Digital Inclusion at the Workplace Post Covid19

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Abstract: The rapid advances in information and communication technologies and the widespread adoption of disruptive technologies such as AI and automated systems are changing the work landscape dramatically and are affecting especially older workers and workers with disabilities. Since 2020, the COVID-19 pandemic has accelerated some of these changes, widening the unemployment gap for people with disabilities. To facilitate reskilling and upskilling of older workers and people with disabilities we need to create inclusive work environments that consider their evolving needs and capabilities. The Global Public Inclusive Infrastructure (GPII) provides workers, employers and organizations with tools and methods to include accessibility into their practices and policies. The SmartWork project provides a great opportunity to test how Morphic, the auto-personalization from preference solution provided by the GPII, can help building a more inclusive workplace.

1 INTRODUCTION

Over a billion people in the world – around 15% of the overall population - and 100 million people in the EU live with a disability[1]. More than 46% of persons aged 60 years and over have disabilities and more than 250 million older people experience moderate to severe disabilities[2]. When most people without a disability think about disabilities, they usually picture major disabilities such as blindness or paraplegia, but disability encompasses a vast and fluid number of physical and mental health conditions such as asthma, depression, or temporary physical problems, which can come and go throughout a person's lifetime (even in a single day). As we age, our physical and mental capacities change for the better or worse, which requires us to continuously adapt to our changing circumstances. These changes can affect us in all aspects of our life and can be especially challenging in the field of work, as our capacities need to comply with the requirements and expectations of our co-workers, managers, or clients. Theories such us the lifespan development theories propose that humans face different challenges across their individual lifespan that require learning and adaptation as well as decisions about changing resources (Baltes, 1987). These challenges occur due to the ongoing interplay of both individuals' abilities and needs and environmental requirements and resources (Hertel & Zacher, 2018). This mismatch is what defines disability, according to the definition provided by the social model of disability.

The Global Public Inclusive Infrastructure (GPII) aims to ensure that everyone who faces accessibility barriers due to disability, literacy, digital literacy, or aging, regardless of economic resources, can access and use the Internet and all its information, communities, and services for education, employment, daily living, civic participation, health, and safety. The SmartWork project has provided an opportunity to test some of the concepts developed within the GPII in a work environment, as well as the first time that Morphic, the auto-personalization from preferences solution part of the GPII, is tested in a real environment in European soil.

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[1] https://www.euro.who.int/en/health-topics/Life-stages/disability-and-rehabilitation/data-and-statistics/facts-on-disability

[2] https://www.un.org/development/desa/disabilities/disability-and-ageing.html

Section 2 of this paper presents an overview of the problematic and discusses some barriers that older workers and worker with disabilities face in the work environment, and how the COVID-19 pandemic has exacerbated some of these issues while also opening some opportunities. Section 3 discusses relevant trends regarding the future of work, and how they can impact older workers and workers with disabilities. Section 4 discusses some strategies for building inclusive workspaces, and how the GPII can be used to improve the performance and motivation of older workers and workers with disabilities. Finally, section 5 describes how the SmartWork project will test Morphic, the auto-personalization from preferences solution provided by the GPII, in a real work environment, and our expectations from the pilots.

2 WORK, AGEING AND DISABILITY

2.1 The Right to Work

Having a job in equal terms to their counterparts is fundamental to social integration and participation in society of people with disabilities. The population of people without connectivity, and/or unable to access or use computers so they can work calls for a need to inject inclusiveness in all ICT, to ensure that all people, including people with disabilities, can have their rightful access to work.

Article 27 of the United Nations Convention on the Rights of Persons with Disabilities (hereafter CRPD) enshrines the right to work and employment as a fundamental right. In all regions, countries are making efforts to harmonize legislative and policy frameworks with the CRPD, including by seeking to domesticate provisions. In the United States, the American with Disabilities Act (ADA) of 1990 makes it unlawful to discriminate in employment against a qualified individual with a disability. In Europe, the new 2021-2030 European Disability Strategy foresees the presentation of a package to improve labour market outcomes for people with disabilities in 2022, plus outlining the development of new disability indicators and hence better information about the situation of people with disabilities in employment (European Commission, 2021). At a global level, the United Nation's 2030 Agenda and Sustainable Development Goals aims to ensure an inclusive future of work. More specifically, Goal 8 aims to achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value, by 2030.

