







Engineering and Physical Sciences Research Council

## A Horizon Scanning Study

Digital Technologies for Well-being at Work: Tensions, Opportunities and Future Directions

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## **PROJECT AIMS**

The digital skills of the UK workforce and the integration of technology in the workplace are continually evolving, with substantial changes and benefits still to emerge. Digital technologies (DT), such as big data, tracking devices, and artificial intelligence, are being introduced into organizations, offering advanced capabilities. Due to their ability to help make decisions and develop protocols, these technologies can enhance but also disrupt traditional work processes and affect people's experience at work. As the UK Government is raising to these challenges (see the 'AI Opportunities Action Plan' report 2025), organizations are increasingly focusing on worker well-being and adopting a range of DT to support it, with the promise that such technologies can support wellness as well as productivity.

In the era of the 4th Industrial Revolution and the emergence of 'positive technologies', these developments raise important questions for organizations and individuals, DT developers, work and employment researchers, and public policy makers:

- what is the impact of digital technologies on well-being at work?
- what are the benefits and barriers of applying digital technologies to support well-being at work?

- what are the challenges and opportunities in applying DT for wellbeing at work?
- what should future research focus on?

## **METHODOLOGY**

This research adopted and exploratory methodology including:

- a review of the academic and grey literatures in DT and work-related well-being
- a consultation survey
- interviews with nineteen experts from research and practice

The majority of the research participants were experts in both DT and well-being; others work predominantly in one of the two fields, with research or practice links in the other. The survey and interview data were analyzed using thematic analysis. Outside the scope of the current work was a reviewing of the types of DT available, DTfocused interventions, or the mechanisms for determining the effects of well-being at work. For these, we refer the reader to the bibliography.

For further information of the methodology, please contact the lead researchers.









## **MAPPING THE FIELD**

### MEANINGS OF WELL-BEING AT WORK

There is ample academic research on the multi-faceted concept of well-being at work. Many studies explore this concept by examining positive and negative outcomes such as job satisfaction, work engagement, stress, and burnout. For individuals, wellbeing at work may encompass physical safety, health and comfort, mental health, happiness, experiencing more positive than negative affect, quality of work-life balance, and a positive attitude towards work. It is important to understand wellbeing at work because of its substantial implications for both individual well-being and organizational productivity.

Detailed elaborations by the interviewees indicated complex meanings associated with well-being at work. We group these under two distinct themes: well-being as a multilayered subjective experience and well-being as the responsibility of employers. The perception of work-related well-being evolves with changes in work structures and conditions. When prompted to define well-being at work, research participants mentioned:

- an absence of 'ill-being', a neutral status that can be maintained
- a sense of self and identity, health, and equity
- not to be tied to offices and work locations
- Iow or manageable stress
- time and screen management
- support and appreciation for example, feeling valued, relationships with line managers and colleagues, availability of resources to manage and organize work
- accessible in terms of geography, time, cost
- employment conditions, for example, pay, safe work.









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#### WELL-BEING AS A MULTI-LAYERED SUBJECTIVE EXPERIENCE

Research participants noted that well-being is a deeply personal experience, both in the personal and work spheres. They stressed the relevance of understanding well-being at physical and mental level. Importantly, they highlighted that well-being is not a one-sizefits-all state. Achieving well-being involves addressing multiple layers – from avoiding negative experiences at the workplace to fostering growth. Authenticity, inclusion, and support for diverse needs play a vital role in enhancing well-being at work. To address these multiple layers, it is essential that personal differences are considered. The following quotes illustrate these points:

"the final thing is, my well-being will also come from the fact that my employer understands that every employee brings a different set of abilities to their work... so it's important for my well-being that the workplace understands that need technologies in front of me that allow me to make things larger, that I might need assistive non digital technology with me to help me interact with the world. And again my well-being at work will come from me not having to hide that."

"well-being is a is very much a sort of moving target that it's a sort of subjective thing rooted in individual experience... one person may feel that ... they have good well-being in a situation, but another person in the same situation would not feel that... it's not just ordinary being, it's actually being with some kind of quality of wellness about it..."

"well, if we take my three-layer cake, the first would be an absence of ill being. The second would be a neutral state that I can maintain and the third would be things that positively contribute."









## WELL-BEING AS THE RESPONSIBILITY OF EMPLOYERS

Well-being at work is very closely tied to a positive environment where individuals can thrive. Employers play a key role in fostering such an environment, which should be grounded in the essential elements of good work, such as fair pay, safety, the availability of relevant tools and technology, a sense of being valued, and supportive management.

"to be supported in the way that ... you should be, have you got your foundations in place? are you paid? is your work safe? do you feel valued? Is your line manager available to help you manage and organize your work? Health and well-being... should start with good work and then all of these other things."

"my well-being at work comes from my employer recognising that we all are different, we may have impairments, we have conditions, but we have different abilities and whether I'm a neurodivergent person, whether I'm someone with a hearing impairment or I'm deaf or I'm someone visually impaired... Actually, you know this is vital that my well-being will be that... I know that my employer understands that we all need to work in a work setting that's right for us."

