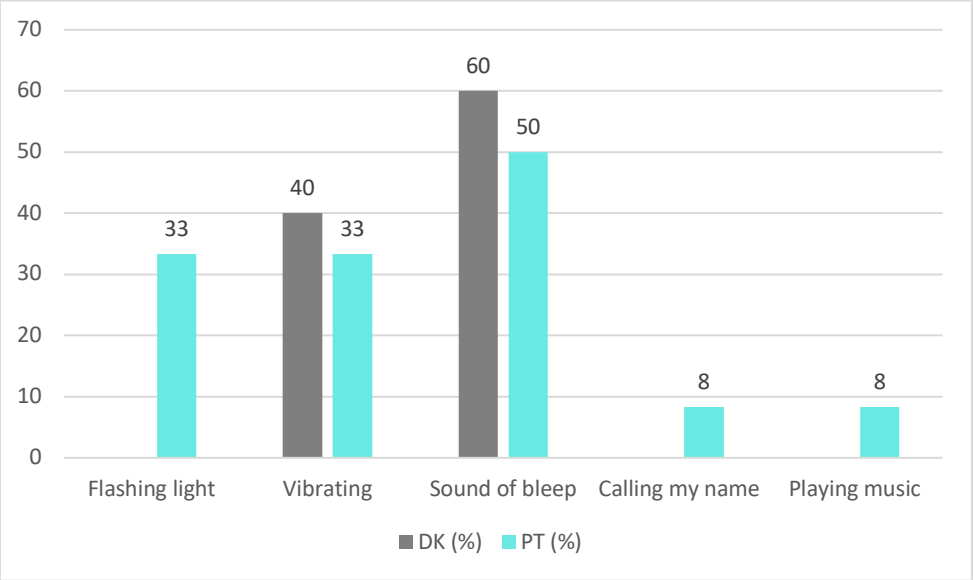

FIGURE 69: EMPLOYERS: PREFERRED WAY TO DRAW ATTENTION

E1. Does your organisation have a privacy policy?

40% of the Danish managers indicated to have a privacy policy; 92% of the Portuguese employers have.

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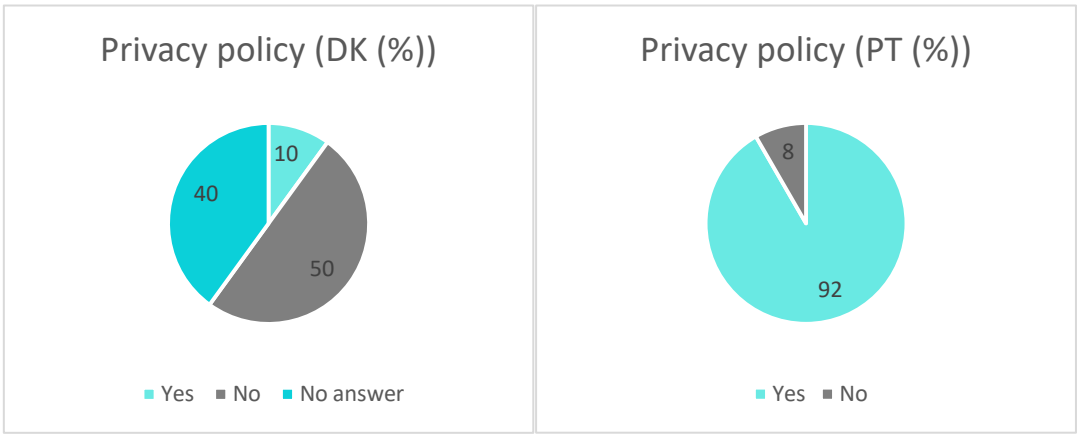

FIGURE 70: EMPLOYERS: PRIVACY POLICY IN ORGANISATION

E2. How do you communicate about privacy issues with your employees?

Employers/managers communicate about privacy issues in the Danish case, mainly private/individual (80%), where in Portugal the employer mainly uses circulars or internal communication (62%) and individual meetings (38%).

E3. Do you have any concerns regarding privacy management and protection if you implemented a system such as SmartWork in your organisation?

If yes, can you give an example.

60% of the Danish managers and 42% of the Portuguese managers don't have any concern regarding privacy issues. As example was mentioned the data security and another manager indicated that he/she doesn't know SmartWork to judge the privacy issues.

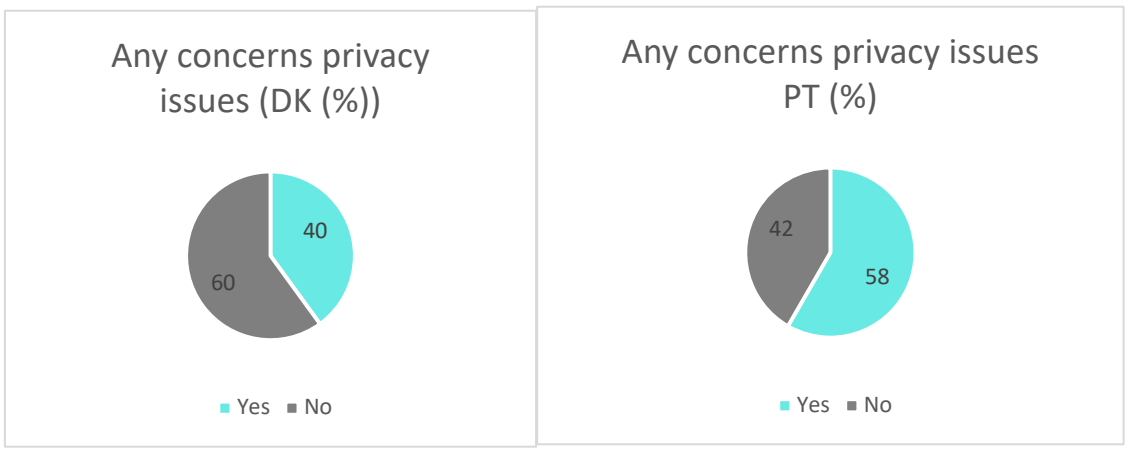

FIGURE 71: EMPLOYERS' CONCERNS ABOUT PRIVACY ISSUES

6.1.3. Caregivers

Caregivers in this project are informal caregivers of an older worker. For example a husband or spouse or partner, child, neighbour or friend. In May and June 2019 CDC and CAT approached 10

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caregivers each and got a full 100% response. In both countries the caregivers' responses were obtained from an online questionnaire. All responses were anonymous.

1. Do you have a job? If yes, for how many hours per week?

Danish respondents refer to have a job for "15-20 hours" per week (40%) or "21-39 hours" per week (40%). In Portuguese sample most carers refer to work "40-50 hours" per week (40%) or "21-39 hours" per week (30%), making global sample more frequent on this last weekly schedule.

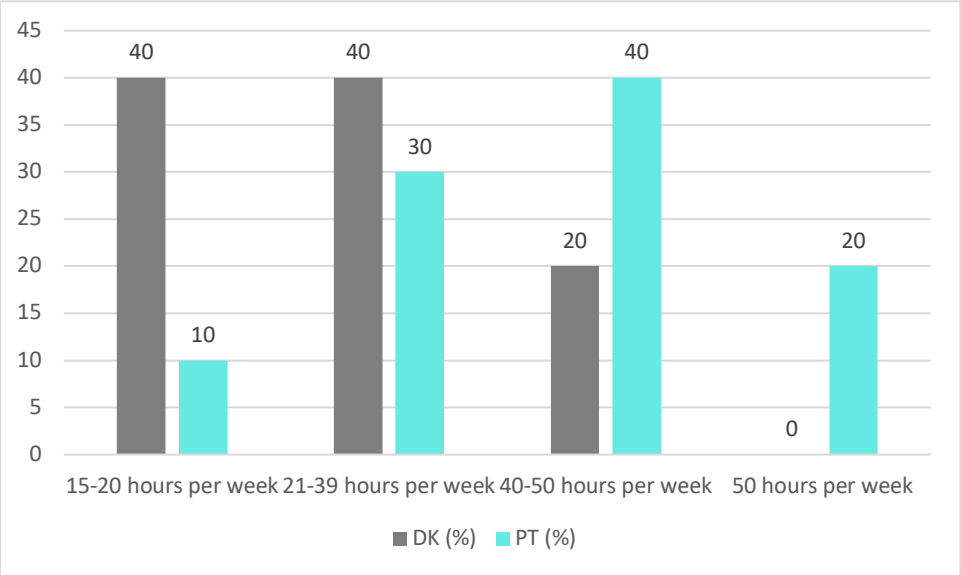

FIGURE 72: CAREGIVERS HAVING A JOB

2. What is your relationship with the worker you care for?

Danish respondents are mainly "spouse or partner" (50%). In Portuguese sample most carers are "other relatives" (50%) for the worker they care for. Global sample is more frequent on "other relatives".

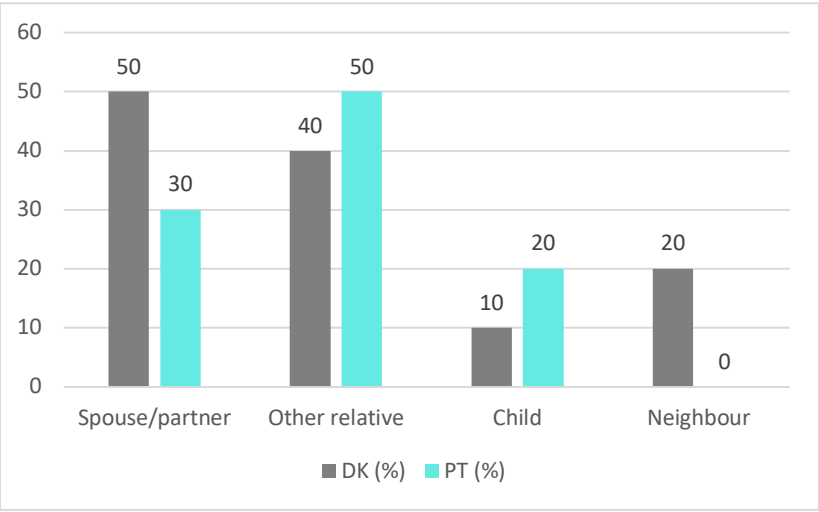

FIGURE 73: RELATIONSHIP CAREGIVER-WORKER

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3. From which chronic disease(s) or condition the worker you care for suffers?

Most of respondents mention "hypertension", "diabetes" or "other" as the main conditions the worker they care for suffers from. In Danish sample "diabetes" is more often (30%); in Portuguese one, "hypertension" is (40%).

