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AI and work engagement in the IT industry

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Abstract

Despite the rapid integration of artificial intelligence (AI) in professional environments, its implications for employee engagement are not yet well understood. Hence, this study examines how AI technologies impact employee engagement in the IT sector. The study consisted of 28 semi-structured interviews with IT professionals, recruited in Sweden. The responses were recorded, transcribed, and thematically analyzed using the job demands-resource framework. The findings reveal that AI can enhance work engagement by reducing repetitive tasks, supporting learning, and increasing the meaningfulness of work. However, AI also introduces new demands, including cognitive overload, skill relevance uncertainty, and concerns about tool reliability and leadership support. Theoretically, the findings highlight the need to adapt the Job Demands Resources model to account for the dynamic, context-dependent nature of digital technologies, such as AI. This suggests the emergence of a concept we term Digital Work Engagement, a positive and fulfilling user experience of vigor, dedication, and absorption based on the worker's interactions with and relation to technology in the workplace. Practically, the study offers guidance for designers and managers on fostering work engagement by aligning AI development and integration with professional growth, autonomy, and support.

RESEARCH HIGHLIGHTS

- AI simultaneously shapes job resources and demands in IT work.
- Introduces Digital Work Engagement as a technology-mediated construct.
- With support and foundations for use, AI enhances work engagement by enabling meaningful work.
- AI obstruct work engagement through demands of cognitive load, uncertainty, and distrust.

Keywords work engagement, artificial intelligence (AI), IT sector

CCS CONCEPTS

- **Social and professional topics→ Computing profession.**
  - **Human-centered computing → Empirical studies in HCI.**
  - **Computing methodologies → Artificial intelligence.**

A Gallup report (Gallup, 2022) states that the global economy's cost of not having a fully engaged workforce is nearly $10 trillion, and the estimated 2% decline in 2024 is projected to result in a loss of over $400 billion. Work engagement is commonly defined as an experience of a positive and fulfilling state of mind, characterized by resilience, dedication, and deep absorption in one's work practices (Schaufeli et al., 2002). In this study, we focus on work engagement as it unfolds in highly digitalized IT work contexts, without redefining the concept itself. Research indicates that employees with high levels of engagement tend to be healthier and have happier, more stable families. Furthermore, they contribute more effectively to achieving organizational goals (Bakker et al., 2023).

By 2030, 75% of companies in the EU are expected to use artificial intelligence (AI), the cloud, or big data (European Commission, 2022). In the IT sector, the novelty of this can be debated as AI and machine learning tools have been used to support software developers in their jobs for about a decade (Clear et al., 2025), while other types of automation and rule-based systems have been around for even longer (cf. Bernard, 1988). However, the recent emergence of generative AI (GenAI), such as ChatGPT, represents a significant shift in how digital technologies are integrated into everyday work.

Artificial Intelligence, rooted in mid-20th-century ideas (Haenlein and Kaplan, 2019; Rajaraman, 2014), has become increasingly relevant today through its workplace applications. Recent advances, particularly in generative AI (GenAI) and popularized by ChatGPT, are reshaping work environments (Fui-Hoon Nah et al., 2023) and interaction design by enabling text, image, and video generation (Kim et al., 2024). AI technologies offer opportunities such as personalized tutoring (Zhang et al., 2024) and innovative prototyping (Rapp, 2019),

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yet they also raise challenges related to ethics (Farina et al., 2025), bias (Ali and Aysan, 2025), sustainability (Humble and Mozelius, 2024), and potential misuse (Duong et al., 2025). Meanwhile, the HCI field has pushed towards the need for further research on user experiences of technology in work contexts (Bergqvist et al., 2024; Simsek Caglar et al., 2022, 2025). And a few studies have begun to conceptualize how work engagement is affected by usage of AI and similar technological advances (Li et al., 2024b; Mäkiniemi et al., 2020). Understanding these dynamics is critical for designers to be able to develop AI and new digital tools effectively without compromising employee motivation and well-being.

Despite this rapid evolution, research has yet to fully explore how such technologies affect employees' work experiences (cf. Cajander et al., 2022; Palanque et al., 2019; Pereira et al., 2023; Roto et al., 2018, 2019). As such, HCI researchers have begun highlighting the need of understanding user experiences at work (Clemmensen et al., 2020; Simsek Caglar et al., 2022, 2025) and approaching work engagement from an HCI perspective (Roto et al., 2018; Scholze and Hecker, 2024), and has yet to go in depth around the consequences of AI in these regard. While many existing studies focus on preventing adverse outcomes such as stress and injuries, there is a growing need for research that also supports positive health and motivation (Lesener et al., 2018). In particular, while it has been studied in other sectors of work (Mäkiniemi et al., 2020; Marimon et al., 2024), few studies have qualitatively examined how IT professionals perceive and interpret AI in relation to their work engagement. Furthering our understanding of how AI and similar technologies in workplaces affects work engagement will provide designers a better foundation for designing such tools in respect of the workers' wellbeing. Addressing this gap, this study explores how Swedish IT professionals perceive and experience the role of AI in shaping their work engagement, using qualitative insights to complement existing quantitative research:

- How do Swedish IT professionals perceive the impact of AI on their work engagement?

The study makes four contributions through this. First, based on qualitative interviews, it shows how AI in IT work can function both as a resource and as a demand. The same technology can support employees in their work while also creating new challenges, depending on how and in what context it is used. Second, the study extends the job-demands resource model by showing that in digital work environments, resources and demands are often closely connected and influence each other, rather than being clearly separate. Third, we introduce the concept of *Digital Work Engagement*, describing engagement as a work experience shaped by employees' interactions and relationships with intelligent technologies. Finally, the study offers practical guidance for designers and managers on how to implement AI in ways that strengthen autonomy, professional development, and meaningful work, while reducing cognitive overload and concerns about reliability.

Background

In this study, work engagement is defined as "a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption" (Schaufeli et al., 2002). According to the Job Demands–Resources (JD-R) model (Bakker and Demerouti, 2007), work engagement emerges when sufficient job and personal resources help employees meet or buffer job demands.

The JD-R model remains a widely used framework for describing the causes and outcomes of work engagement (Bakker and Demerouti, 2007). The model has previously been used to study interactions with technology (Carlson et al., 2017, Oberländer and Bipp, 2022; Scholze and Hecker, 2024). It has also been adapted to focus on techno-work engagement as in work engagement during direct interaction with digital technology (Mäkiniemi et al., 2020) and AI work engagement as work engagement during direct interaction with AI (Li et al., 2024b). These definitions limit and further specify the scope of the concept and model without changing the structure or content of it. These previous adaptations have addressed the effects of digitalization on work engagement as the consequences of direct use of technology. Iterations with such constraints are unable to account for interactions that might be situated and contextual (cf. Abdelnour-Nocera and Clemmensen, 2019), ubiquitous (cf. Salber et al., 1998), complex and interdependent (cf. van Berkel et al., 2021), or entangled (cf. Frauenberger, 2019). As such, this study will use the basic model as it does not limit what interactions that are studied.