"no amount of, you know, sympathetic line managers or whatever is going to help. What I need is the environment that that enables me to function."









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### **TYPES OF DIGITAL TECHNOLOGIES**

There is a wealth of DT that are purposefully developed to support individual well-being (e.g., wellness applications), mental health (e.g., digital mental health platforms), and self-development (e.g., continuous learning platforms). Additionally, existing technologies are continuosuly being improved with the view to support wellbeing (e.g., emotion recognition software, Al-powered chatbots). Although a review of the specific DT solutions and platforms developed to support well-being was not part of the study, participants provided arrange of examples of technologies that they are familiar with. Based on their input, we categorize DT by purpose and ownership. These categories are not exhaustive.

### DIGITAL TECHNOLOGIES BASED ON PURPOSE

#### Work needs

DT that support individuals with different needs to undertake their day-to-day work. While essential for individuals with special needs, these technologies are often rolled out widely to supporting more people across the organization. Examples: noise cancelling headphones, hearing aids, accessible screens.

#### Detachment

DT that support individuals with detaching from technology. Examples: apps and functionalities that support individuals with minimizing screen time or batching emails.

#### **Mental health**

DT that support and monitor individual mental health. Examples: well-being apps and wearables (tracking devices) that often collect biometric data.

#### Adaptation for well-being

Existing DT solutions adapted to support well-being. Examples: extensions and added functionalities of existing software, such as spelling support in Microsoft applications or live transcriptions for online meeting software.

## DIGITAL TECHNOLOGIES BASED ON OWNERSHIP

#### **Service providers**

DT made available by health insurance companies or service providers subcontracted by an employer to support and monitor employees' physical and mental health.

#### Personal

DT solutions that can be used at work to manage well-being out of their own initiative and needs (i.e. not directed by an employer).

#### **Governmental schemes**

Supporting people to manage health limitations or disabilities.









## THE ECOSYSTEM OF DIGITAL TECHNOLOGIES FOR WELL-BEING AT WORK

Multiple stakeholders play a significant role in the mobilization of DT for well-being at work. It is crucial that these actors work together to enable exchange of expertise and develop feasible and effective solutions. As one of the participants noted:

"making sure that all (...)stakeholders have some involvement (...) would be an important piece for development."

### **STAKEHOLDERS**

#### Users

Individuals who utilise DT for well-being at work; organizations and DT developers need to consult users regarding their needs and DT usage patterns.

#### **Developers**

IT experts specialising in the development of general and well-being specific DT; they need a good understanding of users' needs and of the workplaces where DT are implemented.

#### Scientists

Researchers in fields such as management or work and organizational psychology; they provide the evidence that can inform the development of effective DT solutions or the adaptation of existing DT to work-related well-being issues.

#### **Buyers**

Often human resource or information technology specialists and organizational leaders; they need to have a good understanding of what well-being at work is, how it can be enahnced and how existing or new DT can be used.

## IMPACT

The existing literature documents that DT may have both positive and negative effects on various aspects of users well-being and their effectiveness at work, including concentration, motivation, engagement, and teamwork. Importantly, very often such impacts reflect different sides of the same coin.









## POSITIVE / NEGATIVE IMPACTS OF DT ON USERS WELL-BEING

#### When DT is a demand it generates:

- increased job demands
- blurred work-life distinctions
- technology-induced stress
- anxiety and overload
- interruption and distraction
- excessive use, possible addiction

### When DT is a resource it enables:

- more worker flexibility and autonomy
- satisfaction and motivation
- performance, mental health, clinical management, care delivery and access for healthcare workers
- direct and indirect costs for organizations
- opportunities for neurodiverse or disabled users
- job-crafting as per individuals needs and strengths

Participants further added nuances to the understanding of both positive and negative impacts of digital solutions on users and organizations. Specifically:

**Positive impacts** include the potential of DT to empower individuals and to help foster connections. Specifically, DT can be used to promote equity and inclusion. For example, using email signatures with preferred

pronouns and name pronunciation can aid to the development of a culture of respect and acceptance. Furthermore, personal digital tools, such as noisecancelling headphones and hearing aids, can empower individuals to manage their physical or mental health independently without employer involvement. Additionally, digital tools are also useful for building team cohesion by facilitating non-work-related connections, through shared activities or apps that encourage collaboration and interaction, fostering a sense of community among colleagues.