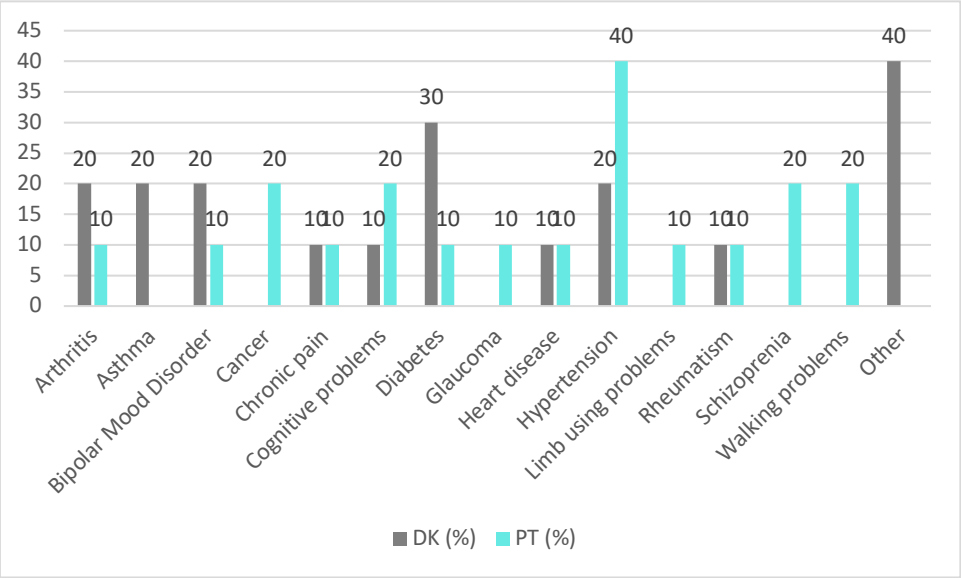

FIGURE 74: CAREGIVER AND CHRONIC DISEASE WORKER

4. How many hours per day you have to spend on caring?

Most of respondents spend 2 or 3 hours a day on caring tasks (most Danish spend 2 hours – 60%; most Portuguese spend 3 hours a day – 40%).

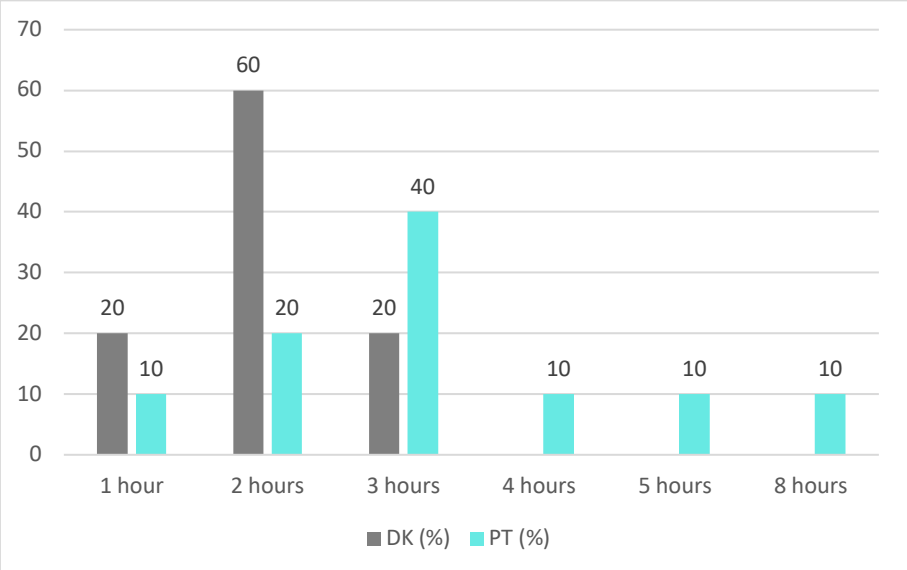

FIGURE 75: CAREGIVER HOURS OF CARING

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5. Did you reduce your working hours to be able to deliver the care?

Most of respondents refer they did not reduce their working time to be able to deliver the care for the worker.

FIGURE 76: CAREGIVER AND REDUCTION WORKING HOURS

6. Does the chronic disease(s) or condition of the worker you care for affect your personal life?

6a. If yes, please specify:

6b. If yes, how do you manage?

The majority of respondents acknowledged that the chronic disease or condition of the worker they care for affects their personal life, in a similar distribution between both samples (DK = 70%; PT = 60%). From those who said "yes", most carers mention "less time to go out" (20%), "less daily exercise" (15%) and "getting a good feeling" (15%) as the main reasons to this impact. Regarding how they manage this, globally, most frequent answers were "employer understanding" (35%) and "giving up personal life" (25%).

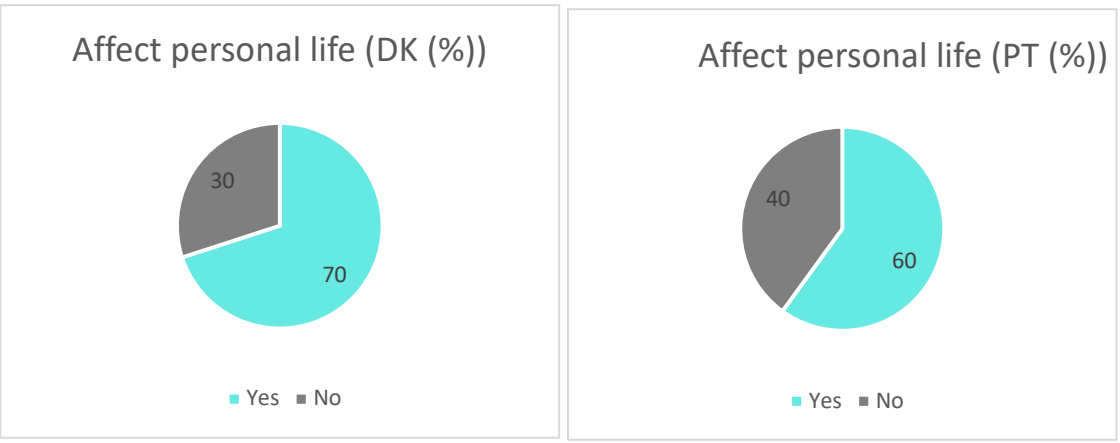

FIGURE 77: CAREGIVER AND PERSONAL LIFE

7. Does the chronic disease(s) or condition of the worker you care for affects your own health?

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7a. If yes, please specify

7b. If yes how do you manage?

Globally, most of respondents acknowledged that the chronic disease(s) or condition(s) of the worker they care for do not affect their own health, with Danish sample being much more clear on this (90%) than Portuguese sample (50%), which splits to half between "yes" and "no". From those who said "yes", most carers mention "feeling stressed" (25%) and "tired" (25%), and also "sleeping badly" (20%) as the main reasons to this impact. Regarding how they manage this, globally, most frequent answer was "extra rest" (10%), followed equally (10%) by "exercise/meditation", "medication", "relativizing the situation" and "conscious of time spending" - with high responding absence from Danish sample.

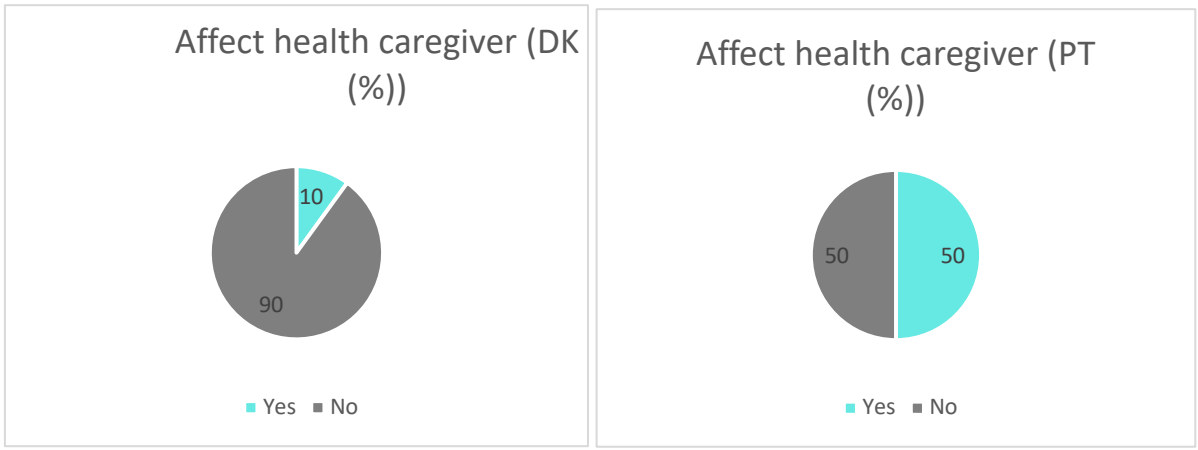

FIGURE 78: CAREGIVER AND HEALTH

8. Does the chronic disease(s) or condition of the worker you care for affects your working conditions?

8a. If yes, please specify:

8b. If yes, how do you manage?

Globally, most of respondents acknowledged that the chronic disease(s) or condition(s) of the worker they care for do not affect their own working conditions (70%). From those who said "yes", most carers mention "remote work at home" (20%), and then, equally (15%) "absenteeism", "less salary" and "flexible hours" as the main factors to this impact. Regarding how they manage this, globally, most frequent answer was "work at home" (15%), followed by "professional entity help" (10%).

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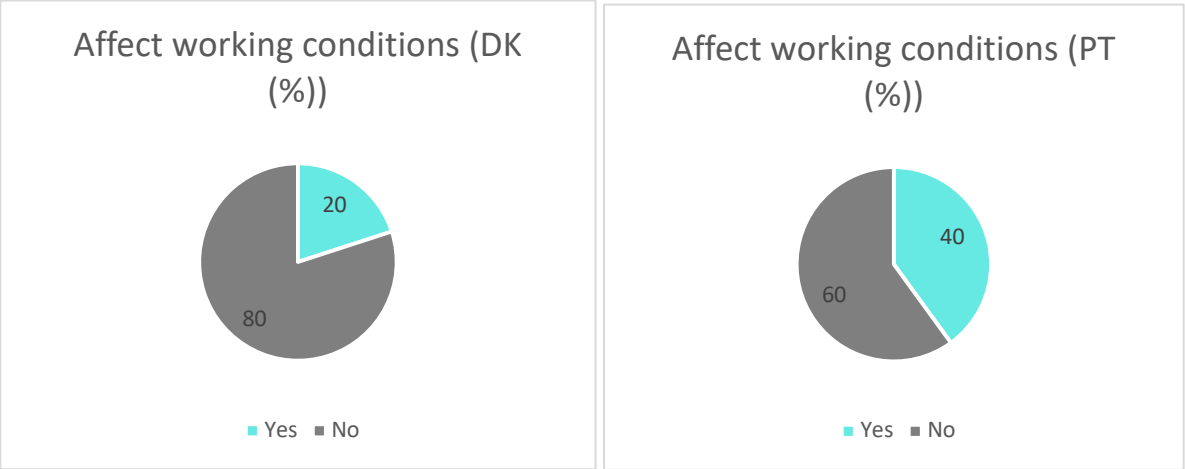

FIGURE 79: CAREGIVER AND WORKING CONDITIONS

9. What, in your opinion, could be added or improved in the support/conditions the organisation/workplace offers to the person you care for? Are there already good measures? If yes, please provide an example. If not, what is mostly missing?