The model's most basic version comprises five parts: resources, job demands, work engagement, burnout, and organizational outcomes. Resources help you achieve goals and support your development. These are often split between personal resources that are aspects, skills, or traits of the individual and job resources that are aspects of the organization, workplace, and work process. Job demands are aspects of work that drain you physically or psychologically. Job and personal resources are balanced by demands, in that the resources lead to work engagement, while demands limit the extent. Similarly, job demands may lead to burnout, while resources limit the extent of that burnout. Work engagement leads to positive organizational outcomes, while burnout leads to negative ones.

Over the years, different model variations have been proposed and explored. These tend to vary in their structure. Since its conception, later iterations of the model have, for example, included individual outcomes that benefit the worker (Uslukaya et al., 2024). There has also been a differentiation between different types of resources as job resources cannot account for personal differences (Crawford et al., 2010) and individual differences in for example self-efficacy or conscientiousness have been shown to correlate with differences in work engagement (cf. Janssens et al., 2019; Macey and Schneider, 2008; Xanthopoulou et al., 2007). Similarly, job demands have been differentiated into hindrance and challenge demands based on whether they increase or decrease work engagement (cf. Crawford et al., 2010). Lastly, job crafting and self-undermining have been included in the model as positive feedback loops in that current work engagement and burnout affect future job demands and resources (Bakker et al., 2012).

A common criticism of the JD-R model is that if work engagement is a motivated mental state, there needs to be an underlying psychological process that causes the engaged state through the resources and demands available (Schaufeli and Taris, 2013). This motivational process is overlooked in the JD-R model, which is evident in the pragmatic nature of the model, as it focuses on describing and identifying the different endpoints without explaining the process of transitioning from one to the other. To answer this critique, theories such as self-determination theory (Deci and Ryan, 2000) has been used to explain the motivational process (cf. Bakker and Oerlemans, 2019). While the model can be supplemented with such theories to address this lack of explanatory power (Schaufeli and Taris, 2013), the pragmatic focus on the model on what, rather than why, makes it more approachable

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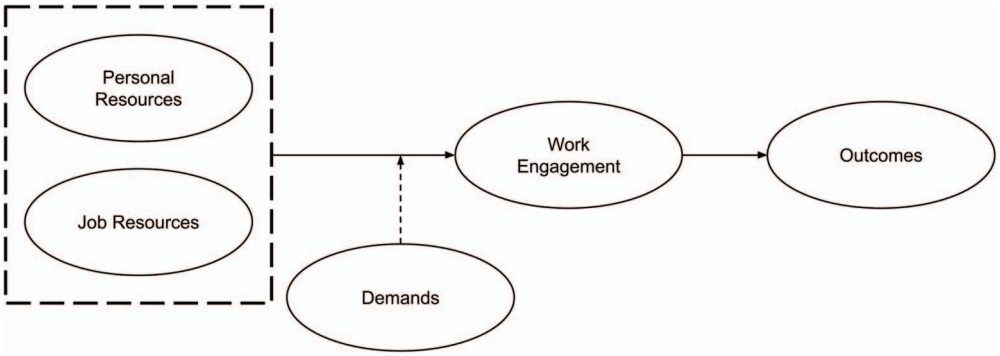

Figure 1 The motivational part of the Job Demands-Resource model. Adapted from Bakker et al. (2023).

and usable in everyday applications for improving workplaces' work environment.

There have also been studies done on work engagement in the IT sector without focusing on the role of technology. Many studies have investigated the outcomes of work engagement in various sectors, including a Dutch study (Van Zyl et al., 2021), which found that work engagement is a crucial driver of performance and innovative practices. Some studies examine the organizational qualities and their impact on work engagement, as seen in Bhuvanaiah and Raya (2016), who investigated the effects of transformational leadership and organizational culture on work engagement, as well as the impact of work engagement on job performance at an IT company in India. Their results revealed the relationship between organizational culture, work engagement, and transformational leadership, as well as the connection between transformational leadership, work engagement, and job performance. They did not find a relationship between transformational leadership and work engagement. There is also a smaller number of studies investigating the nature of work engagement in the IT sector, such as Gan and Gan (2014), which examined the sequential order of work engagement dimensions in the IT sector in China and the impact of various resources and demands. They found that the sequential order differed from the sequential order of burnout dimensions and that conscientiousness and extraversion predicted specific dimensions of work engagement. Similarly, studies have looked at how the use of AI and automation affect engagement in other sectors of work. Saha and Iqbal (2023) studied automated scheduling of focus time and found that it increased work engagement for information workers. Marimon et al. (2024) studied how workers perceived that generative AI as a coworker affected work engagement, and found that trust increased work engagement while usefulness and ease of use only did so indirectly. Li et al. (2024a) studied perceptions of algorithmic management in car hauling platforms and found fairness and appraisal of stressors as challenging to be resources and monitoring and appraisal of stressors as hindrances to be demands. Nadeem et al. (2024) found that digital transformations of work places to increase work engagement without breaking down what in those digital transformations had an impact. As seen here, studies differ in if they either position a type of technology as a resource or demand in its entirety or if they look at aspects of work that the technology might affect or be affected by.

This study primarily focuses on the motivational part of the JD-R model, where resources and demands affect work engagement and lead to outcomes (see Figure 1).

Method

The reported study employed a qualitative approach, using semi-structured interviews to understand how IT professionals' experiences of AI in their work practices have affected their work engagement. The sample consisted of 28 IT professionals who were recruited for the study in Sweden. The interview participants were recruited through a mix of convenience and snowball sampling. The participants' occupations were coded using the Skills Framework for the Information Age (SFIA) framework (SFIA Foundation, 2024) to ensure a wide range of interview participants and provide a deeper insight into the sample that the results and analysis of this study represent. Participants included, for example, solution designers, developers, digital consultants, project managers, business information managers, and business analysts. The sample size was determined based on the principles of information power and thematic saturation as interviews continued until no new substantial themes emerged.

The sample size was determined based on the principle of information power, which states that the more relevant and rich the data, the fewer participants are needed, and the principle of thematic saturation. After approximately 25 interviews, the researchers observed that no new substantial themes were emerging, and the incoming data largely reiterated previously captured insights. Three additional interviews were conducted to confirm this assessment. This saturation threshold supported the decision to conclude data collection at 28 participants.

The 28 participants in the study consisted of 8 women and 20 men with an average age of 44. Twenty currently work in a private company, and 21 in companies with 250 or more employees. The participants were recruited in Sweden. The participant information is detailed in Table 1.