Despite all legislative efforts, in the European Union, only 50.6% of persons with disabilities are employed, compared to 74.8% of persons with no reported disabilities. Moreover, it is common that people with disabilities face higher levels of unemployment and higher risks of poverty and discrimination. Segregated work, or sheltered environments, usually lead to sub-minimal wages and, as its own name implies, segregation. It is still not clear how the COVID-19 pandemic has affected the rates of employment of persons with disabilities compared to people without disabilities at European level. Nevertheless, during the pandemic a widening of the disability employment gap has been observed both in UK (Holland, 2021) and the USA (Schur, Ameri, & Kruse, 2020).

2.2 Barriers to Employment for PWD

There are several reasons why business managers and employers have reservations regarding hiring people with disabilities: in some cases, they fear their job performance will be lower; in other cases, they are worried that workers with disabilities will miss work more frequently because of health problems, or are worried about the cost of accommodations (Gaunt & Lengnick-Hall, 2014) (Gold, Oire, Fabian, & Wewiorski, 2012). In the former case, previous research shows that people with disabilities score higher in several efficiency-related metrics (Aichner, 2021). Regarding accommodations and their cost, reasonable accommodations used at workplaces vary from no-tech solutions which cost little or no money (i.e., writing shorter emails in a simpler language) to accommodations that are technologically simple or unsophisticated (i.e., installing assistive technologies in a computer, replacing a doorknob with an accessible handle, etc.). A 2020 survey report prepared by the Job Accommodation Network (JAN) for the Department of Labor's Office of Disability Employment Policy estimated that 56% of workplace accommodations for employees cost nothing to execute, while the remaining ones have a median cost of $500[3]. Moreover, some studies demonstrate that businesses that integrate persons with disabilities in their teams along with accessibility practices are more likely to be innovative and reach broader audiences, according to the World Wide Web Consortium[4].

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[3] https://askjan.org/topics/costs.cfm

[4] https://www.w3.org/WAI/business-case/

2.3 The Impact of COVID-19 on Work and Disability

The broad adoption of "remote" processes – tele-work, tele-medicine, virtual schooling, e-commerce and more – was steadily growing in the last decade. But with the pandemic situation in 2020, the digital transformation has accelerated to an unexpected rhythm. According to Upwork's, the world's largest work marketplace, as stated in its Future Workforce Report, in 2025, there will be more people working from home, more virtual social and entertainment interactions, fewer forays in public than has been the case in recent years (Ozimek, 2020). The pandemic has rearranged incentives so that consumers will be more willing to seek out smart gadgets, apps, and systems. Digital transformation, i.e., "a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies" (Vial, 2019), is generally taking place in all spheres of our life and affecting everyone from babies to older people. In the digital life at pre-COVID-19 times we were attending to a process of steady digital transformation in e-government services, health and care, business, education, arts, etc.

This will speed up adoption of new education and learning platforms, rearrange work patterns and workplaces, change family life, and upend living arrangements and community structures. The crisis is enhancing digital interconnectedness that engenders empathy, better awareness of the ills facing humanity and positive public action.

The COVID-19 pandemic has disproportionately affected many who historically faced significant barriers to employment, including people with disabilities. Because of a variety of factors, older persons and persons with disabilities have been more likely to be infected by COVID-19, develop serious illness or die, or find themselves isolated, impoverished and facing increased hardship in the future.

3 THE FUTURE OF WORK AND ACCESSIBILITY

A joint publication by Fundación ONCE and the ILO Global Business and Disability Network, developed within the framework of Disability Hub Europe, identified the following megatrends of the Fourth Industrial Revolution that will shape the future of work: (1) the technological revolution; (2) the new skills that will be required; (3) the cultural changes; (4) demographic shifts, and (5) climate change. The technological revolution is mainly driven by rapid advances in information and communication networks, data analysis and manipulation, and the widespread adoption of disruptive technologies such as Artificial Intelligence (AI) and automated systems. Moreover, the COVID-19 has accelerated trends such as the adoption of remote work and procedures. Regarding demographic shifts, ageing societies need to make disability inclusion a priority to be able to address the current and future requirements of a large percentage of their members, included the workforce. The following subsections will discuss some of the challenges related to the technological revolution (specifically, Artificial Intelligence and automated systems (section 3.1) and remote work (section 3.2)), and the new skills that will be required (section 3.3).