Most respondents (30%) think "nothing" can be added or improved in the support/conditions their organisation/workplace offers to the person they care for. Then, globally and equally (15%), carers mention "reduction of working hours and flexibility", "not employer, but social health service (should do better)" and "the choice of caring is my own" as the more frequent options.

10. What, in your opinion, could be added or improved in the support/conditions your organisation/workplace offers to you, as a carer? Are there already good measures? If yes, please provide an example. If not, what is mostly missing?

Most respondents (25%) think "nothing" can be added or improved in the support/conditions their organisation/ workplace offers to them, as carers. Also the same percentage (25%) thinks "flexible hours" would be a possibility. Then, globally, carers mention "work at home" (20%) and "reduction of working hours and flexibility" (15%), as the more frequent options.

11. What is your opinion to have a system that: Allows me to continuously monitor the health status of the person I care for.

Portuguese caregivers find every proposed functionality useful or very useful. The monitor on the health status of the worker is most favourite. On the contrary, Danish respondents find the functionality to receive information on health risks most useful, followed by monitoring on the health status of the worker. Danish respondents dislike to receive personalized care and intervention plans. Useful nor not useful they think is the continuously monitor behavioural attitudes, daily planning of activities and other.

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TABLE 25: DANISH CAREGIVERS: USEFULNESS FUNCTIONALITIES

Denmark in %, N=10	Very useful	Useful	Not very useful	Not useful at all
Monitor health status worker	20	40	30	
Allows to monitor behavioural attitudes	20	30	30	20
Personalized care and intervention plans	10	20	70	
Provides information on health risks	40	60		
Supports daily planning of care activities	20	30	50	
Other	10	40	40	10

TABLE 26: PORTUGUESE CAREGIVERS: USEFULNESS FUNCTIONALITIES

Portugal in %, N=10	Very useful	Useful	Not very useful	Not useful at all
Monitor health status worker	90	10		
Allows to continuously behavioural attitudes	40	50	10	
Personalized care and intervention plans	70	30		
Provides information on health risks	60	40		
Supports daily planning of care activities	50	50		
Other	20	30	10	40

12. On what kind of devices should a system like this be available? Please tick all applicable

Most caregivers think that a system like SmartWork should be available through "smartphone" (95%), "tablet" (80%) or "desktop/laptop" (55%).

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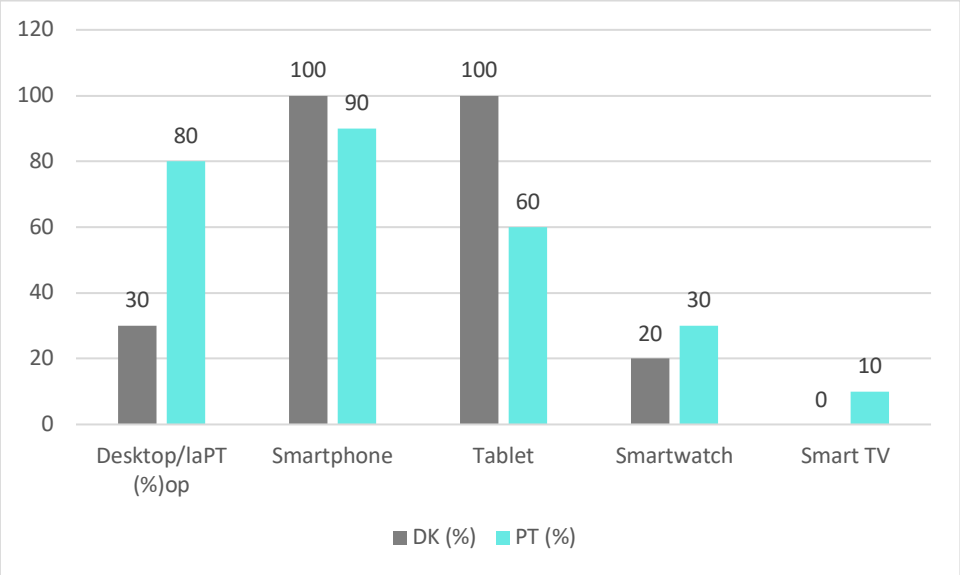

FIGURE 80: CAREGIVERS AND DEVICE SMARTWORK SYSTEM

13. I prefer to interact with my devices by...

Both keyboard and touch screen are preferred by Danish and Portuguese caregivers. Danish caregivers also choose for communication by using pictograms (50%). Portuguese also indicate to prefer to interact by speech (4 times).

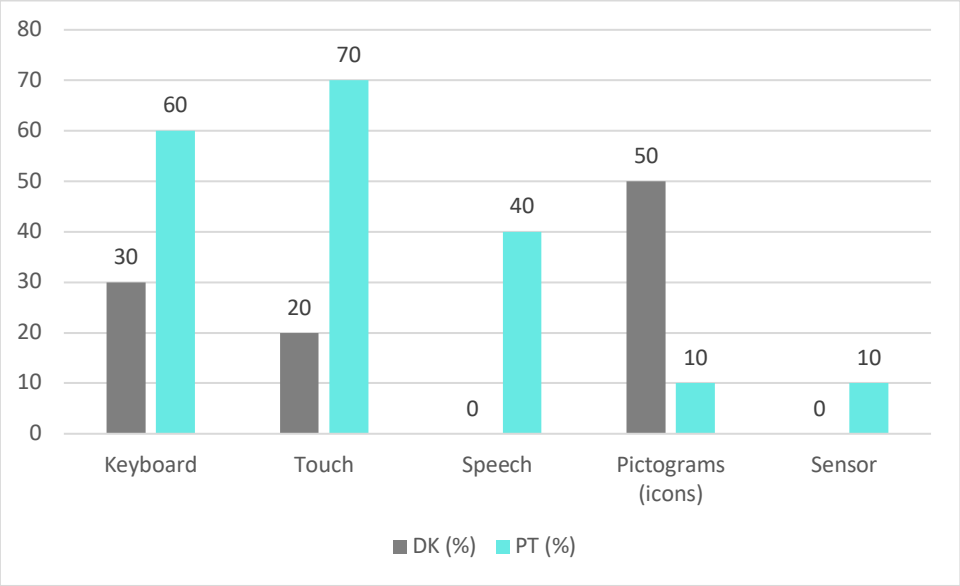

FIGURE 81: CAREGIVERS PREFERENCE TO INTERACT WITH DEVICE

14. How would you like the device to draw your attention?

The majority of carers prefers to interact with their devices through "sound or beep" (90%), "vibrating" (60%) or "flashing a light" (30%).

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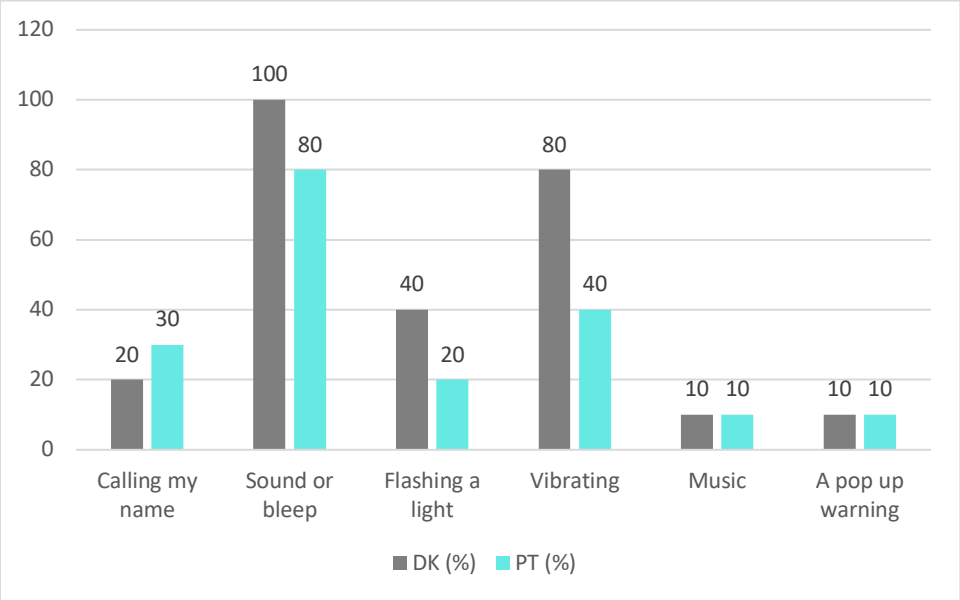

FIGURE 82: CAREGIVERS AND ATTENTION BY THE SYSTEM

6.2. Summary

6.2.1.1. Employees

Three online questionnaires in English, Portuguese and Danish, received respectively 60, 50 and 49 respondents in the age-group of 55 years and over. Both the Danish as Portuguese questionnaire were mainly answered by women (70%). The English questionnaire was more gender balanced: 52% male. Most of the respondents were aged 55-59 years. 84% of them was not living alone at home and 32% were performing caregiving tasks as well. Almost 100% possesses internet at home. They mostly at work in administrative or social care functions for 26 till 40 hours per week. More than half of the workers perform daily repetitive tasks and have routine break activities. The main activities are working at a desk and at the computer. The English questionnaire respondents don't spend hours on walking and smartphone apps, where the Danish and Portuguese employees spend more time on that activity.

Positive effects of being an older worker mainly are experience and in line with that respect, seniority and leadership. From the Danish employees only 49% indicated that there are positive effects of being an older worker, this is rather low compared to the respondents from Portugal and Europe (49% vs. 80 and 87%). On the other hand many Danish respondents didn't indicate negative effects as well. Portuguese and European respondents indicated that being slower, more tired and less technology skills are the main negative effects.

Regarding the opportunities for older workers the respondents are positive, however agree less on workers at retirement age in the office or careful planning of succession. Experience, beneficial to the company, good mentors and maturity to better handle customers services are valued as the main assets of older workers. Most workers want to retire at normal retirement age. For the Portuguese

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respondents 44% of them need to have work after retirement for financial reasons. This is also the case for European workers (33%). Danish and Portuguese respondents further think differently on that older workers should retire at retirement age and that retaining older workers would lead to less opportunities of younger workers (Danish disagree, Portuguese agree on both issues).

Hearing problems occur for 12% of the Danish and Portuguese respondents. Only a small minority of them uses a hearing aid. Portuguese respondents report with a large majority (70%) to have an eye vision problem. Danish workers for 27%. They use glasses in similar percentages. Portuguese respondents also take more often daily medication (56%). Danish for 27%. The respondents report a variety on having chronic diseases or condition, however 40% of the Portuguese and 59% of the Danish report not to have any chronic disease. Hypertension, limb using problems, rheumatism and diabetes are the most occurring diseases. The Danish respondents don't have any difficulties at work with the occurring chronic disease or condition. In Portugal and Europe 14 and 13% has. Problems with moving is the most reported example. The workers recommend employers to introduce individual action plans to meet the needs of the worker and to perform workplace assessments. Also flexible working hours or reduced working hours are advised. Most Danish and Portuguese respondents haven't been on sick leave during the last 3 years. For those who have, working at home would have avoided or shortened the sick leave.