The semi-structured interviews were conducted by three of the authors who have prior experience in qualitative research on digital work contexts. The semi-structured interviews followed an interview guide that consisted of five topics: questions on demographics, the participant's understanding of AI, work engagement, socio-technical dynamics, and professional development. As the interviews were semi-structured, the guide was intended to serve as a starting point and support for the interviewer, and as such, the interviewer was free to follow the guide in the order they saw fit. The guide was tested in two pilot interviews and refined accordingly. The interviews were conducted using Zoom or Teams. Each interview lasted between 30 and 60 minutes. The recorded audio files of the interviews were then transcribed using a GDPR compliant automatic transcription

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Table 1 Demographics of the interview participants (numbers in parentheses are the Skills Framework for the Information Age (SFIA) role).

#	Role and SFIA role number	Age	Gender	Org. size	Sector
1	System administrator (19)	37	Male	250+	Public
2	Service support (17)	36	Female	250+	Private
3	Business analyst (2)	53	Male	10–50	Private
4	Account manager (1)	50	Male	−10	Private
5	Project manager (15)	26	Female	250+	Public
6	Developer (6)	42	Male	250+	Private
7	Systems architect (21)	46	Male	250+	Private
8	Test specialist (23)	63	Male	10–50	Private
9	Solution design (24)	55	Male	250+	Public
10	Test specialist (23)	32	Female	50–250	Private
11	Project manager (15)	44	Male	250+	Private
12	Solution design (24)	48	Male	50–250	Private
13	Project manager (15)	45	Male	250+	Private
14	Service manager (18)	33	Male	250+	Private
15	Developer (6)	34	Male	250+	Public
16	Data specialist (28)	48	Male	250+	Public
17	Digital consultant (9)	49	Male	250+	Private
18	Digital consultant (9)	45	Male	250+	Private
19	Digital consultant (9)	28	Female	250+	Private
20	Enterprise architect (8)	41	Female	250+	Private
21	Chief information officer (4)	56	Male	250+	Private
22	Digital transformation leader (25)	49	Female	10–50	Private
23	Developer (6)	35	Male	250+	Public
24	Solution design (24)	44	Female	250+	Public
25	Digital consultant (25)	50	Male	250+	Private
26	Digital transformation leader (25)	49	Male	250+	Public
27	Business information manager (3))	35	Female	50–250	Private
28	Data scientist (27)	56	Male	250+	Private

tool. Transcripts were reviewed to verify accuracy and clarify any unclear sections.

To capture both expected and unanticipated aspects of participants' experiences, a combination of deductive and inductive thematic analysis was used, drawing inspiration from the distinctions in the early work of Braun and Clarke (2006). The Job Demands–Resources (JD-R) model (Bakker et al., 2023) was chosen to inform which segments that would be coded, while the codes were then inductively based on the data. As such, segments relating to job and personal resources, job demands, work engagement dimensions, and outcomes were coded. The JD-R model is well suited for this study, as it offers a flexible structure for analyzing how work engagement is shaped in knowledge-intensive, technology-driven contexts. In addition, segments relating to work engagement that did not fit within the framework were coded as well. This combination enabled the analysis to remain grounded in an established theoretical model while also being sensitive to contextual nuances, such as meaning-making, value tensions, and identity-related motivations, that are not fully encompassed by the JD-R categories. All coded segments were grouped and thematically analyzed to reflect both the theoretical model and the emergent patterns that extended beyond it. This process was done iteratively. In this, large themes were broken down into smaller themes to further nuance differences in the data. By the end, the analysis arrived on a total of 106 different codes and thematized into 20 themes. See the summary of themes and how it affects work engagement in Figure 2. Aside from the themes related to outcomes of work engagement, each theme consisted of at least three different codes. The themes related to outcomes had only one or two codes each as fewer participants discussed the outcomes of work but were distinct enough to not be grouped together. The initial coding and thematizing was done by one of the researchers, but iteratively discussed with the remaining researchers to find uncertainties, naming of themes, and lack of clarity until a consensus was reached. Preliminary findings were discussed with a reference group that included IT professionals and other relevant stakeholders. These discussions helped refine the themes and added support for the trustworthiness of the analysis. The researcher who did the initial coding and thematizing has a background in HCI and has previously worked as a software developer. As an example, the segment "*If we don't, uh, work with AI at all, I will be less motivated, right?*" was chosen to be coded as it showcased how AI can be a personal resource. One of the codes that segment was coded with was *Motivated by technology*. That code, along with the codes *personal interest, feeling excited, being curious and wanting to adapt*, were then thematized to the theme *Driven by tech*.

In addition to conventional qualitative methods, AI-based tools were utilized to support the research process in a manner that did not impact the core analysis. Verbatim transcription of interviews was conducted using Klang.ai, a GDPR-compliant platform with end-to-end encryption and two-factor authentication. All transcripts were subsequently reviewed and verified for accuracy by the researchers. Grammarly was used to enhance linguistic clarity of the manuscript, and ChatGPT (OpenAI) was used to critique the manuscript during preparation. No AI tools were used to analyze participant data or to generate thematic codes; all analytical steps were carried out manually by the research team.

The study was conducted in accordance with national ethical guidelines, and several measures were taken to ensure participant consent,

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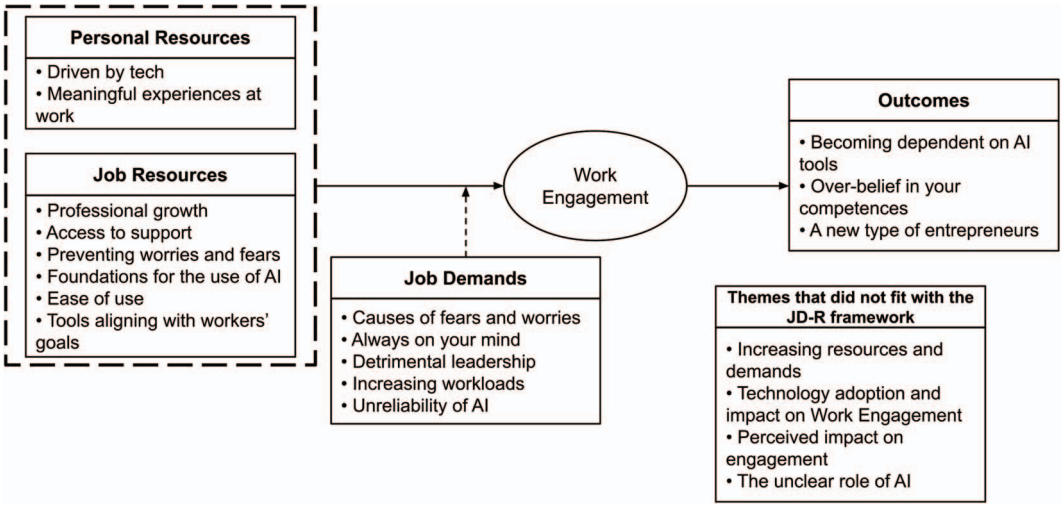

Figure 2 The themes from the thematic analysis and how they influence work engagement as seen through the JD-R framework. As such, themes in personal and job resources enable work engagement while those in job demands limit it.

confidentiality, and data security. Before participation, all interviewees received written information about the study. The information was also provided orally at the beginning of the interview for those who had not read the material in advance. Participants were informed that their involvement was entirely voluntary and that they could withdraw their consent without any consequences. Informed consent was obtained before commencing the interview. The transcription tools employed do not utilize input data for model training purposes. All transcribed data underwent a pseudonymization process to protect participant confidentiality, thereby minimizing the risk of individual identification. The study was approved by the Swedish National Ethical Authority (Dnr 2024-00609-01). As per compliance with National Ethical guidelines and requirements from funding bodies, the data are stored at a secure repository for 10 years following the study's publication.