3.1 Artificial Intelligence, Automated Systems, and Accessibility

AI and automated systems are already having a profound impact throughout the overall employment life cycle, informing decisions about hiring, management, performance evaluation, and beyond. As an example, many companies are outsourcing their human resources processes to specialized companies that use machine learning and AI for applications such as candidate screening, resume parsing, and employee attrition and turnover prediction. AI-driven tools are used for performance evaluation, talent management, and employee recognition using raw data and insights driven by algorithms.

On the one side, AI has the potential to make the workplace more inclusive by making workplace accommodations faster and more convenient. For instance, real-time AI-based captioning or translations for teleconferencing applications can help people with deafness, intellectual disabilities or who don't speak the language participate in a remote call, or object recognition can support individuals unable to view and image or see move through "live spaces" (Inclusive Design Research Centre, 2021). AI and automated systems are also being introduced as replacements for human workers who help provide disabled people access, and the use of AI-enabled worker management platforms is growing steadily. (Whittaker, et al., 2019)

Despite its apparent advantages, considerations regarding fairness in AI for people with disabilities has received little attention thus far. The fairness of

AI methods needs to be examined since human bias can be amplified rather than mitigated by machine learning. Sources of bias can arise from biased training sets, lack of representation in data sets or because of the use of proxy data (Trewin, 2018). When AI is part of the decision-making, it is important that the decisions made by AI are explainable. Some of the authors are currently working on the We Count project[5], a community-driven project that aims to address the inherent bias against small minorities and outliers in AI and data analytics.

3.2 Remote Work

Since the outbreak of the COVID-19 pandemic working from home has become the norm for millions of workers in the EU and worldwide. Early estimates from Eurofound (Eurofound, 2021) suggest that close to 40% of those currently working in the EU began to telework fulltime because of the pandemic. A recent JRC study provides a rough estimation of around 25% of employment in teleworkable sectors in the EU (Fana, Tolan, Torrejon, Brancati, & Fernandez-Macias, 2020). Teleworking is traditionally more common in high-skilled, white-collar occupations. As companies revisit their work practices and embrace telework, the potential it offers for change could prove a useful angle in making society in general and work specifically disability inclusive. On the one hand, employees with disabilities would greatly benefit from working in a familiar environment and reducing commute time, as well as from avoiding stressful environments. On the other hand, the types of jobs currently held by workers with disabilities may greatly constrain their ability to benefit from this increased availability of remote work (Schur, Ameri, & Kruse, 2020). To ensure that older employees and employees with disabilities are included in all aspects of remote work during this crisis and always, employers should consider new technologies that may assist older and disabled employees with remote work, as well as to make sure that accommodations follow the employee home.

3.3 Skills and Disabilities

71% of employees in the EU need basic or moderate level digital skills to perform their jobs. (European Centre for the Development of Vocational Training

(Cedefop), 2015). Digital skills range from basic usage skills that enable individuals to take part in the digital society and consume digital goods and services, to advanced skills that empower the workforce to develop new digital goods and services. In 2019, the percentage of people from 17 to 64 years old having at least basic digital skills reached 58% (up from 55% in 2015). These skill indicators are strongly influenced by socioeconomic factors: regarding age, only 38% of those aged 55-74 and 32% of the retired and the inactive claimed to possess basic software skills. It is expected that nearly 14% of the global workforce will possibly need to change occupational categories by 2030 due to technological advances (Manyika, et al., 2017).

In the next decade, technological change will likely bring a decline in physical tasks, and an increase in cognitive and social tasks, digital tools, and autonomy and teamwork (European Centre for the Development of Vocational Training (Cedefop), 2015). Skills such as critical thinking, analytical capacity, emotional intelligence, and cognitive flexibility may become essential in this new landslide. This new paradigm can be specially challenging for older workers and especially for workers with disabilities, who have statistically lower levels of education and training, as well as difficulties to access information and communication technologies (Fundacion ONCE (Organisation) ILO Global Business and Disability Network (Organisation), 2021). Therefore, companies and policy makers need to create the tools and environment to facilitate reskilling and upskilling for older workers and people with disabilities, especially those whose jobs will likely disappear.