"But really, you know, workplace thrives when the people like each other, and they feel connected to each other and they feel like they want to support the other people around them. So I think opportunities for them... in digital tools can be doing this in a way as well where it can be ... non-workrelated connections... It's always an awkward thing to be like 'OK, you know, let's go and have this work holiday party or something'. But other sorts of capacities for them to be able to interact. So there's all sorts of things *like exercise apps... where people could be* competing in small groups and encouraging others each other... So to be building this kind of team cohesiveness with other sorts of digital tools because people are spending all these times on their devices, getting them linked up in other ways. So I think that's... kind of building that team spirit, that team cohesiveness potentially with digital tools could be effective. "









## DT POSE BOTH CHALLENGES AND OPPORTUNITIES FOR USERS AND ORGANIZATIONS

#### Challenges from a user perspective

- lack of personalization and humancentred approaches: which, for whom, under what circumstances
- difficulty to obtain active engagement of individuals in design and implementation DT may be used in a selective usage,
- addressing only part of the users' experience
- technology anxiety, changes in cognitive abilities with age, expertise or lack of awareness can act as barriers to acceptance

#### Challenges at the organizational level

- impact is not deterministic but linked to social factors (team and organizational practices) and influenced by organizational decisions
- change that is driven by technology and does not take into account the social and organizational context is likely to fail
- training stakeholders to adapt DT to suit humans
- building the organizational conditions for DT for well-being to succeed
- digitalization can bring standardization of knowledge, subjectification of employees, a neglect of the emotional impact on individuals, and concerns related to 'digital Taylorism'

#### Opportunities for person-focused and needs-based approaches

- addressing the needs of individuals and different groups
- digital equity
- more effective implementation
- participatory approach to ensure validity and ownership
- support adaptation and adoption, promote positive attitudes and work practices

# Opportunities for building organizational resources

- whole-organizations approach, foundations for successful implementation
- importance of readiness and preparedness
- attitudes and infrastructure, operational and organizational
- primary prevention rather than secondary/tertiary intervention
- simultaneous use of multiple DT solutions to address diverse needs







**Negative impacts** concern both workers/ employees (the Users) and organizations (the Buyers). For example, concerns were expressed regarding potential stigmatizing effect of DT for some users. Specifically, people with disabilities can unintentionally signal their disability via the use of specific visible technologies, leading to social stigma due to embedded ableism. Furthermore, DT can also represent a cost and a vulnerability for organizations, in that DT is inherently fragile and subject to malfunctions, deterioration, and data loss, each of which need to be managed carefully.

"You know one limit of digital technology is that it can break, it can be erased, it can malfunction, it can deteriorate over time. So our digital infrastructure is fragile. We may think that because it's digital, it's backed up. It's in the cloud. It's there forever. No, it's a pulse of energy. It's a signal that can be scrambled. It's locked on a piece of, you know, hardware on a recording medium that can be lost or can be damaged or can deteriorate. So that very basic level digital technology is still subject to the rules of entropy in the universe, which means, you know, it's not timeless. So networks can break. Networks can be hacked. Networks don't always talk to each other as well as they should, so there are those vulnerabilities within the whole notion of the network. And again we can build an illusion we can delusion delude ourselves that the network means that the technology will always find a way through."

#### Advantages of DT over non-digital

solutions for workplace well-being were also identified. First, DT offer greater accessibility in terms of time and location, allowing users to access automated systems whenever and wherever they need. Second, they can build trust through data privacy, as users may feel more comfortable knowing that their data is anonymous. Lastly, DT provide cost savings for organizations, enabling them to achieve more with the same investment.

"Accessibility in terms of geography and time. So for instance, for an automated system which doesn't involve another human at the other end, you can access that at any time that you choose. So I'd say that there's an accessibility in that term, and also someone who might be remotely based can access more easily."

"Trust in what will happen to your data. I would say at there's an anonymity that can be achieved whereby if you know that the data is not going any further and it's not being analysed, you might feel more comfortable with an automated system as well."

Several factors can bolster the effects of DT solutions and enable user well-being. The perceived benefits of DT solutions depend on how they are used, the broader workplace context, as well as on individual circumstances. These routes to the effective and efficient use of DT are worth further research.







Some examples are:

Allowing users to have a stronger sense of job control and autonomy in how they do the work

Supporting a better balance between the demands of the job and the resources available to address these demands

Knowledgeable and supportive managers that can help to alleviate the negative effects of DT (such as technostress)

Facilitating progress towards achieving job goals which can build confidence and competence

## **CHALLENGES AND TENSIONS**

# RESEARCHERS' VIEWS ON THE DISADVANTAGES OF DT

#### A sense of overoptimism

The potential and promise of DT "to transform workplaces or solve big problems" often sounds like an overstatement, especially when its benefits have yet to be fully realised.

#### Sacrifice of social connections

DT is not a substitute for human support and empathy. Rather, it can alienate individuals and reduce social interactions "that make a work setting collegial and positive", and even erode the boundaries between work and non-work domains. It can make it difficult to generate engagement in the absence of non-verbal behavioural cues that communication via DT often allows for. non-verbal behaviour cues.

#### Digital divide and equity

Off-the-shelf DT solutions do not take into account the users, their contexts, and intended DT usage. For example, people with lower digital literacy may find it more difficult to engage with DT.

#### "The pizza party problem"

Without honest and concerned investment in employee well-being, DT can be used as 'a band-aid' to avoid tackling the sources of ill-being.. Participants warned: "be wary of the 'pizza party problem". Addressing wellbeing issues at work requires demonstrable authentic concern and a systematic and holistic approach.