Results

As part of the interviews, participants were asked to describe what they consider to be AI in the context of their daily work to frame what perspectives that were studied. Their responses reflect a wide range of interpretations, from simple rule-based scripts and process automation to more advanced data-driven systems capable of adaptation and learning. Some participants emphasized efficiency and reduced repetitive tasks, while others highlighted predictive capabilities and human-like reasoning as key features of AI. On one hand, this wide range of responses limits the extent to which the data can be summarized without losing those nuances. To support the reader in aligning what was said by the participants with their definitions of AI, each participants' descriptions are presented in Table 2 and all quotes in this chapter have the interviewee number alongside them. On the other hand, while these perceptions can make AI-based tools be seen as being somewhere between a resource or a demand, it was not as cleanly separated for most participants. As will be seen in the following findings, participants' perspectives vary based on the situated and negotiated practice the tools are part of and how the workers frame and relate to it.

Themes related to personal resources

These technologies influenced individual resources in two clear ways: driven by technology and meaningful experiences at work. Both were focused on participants' perception of what was meaningful regarding their engagement and technology.

Driven by tech

Some participants expressed that they found new technology interesting or fun, which sparked their curiosity and motivated them in their work. For instance, participant six stated "*If we don't, uh, work with AI at all, I will be less motivated, right?*." With a similar sentiment, participant seven highlighted the engagement among those interested in new technologies: "*I think it's nerds like me who appreciate these AI possibilities. that we get from the employer. And the rest don't care that much. They don't feel threatened or affected by it. I think it's just those who are technically interested and see opportunities, they see this as something very positive.*"

Meaningful experiences at work

The other clear impact on resources was that the technology improved the experiences they found meaningful or made these experiences more common. The specific experiences were varied between participants. For example, participants wanted to feel that they were on the forefront or that they were innovating. Others expressed that they wanted to help people, do good or improve society. Some also mentioned being part of a team, as participant 20 noted: "*Then there's the fact that we work a lot in teams and it's fun to sit together and create something. And AI, absolutely, could do it efficiently, but it's not as fun maybe.*"

For some, the meaningful experience was an integral part of the work itself, which could then be given more attention. For example, participant 12 stated that "*I feel strongly that it has a net positive, or would likely have a net positive on my efficiency, and being able to focus on higher level problems, then I think that being able to continue to develop in that space, then I would be more engaged.*" Similarly, participant seven mentioned being able to do better deliveries: "*it makes me better and that motivates me. I deliver my delivery, that sounds*

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Table 2 Definitions of AI made by the interview participants.

#	How they define AI
1	Generative tools
2	Utilization of data for automation
3	"It's helping me come to a come up with a solution now, whether it's done it itself or it's contributed to that."
4	Tools that adapt and get better over time as I use them.
5	AI is one "tool that allows for the possibility to simplify for people in the system, or to develop the system with the help of it in order to further optimize the system and increase its efficiency."
6	AI simulates the human brain by being data-driven instead of rule-based.
7	Summarizes large amounts of information relevant to what is asked for.
8	Something that relies on gigantic amounts of structured data instead of thinking.
9	A support or a tool could be a general intelligence or machine learning, depending on when you ask.
10	A tool that helps gather information and express ourselves.
11	Digital intelligence that draws conclusions based on training from data. Uses AI or machine learning depending on context.
12	Either algorithms in games that do not qualify as AI, or pattern recognition using machine learning.
13	A tool in your toolbox. It interprets things it receives, and you can use it in more ways.
14	Hard to pinpoint. Universal tools are generative but must be adapted and integrated to each case.
15	Do not use the term AI with its connotations, prefer using specific concepts like large language models or statistical models.
16	Broad category of methods, intelligent search for a solution with randomness in variables.
17	When a machine is made to make its own decisions. OR mathematical guessing based on previously interpreted data.
18	Few of the systems that are called AI are AI.
19	The times when I feel myself "now I'm using AI" are when I browse to ChatGPT and write, give me this or explain that or whatever it might be.
20	The simpler forms of AI are not really AI to me at least, just smarter automation, maybe.
21	Currently focused on chatbots.
22	An intelligence that we can both control and not control.
23	A buzzword, it is pretty broad. Generative AI nowadays, smart solutions to problems previously.
24	Enabler of the use of qualitative data, but dependent on data on site.
25	So broad that it lacks meaning. It could entail anything. It used to imply specific techniques. Now it could include anything that would require a human to put in cognitive effort to accomplish.
26	Umbrella term, from generative AI, to classical rule based systems, to digitalization. Important to be more specific.
27	Use of intelligent programs to make decisions.
28	It is about helping humans make decisions in intelligent ways.

quite formal, but my delivery to whoever it might be, project or employer, gets better and that motivates me. I do a better job." In all of these cases, the emerging technologies provided participants with more meaningful experiences in their work, regardless of what they found meaningful in it.

Themes related to job resources

The use of AI has influenced resources in work practice and organization in multiple ways. The first three themes primarily concern resources within the organization and job, while the latter three relate to resources associated with the type of technology and its design.

Professional growth

Most participants echoed that professional development and experiencing what you are developing were necessary for their engagement. As such, participant 26 described it as "*from my perspective, competence and feeling like you are part of the game in some way is important for engagement.*" *In contrast,* participant 12 stated it more explicitly: "*So I think I'm engaged because I am learning*." Participant 25 saw similar tendencies in their coworkers: "*there is a strong correlation between professional development and engagement. I believe that if one feels they are not developing or learning, I think they will lose engagement. I generally think so.*"

Other participants highlighted the need for growth opportunities. For example, participant 12 stated, *"I think if I weren't in those opportunities, I would probably get pretty bored.*" Participant six even felt that the opportunity for growth in this area was insufficient: *"I get the opportunity to learn something about AI in my current team. But still, that's not enough. I hope we can work more with AI in future. So meanwhile, I'm reading some books about AI during my spare time so that I can keep myself updated.*" As seen here, the participants found that professional development was necessary for their engagement, and that these new technologies were a new area to learn and develop in even if the need for that growth was not visible enough to some.