Most used devices by the Danish respondents are the laptop and smartphone. Portuguese workers more often use desktops (including ordinary mouse and keyboard) and smartphones. The Danish respondents indicate with a large majority that they are very familiar to use a desktop or laptop at work and they find computer tasks not difficult. The Portuguese too, however there are more respondents answering not being familiar with using these devices. 8% of the Portuguese indicate to find tasks on the computer very difficult. 70% of the Danes perform their daily work mainly at a computer or laptop. From the Portuguese only 32%, were 40% indicates to use it only 0-25% of the time. The Portuguese respondents receive more assistance the computer. The Danish respondents more than Portuguese value it positively to have tips when using the computer (39%-28%). Half of the respondents get acquainted with a new programme for less than 1 hour. The other half is more diverse, varying from 2-3 hours till more than 8 hours. To receive training or support with computer tasks is welcome for all respondents. Group training is the most preferred method. For most respondents it is no problem that the training is visible for colleagues.

As for the utility of an eventual system or device provision of specific features or services, the most wanted features for the majority of Danish and Portuguese respondents are "informing on meetings and events" (81%), "providing guidance" (79%), "reminding on appointments" (78%), "training contents" (78%), "transfering work between devices" (77%), "managing and organising work" (73%). Least favourable are: "checking health status every minute" (85%) and every day (80%), "providing company" (77%), "informing about time working on computer" (62%), and "informing boss on worker performances" (61%).

The European respondents have a slight different opinion on wanted features: they most value a device that automatically chooses individual settings (75%), that supports information on meetings

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and events (72%), reminds on appointments (72%), transfers work between devices (73), provides training contents (70%) and guidance (68%).

A small minority of the respondents use health monitoring devices such as Sony Smartband, Apple Watch, Blood-pressure/glycaemia equipment, SNS and Fitbit.

SmartWork services should become available on a desktop or laptop, smartphone or tablet. Preferred interaction method is using keyboard and touchscreen. Portuguese also like to use speech. When it comes to the better way for the SmartWork device to draw their attention, most of the older workers mention "flashing" (31%), "vibrating" (25%), "music" (21%) and "calling" (14%), as main preferences. Regarding the English sample, a sound of bleep is by far the most preferred (58%). Vibrating scores 25%, flashing a light 10%.

Most companies have a privacy policy in the organisation and most workers know who the data protection officer is and how to contact this person. A small minority has concerns regarding the privacy policy within their organisations.

6.2.1.2. Employers

The Portuguese and Danish online questionnaire received respectively 12 and 10 responses from employers/managers.

The majority of the Danish and Portuguese employers think that older workers bring experience to their organisations, that they are good mentors and are beneficial for the organisation. Compared to the Danish employers, more Portuguese managers think that older workers are better in handling customer service issues and are less adaptable to change and technology and cost more. Danish managers don't agree on these features.

Employers don't approach younger or older workers differently, nor in attitude, nor in dividing tasks and nor in monitoring progress. Regarding the technological skills of older workers many Danish managers didn't answer the question, where 50% of the Portuguese employers think that older workers have less technological skills.

Health prevention policies are present in 60% of the Danish and in 50% of the Portuguese organisations. This includes occupational health policy, hygiene and safety, health insurance (Portugal) and personalized policy. The majority of the employers manage workers with a chronic disease or condition. A small majority of both respondent groups think that this doesn't affect the work productivity of the worker.

Regarding the functionality of the system, the opinions of Portuguese and Danish respondents very much differs. Portuguese employers or managers in big majority find the suggested functions of the device useful or very useful. They all like the functionality that it identifies training needs, offer optimal employee pairing, supports on the fly work practice and advises on workplace adaptations. Also, the other functionalities are welcomed: reports on progress and on health and condition of the worker, however 17% of the managers don't find this useful. Danish employers/managers don't find above

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mentioned functionalities useful. Reports on progress and on health and conditions, and the identification of training needs are the least liked.

Most employers already use digital monitoring tools. They prefer to have the SmartWork services available on smartphone and desktop/laptop. Portuguese also prefer to use a tablet for it. To interact with the system they like to have keyboard and touch screen. Other is pictograms and speech. Sound or bleep, followed by vibrating are the most favoured attraction modes.

Finally, the employers indicate to have concerns regarding the privacy as it comes to data security issues.

6.2.1.3. Caregivers

For both the Danish and Portuguese questionnaire 10 respondents each filled in the questions.

Danish and Portuguese caregivers work for 15-40 hours per week (80% of the Danish respondents) and 21-50 hours per week (70% of the Portuguese respondents). In most cases they take care of their spouse or partner or another relative. This person suffers from hypertension and diabetes mostly, and sometimes in combination with other chronic diseases, such as arthritis, asthma, mental disorders and walking problems.

The caregivers mostly spend 2-3 hours per day on caring. Most of them didn't reduce their working time. They acknowledge in majority that the chronic disease of the worker affects their personal life, because they have less time to go out. In case of Portuguese respondents it affects for 50% of the caregivers the health of the caregiver. In Denmark only 10%. Most mentioned are: feeling stressed, tired and sleeping badly. Also the caring affects their working condition, however more in Portugal (40%) than in Denmark (20%). Remote work at home, absenteeism, less salary and flexible hours are the main factors to this impact.

Most respondents think 'nothing' can be added or improved in the support/conditions of organisation/workplace of the person they care for. This majority is also found for their own working conditions. Additionally is mentioned that flexible hours, work at home and reduction of working hours could help.

Regarding the proposed functionalities, Portuguese caregivers find every proposed functionality useful or very useful. The monitor on the health status of the worker is most favourite. On the contrary, Danish respondents find the functionality to receive information on health risks most useful, followed by monitoring on the health status of the worker. Danish respondents dislike to receive personalized care and intervention plans. Useful nor not useful they think is the continuously monitor behavioural attitudes, daily planning of activities and other.

Most caregivers think that a system like SmartWork should be available through "smartphone" (95%), "tablet" (80%) or "desktop/laptop" (55%). To interact with the devices they would like to use keyboard and touch screen. Additionally using pictograms and speech. The system should draw attention by sound or bleep, followed by vibrating and flashing a light.

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7. User Needs analysis

This chapter will be mainly focused on summarizing the users perspective and describe this in terms of user needs. Our starting point is the previous literature review and the consultation of end users (i.e. questionnaires results).

The methodologies and respective concepts, used to derive the most important features for SmartWork system, will be described in a stratified and concise way. In this chapter, we will describe user's expectations for the system in an incremental manner. This means, after briefly introducing some terms, we will present four Personas, some User Scenarios and few User Stories. This level of abstraction should be enough to identify and describe the SmartWork Requirements (functional and non-functional), in D2.4.

7.1. Introduction

7.1.1. Definitions

The definition of the main concepts are important for a common understanding of terms and processes when analysing scenarios and extracting use cases and user needs etc. For the understanding of the SmartWork project partners, some definitions are given in the following chapter. Such definitions will be important guidelines when including users groups in the scenario building and in site trials later on. The definitions summarized below were adopted in previous related projects (i.e. CogniWin) [57] and represent the starting point for a close collaboration with the technical partners.

- Stakeholder

Stakeholder means a person or organisation that has a legitimate interest in a project or entity. In SmartWork, stakeholder means to be a person or organisation that either is a user of the system or that have an important relation to one of the users, which the project benefits from describing and representing.

- User needs

A user's need is often explained as a person's felt need [54]. Since the need is related to a feeling, it can be partly or fully met by one or several actions, which do not directly provide a service to the user, but may affect other stakeholders. User needs are collected from different stakeholder's point of view and some of the stakeholders may suggest needs identified for other stakeholders. An example is persons with dementia that not always are able to express what their needs are and their needs are acquired through next of kin.

- User requirement

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User requirement is different from user need in the way that the requirements claim something from the product or the solutions in order for them to be beneficial for the user. This could be requirement regarding the design of the product, the functionality.

- Scenario

A scenario is a fictional story about the "daily life of" or a sequence of events with the primary stakeholder group as the main character. Typically, a persona that was created earlier is used as the main character of this story. The story describes the problems of the primary stakeholder group and very specific the events happening related to those problems. Normally the main research questions of the project and the design process are built upon those problems. These may turn out to be a simple story about the daily life of an individual, but small details from the events should imply details about the users, and may include emotional or physical characteristics.

Scenarios are appropriate when you need to describe a system interaction from the user's perspective. There can be the "best-case scenario", where everything works out best, the "worst-case scenario", where the main character experiences everything going wrong around him or her, and an "average-case scenario", which is the typical life of the individual, where nothing really special or really depressing occurs, and the day just moves on.

Scenarios provide a social context in which the personas exist, and also create an actual physical world, instead of imagining a character with internal characteristics from gathered data and nothing else; there is more action involved in the persona's existence.

- Use Case

Use case is a technique for capturing functional requirements of systems and systems-of-systems. These are useful because they help to identify useful levels of development work. They allow the designers to see the actual low-level processes that are involved for a certain problem, which makes the problem easier to handle, since certain minor steps and details the user makes are exposed. The designers' job should take into consideration of these small problems in order to arrive at a final solution that works.

Another way to say this is that use cases breaks a complicated task into smaller bits, where these bits are useful units. Each bit completes a small task, which then builds up to the final bigger task. Like writing code on a computer, it is easier to write the basic smaller parts and make them work first, and then put them together to finish the larger more complicated code, instead to tackling the entire code from the very beginning.

- Feature

Features can be considered as the pieces composing the system. They correspond to an atomization of the implementation of parts of the system and are intended to deliver a functionality. Usually, an iterative project can be planned to release Features along the development life cycle. Additionally, we can draw a relationship between Features and Use Cases. The first can be described as what the

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actors can do with the system, while the former can be described as the narrative that explains how the actors can use the system.

This approach is important to identify, list and determine the important aspects that the system should met in order to maintain a successful connection between the different conceptual layers until reach the specification level.

7.1.2. Overall approach

The partners representing the users agreed upon generic methods to gain knowledge about user requirements. The target groups were defined to be older people who are still active in their work environment (age 55+). Portugal and Denmark both have older office workers, employers/managers and caregivers as target groups.

7.1.3. Scenarios, use-cases and features

A major challenge is to develop the features and services based on the user needs. The challenge is to cover all the needs from the end-user and providing functionality and services which for the end-user is difficult to imagine when evaluating the user needs.

Therefore it is important to use both an iterative approach for developing the solution and also use scenarios, use cases and features for developing an understanding of the user needs. A scenario is a story that first describes the problem and then describes a possible solution.

This approach makes it possible to start describing some of the most important user needs for one or several different user groups, and use this as an input to start developing the software and hardware as well as the service functionalities later will be tested. This way we do not need to describe all the needs of all the different users before starting the specification and developing of the Smartwork solution and services.

With reference to Figure 80, the related work will give the input to the creation of Scenarios, Use Cases and Features. This is described in detail in the next sections. This will again be important input to the Test Specification. Beside this in the trials and pre-trials we will test the use cases like specified in this document.