# The mechanisms of change are still unknown

DT has been linked to reduced well-being but we need to understand the mechanisms by which DT solutions impact on aspects of well-being and circumstances under which they can be effective: how, when, for which which groups of individuals and workplace contexts.

## RESEARCHERS' VIEWS ON THE ADVANTAGES OF DT

## Self-paced and responsive

Several DT enable individuals to utilize self-paced and individualized wellness interventions aligned with their strengths, abilities, and needs. These interventions often provide instant support, which is essential in certain situations.

### "Anywhere, any time"

The accessibility of DT, allowing for remote access, geographical convenience, and temporal flexibility. Users can benefit from psychological interventions without a requirement to attend workshops or sacrifice personal time.

DT are particularly useful to support wellbeing of people with less flexible scheduled (e.g., carers). They can also prove valuable during busy periods, when time available to reflect on one's well-being can be scarce.

### Integration

A yet unrealised potential to embed solutions into existing organizational/HR systems and processes, or use existing DT solutions to improve well-being at work in a holistic way.

### Bringing people together

DT can alleviate feelings of isolation or disconnect from the workplace, particularly for people who mainly work from home or with remote teams.

## Confidentiality

A major concern when it comes to discussing about ones well-being and mental health is data confidentiality. DT may ensure a level of anonymity and confidentiality as long as there is transparency regarding the information collected.

## PRACTITIONERS' VIEWS ON THE DISADVANTAGES OF DT

## Digital skills gaps

Digital divide in many organizations: "many researchers are not skilled in solving IT problems as they emerge".

## Technological anxiety

Not all users are comfortable with technology. Paradoxically, it is often those who would benefit the most from DT solutions that end up rejecting them due to technological anxiety.









#### Confidentiality and data security

DT may offer the benefit of anonymity and confidentiality. However, they also pose concerns regarding what and how data is being collected and with what purpose.

#### **Inexperienced buyers**

DT are particularly useful to support wellbeing of people with less flexible scheduled (e.g., carers). They can also prove valuable during busy periods, when time available to reflect on one's well-being can be scarce.

## PRACTITIONERS' VIEWS ON THE ADVANTAGES OF DT

#### **Effectiveness and efficiency**

DT are particularly useful to support wellbeing of people with less flexible scheduled (e.g., carers). They can also prove valuable during busy periods, when time available to reflect on one's well-being can be scarce.

#### A plethora of solutions

DT offer a very wide area of resources ranging from mental health apps to wellbeing platforms - able to address a range of well-being aspects.

#### Personalization

Online learning and development.

Introducing DT solutions to support wellbeing requires patience as the effects may take time to show. However, most DT can be introduced gradually in organizations, enabling people to get familiar with the technology.









#### **Tensions when using DT to support well-being**

1

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# The usefulness of gathering data about individuals' well-being vs. concerns about data misuse and privacy

"First thing that comes to mind is of course the GDPR regulations, so that would be "how do we treat these data. Are my data secured with the provider of the software?" That's a challenge that could be overcome if we reorganize in a way where we are owning the data. They (i.e., software provider) are not the company, so they first first thing is that they employee can trust that the company cannot misuse the data. Secondly, as we are the owners, we could potentially misuse the data, but (...) we're not legally allowed to violate any breaches of personal data. You can do some statistics. You can do some analysis on it, but but we can't share any personal data whatsoever."

## 2 Using technology as an equalizer (e.g., everybody can work from home) vs. it inadvertently reproducing hierarchies of power

"It's to do with manifestations of power... in these kind of formats when you can see people's background, it's a subtle projection... that I choose... This is my office... which I like. It's a nice office. It implies that I have the financial ability to have a house with an office that's just for me. Yeah, you can also see there's other things that I have curated to be in the background and some things that I don't care about... But many people (...) I might be talking to don't have the ability to have an office for themselves and have the time to make it look nice. So there is a projection of power and privilege by my background."

# Using DT to support well-being vs. well-being potentially being affected by the overuse of technology

"I see it from two sides or so. One is the side where actually technology is very supportive of well-being generally. People not tied to offices, for example, to weave work more into life in a positive way. And the other side is... we're actually, you know, overloaded, techno stress, digital workplace technology intensity. So just the sheer amount and complexity of technology environment has in itself an impact on well-being."

# 4

# The "promise" of an add-on DT (e.g., well-being apps) vs. the complexity of work environments

"And I know that one of the criticisms in that area is that mindfulness, you know, the answer is "I will rather roll out a mindfulness app rather than addressing issues of, say, workload or toxic management or whatever". So it's always about broadening the perspective, I think, to understand where digital technologies fit in."