Access to support

Having support from coworkers, managers, and the organization in using technology was clear to the participants. Participant 2 highlighted that she had coworkers she could rely on: "*There is a lot of in-house support from people with more experience, but also, foremost, more experience, but also more insight into what is needed.*" There were many different ways and cases where the support mattered, as discussed. For instance, participant five stated, "*It feels incredibly important to be at a workplace that constantly encourages learning,*" and participant 17 described similar experiences: "*The colleagues that I have talked to who use it, I haven't heard anyone who has a negative experience. Then you can also share experiences with each other and get tips.*"

In addition to having access to support from coworkers and the organization, the technology itself was reported to have replaced some parts of the support that participants usually got from coworkers. Participant 12 had such experiences when his company tried out a system: "*For a couple of the services that we use they have implemented*

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a co-pilot bot to help with just learning the system and doing some more complex tasks. But it was just a trial."

Participant 16 noted that specific support tasks had been replaced: "*We have streamlined certain inquiries, help support and such*." While participant 23 saw the differences between developers of different experience: "*I think that AI makes it so that more experienced developers are not bothered as much by the less experienced ones which I believe contributes to a more positive relationship.*"

When it comes to gaining support from technology or organizations, many participants stressed that it was vital for them to be allowed autonomy in their work. For example, participant 20 felt that she enjoyed her freedom, "*It's not that my leader has forced me to take on these tasks. I have largely created my daily routine myself, with the support of my leader,*" and participant 11 felt that he had gotten more control over how he used AI: "*Especially how we make decisions and what we base decisions on. That has sunk in at the company. When it comes to how we ourselves use AI.*" As highlighted here, the participants described how these tools can both require support and offer autonomy from coworkers and managers, as well as the fact that the tools can sometimes replace the need for support.

Preventing worries and fears

Participants mentioned two main ways, *mature and secure tools* and *signs of being irreplaceable*, that tools and their organizations could lessen or prevent their concerns and worries. Although these worries and fears are experienced by the individual, the organization's approach to managing technology and intrinsic characteristics of tools used within the workplace were described as the source of those concerns. Early adoption of tools that had not yet matured was a concern for some participants. Similarly, the insecurities built into these tools regarding IT security were also a cause for concern. Participant 24 also mentioned the risk of low quality training data, "*the risks of really wanting to use AI, leading to using it on poor data, you get a basis that isn't correct and then make decisions or do things based on that. I see that as a big risk*" (participant 24).

Participants also discussed the potential future of their profession in relation to AI, with one participant stating, "*I think the only probable thing we need to be careful about is [...] if this takes off, we will not be needed*" (participant 21). But, participants who expressed that they did not believe that AI would replace them were also less worried. Participant 27 said that, "*Personally, I don't think it will work that well. Instead, it is more of a tool to possibly be more effective, more creative and come up with ideas. So therefore I'm not that scared of it.*" As seen here, these worries and fears can be mitigated by the design and integration of automation and AI tools into the workspace.

Foundations for use of AI

If workers are to utilize a specific technology, such as AI, the technology must be perceived as applicable to the worker, and they also need access to it. Participant 27 stated that, "*If one is at a company where one can't use AI at all because they don't have the tools, or so, then one won't learn.*" As expressed by participant 25, it is also crucial that the added value of engaging with the technology is visible, "*I had a little lecture today, we had half an hour, I showed and told some. And those individuals afterwards, it felt like there was a before and an after. 'Huh? Can you do this?' And I think that's a sign of engagement*. Furthermore, it is also important that professionals are informed about how the technologies can be utilized. For example, "*We could leverage AI more internally if we made a bigger effort to educate and drive and explain and help people get started*" (participant 11).

Participants further emphasize the need for professionals to understand the tools: "*You do still need to learn the tool. Even if it is alluringly simple to use. There is a need for expertise; how do you phrase these questions and how do you generate the answers*" (participant 9). Participant 18 also discusses the need for a critical perspective on AI and the importance of a basic understanding of the technology, "*I believe you must still know what you're doing and be critical. I don't think that if you don't have basic understanding, you can see the output for that.*" Participants also described the company culture regarding these tools as part of the foundation for AI use, "*the biggest challenge for me and many others is not just to have a case that a consultant comes in with, but to build it into the culture of a company. Because if you don't succeed in this, you will have a case that will die*" (participant 28). As such, the use of AI tools requires that the workers adopt the technology for it to be a job resource.

Ease of use

That being said, the threshold for starting to use these technologies is often relatively low, limiting the need for specialized skills and effort required to get started. Participant 9 expressed this as "*grasping chatGPT and these helpers, so to speak, is quite easy. One just writes natural text. It's quite easy. There's no direct threshold to it.*" Participant 23 further stated that, "*So you can discuss more with AI, which makes it much more natural for me who uses it, compared to a Google search, of course.*" While none of the participants directly described this low threshold as impacting work engagement, multiple participants described how these tools are convenient and accessible. For example, participant five said, "*I would say that it's more of a laziness factor, ChatGPT for me. That it can give a brief introduction to a topic*." While this theme appeared less impactful on the participants, the low threshold to start using the tools made them feel within reach and effortless.

Tools aligning with workers' goals

Almost all participants had found ways in which technology helped them achieve their work goals, but the methods they employed varied. Some of these included the technology making new outcomes of work possible or improving the quality of participants' work outcomes. The tools empowered participants to work outside of their expertise, as described by participant three, "*I've found it very useful for doing things which I have never done before and have no idea about.*" Participants commonly mentioned that these tools made their current work practices more efficient and productive, often by reducing the workload or removing tedious or time-consuming tasks. Participant 4 expressed this as "*minimizing use of work done on easy tasks that are maybe repetitive or you know, for example, answering emails with short replies or things like that. I think that will help.*" It could also be to aid with the mental load of their work, as expressed by participant seven: "*AI helps me to think of all parts of something. A checklist, a document structure, whatever it may be. So that I do not forget things.*" More specifically, the tools improved the workflows for the participants.

For others, the tools aided in decision-making and problem-solving. One who used it in decision-making was participant 28, who stated that "*actually, I use to say that it is about decisions, [...] in an intelligent way, imitating and automating decision making. Imitate the human capability for decisions, but with data and a purpose*." Participant 17 used it in problem solving, explaining that "*I like solving problems. I still manage to solve problems faster. And that's what drives me in a way, that's why*

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I keep at it and work on what I'm working on. Solving problems is fun." Multiple participants mentioned that AI tools can sort through large amounts of data, analyze it, generate content for you, and validate what you have already done. Some participants also brought up that it helped them get started or provided inspiration: "*I use it as some sort of aid to kickstart the brain office, so to speak, in areas where I don't know. That's most things*" (participant 14). As seen here, there are numerous ways in which AI facilitates work processes and the achievement of work goals for participants.