SmartWork follows an iterative process, and Scenarios, Use Cases (or User Stories) and Features will be created in parallel and they will all give input to each other (Figure 1).

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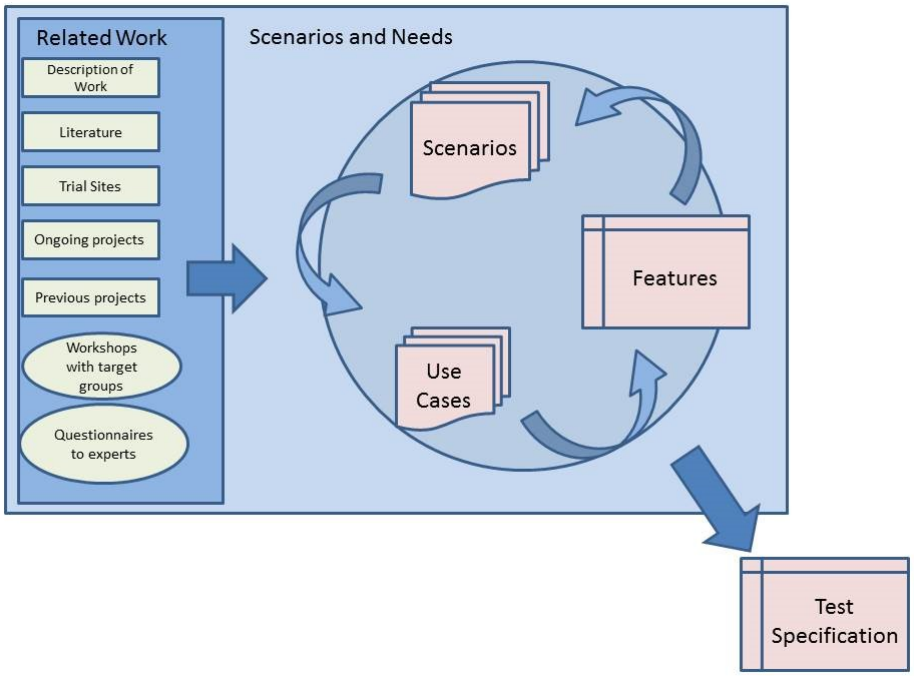

FIGURE 83: RELATION BETWEEN DEVELOPED WORK AND USER SCENARIOS AND NEEDS

7.2. User scenarios

As introduced in chapter 7.1, a scenario is a hypothetical story which is used to help a person think through a complex problem or system.

The motivation for using scenarios in general is:

- Describe different user situation as a fundament for developing use cases and features
- A tool for creating shared mental models of the projects aim among the different partners.
- The easy understanding for the users and developers, enabling the sharing of informatino in a perceptive and concise way.
- The scenario is a story about someone trying to accomplish something with the product (integrated set of features) under test. From the scenarios there will be developed test scenarios.

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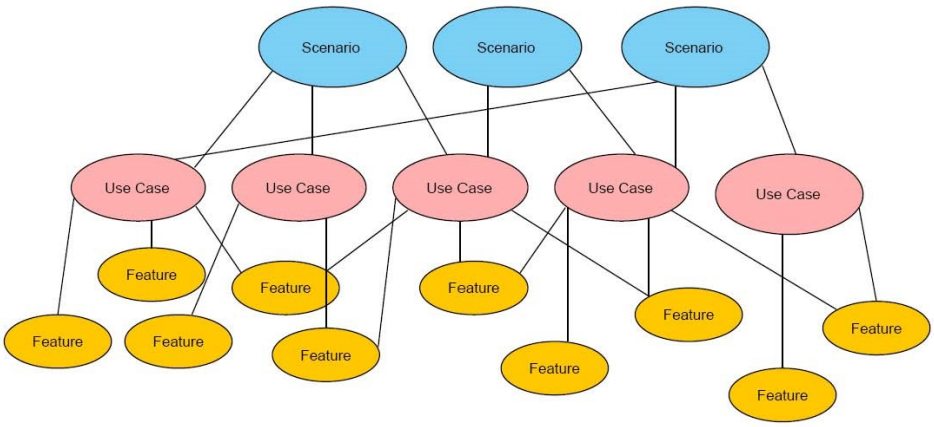

FIGURE 84: RELATIONSHIP OF SCENARIOS, USE CASES AND FEATURES

7.3. Methodology to choose use cases

The scenario describes (based on experiences) what the problem is, not knowing in which direction the solution might go. Once the problem is well formulated; the next scenario will be developed, the so-called activity scenario.

The activity scenario tells a story about a person trying to accomplish something with the product/ system in the future. It requires new ways of thinking about users' needs and how to meet them. The activity scenarios can be a complex story but it must be easy to analyse and to extract the relevant features. The strength of the scenario is that it helps discover problems in the relationships among the features. The final characteristic of this scenario is the easiness of evaluation, important to validate if the solution and development passed or failed.

When identifying activity scenarios we have identified "system events", and described how the system handles them. An event is any occurrence that the system is designed to respond to. These are events that have meaning to the system, such as registering an appointment or applying for a service. For any event, it is important to understand its purpose, what the system is supposed to do with it. Describing the user interests helped identifying the events. The user will value the system if it furthers her interests. From the interests, we have identified the user objective for the system, something it can do for her. From this, we have found features that serve that objective. Special events are also important, because unusual occurrences may require special handling.

7.4. Personas, user scenarios and system features

To bring user context to life, 4 different personas are developed, based on the results from the Portuguese and Danish questionnaires. The respondents of both questionnaires were mainly based in the organisations where the semi-controlled and larger pilots of the SmartWork project will take place: at the offices of social and health care provider Cáritas Dioscesana de Coimbra and of public

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authority Aarhus Municipality. The personas are connected to the six proposed SmartWork services. Two personas also interlink with the use case scenarios that were described in the Description of Work.

Each persona is followed by a description of a day of their life (user scenarios) to showcase what users might expect and need from the SmartWork system services. Moreover, a very important objective of this project is to demonstrate how the SmartWork system works; in the user scenarios presented below emphasis is given on the interchange between the end-user and the system, aiming to assist the technical partners on the development of the dialogue patterns. The functional and technical requirements of the use cases as a whole will be described in D2.4. This is to provide one coherent document which supports the technical development of the SmartWork system and the pilots outcomes.

Persona 1: António Lima: Portuguese male, 55 years of age, health problems, digital illiterate (related to DoW #2 New office worker in older age)

António, 55 years old, is living in his home in the city centre of Coimbra. His wife died some years ago due to cancer. He is working in Cáritas Coimbra since he started his professional life. He started in the organisation very young, as a chauffeur and in administrative support, such as mail correspondence delivery and receiving products and orders in the Purchases Department. During the years, a lot has changed in the organisation. Chauffeurs are no longer needed and therefore he was requalified and trained to be working in an office as an administrative worker in full time, where he should be using MS Office, internet and email for 3-4 hours a day.

Although António tried to do his best to learn the new tools and paradigms, the work is not completely easy to him as he had no knowledge at all on working with computers and paper files and in fact these tasks are not his preferred ones.

This context is increasing António's stress and makes him feeling less competent when performing his tasks. Although his manager seems quite happy to give him some time to adjust since he can bring valuable skills such as reasoning, verbal skills and knowledge born of experience; however, he is aware he would need some extra help to be able to work further for another 10 years. At the same time, and due to many years delivering and receiving heavy packages and driving for long periods, he developed scoliosis which gives him now some heavy back and neck pain when working on the computer. Some ergonomic improvements to its working tools would be an asset for his health condition.

He was recently proposed by his manager to participate in the trial and validation of a new system, which is now helping him to be trained on his new functions, exchange skills and knowledge with younger colleagues and also providing him some monitoring and improvement on his health conditions.

This system also connects with his daughter Luísa, the primary carer in his life. Before, because she calls him every day, she would spend the whole phone call asking repetitive and boring questions on his health. But now, António has agreed to share with her the monitoring of his health data and risk assessment and they can use the phone calls to talk about other more amusing themes.

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Persona 2: Luísa Lima: Portuguese female, 26 years of age, caregiver for António

Since the death of her mother some years ago, Luísa became even closer to her father António, as they do not have any other family members in the Region. She expects her father to be independent for many years still and therefore she worries about the stress and physical pain António experiences due to the change of tasks and work. Luísa works at the local florist and lives in a village near Coimbra and is expecting her first born in a couple of months. She connects with her father by telephone and she knows that she usually bores him with her various questions about his health and feelings. Now that António has agreed to share with her the monitoring of his health data and risk assessment, they can return to use their daily phone calls for social talk and the expected (grand)child. Luísa owns and uses a smartphone for internet and calls and she will use it to join the SmartWork project as caregiver of her father.

Persona 3: Maria Almeida: Portuguese female, 42 years of age, manager, new on the job

Maria is a manager in a health and social care organisation that has recently been promoted to Unit Manager of the Secretariat. She was before mainly working with the public and she is thus very friendly and has some difficulties in being rigid and inattentive to her worker's needs. She inherited a pretty heterogeneous team, with some focused and ambitious younger workers and three older workers – one came from another function and is therefore not at all happy with his new tasks. The other two workers have always been in that team and, if one is very competent, proactive and the real motor of all the work done, the other is very resistant to change, namely to digitalisation of processes and to the new management procedures that are being implemented in the organisation.

Maria was having many difficulties in balancing productivity inside the team and being able to modernise this Unit. She approached the Board, which decided to experiment with a new unobtrusive system that aims to address a holistic approach on the worker ability and well-being, their caregivers and also provided managers with a brilliant tool that helps them distributing tasks and enhancing the strengths of each worker. She is now having major advances on the Team as all of the workers feel valued and supported in their needs, in a non-invasive way.

Persona 4: Birgit Johansen - Danish female, 60 years of age, health problems, caregiver to her husband (related to DoW #1, Work flexibility for older worker with health problems)

Birgit works for 12 years at Aarhus municipality. She is married to Carl and has two children who work and study in Copenhagen and Brussels. Birgit suffers from diabetes type II and wears glasses to compensate her short-sightedness. She tests her blood sugar level at a regularly basis and with the help of a diet and pills, she manages to keep the disease under control. However she must take care to take enough rest and to follow a strict daily pattern of eating and monitoring her glycaemia. Carl is having health problems after a heart attack 6 years ago but he is still able to work as a computer scientist. Birgit still feels the fear and pain when she found Carl in the bathroom, hardly able to breath and suffering from pain at his chest. She immediately called 112 and as former nurse she was able to give Carl the necessary support while waiting for the ambulance. Luckily Carl recovered soon, but he

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still needs to take his daily medication and daily resting hours and he also has regular medical check-ups.

Birgit works 32 hours per week as senior policy advisor labour affairs at the Municipality of Aarhus. Her work has a lot of variety, however most of the working hours is spent at her desk and desktop. Besides that, she has regular meetings with colleagues, managers and the Executive Board of the Municipality. She works in a team of 15 colleagues that are all involved with labour affairs. One of the colleagues of the team is the team leader and together with 7 other teams they form the Social Affairs Department of the municipality.