# 5 The subjective nature of well-being vs. DT being designed to be universal

"So the problems that arise with technology tend to be ones where you have a one-size-fits-all solution to something. Because people vary a lot. So you know, if there's a technology which is designed to be universal in some way, it's almost inevitably going to create a problem. Because well-being is not a universal condition and can never be a universal condition, so a technology cannot support. Universal, Universal state of well-being. So if a technology is designed with that in mind, then I think it's probably going to fail."









### 6 OPPORTUNITIES AND SUCCESS FACTORS

Seven forces that can shape the development of DT for well-being. These need to be taken into account by all stakeholders.

#### 1. Ethics and trust

The need to adhere to ethical issues in DT development and implementation and, in turn, build trust in the use of DT by the buyers. It is important to stress that DT solutions are not a cure-all for well-being issues at work.

# 2. Sensitivity to the needs of different stakeholders

DT highlight the need and offers an opportunity to promote equity, access, and inclusivity, as well as organizationwide awareness of the diversity of the workforce. Aspects such as the background, circumstances, culture, gender, type of wellbeing issues experienced and disability need to be considered.

"If there's a technology which is designed to be universal in some way, it's almost inevitably going to create a problem. Because well-being is not a universal condition."

### 3. Balancing DT and human support

Human and DT support need to support each-other. Importantly, organizations need to consider blended delivery, screening and the integration of hybrid approaches.

## 4. Cultural fit

DT solutions for well-being need to be aligned with the organization's culture and values to be accepted and be effective. When implemented well, DT can help to foster a positive organizational culture, psychological safety among individuals and managers, and a psychosocial safety climate in the workplace.

## 5. Inter-professional collaboration

This is essential at the development stage and, importantly, for the successful and sustainable implementation of DT solutions.

#### 6. Empirical research

This is urgently needed to build the evidence base for the effectiveness of specific DT solutions and approaches. It includes ascertaining effect sizes, the mechanisms of effective and sustainable change, what solutions are most effective for the needs of specific groups in the workforce, the development of implementation principles, and tailorable solutions.









## **3 PRIORITIES FOR DT BUYERS**

Three primary organizational considerations to realise the opportunities above.

# 1. Ensuring that the impact on individuals is sufficiently considered

Potentially adverse impact on well-being can be undermined when good work design principles are not followed or when organizational operations are not aligned.

# 2. Building favourable conditions for DT solutions to succeed

The impact of DT is not deterministic; rather, it is linked to social factors (for example, team and organizational practices) and influenced by work organization decisions, all of which need to be taken into account when preparing for the introduction of DT solutions for well-being.

### 3. Taking a whole-organization approach that acknowledges the ecosystem of DT for well-being

It is very important to start with positive attitudes (i.e., user and buyer readiness and preparedness), appropriate skills and infrastructure (i.e., operational and organizational resources), and a forwardlooking perspective and commitment to invest the right resources (i.e., primary prevention rather than secondary/tertiary intervention on well-being).

## 4 CONDITIONS TO MAKE THE IMPLEMENTATION OF DT SOLUTIONS MORE EFFECTIVE

#### 1. Design for diversity and inclusivity

It is essential to involve users with different needs and backgrounds in the design and implementation of DT for workplace wellbeing. Ensuring that diverse perspectives are considered in the design stage is foundational for the effectiveness of DT solutions.

"Well, the most crucial thing is to involve the people who are going to use the technology in the development of the technology... If you want to understand how this technology is going to add to well-being, then you've got to involve the users in the development of the technology."

# 2. Integration of digital technologies within organizations

Viewing DT solutions for well-being as standalone should be avoided. A holistic strategy, combining digital and non-digital (e.g., organizations support systems) elements to support individual wellbeing can lead to better and longer-term results. Additionally, the effectiveness of DT depends on their adaptation to the technological maturity of each organization. The buyer should assess whether specific DT solutions fit within the organizational ecosystem and adapt these to the needs and capacities of the workforce and technological environment.









"Using them on their own is usually not effective... There needs to be a whole holistic movement in order to do it. So these aren't just a one-shot silver bullet here that is going to fix all the problems."

"Obviously it makes a lot of difference how mature the environment is... In certain industries like technology, finance, that tend to have more money, they're going to have more mature environments."

#### 3. User buy-in and engagement

A crucial success factor is the early and active buy-in from individuals. Buyers must involve the users in choosing which technologies to adopt and ensure there is ongoing support and engagement when these are implemented. Such engagement could be supported via workshops and ongoing communication between managers and their teams.

"Getting buy-in from the employees early. So making sure that they are on board and it doesn't just seem like something else in a list of benefits that they're never going to pay attention to."

# 4. Continuous monitoring and assessment

To achieve sustainability in introducing DT for well-being, organizations should monitor and evaluate their effectiveness. This can be achieved by collecting and analysing usage data, ensuring the technology addresses the intended well-being goals, and adapting the implementation of solutions based on feedback. "We've got a divide in that we've got lots of products that look good but have no evidence base... We need to encourage people to share and track the evidence and join it up with different indexes."