Themes related to job demands

In the interviews, multiple ways that the presence of these technologies in work required effort or skill, or came with additional physical or psychological costs, were discussed.

Causes of fears and worries

Participants experienced both fear and worry related to various aspects of the presence or use of AI in their practices and workplaces. Overall, this was more about the presence of these technologies, rather than their use in most cases. The most severe concerns they had were being replaced or the potential for these tools to become dangerous to society or the current industry practices. But the fear of being replaced was mostly perceived among coworkers and not something that the participants themselves felt: "*there is a sense of widespread concern as well. When it comes to the IT industry as a whole, I can feel that there are probably some people who are slightly stressed. But not near me*" (participant 11). While many were concerned about the future, they were not sure how realistic it was. For example, participant nine expressed that "*if we manage to create a general intelligence and human beings are no longer the most intelligent it could possibly mean a problem for humanity on a global scale. But that danger, I can't quite see it with Chat-GPT.*" These worries about macro-level issues encompassed a range of concerns, from discussions about how the current market model might not be sustainable to the loss of personal autonomy, such as the erosion of competence and knowledge when everything is handed to us.

Regarding work practices, there are concerns and fears about more hands-on involvement. Some felt less in control: "*It's a bit scary. I still feel like I want to be in control*" (participant 22). Others worried that the systems were less secure to use: "*I'm scared it might cause carelessness and mistakes in the future, which are security vulnerabilities*" (participant 18). The loss of social habits and support in work organizations was also a concern that was discussed. For example, participant 18 said, "*I think that the relationship between younger and older people is lost. At least in the beginning, on the simpler tasks. It's not entirely optimal.*" Some even experienced that it feels unfair to use: "*it always feels a little like cheating too, still. I don't know when that feeling will let go*" (participant 26). This theme highlights the extent to which AI can lead to fear and worry about the work practice directly and about the consequences on a larger scale.

Always on your mind

Using these technologies requires us to exert more psychological effort and skill in our work, as we must constantly consider them, in addition to the previously mentioned concerns. The central point is that these tools are demands as they always require you to be careful and critical when using them. Critical was mainly about constantly having to reflect on the outputs of AI tools. Participant 20 expressed this as "*We will always need to review, like what comes out from these different tools and check, still keep this source criticism.*" However, participants felt that they needed to be cautious when using these tools as well. Participant 19 expressed her reason for being careful as "*you don't want to make a mistake and I'm quite new to the company so I want to be a little careful with, like, where the information ends up before you maybe understand it fully.*" This was evident in that many participants were required to consider compliance documents and guidelines when using these tools on a regular basis. For companies that had not yet introduced compliance guidelines, it was still a strain as participants were tasked with considering what they were allowed to do. Participant 11 mentioned that "*I am a manager of those who primarily use AI technology. For me, AI has resulted in me ending up in various tricky questions around legal aspects.*"

Some participants provided examples of how using these tools reduced their mental load. Participant 23 felt that it required the same amount of insight as before these technologies to use them well, "*So that you must strain yourself almost equally hard to understand the problem and understand the solution as one does before*." Participant 18, on the other hand, felt that it was hard to remember all that he gained from it, "*But then when you have a discussion it's difficult to remember or save that information in a good way,*" and had started to copy good discussions into a document to remember those answers. In summary, while these tools automate work tasks and facilitate work, they also require mental effort to use, as care must be taken in their use, and constant critical reflection is necessary.

Detrimental leadership

Participants described several ways in which the leadership was struggling with these technologies. These actions and attitudes of managers and leadership became demands as they reduced participants autonomy, which in turn made the participants experience less work engagement. The first and most straightforward is when managers and leaders act on the hype of the technologies without actually understanding the uses, values, and problems that come with them. Some examples of these were "*It depends a lot on how the boss thinks about whether one can replace it, for nothing can really be fully replaced in any way*" (participant 15) and "*we're not letting through anything that doesn't have AI in it*" (participant 20). This can also lead to workers being forced to adopt these new technologies in their work practices. Participant 21 mentioned how this change will be hard to resist: "*if there is anyone who wants to resist it, it will be quite impossible, I think, in the next few years. So we will just make sure that everybody has the possibility to actually, you know, embrace it and be ready for it.*" Many participants had coworkers who were reluctant to adopt these tools.

Some saw that these technologies led to their work practices being more controlled and that the leadership's expectations of their workers grew. Participant 28 expressed that too controlling leadership was a concern: "*We noticed that in some of the traditional hierarchical organizations, there were pretty many managers that did not allow their personnel to harness the potential that exists in these new technologies.*" Participant 17 also expressed that: "*We have no support at all from the employer. Or rather, resistance when it starts to cost money.*" Participants expressed that managers expected more out of their workers simultaneously. At the same time, they had insufficient time for the work they were expected to do.

Participants reported that these technologies led to conflicts of ownership in some workplaces. The ways managers handled these

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conflicts did not always yield successful outcomes. Participant 28, as a manager for an analytics unit, was aware that he was unsure about how to handle these conflicts. "*When we find new cases, who will own them? There will be new questions that we have never asked before actually because you can do new things*." Similarly, participant 21 had experienced these conflicts as well: "*there was a period of time where basically people started having conflicts. So, everybody was pushing for different things because everybody wanted ownership of these new, cool things to work on. So that's when we understood that we had done it wrongly, because it was too much of our discussions on who should own it, who should do things, rather than how do we do it."* As described here, some practices of managers and those in leadership positions can be detrimental to workers' engagement in light of these technological advancements. These practices include increasing their expectations of their workers' performance, a heightened belief in the capabilities of new technologies and tools, maintaining too high a level of control over their workers, and not being prepared to deal with conflicts over ownership of the technology.

Increasing workloads

To begin with, many participants found that these tools did not always work perfectly out of the box and required effort, time, and resources to use them effectively. This was both upfront and also during each time they are used. As such, these tools often create more work and new tasks that need to be done, even if they might replace or reduce other tasks in the process. Participant 4 began to say that he got less to do, but caught themselves noting that the increase in efficiency did not reduce his workload. "*The goal for me is [to have a] fast turnaround on work. Basically, that's the main issue to be, you know, quicker, um, so, lessen my workload as such. Yeah, well, not lessen it, but I, to get more things done, you always have plenty to do.*" Many participants saw it as a requirement in their position to stay ahead of these developments.