Working at the desktop, she uses MS Office, internet and email programmes. She is very well used to work on digital devices either at the office or at home. Due to the care she gives to her husband, she also wants to be able to work at home.

The team of labour affairs is always looking for innovative solutions to improve the workability sustainability of the citizens of Aarhus. Recently they heard about the SmartWork project and decided to test this innovation within their own team. Because Birgit fits within the age requirements of the target group and the system also focuses on health and risk prevention, Birgit was invited to join. She is very willing to join the trial to learn how she can reduce her health risks, to improve the work flexibility at home or at the office and her workability.

TABLE 27: PERSONAS AND SERVICES SMARTWORK

Personas Services	**António** 55, back pain, digital illiterate, new on the job, shared computer	**Luísa** 26, caregiver of António	**Maria** 42, manager, new on the job	**Birgit** 60, diabetes, caregiver, work flexibility
healthyMe	X			X
myWorkability	X			X
ubiWork	X			X
workCoach	X			X
digiTeam			X	
iCare		X		

A Day in the Life of António, Luísa, Maria and Birgit

User Scenario persona 1 António:

Every working day António wakes at 7.30 in the morning. He washes himself in the bathroom, puts on his watch with healthyMe, and after one cup of espresso in the café next door he drives off to the office of Cáritas Coimbra. When arriving at work, he checks in by face recognition at the entrance.

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He starts his work at nine o'clock sharp. He greets his colleagues, walks to his desk and starts his computer. The computer asks for a login. António is bored to type each time his user name and password and wishes that there was another way to enter the machine. His manager asks him to perform administrative tasks in the Excel programme. He had a training on Excel and now understands the basics of it. Using Morphic to login on the shared desktop computer, he learnt that he could easily activate a simpler interface for Excel, which makes his work more easy. Extra support and guidance however are still very welcome. For this he will use the workCoach app. This app provides spoken and pointing guidance at the computer based on the Excel training António received. To activate the support, he says or types his question and the workCoach shows him how to proceed and gives spoken instructions. The workCoach is flexible and can almost interact like a human helpdesk worker. The workCoach also supports António if the system senses that António is having too much stress and threatens to quit the task.

After 1 hour of work, António has to stretch his back and neck to get rid of the pain. He walks and gets some coffee for himself and his colleagues. The SmartWork system (healthyMe) monitors that he is in pain and checks the way António is sitting and at what height his desk and chair are installed. HealthyMe advises António to request his manager for an adaptable desk and chair, to achieve that his way of sitting and performing computer tasks improves. HealthyMe also reports to daughter Luísa how her father is doing during the day. It reports how much stress António encountered, if he ate healthy and whether he had sufficient physical exercise.

The manager receives the workability data from António. Progress or downfalls are reported and the manager can act accordingly to compliment, support or coach António.

Overall only two weeks after, António already feels a bit more confident to perform computer tasks with the support provided by the SmartWork system and is now highly motivated to enhance his capabilities.

User Scenario persona 2 Luísa:

To take part in the SmartWork trial, Luísa downloaded the iCare app on her smartphone. After waking up, Luísa checks her smartphone to see if there are any messages regarding her father António. To enter the SmartWork system she makes use of touch recognition. Then she drives off to her work at the local florist owned by Mr. Fernando. Luísa starts working by making new bouquets and removing old flowers and leaves. After that she arranges the selling corner and interacts with clients about the flowers and bouquets, cashes the money or card transfers and makes notes for deliveries. At the end of the day she cleans up again and closes the shop if the owner has already gone.

While working, her smartphone is stored in her bag under the counter. This however, doesn't bother Luísa, because she knows that if there is any news, the iCare app will immediately warn her by ringing loudly. During lunch time she checks again her smartphone on emails and messages. When she returns at home in the evening, Luísa receives a report from the SmartWork system on the monitoring figures of António's health during the day. She checks if there are any irregularities compared to other days and feels relaxed when everything goes as expected. Before preparing dinner, she calls

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her dad to hear how things were today at the office. She tells him about how she feels, how well work and selling went and the news that she heard.

User Scenario persona 3 Maria:

Since she was integrated in the SmartWork project validation trial, Maria downloaded the digiTeam app on her personal computer at the office and on her smartphone. She enters the system by using a login of a 15 digit password or touch recognition. She prefers to use the touch. Today is Tuesday, which means that in the afternoon she will have her weekly team meeting. The progress on the ongoing tasks and new tasks will be jointly discussed. Maria will chair the meeting and will take care that every team member is heard. After the meeting there is room for individual meetings with team members that need extra support or coaching.

To prepare the meeting she enters the digiTeam service. The service is securely connected to several information systems of the organisation. At first the Collective Management Information System (CMIS) of the organisation. Every worker has to fill in the working hours and delivered tasks at the end of each day. In this way Maria can check the time spent and the progress individual workers made regarding the tasks. Secondly, the digiTeam is connected to the services that SmartWork provides. After being thoroughly advised on the sharing of personal knowledge and the potential imbalance of power between the manager and the team members, some team members approved to share their information on workability, flexibility and coaching with Maria. In this way she can check how her team members are performing, what their competences and needs are and in which way she can support or correct them. Some other members of the team also join the SmartWork trial, but they didn't want to share their information with Maria. Maria is fine with that; she completely understands some information should be very personal and even her doesn't want to share her personal health or flexibility information with her boss as well.

During the meeting Maria at first complimented the team members with the delivered progress. She mentions that the Chair of the Board personally congratulated her and the team on the progress that was clearly visible on the CMIS. Then she continued to discuss the current and new tasks more in detail. She asks every team member to report on progress and occurring challenges. To divide the new tasks of the Unit, she already checked the competences of her team as reported in the workCoach service with her own ideas. In this way she was double secured that she would create the best teams for the new tasks.

After the team meeting, she asked two team members for an individual meeting. She saw that during the meeting the members were showing some disinterest and were hesitant to take up new challenges. She asks the team members after the circumstances at work and at home, supported them in their new tasks and motivates them to come back to her again as soon if needed.

User Scenario persona 4 Birgit:

First thing in the morning at home, Birgit checks her sugar level and if necessary takes extra measures to level it again. Today she starts to work at home, because she has a long working day ahead. To

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avoid that her blood sugar level becomes irregular she will take a rest at the end of the morning. At home she wants to prepare the Municipality Council working group meeting that will take place in the evening. Then she will have to support the alderman of Social Affairs who recently released a new policy measure on voluntary and paid work.

She enters her work laptop by eye recognition. At the office some weeks ago, she already set the settings she prefers to work with in her desktop computer using the Morphic Quickstrip. There, she found that she is more comfortable using bigger fonts and high contrast, which she probably would have not been able to find out by herself. Now, when she logs in to her work laptop, these same settings are applied automatically, the computer connects automatically to the apps of the SmartWork apps and she has direct access to her work documents in a shared folder. This saves a lot of time and she finds it a very valuable asset. She accesses the internet making use of a secured WIFI connection and a token provided by her employer. Aarhus Municipality allows to work at home only when secured internet access is provided.

Birgit answers her emails and prepares an answer on the questions the political assistants already provided. On request she receives guidance and trainings from the SmartWork provided services, such as the best way to find statistical data on workers and volunteers in Aarhus and Denmark in general.

Birgit takes her rest from 11.30-13.00 hours. After lunch she puts on her bracelet with healthyMe, and cycles to the office. Because of her late arrival she has to search on other floors for a free desk to work. The Municipality introduced the flexible office concept a couple of years ago and at some days it is very hard to easily find the right place to work. Arrived at her workplace she adjusts the desk and chair at her height and opens up her laptop again.

At the end of the afternoon, the SmartWork system sends Birgit a report about the activities she undertook that day. myWorkability reports that she did well today to cycle and by adjusting the chair and desk and that she had more stress when she was struggling with answering some questions. Her stress level was well again when she was able to talk with some colleagues from her team.

In the evening, the meeting with the Municipality Council went rather well. Only a few amendments arrived from the council, which Birgit will handle the day after.

In table 28, we present the summary of the user needs that came out of the user scenarios. These user needs will be further used to define the user stories (section 7.5).

TABLE 28: SUMMARY USER SCENARIOS AND USER NEEDS

Feature	User Need ID (UN_##)	User Need Description	SmartWork service
Devices	UN_1	Desktop, laptop, smartphone, bracelet, watch to use the healthyMe service at home, at the office and on the move	healthyMe
Login	UN_2	Easier way to login than using user name and password;	Devices SmartWork apps

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		○ Touch recognition ○ Eye recognition	
MS Office tasks	UN_3	Support and guidance to learn to handle programmes such as Excel, Word, Outlook Support and guidance to organise the work and find resources	workCoach
Digital support	UN_4	To achieve support and guidance the user can verbally ask or type the question, complaint, misunderstanding	workCoach
Sitting at a desk and working at computer	UN_5	To monitor the right position to sit and work at a desk and to advise to take a rest, walk, adaptable workstation, sit-stand desk	healthyMe
Stress and blood tension	UN_6	To monitor the stress level, alerts when it is too high and delivers advices	healthyMe
Healthy eating	UN_7	To monitor the daily food consumption. Advise on quantity, quality and health	healthyMe
Physical activity	UN_8	To monitor the distances of walking, gymnastics and other physical activity and to advise	healthyMe
Caregiving	UN_9	Reports on the health monitoring of the involved office worker. Alerts if the health status drops dramatically	iCare
Smartphone caregiver	UN_10	App to receive and follow status reports on health and wellbeing	iCare
Alert	UN_11	Bleep or sound to alert the caregiver	iCare
Smartphone and computer manager	UN_12	App that is compatible between different devices of work	digiTeam
Information from organisational management information systems	UN_13	To be able to follow the performances of the team, the SW system is securely connected to the organisational management information systems	digiTeam
Information on individual workers' performance from management information system	UN_14	To be able to follow the performances of individual workers (hours spent, delivered tasks) the SW system is securely connected to the organisational management information system	digiTeam
Information on flexibility, workability and coaching SW services for individual workers	UN_15	To be able to monitor the results of the SW services on individual team members, the services are connected to digiTeam	digiTeam
Informed consent and withdrawal opportunities	UN_16	digiTeam and iCare are only connected to the SW services the office worker has agreed to share. The office worker can withdraw the informed consent at any time	SW services informed consent and withdrawal security
Working at home flexibility	UN_17	To work at home and at the office delivers the same quality of performance	ubiWork

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System starts there were ended the last time	UN_18	After starting-up the system automatically returns to where the user left the session before and automatically connects to the SW apps	SW system
Secured internet at home	UN_19	The system checks whether or not the internet connection at home and at the office is secured	SW system
Place to work	UN_20	The system provides information where available desks are located	SW system
Adaptable work station	UN_21	To be able to adjust chairs, desks, monitors at the work station, adaptable furniture and devices are available	Organisation
Coaching on job performance	UN_22	The system reports to the individual office worker what went well during the day and where extra attention is needed to avoid stress	myWorkability

7.5. User Stories

Formulating user stories is a technique for capturing relevant information from the user's perspective before deriving and detailing functional requirements or features of a system. User stories describe the intention of use and what should be the expected action from the system. Thus, they provide a narrative of how a system is used, described in terms of natural language. It is the last layer before starting the definition of the use cases and requirements that the system should meet in order to implement the desired system meeting the needs of all stakeholders.