## DT FOR EQUITY, DIVERSITY AND INCLUSION

DT offer great potential for supporting diverse groups of the workforce who have specific needs, such as neurodiverse individuals, carers, those with chronic illness or mental ill-health, those with mental health issues, etc. They enables organizations to promote equity due to their ease of use, low cost, flexibility, and adaptability. Our study reveals two essential principles for realising the power of DT to support inclusion, equity, and diversity:

- 1. DT solutions should not introduce bias
- 2. Sensitivity is necessary when developing and applying DT solutions

Throughout this report we have integrated relevant considerations relevant for the development and implementation of more inclusive DT for well-being solutions. We do not consider DT for equity, diversity and inclusion as an add-on, but an integral part of all our findings and recommendations.









"Some people are more comfortable in one media or another. (...) some people are, more comfortable because of their experience. So for instance, there might be some, demographic groups. So for someone like me, communicating over teams is very common and out of all the bells and whistles mostly. But for someone else working, let's say in catering or in gardening or something or something that's hands on (it might not be)."

"So when we're empathising, we have a diverse group of people. They will enable that room to empathise in many different ways. We're trying to define the problem. That problem can be defined in many different ways, expressed and articulated in many different ways and different requirements, said and unsaid, explicit and tacit... At the moment you're ideating having people who work in different linguistic, cultural, personal, gender, political, professional settings, and you're thinking about what is what is possible, and you need to be at your most divergent in your thinking in the process. That's when a diverse room can be so powerful, (...) it enables the design to be to be more open minded. Almost certainly more effective."

#### **DT CONSIDERATIONS**

#### In development

- apply inclusive design principles
- take a user-centric approach and ensure diversity in user representation and cultural, gender and disability sensitivity, using a range of interface options
- ensure personalized interventions do not introduce bias
- develop language-agnostic tools that are relevant and appropriate for different groups
- include customization features and feedback mechanisms

#### In implementation

- consider entry checks for each individual
- streamline processes to allow people with different types of disabilities to access
- provide training to all groups of users
- support accessibility for some groups to ensure equity for all groups
- establish user support networks
- promote role models and support early adopters
- excessive use, possible addiction







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## BUILDING THE FUTURE OF DIGITAL TECHNOLOGY FOR WELL-BEING AT WORK

Drawing on the opportunities and challenges discussed earlier, we turn to the future of DT for well-being at work. We explored attitudes, possibilities, and promising routes for future development, emerging applications, opportunities that are yet to be realised, and potential to be transferred and applied to the workplace.

## HOW OPTIMISTIC ARE RESEARCHERS AND PRACTICTIONERS?

Researchers and practitioners are generally optimistic about the future use of DT in its potential to support well-being.

"Just at the moment when our experience of well-being at work and our culture of wellbeing at work are becoming more mature, we are also experiencing a moment of digital maturity as well. Those two developments would suggest an optimistic and bright future."

However, they are also concerned that the benefits of DT are not yet being fully realised and that their use may encourage short-termism as opposed to a more effective integrated approach in supporting individuals both in and out of work. Such an integrated approach is crucial: although DT can become an integrated feature of work and be well-embedded in the workplace, it cannot replace the physical and emotional benefits offered by well-being support based on human interaction.

The potential and benefits of DT for wellbeing will be increasingly realized as the use and availability of tools and solutions also increase. However, this ought to be done in a concerned and collaborative way and with comprehensive future planning.

## RESEARCHER AND PRACTITIONERS' OPTIMISM IS DESCRIBED UNDER THREE THEMES:

# 1. DT should supplement rather than substitute human support.

Research participants have shared concerns about employers potentially using DT to deal with bell-being issues in an ad-hoc manner, without full and appropriate consideration of user needs and integration in current practices:

## "As a sticking plaster solution to reduce costs and managerial responsibility."

To properly support well-being, it is essential to understand how it may also contribute to poorer well-being. DT solutions should be used to supplement human support as well as good work-design and the creation of positive work environments. For example, the use of DT to automate tasks whilst reducing work hours and retaining pay levels can be encouraged.









"We need to think holistically... design for humans, foster participation and connection - digital technologies should augment our ability to be well at work, not diminish or replace human connection."

*"It would do wonders for workplace well-being."* 

#### 2. Encourage collaboration between all relevant professionals not just developers and HR

Often, collaboration principles work well on paper but real-life collaborations between users and developers can face hurdles. Although co-creation can be extremely challenging, it enables the best expertise to be used to develop and implement the most promising solutions. Collaboration should also reflect the users' needs and preferences for type of support, for both givers and receivers. Full collaboration can also ensure that we move from more reactive well-being (wellness) apps to more proactive design of good work and a whole-organization approach.

"Research indicates that developing these technologies using co-creation is probably best done on paper rather than digital."