Unreliability of AI

The unreliability of AI was another demand that required effort to handle. Participants highlighted that these tools and models lack transparency, which makes it unclear what is happening. Furthermore, participants noted that the output does not always meet expectations, which can be frustrating, as participant 23 mentions: "*You keep grappling with ChatGPT for half a day and just go around in circles* [...] and *it would have been easier and faster to just Google and read documentation.*" Sometimes there is also a lack of connection between the output and the real world, as participant 15 noted: "*You often end up in strange situations with them [...] So they suggest a function you might not know about, or sometimes a function that does not exist.*" Not all topics have sufficient good training data to make them reliable on those topics, either. Participants mention Liquid and CSS code as examples of this: "*there are actually not many who are good at CSS. So much of the CSS code you get when you ask for CSS code, especially when asking for more modern CSS code, doesn't work that way at all*" (participant 15).

Similarly, people experienced concern about less experienced coworkers using these tools without understanding the consequences or implications. Participant 8 described this from when he tried to get personas from ChatGPT, "*Then I had fallen into the trap and started acting like a typical phone camera user is a professional photographer. But that's not the case. So I don't know if anyone else would have stopped and noticed it [...]. They possibly had bought that one, I don't know. It is riskful, I would say. Professional expertise is required to know if it is correct and if it is what you should focus on or not.*" Many of the participants still felt that it was a net positive. However, it was unreliable, such as 23 who said "*it definitely doesn't always go faster. But that's the goal. If I experienced every time that it wasn't faster, I wouldn't have used it.*" While these tools can often be beneficial for workers, they are often experienced as unreliable, requiring more effort from workers than handling tasks manually from the start, and unpredictably at times which prevents workers' work engagement.

Themes related to outcomes of work engagement

While few participants mentioned the consequences of their work engagement, three types of impacts were mentioned to varying degrees: that workers began to feel dependent on these tools, that less experienced workers might overestimate their capabilities based on these tools, and that the tools have the potential to create new types of IT entrepreneurs.

Becoming dependent on AI tools

Some participants discussed feeling or seeing that the experience of having and using these tools made them rely on them, and that they did not want to lose the tools or miss out on learning more about them. Participant two answered, "*It would be devastating, if we were to backtrack there in our industry where we must be at the forefront [...] then I probably wouldn't want to work there,*" when asked what would happen if she stopped using AI. Other participants expressed similar notions of what would happen if they stopped using AI. Participant 11 also included his team in this notion: "*They would feel as if they missed the train and became completely uninteresting on the job market. They would lose work engagement and quit my team if they didn't do this. It's absolutely central that it happens. I could have the same thoughts, too. They would arise in me as well. To question the commitment and the company if they didn't do this."* The empowering and facilitating nature, the feeling of being on the forefront of technological advancements, and the low threshold for using these technologies made many workers feel dependent or reliant on these tools.

Over-belief in your competence

It was also mentioned that these tools could empower less experienced coworkers to a point that they became overconfident in their perceived abilities. The ease and accessibility of such tools could create an impression that deep expertise is no longer necessary. As one participant put it: "*I don't know if it will become even more so in the future that one thinks this way, I can take this course in a few weeks, and then I have AI. So the question is whether the quality will deteriorate. [...] Why should I sit and take student loans for four years, and then, I can still do the same job anyway?."* While not a dominant theme, several participants suggested that AI might lead to overconfidence, making less experienced users underestimate the value of formal training and critical thinking.

A new type of entrepreneur

Some participants, though only briefly mentioning it, recognized the potential of these tools to foster engagement and empowerment. They believed that such tools could enable individuals who previously lacked opportunities to become entrepreneurs. This was, for example, expressed by participant 25: "*So, having access to knowledge and ability, this is what I mean by intriguing, how will it impact business development? How will young entrepreneurship change in the next ten years?*

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Thanks to tools like this. I think there will be huge consequences. [...] the economic development will be able to take a significant leap forward in the next decade. It's intriguing."

Themes that did not fit with the JD-R framework

Much of what was discussed in the interviews did not entirely fit with the JD-R model. The first three themes presented below suggest differences in the relationships between the model's parts. The last theme relates to the variations and differences observed between individuals and cases in the interviews. In addition to this last theme, a lot of the discussions highlighted how situational these experiences are. Additionally, a few participants did not feel that the emergence of AI and generative AI had significantly impacted their work or work environment.

Increasing resources and demands

Some of the resources seen were not as straightforward as often described in the literature, as evidenced by the theme of increasing resources and increasing demands. This primarily relates to resources in the theme of tools aligning with workers' goals, leading to increased productivity and efficiency. While they were seen as meaningful, facilitating the achievement of work goals or reducing the effects of work demands, they also led to increased demands as the increase in productivity caused more work to be done, a higher concentration of complexity, and higher expectations. Similarly, reducing or eliminating tasks that are perceived as repetitive, time-consuming, and unchallenging. The time typically spent on these tasks was instead used for tasks that the participants found more valuable but also demanding, as exemplified by participant 9: "*When you code for example, it can generate code and the code is often very good. Then you don't have to write it yourself. You focus on these more complicated cases.*" As described here, there appears to be a tendency for organizations in the industry to meet the productivity and efficiency gains from these technologies with increasing demands and expectations on their workers, which suggests interactions between job resources or organizational outcomes and job demands.

Technology adoption and impact on work engagement

The theme of Adoption of technology and its impact on work engagement highlights that these resources and demands require the existence of clear use cases, and access to relevant tools and that the value in using these tools is visible. Otherwise, the technology cannot be adopted and utilized, and workers may not realize that it affects work engagement at all. As such, if these were not provided, AI was seen to neither affect resources nor demands. Participant 26 provided one example of how this differed in different parts of his organization: *"Education is a bit more challenging, and so is administration. Today, we do not have sufficient infrastructure there to adopt what we need in the future."* Based on these findings, it appears that adoption plays a significant role in work engagement, as these technologies must be accessible to workers and offer them visible value and utility to positively impact their engagement at work.

Perceived impact on engagement

Only a small subset of the mentioned resources and demands were explicitly mentioned as affecting the participants' work engagement when asked, as seen in the theme "What you perceive impacts engagement." When asked about what drove their work engagement, almost all participants said that their work engagement stemmed from either their interest in technology, being fulfilled through their work, or having meaningful experiences while working. The opportunity to explore or use these new emerging technologies was essential to the participants who were directly driven by technology, as exemplified by participant six, who stated, "*If we don't, uh, work with AI at all, so I, I will be less motivated*." On the other hand, people who said that specific types of work experiences drove them to find meaningful work described how AI often increased the availability of such opportunities. Participant eight expressed this as, "*I feel that my great engagement actually has to do with being able to use AI in the services and products that I am involved in developing, so that they can use it to their benefit without them knowing*." Although most participants discussed how these tools facilitated their work goals or alleviated their burdens, this rarely came up when they were asked directly about their work engagement. A few even expressed that those aspects of these tools were not engaging them. What people find drives engagement is what is meaningful in their work, such as fulfilling technological interests and having impactful experiences, which do not necessarily come from resources that facilitate work goals and reduce the impact of demands alone.