4 BUILDING AN ACCESSIBLE WORKPLACE POST COVID-19

Creating an inclusive workplace is a complex process that involves all departments in the organization. Drawing on the collective expertise of their partners, the site Disability:IN proposed a list of action items aimed to help organizations ensure that employees with disabilities are included in all aspects of remote work during and after the pandemic [6]. In their Accessibility Blog, Microsoft shared some thoughts regarding what the disability community can teach us about working remotely [7]. In both cases, their

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[5] https://wecount.inclusivedesign.ca/

[6] https://disabilityin.org/resources2/covid-19-response-accessible-tools-and-content/

[7] https://blogs.microsoft.com/accessibility/inclusive-remote-working/

recommendations align with the detailed recommendations provided by the World Wide Web Consortium's Web Accessibility Initiative (W3C WAI) for planning, implementing, and sustaining an organizational ICT accessibility program [8] or the recommendations provided by the Employer Assistance and Resource Network on Disability Inclusion (EARN) for creating an accessible and welcoming workplace[9], and that can be summarized in the following points:

1. Learn from people with disabilities and, if possible, involve them in the design and decisions processes in your company.

2. Incorporate accessibility in the corporate culture of your organization, creating an accessibility policy, supporting accessibility champions and, importantly, granting resources.

3. Leverage assistive technologies.

Furthermore, a joint document developed by Fundación ONCE and the ILO Global Business and Disability Network within the framework of Disability Hub Europe (Fundacion ONCE (Organisation) ILO Global Business and Disability Network (Organisation), 2021) identifies the following main levers for an inclusive labour market:

New forms of employment and employment relations integrate disability inclusion.

1. Skills development and life-long learning made inclusive of persons with disabilities.

2. Universal Design embedded in development of all new infrastructure, products, and services.

3. Make assistive technologies, existing and newly developed, affordable, and available.

4. Measures to include persons with disabilities in growing and developing areas of the economy.

Raising the Floor is working to ensure that the widespread adoption and rapid advances in information and communication technologies do not leave anyone behind, regardless of their physical and mental abilities, their age, or their socioeconomic status. As part of that vision, we have coordinated the development of the Global Public Inclusive Infrastructure (GPII), an infrastructure for making the

development, identification, delivery and use of pre-existing access technologies and services easier, less expensive, and more effective. The GPII takes a comprehensive approach to ICT access, addressing 3 key barriers through its 3 main pillars:

1. People do not know what will help them or even if anything exists that would help them. The GPII brings together information from 14 different databases about accessibility software and hardware in its Unified Listing[10].

2. Solutions do not exist for a person's type, degree, or combination of disability. The GPII DeveloperSpace [11] list components and resources to conceive, develop and market novel accessible solutions.

3. Introducing the cloud-based auto-personalization of digital interfaces based on user needs and preferences. Morphic facilitates the discovery of the accessibility features embedded in the computer, as well as assistive technologies both present in the computer or in the cloud. When the user finds a configuration that works for them, they can store it securely in the cloud. The configuration, based on the user's needs and preferences, will activate automatically when the user keys in to Morphic in any other computer with Morphic installed.

The solutions provided by the GPII will facilitate the development of a more inclusive workplace. More specifically, Morphic will provide employers and employees with:

- **Easy discovery of accessible features and solutions for workers (and employers).** Sometimes, users are not aware or not eager to recognize their own functional limitations (as an example, during the SmartWork pre-pilots, asked if they had any disabilities, one of the interviewees stated that he did not, but he was color blind). Moreover, our own capacities may vary over time. even during the same day or seasonally due to events like accidents or injuries. Morphic unveils the accessibility features embedded in the user's computer and provides them with easy access to otherwise difficult to access settings. With Morphic, users can play around with the computer's settings, find the configuration that better suits

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[8] https://www.w3.org/WAI/planning-and-managing/
[9] https://askearn.org/topics/creating-an-accessible-and-welcoming-workplace/

[10] https://ul.gpii.net/
[11] https://ds.gpii.net/

their needs and store that configuration for future use, hence implementing our "one-size-fits-one" vision.

- **Enabling Full Digital Equity.** Morphic allows importing your configuration into any Morphic-enabled computer. Nowadays, many companies have dedicated computers with several assistive technologies installed, usually placed in segregated places within the organization's premises. This creates a sense of "difference" between users who need assistive technologies and those who do not. With Morphic and its Install on Demand functionality, any computer within the organization can be automatically adapted to the needs and preferences of the user, and even the assistive technologies they need will be automatically installed when the user keys in. When the user keys out of Morphic, this software will be automatically removed, and the computer will be restored to its original state. With Morphic, a shared computer can be used in the morning shift by a worker with disabilities and in the afternoon shift by another worker with completely different needs, without going through complicated installation procedures. With Morphic, companies can have a pool of "clean" computers that can be provided to workers that need to attend a meeting outside the company's premises or work remotely, and that will be automatically configured to meet the needs and preferences of the user.