#### 3. Focus on design and implementation

Crucial for realising the potential of DT for supporting well-being is also a consideration of how solutions should look like for those who receive and deliver well-being support. New technologies should be well-regulated, to protect participant data and behave in an ethical manner. In terms of the future development of DT solutions, we can expect continued advancements in personalized interventions, integrating AI for real-time insights, while virtual and augmented reality may also play a role in creating immersive well-being experiences. Principles of ethical design, user autonomy, and addressing the needs of diverse groups will also likely shape the evolution of these technologies. As mentioned previously, an iteration of ongoing research, user feedback, and collaboration between DT developers and well-being professionals will be crucial in shaping a fruitful future for DT for well-being.









## WHERE DOES THE POTENTIAL YET TO BE REALIZED LIE?

There are still a range of uses and applications of DT for well-being that have yet to be realized.

## DO DT OFFER POTENTIAL FOR SUPPORTING WELL-BEING AT WORK THAT HAS YET TO BE REALIZED?

#### **Personalized interventions**

Leveraging advanced data analytics and artificial intelligence to provide personalized, real-time well-being insights.

#### **Fostering inclusivity**

Supporting inclusivity by supporting access to DT; supporting those with disabilities or specific needs.

#### A hybrid approach

Support solving well-being issues not being used to solve well-being issues.

#### Collaboration

Collaboration between developers and users and among DT developers to develop personalized recommendations. Well-being requires multidisciplinary teams... *"yet few companies use that outside HR."* 

# Fostering a positive organizational culture

To realise the potential of DT for well-being solutions to support a positive workplace culture, they need to be integrated into current organizational processes. An emerging consensus among participants was on the potential for DT to create good workplaces and psychologically safe spaces.

"We need to think broader than just "well-being apps" - we need to think about the whole human experience of work as mediated by digital technologies. Connecting and collaborating with colleagues effectively is core to our well-being."









## WHAT ARE THE PRIORITIES FOR DEVELOPERS AND USERS?

A number of priorities for the developers of DT solutions and the users of those solutions were identified, some by both groups and, again, indicating the need for concerted efforts among stakeholders. As shown below, some of these mirror the concerns and potential identified earlier.

## **PRIORITIES FOR DEVELOPERS & DESIGNERS**



#### Specifically:

- to develop robust scientific evidence on the conditions for effectiveness, return on investment, theoretical foundations, and co-design principles
- to understand the well-being needs that specific DT solutions are relevant, appropriate, or effective for
- to address privacy and confidentiality concerns
- to understand user attitudes towards DT, which is essential for building long term engagement and continued use
- to focus on solutions for building digital literacy. This can support accessibility and user training

- resolve design issues such as accessibility on small devices, using good humancentred design practices, solutions that are user-centric, personalization principles, and addressing screen fatigue
- to apply codesign principles to build effective and sustainable solutions
- to focus on standardization and benchmarking:

"commercial development to work with standards or researchers to develop and benchmark products."









#### **PRIORITIES FOR USERS & FACILITATORS**



#### Specifically:

- to develop ways to secure buy-in from buyers and users, as their willingness to adopt and invest in DT solutions may be limited by their negative attitudes or lack of understanding
- to take a more concerted effort
- to consider costs and affordability
- to integrate technology into existing systems and workflows
- to ensure ethical principles are followed and practices implemented
- to provide ongoing training and support to all users as standard
- to address the negative impacts of DT (e.g., technostress) to enable its positive impacts
- to apply ongoing monitoring of DT solutions for unpredicted problems



- to evaluate DT effectiveness by assessing intended outcomes and investing in review and improvement of solutions
- to ensure DT solutions are aligned with the workplace or work team culture.









### NEED TO DEVELOP SUPPLEMENTARY SUPPORT

Research participants also highlighted the importance of offering training and specific support for managers who may not always have the necessary knowledge, attitudes, mindset or priority for supporting DT without being trained and supported.

"What's needed in terms of implementation? I wouldn't say ... you know, five days training course that's not what I'm talking about, but rather an ongoing online support to the manager. Because (...) is in a manager position, but nobody trained them on well-being. Nobody trained them on understanding people, people's behaviour, conflict management, you know, they might have had a venture class on conflict management or leadership training. Ten years ago, but they forgot all about it."

## FUTURE RESEARCH NEEDS AND UNKNOWNS

A number of needs for research as well as some uncertainties that can impact research priorities were also identified, including:

- empirical research on the efficacy and efficiency of DT solutions for well-being
- developing truly inclusive DT for wellbeing and for quality of work

- ways to encourage collaboration between all relevant stakeholders and professionals
- developing strategies for managing data privacy
- the emergence of AI and the data security challenges that come with it.









### WHAT NEEDS TO BE IN PLACE TO ADVANCE RESEARCH AND PRACTICE?

There are a number of conditions that can allow the advancement of practice and research in DT for well-being at work. Some mirror existing concerns but some are unique. Below we list and detail some key recommendations.

Recommendations to advance research:

- explore methods of blended delivery
- establish effect size estimates and effectiveness, including in the long term
- establish mechanisms of change and mechanisms driving change
- research funding investment is urgently needed
- understanding the context of DT solutions for well-being at work and potential effectiveness mechanisms, including prioritising different user groups, digital equity and inclusion, and differences in ways of working or workplace cultures.