7.5.1. Method

In this section we introduce how we describe the user stories, using the simple activity scenarios described in chapters above. Inspired by the Behaviour Driven Development methodology [55], we describe the agent's behaviour by creating user stories that explain different contexts of operation for some relevant application scenario. First, we should start gathering some relevant information by interviewing directly the end-users. After we have collected their initial expectations we should describe this information in generic formats, for example using Personas and User Scenarios. Having described users initial needs and requirements, we can refine these into a more suitable format to be used in the agent. At this stage, we will create the user stories. This is done by breaking down Personas and User Scenarios into a more detailed description of the expected behaviour for each feature of the agent, while operating in different contexts. We use Gherkin Scenarios (see template below) to describe the agent's behaviour with great detail [56].

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Feature: <feature title>

In order to <goal>

As a <actor role>

I need to <action>

Background:

Given <pre-condition1>

And <pre-condition2>

...

And <pre-conditionN>

Scenario: <scenario title - context1>

Given <context1_feature1>

And <context1_feature2>

...

And <context1_featureN>

When <control action1>

FIGURE 85: GHERKIN SCENARIO, FORMAT FOR DESCRIBING USER STORIES

Based on the template provided above, it is possible to derive a simple example where the Gherkin Scenarios was applied to refine the data provided by the user scenarios, generating more focused and targeted information, relevant for defining the functional requirements of the system. A similar approach should be derived to SmartWork project, to obtain the system requirements.

In table 20 below, the identified user needs from the user scenarios were translated in user stories. These user stories are used for the system architecture and technical specifications of D2.4. During the project the user requirements and technical requirements will be further elaborated into D2.5 (Refined version of system architecture and specifications, M12), into D2.7 (Final version of co-design methodology, user requirements and use cases, M28) and D2.8 (Final version of system architecture and specifications, M36).

TABLE 29: USER NEEDS TRANSLATED INTO USER STORIES

User Story ID (US_#)	User Story Description	User Need ID (UN_##) covered
US_1	Feature: healthyMe multi-platform user interface	UN_1

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	In order to use the healthyMe service at home, at the office and on the move As a user, I want SmartWork to run in my personal devices. Background: Given I move around from place to place (e.g. work to home) And I use different personal devices to access work and lifestyle information Scenario: Consulting healthyMe dashboard in my personal computer Given I use a desktop and a laptop for work and personal recreation And I want to consult my health and wellbeing data When I open SmartWork application And I select the healthyMe section Then the application should display a dashboard with my health and wellbeing information And I should be able to select the timeline as daily, weekly and monthly Scenario: Using healthyMe fitness tracker in my mobile devices and wearables Given I use a smartphone and a smart watch And I want to keep track of my fitness activity When I have SmartWork application running on my mobile device And I wear the smart watch to count the number of steps I take during the day Then I want the application to send this information to the SmartWork And to be accessible through the healthyMe dashboard	
US_2	Feature: Simplified user identity validation for SmartWork software In order to Smartwork software recognizes me as an authorized user As a user, I want to Log-in in SmartWork software without typing my username and password Background: Given I move around from place to place (e.g. work to home) And I want to view my personal or work related information generated by Smartwork software Scenario: Log-in in SmartWork software on my laptop/desktop Given I use a desktop and a laptop for work or leisure And I want to use the Smartwork Suite	UN_2

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	When I open SmartWork application And the application asks for log-in Then the application should automatically recognise me or possibilitate the authentication with my fingerprint And I should be able fully use the programs I need to do my tasks. Scenario: Consulting SmartWork global dashboard information in mobile devices Given I use a smartphone and a smart watch And I want to view what tasks I have assigned for the day or how many steps I have taken When I have SmartWork application running on my mobile device and click on the icon Then I want the application to know who I am and do not ask me for any extra authentication steps And view the information I need.	
US_3	Feature: workCoach support and guidance In order to better organize my work And to find resources And to handle office programmes such Excel, Word, Outlook As a user, I want SmartWork to support and guide me through learning new knowledge. Background: Given I use a personal computer for work And I can type And I can use verbal commands Scenario: Organize workload through a to do list Given I have to complete a number of tasks in a given period of time And I have difficulty in organizing the optimal order to work When I use SmartWork application And I select the workCoach section Then the application should display a suggestion to prioritize my tasks And I should be able to access supporting content to implement each task	UN_3 UN_4
US_4	Feature: healthyMe ergonomic optimization In order to be productive at work As a user, I want to be comfortable and relaxed at work. Background: Given I can use several monitoring devices in my work environment	UN_5 UN_6

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	Scenario: healthyMe ergonomic monitoring Given I use a personal computer for work And I work at a desk And my work requires I am sitting for long time When I am using SmartWork at work And I can use an external device to measure my posture Then I should be alerted when my posture is not correct And I should be advised to take a break And I should receive suggestions about physical exercises I could do at the work place Scenario: healthyMe relaxation monitoring Given I am working in an urgent task And I want to keep my focus And I want to maintain my best productivity level When I am using SmartWork at work And I can use an external device to measure my body parameters Then I should be advised to take a break if my relaxation has changed And the relaxation level is below a set threshold And the threshold is associated with low productivity	
US_5	Feature: myHealth monitor the daily food consumption. Advise on quantity, quality and health In order to control my wellbeing: I want to monitor what I eat and my levels of sugar because of my health condition. I want the system to advise when I should eat or check my sugar levels again taking in consideration my physical activity. Background: Given I want to access the health information And I use both personal computer or smartphone Scenario: Advise about sugar level and time to eat related with my physical effort Given: I use a smartwatch to control my physical exercise And my myHealth to insert my sugar level And also, what I had eat When pass to must time from my last meal And I been very active physically Then myHealth send an alarm to advise that I could be in danger. Also advise about how many calories should I ingest And the type off food more recommendable And I should adapt my meals according this advice and improve my health.	UN_7
US_6	Feature: myHealth monitor the distances of walking, gymnastics and other physical activity and to advise In order to control my wellbeing:	UN_8

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	In want to be advise to walk or take some stretching. Background: Given I want to access the health information of the monitored person And I use both smartphone and smartwatch Scenario: Given: I use a smartwatch to control my physical exercise And it will count every step I gave during the day If I spend much time seat Then myHealth advise me to take a walk And perform some stretching exercise to improve my wellbeing I should follow these advices and perform the recommended actions.	
US_7	Feature: iCare health information reporting In order to know, at any time and anywhere, the health status of the monitored person As a carer/employer, I want iCare to run on my personal devices. Background: Given I want to access the health information of the monitored person And I use both personal computer or smartphone Scenario: Consulting health status and well-being parameters of the monitored person on my personal devices Given I use a desktop and a laptop for work And I want to view the status of my employees/carers When I open iCare application And log-in with my credentials And select the Monitoring tab Then the application should display a dashboard with health and well-being characteristics of the persons who allowed to be monitored And I should be able to select the correct person and access a complete report about the health status. Scenario: Using iCare to alert me of sudden changes in health status of the monitored person Given I use a smartphone And I want be notified about sudden changes in employees/older person When I have iCare application running in my device And the monitored person have a sudden drop in his health condition Then I want the application to send a notification and a sound signal	UN_9 UN_10 UN_11

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	And I should be notified about the reason of the deterioration of health status Scenario: Using iCare to alert me of sudden changes in health status of the monitored person Given I use a personal computer And I want be notified about sudden changes in employees/older person When I have iCare application running in my device And the application knows who I am And the monitored person have a sudden drop in his health condition Then I want the application generate a pop-up mentioning the information And I should be able to click on it and visualize the complete health and well-being status along with the identification of where the sudden change was noticed.	
US_8	Feature: digiTeam workability on multi-platform devices In order to use the digiTeam at work and out of the office As a manager, I want digiTeam to work on my personal computer and in my smartphone. Background: Given I regularly need to work at different locations (in the office, on the move) And I use different devices to do work related tasks Scenario: Analysing team performance indicator through digiTeam dashboard in my personal computer Given I use a laptop for work tasks And I want view how my team and my employees are performing When I have a secure internet connection And I'am connected to the enterprise network And open digiTeam application And log-in properly And select the Performance Indicators tab Then the application should display a dashboard with the preset performance indicators (Hours Spent, Tasks Completed, Tasks in Progress, etc) And I should be able to filter the information show by team or individual worker Scenario: Analysing the digiTeam services, that are running in the team member, via dashboard in my personal computer Given I use a laptop for work tasks	UN_12 UN_13 UN_14 UN_15

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	And I want view how my team and my employees are performing When I have a secure internet connection And I'am connected to the enterprise network (on-site, vpn) And open digiTeam application And log-in properly And select the Services tab Then the application should display a dashboard with results of the SW services on individual team members And I should be able to filter the information show accordingly. Scenario: Using digiTeam in my mobile device Given I use a smartphone And I want to keep track of tasks and team performance When I have a tunnelling to the company network And open the digiTeam application And input the information needed for a correct login Then I want the application to show me a dashboard with the most important indicators And to be able to view in detail some of the indicators	
US_9	Feature: Control panel to manage Smartwork service permission In order control the data that I shared As a user, I want to have a control panel to select what informations I want to share. Background: Given I agreed that my work ability and well-being parameters can be monitored And I use SmartWork software suite in my work computer Scenario: Changing permissions about the data that I share with my employer or caregiver Given I use a computer for work And SmartWork suite is installed And my work and health parameters are being monitored And I want to change what information is being sent When the computer knows who I'am And I open the control panel of Smartwork And select the Permission tab Then the application should display all of the Smartwork services that are sending my information to the correspondent identities (employer, caregiver, other) And I should be able concede or remove the permission for each service	UN_16
US_10	Feature: ubiWork multi-platform user interface	UN_17 UN_18

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	In order to perform my work with same quality at home, at the office and on the move As a user, I want SmartWork to perform seamlessly in any environment. Background: Given I move around from place to place (e.g. work to home) And I use different personal devices to access work information Scenario: Managing work in ubiWork dashboard Given I use several devices for work And I want to organize my work list from any device When I open SmartWork application Then my performance should be the same And the quality of my work should be maintained Scenario: Resuming work session Given I interrupt my work session And I want to resume work where I left of When I log in to a compatible computer Then I want to be able to start-up from the point I left my work Including my settings, my software and my documents Scenario: Secure work connection Given I connect to my work content When I am using an untrusted connection Then I want SmartWork to check whether or not the internet connection at home and at the office is secured	UN_19
US_11	Feature: SmartWork search for work spots In order to perform my work with same quality at home, at the office and on the move As a user, I want SmartWork to suggest places with good conditions to work. Background: Given I move around from place to place (e.g. work to home) And I use different personal devices to access work information Scenario: Map with desk locations Given I use several places to work When I want to find a suitable place to work Then SmartWork should suggest me where available desks are located And should provide information if adjustable chairs, desks, monitors at the work station, adaptable furniture and devices are available	UN_20 UN_21

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US_12	Feature: myWorkability report and coach ability In order to have a healthier lifestyle and better work capacity As a user, I want to have a daily report about what went well during the day and where extra attention is needed. Background: Given I use a computer to perform my daily tasks And I have myWorkability running on my device Scenario: Analyse my work capacity at the end of the work day Given I use a computer for work And I want to know if I had a stressfull day And if there anything I can improve to be more productive and less stressed When I open the myWorkability app And I select the dashboard Then the application should be capable of showing me specific parameters that tell what went well during the day and point me the aspects that should be corrected And I should be able to convert that information in useful advices to improve my work condition and reduce the stress.	UN_22

7.6. Summary

Making use of personas and user scenarios this chapter defined the user needs regarding the SmartWork system. Subsequently the user needs were transformed into user stories, that form the base of the system architecture and technical specifications of the SmartWork system (D2.4).