- **Bringing inclusive culture into corporate culture.** As stated in section 2 of this paper, many employers and business owners consider that workers with disabilities will perform worse, or that the cost of the accommodations required would impact on the company's benefits. In the end, the main problem is the lack of an inclusive working culture. Morphic can help companies build a more inclusive working culture by raising awareness about the whole range of accessibility needs and solutions, facilitating pre-built configuration bundles for different groups of users that will foster empathy and will allow IT staff to involve users with special needs more quickly and efficiently.

While the GPII will help workers perform their work more efficiently, there are other aspects of the overall

work cycle that need to be addressed to improve the inclusiveness of the workplace. As discussed in previous sections, the fairness of AI solutions used in the work decision processes needs to be addressed, and Raising the Floor is working on initiatives such as the We Count project that aims to ensure that AI algorithms consider the needs of the tails of the tails.

5 CASE STUDY: MORPHIC AS INCLUSIVE APPROACH IN THE WORKPLACE

The European-funded SmartWork project aims to support active and healthy ageing at work. SmartWork is developing a suite of smart services, building a Worker-Centric AI System for work ability sustainability[12]. One of the SmartWork services is UbiWork, which is based on Morphic. Within SmartWork, we are using a TRL-7 version of the softwarej, that has been already tested in several operational locations in the United States, such as public libraries and job centers (Szopa, Jordan, Folmar, & Vanderheiden, 2019). SmartWork marks the first time that Morphic will be tested in Europe, more specifically in two work environments in Portugal and Denmark.

Morphic was already tested during the SmartWork pre-pilots and caused an overall good impression among the workers interviewed. In Autumn-Qinter 2021 it is being tested with 60 users in Denmark and Portugal. The SmartWork project started in January 2019, before the COVID-19 pandemic started, so we had to review our use cases and switch from a classic office environment to a mixed presential-remote work environment. The version of Morphic that will be used in the pilots will provide workers with the following features: (1) employers or pilot facilitators will be able to create custom Morphic implementations, adapted to the company's needs and routines, that can be distributed to the employees; (2) Morphic will automatically install all SmartWork software along with other software required by the pilot facilitator or the worker, and will orchestrate the identity management of all SmartWork applications so that user needs to log in to the system one time; (3) workers will be able to create custom configurations and store them in the cloud, so that (4) when users switch computers, all their configuration and software will appear automatically, and (5) when the worker keys out of

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[12] http://www.smartworkproject.eu/

Morphic, the computer will be restored to its original settings.

One of our objectives in the project is to demonstrate that Morphic facilitates the inclusion of people with disabilities in the workplace by achieving true digital equity. Users with special needs will not require a dedicated computer with assistive technologies installed: organizations that deploy Morphic will ensure that individuals who need assistive technology software are able to sit down at any computer, anywhere in their organization, and have the assistive technologies they need appear on that computer, configured to their needs and preferences. Several users can share a computer and, when a worker finishes its session in Morphic, the computer will get back to its original state. When a new worker or intern gets to the organization, they can use Morphic to import the configuration of their personal computers into their workstation, facilitating the onboarding process of people with special needs.

The results of the pilots will be used to build Morphic Enterprise, that will be made available as a commercial product.

6 CONCLUSIONS

In Western countries people with disabilities face higher levels of unemployment and higher risks of poverty and exclusion. These problems may worsen as the rapid advances on information and communication technologies and the widespread adoption of novel technologies such as AI and automated systems are dramatically changing the work landscape, killing some old jobs, and creating new ones that require new skills, which might lead to the exclusion of persons with disabilities or older workers who have more difficulties for reskilling or upskilling to the new skills. Some preliminary data show that, in certain territories the COVID-19 pandemic has had a more profound effect in older workers and people with disabilities. To facilitate the inclusion of older workers and workers with disabilities in this new work market, we need to create inclusive workplaces, and to make sure that employers and corporations bring inclusivity and accessibility into their corporate culture and practices. We believe that the GPII can be a useful tool to create more inclusive workplaces, by leveraging the use of assistive technologies and raising awareness about accessibility tools and practices. The best way to ensure that no users are left behind is to provide an 'one-size-fits-one' approach, providing workers with the possibility to take control of their experience in an

informed way, involving users in the design and decision processes so we make sure we do not leave behind the tails of the tails.

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