Specifically:

- conduct minimal efficacy testing to demonstrate efficacy in Randomized Controlled Trials or other robust experimental designs
- address ethical issues around privacy and use
- estimate the magnitude of the effect of different factors in the the work environment on well-being
- address limited access to workplaces as companies fear litigation or increased costs
- in funding for occupational health research
- address risks from ignoring occupationrelated factors in risk for noncommunicable diseases (and focusing on lifestyle instead)
- explore blended learning, specifically the use of DT for delivering counselling and the best mix of in-person and digital support
- the long-term effects of DT solutions on well-being.









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Recommendations to advance practice:

- establish that DT is not 'a band-aid' for systemic well-being issues at work and of the workplace
- agree that DT may be good for some but not all well-being issues
- conduct evaluation research that can then be used to identify which DT solutions to develop further
- identify ways to support user adoption and integration, considering the needs of different groups of users
- address ethical and privacy concerns as potential first level barriers.

#### Specifically:

- focus on understanding user acceptance, resistance, and engagement, how to engage the users and keep them engaged, and how people make decisions about DT use
- acknowledge the boundaries of DT: it can be effective for addressing some well-being issues but not others
- organizations should not use DT to compensate for systemic workplace issues
- instil trust by investing in quality assurance for DT









- instil trust by addressing ethical and privacy concerns (use of data, data security on digital devices, maintaining individuals' privacy)
- instil trust by achieving a balance between monitoring and privacy
- knowledge is very limited due to the small number of intervention studies
- invest in evaluation research
- address the lack of well-being/ occupational health and safety budgets in organizations
- develop evidence-based practice and guidance.

#### **PRIORITIES IN A NUTSHELL**

We further highlight some of these priorities as follows:

- the need to focus on technology-enabled well-being and performance in tandem
- the importance of different stakeholder views and, importantly, the user voice when designing and implementing DT solutions and interventions
- the need for collaboration among different disciplines (e.g., computer science, psychology, human-computer interaction) and organizational functions (i.e., human resources, information services, and occupational health)
- the need for evaluation and intervention research and the importance of understanding the mechanisms by which DT impacts on well-being, which can then inform the development of interventions
- the urgency to develop HRM and organization-wide solutions for supporting the positive side of DT for well-being, including training for managers

the prerequisite of building
preparedness at all levels to support
a fruitful introduction of DT with
sustainable positive impacts

the urgency for a better understanding of the impact of DT solutions for wellbeing in terms of equity, diversity, and inclusion

## CONCLUSIONS

Technology impacts how, when and where we work. In this report, we have offered insights derived from expert views on the value and pitfalls of DT for well-being at work. We have also highlighted opportunities yet to be realized and challenges to be addressed in practice and research. DT can offer a range of benefits to individual well-being by supporting good management of work and performance, health and wellbeing, and both in tandem. It can also be invaluable for some groups within the workforce who have specific needs. But it also comes with costs to individuals, their well-being, and performance, as well as challenges for organizations, researchers, and developers. We have highlighted ways to bridge research-practice gaps in the implementation of DT solutions for well-being at work. DT offers important benefits to work beyond well-being, such as supporting productivity, inclusion and equity, designing good work, and developing a positive workplace culture. We look forward to seeing how emerging applications develop, opportunities are realized, and solutions are applied.









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## APPENDIX

## **CONSULTATION SURVEY**

- 1. What are the advantages or benefits in using digital technologies for well-being in work settings? What is the most important advantage or benefit and why?
- 2. What are the disadvantages or challenges in using digital technologies for well-being in work settings? If so, what is the most important disadvantage or challenge and why?
- 3. What are the major unknowns or controversies in advancing research in the field of using digital technologies for well-being in work settings?
- 4. What are the major unknowns or controversies to good practice in the field of using digital technologies for well-being in work settings?
- 5. What are the priorities that those tasked with designing digital technologies to support well-being need to consider?
- 6. What are the priorities for those tasked with applying digital technologies to support well-being need to consider?
- 7. How can groups with diverse needs be best supported when introducing digital technologies for well-being at work? This includes individuals or groups with different socioeconomic backgrounds or characteristics.
- 8. Do digital technologies offer potential for supporting well-being at work that has yet to be realised? If so, what may that be and how can we achieve that?
- 9. How do you see the future of digital technologies for well-being in work settings?

## **EXPERT INTERVIEWS**

- 1. How can we avoid using DT as a panacea for all well-being issues?
- 2. What do you think are the limits of DT?
- 3. How can we help realise the potential of DT for well-being without ending up relying solely on it?
- 4. What types of scientific evidence still needs to be developed before we adopt DT more widely or make it a default tool in our well-being support arsenal?
- 5. What aspects of the context should be considered when developing and implementing DT for well-being?
- 6. Which and how different professionals can work together to realise DT potential?
- 7. Finally, what do you think: is the future of DT for well-being at work bright or cloudy?











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