The personas were defined making use of the desk research outcomes and the consultation of end-users. Four personas were defined:

- António, 55 years old office worker at Cáritas Coimbra. New on the job and also new in learning digital skills. Suffering from back pain.
- Luísa, 26 years old, the daughter of António. She lives outside Coimbra and is worried about the health and wellbeing of her father.
- Maria, 42 years old, manager at the office of Cáritas Coimbra. New on the job and challenged to balance the productivity inside the team and to modernize it.
- Birgit, 60 years old, policy advisor at Aarhus Municipality, suffering from diabetes and caregiver for her husband.

From the description of one day of their lives the appropriate services of the SmartWork system were identified. All SmartWork services were used.

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8. Conclusions and future work

This document investigated and analysed the needs of the SmartWork project's target group: office workers 55+, employers/managers and caregivers of Cáritas Coimbra and Aarhus Municipality. Based on these results a first set of functional requirements that the SmartWork system must support and an overview of user stories have been defined.

This first set of functional requirements of the SmartWork system have been identified based on the information gathered from two main sources: i) a thorough literature study and ii) an end-user consultation making use of online questionnaires. To identify the end user needs, the responses of 159 office workers of 55+ years of age, 22 employers and 20 caregivers were analysed. The topics of the questionnaires were formulated, based on experience of previous projects and a literature study which focused on discovering the requirements and the workability of older workers.

The SmartWork system requirements extracted from this document will be the initial input to all the other technical work packages (WP3-WP7) that will set the base for the design and development of the SmartWork system and services. However, the list of requirements identified by the end users will be subject of a thorough and careful feasibility analysis by all the technical partners participating in the development of the SmartWork project, for validation or identification of any technical constraints that might appear during implementation. Therefore, it is expected, especially after the technical partners start the development of the SmartWork system, that some of these requirements might be relaxed, refined or removed, in order to avoid any risks of implementing functionalities where their applicability could be limited due to technical constraints. Also the needs and expectations of the end users from the SmartWork system is expected to grow throughout the lifetime of the project, especially after the semi-controlled trial and the larger field trials at the offices of Cáritas Coimbra and Aarhus Municipality. These enhancements/refinements providing the final set of requirements, underlying the final SmartWork system functionality and design, will be included in the second and final version of this deliverable (which is due Month 28 of the project), aligning thus the functional specification, design and development of the final SmartWork system.

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10. Annexes

10.1. Annex overview chronic diseases and conditions

Chronic diseases and/or condition (according to NHS[17])

TABLE 30: OVERVIEW CHRONIC DISEASES AND IMPACT ON FUNCTIONING

Disease or condition	Description	Impact on functioning
Arthritis	A common condition that causes pain and inflammation in a joint. Most common types are osteoarthritis and rheumatoid arthritis.	• Pain and swelling in hands, spine, knees and hips • Inflammation in and around the joints • Restricted movement of the joints • Weakness and muscle wasting
Back disorders	Pain in the lower back (lumbago) is particularly common, although it can be felt anywhere along the spine – from the neck down to the hips. Often it's not possible to identify the cause of back pain. This is called "non-specific" back pain. Sometimes the pain may be a result of an injury or of a medical condition such as: a slipped (prolapsed) disc – where a disc of cartilage in the spine presses on a nearby nerve; or sciatica – irritation of the nerve that runs from the pelvis to the feet	• Pain • Difficulty in moving • Stiffness
Osteoporosis	Osteoporosis is a condition that weakens bones, making them fragile and more likely to break. It develops slowly over several years and is often only diagnosed when a minor fall or sudden impact causes a bone fracture. Most common injuries are wrist and hip fractures and of the spinal bones.	• Fragile • Prevention from falling
Ischemic heart disease and heart failure	Coronary heart disease (CHD) is a major cause of death worldwide. CHD is sometimes called ischemic heart disease.	• Chest pain • Heart attacks • Breathlessness

[17] https://www.nhs.uk/conditions/, assessed on June 7th, 2019.

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	Heart failure means that the heart is unable to pump blood around the body properly. It usually occurs because the heart has become too weak or stiff.	• Feeling tired most of the time • Swollen ankles and legs
Stroke	A stroke is a serious life-threatening medical condition that occurs when the blood supply to part of the brain is cut off. Symptoms F.A.S.T. (Face dropped at 1 side, Arms numb, Speech slurred or garbled, Time to dial 112)	• Problems with walking • Problems with speech • Problems with using right or left arm, hand and fingers
Thyroiditis	Thyroiditis is swelling (inflammation) of the thyroid gland. It causes either unusually high or low levels of thyroid hormones (growth and metabolism) in the blood. These hormones affect processes such as heart rate and body temperature, and convert food into energy to keep the body going.	• Lump in throat • Tiredness • Weight gain • Fever and pain in neck, jaw, ear
Asthma	Asthma is a common lung condition that causes occasional breathing difficulties.	• Wheezing (whistling sound when breathing) • Breathlessness • A tight chest • Coughing • Asthma attack
COPD	Chronic obstructive pulmonary disease (COPD) is the name for a group of lung conditions that cause breathing difficulties.	• Increasing breathlessness when active • Chesty cough • Frequent chest infections • Persistent wheezing
Diabetes	Diabetes is a lifelong condition that causes a person's blood sugar level to become too high. There are 2 main types of diabetes: - type 1 diabetes – where the body's immune system attacks and destroys the cells that produce insulin - type 2 diabetes – where the body doesn't produce enough insulin, or the body's cells don't react to insulin	• More toilet visits • Very tired • Weight loss and loss of muscle bulk • Slowly healing wounds • Blurred vision
Mental illness	Depression is the most common mental illness. Others are dementia, schizophrenia, bipolar disorders. Depression affects people in different ways and can cause a wide variety of symptoms. They range from lasting feelings of unhappiness and hopelessness, to losing interest in the things you used to enjoy and feeling very tearful. Many people with	• Feeling useless and no lust for life • Tiredness • Sleeping problems • Concentration problems

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	depression also have symptoms of anxiety. There can be physical symptoms too, such as feeling constantly tired, sleeping badly, having no appetite or sex drive, and various aches and pains.	
Allergy	An allergy is a reaction the body has to a particular food or substance.	• Sneezing • Runny or blocked nose • Red, itchy, watery eyes • Wheezing and coughing
Cancer	Cancer is a condition where cells in a specific part of the body grow and reproduce uncontrollably. The cancerous cells can invade and destroy surrounding healthy tissue, including organs. The most common types of cancer are: breast cancer, lung cancer, prostate cancer and bowel cancer.	• Medical treatment needed (surgery, chemotherapy, hormones, radiotherapy) • Tiredness • Pain • Living with cancer

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10.2. Annex: Extra tables end-user consultation

10.2.1. Employees

A22. Attributes of the younger worker (attachment)

As for the attributes of the younger workers a big majority of Danish and, in opposite, rather a small majority of Portuguese respondents agree on the attribute that younger workers bring more experience to the workplace. Both groups of respondents don't agree on the question that younger workers are less reliable than older ones. Portuguese respondents think differently on attribute that younger workers are more adaptable to change. Portuguese respondents agree on that; the Danish don't, however they agree on the adaptability of younger workers regarding technology changes. Both groups also disagree on the attribute of younger workers being no good mentors.

TABLE 31: OLDER WORKERS AND ATTRIBUTES OF YOUNGER WORKERS

In numbers	Strongly agree		Agree		Disagree		Strongly disagree	
Country Attributes younger worker	DK	PT	DK	PT	DK	PT	DK	PT
New experiences to workplace	10	0	80	54	10	14	0	32
Less reliable	4	4	20	14	69	64	6	18
Less capable to handle customer issues	4	2	45	54	47	40	4	4
More adaptable to general changes	0	16	39	70	55	12	6	2
More adaptable to technology changes	10	32	63	64	20	2	6	2
No good mentors	2	4	18	8	76	72	4	16
Much interest in training	6	16	69	58	22	22	2	4
Less sickness leave	0	8	4	40	73	42	22	10

Similar results are found in the English questionnaire. The respondents agree with a big majority on the question that younger workers bring more experience to the workplace. They disagree that younger workers are less reliable and are less capable to handle customer service issues.

10.2.2. Employers/managers

A9. Attributes of the younger worker (in attachment)

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Regarding the attributes of younger workers both groups of managers agree or strongly agree that younger workers bring new experiences to the organisation. In contrary to Danish managers, the Portuguese managers think that younger workers are more adaptable to changes, have much interest in trainings, have less sickness leaves and are less capable to handle customer issues. The Danish managers only support that younger workers are much interested in trainings. For the rest of the attributes of younger workers, they disagree.

TABLE 32: DANISH EMPLOYERS: ATTRIBUTES OF YOUNGER WORKERS

Denmark in %, N=10	Strongly agree	Agree	Disagree	Strongly disagree	No answer
Bring new experiences	20	80	0	0	0
Less reliable than older workers	0	0	60	20	20
Less capable in handling customer service issues	0	20	70	0	10
More adaptable to changes	20	0	70	0	10
More adaptable to technology changes	20	20	50	0	10
No good mentors	0	0	80	10	10
Very much interested in trainings	40	40	20	0	0
Less sickness leave	0	20	70	0	10

TABLE 33: PORTUGUESE EMPLOYERS: ATTRIBUTES OF YOUNGER WORKERS

Portugal in %, N=12	Strongly agree	Agree	Disagree	Strongly disagree	No answer
Bring new experiences	67	25	0	0	8
Less reliable than older workers	0	50	17	25	8
Less capable in handling customer service issues	17	50	17	8	8
More adaptable to changes	58	33	0	0	8
More adaptable to technology changes	83	8	0	0	8
No good mentors	8	17	25	42	8

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Very much interested in trainings	42	25	25	0	8
Less sickness leave	42	25	8	17	8

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