The unclear role of AI

The unclear role of AI highlights the inconsistent use of the term and the significant differences it causes in how it is perceived. It ranges from it being described as here to stay: "*I see AI as something that is here to stay and will develop and something that will become a given*" (participant 2), to being overhyped or a temporary fad: "*we have AI in our solution, so it's good. It doesn't mean anything when you just say those two letters like that*" (participant 25). However, these different perspectives are further separated from one another, as participants were inconsistent with each other in their understanding of what AI meant (see Table 1). The inconsistent use of the term and multiple perspectives on AI are not only making the phenomenon harder to study but also seem to influence work engagement differently, depending on how it is perceived.

Discussion

This study describes that workers in the Swedish IT industry perceive that AI affects their work engagement in multiple nuanced ways. The results show that AI is neither seen as just a resource nor as just a demand for work engagement, but often both in different nuanced ways. The way that work engagement is affected depends both on how the tool is designed and how workers interact, directly and indirectly, with it. The paper uses the JD-R model to illustrate a wide variety of ways that IT workers experience how AI affects work engagement. Additionally, a need to conceptualize Digital Work Engagement was perceived based on the study's results. This perception is grounded in how the current conceptualization of work engagement limits how well it can account for how interactions and relations to technologies affect workers' engagement. This is further detailed in the following discussion.

Some of these findings are also found in previous research on how digitalization influences work engagement in the IT sector. For instance, the theme Ease of Use is similar to findings by Mehta (2021) on how convenience in remote work and by Deepa and Dharshini (2024) on how flexibility impacted work engagement. Furthermore, similarities can also be seen in the theme Access to

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Support to research on impacts on work engagement in remote work in the IT sector. Examples are Mehta (2021) and Tokdemir (2022) studying being allowed autonomy or decision latitude, Alok et al. (2024) investigating having support in the use of technology, and Gaan et al. (2024) looking into having resonant leadership. The theme on Tools Aligning with Work Goals is supported by Saha and Iqbal (2023) who tested how automatic scheduling of focus time impacted work engagement for information workers. Tokdemir (2022) also found that remote work did not only affect resources as it also increased job strain, which is similar to the theme Increasing Workloads in this study, and showcases the duality of the theme Increasing Resources and Demands as these technologies can simultaneously increase and decrease engagement in complex ways.

Some of the themes are also supported by studies on the impacts of AI on employees' work engagement that are not limited to a specific field of work. Marikyan et al. (2022) found that the perceived satisfaction with digital assistants increased workers' engagement and Marimon et al. (2024) found that trust in generative AI influenced work engagement. These findings are similar to how this study identified the theme Unreliability of AI as decreasing engagement and illustrates the importance of the themes Preventing Worries and Fears and Causes of Fears and Worries. Furthermore, Liang et al. (2022) found that service industry workers' worry about being replaced could both be a resource and a demand depending on how prepared they were for such circumstances. While that is in another field of work, it still showcases the importance of handling worries and fears in careful ways to prevent them impacting work engagement negatively. Stamate et al. (2021) saw that perceived usefulness of AI was positively related to job resources and Marimon et al. (2024) found that the usefulness and ease of use of genAI as a coworker impacted work engagement as well. Both of these studies are in support of the theme Ease of Use.

While previous studies have explored the impacts of specific job resources and demands in relation to either the IT sector or AI and automation, it has not previously been studied at this width. This study offers several novel contributions. It is the first to comprehensively map how AI simultaneously functions as both a job resource and a job demand across a wide range of interrelated themes, illustrating the dual nature of AI in shaping work engagement. In particular, we introduce the concept of Unreliability of AI as a distinct and underexplored factor that negatively affects engagement—highlighting how lack of trust in output, technical inconsistencies, and opaque functioning can erode motivation. We also show that worries and fears surrounding AI, often framed as stressors, may also act as motivational drivers when proactively addressed—suggesting a more dynamic role for these experiences within the JD-R model.

Moreover, our findings reveal that work engagement in AI-mediated IT roles is shaped not merely by task-related efficiency but by deeper personal and emotional factors. Participants described how AI enables more meaningful and value-aligned work, fosters curiosity and continuous professional learning, and inspires a sense of being on the frontier of technological progress. These insights go beyond the traditional resource-demand framing by identifying emergent motivational conditions such as identity, autonomy, and psychological resonance. Lastly, the study finds that these themes often do not act in isolation, but instead form situational constellations—ease of use, access to support, and sense of purpose frequently co-occur and reinforce each other. These patterns suggest that AI's influence on engagement is not linear but deeply contextual, reinforcing the need for a new conceptual framing, such as Digital Work Engagement, to better capture this evolving landscape.

Beyond the JD-R model: meaning, motivation, and AI at work

While the JD-R model offers a pragmatic framework for analyzing work engagement, our findings suggest that it does not fully account for how meaning and motivation are experienced in AI-infused work settings. First, the participants pointed to personal meaning, curiosity, and value-driven motivations as key drivers in their AI-mediated work. Instead, Bakker and Demerouti (2007) limits job resources to things that either are "functional in achieving work goals," "reduce job demands and the [...] costs," or "stimulate growth." These observations align with longstanding critiques of the JD-R model's limited attention to the underlying psychological processes that drive engagement (Schaufeli and Taris, 2013). Rather than being primarily motivated by reduced demands or enhanced efficiency, participants in this study expressed they experienced work engagement when their work aligned with personal values or offered opportunities for exploration and meaningful contribution. This resonates more closely with Kahn's (1990) foundational theory of engagement, which posits that individuals engage more fully in work they find meaningful, psychologically safe, and where they feel able to express themselves. Similarly, Self-Determination Theory (Deci and Ryan, 2000) gives a theoretical foundation for how the need for meaning and autonomy has a role in our experienced work engagement (Meyer and Gagné, 2008). Second, participants in this study often described their engagement in terms that extend beyond the categories of demands and resources, showcasing that AI in itself is neither just a resource or a demand. At the same time, one interaction with or relation to AI can as such be a resource while another a demand. This goes against Bakker et al. (2023) who argue that actions and behaviors are not resources or demands and do not affect work engagement as they are not characteristics of work or the individual. But as seen here, it is not enough to handle technology at work as a big black box regardless of how it is used. Instead, in order to see how technology affects our work engagement, we need to break down how it is used by us and others. As such, JD-R does not only overlook the psychological processes, but also the role of interaction. While Kahn (1990) and Self-Determination Theory (Deci and Ryan, 2000) provide tools to break down the psychological processes, neither break down the situated interactions and relations with technology and how they matter.

This study demonstrates that the established JD-R model provides a foundation for understanding how AI influences work engagement. However, the results also suggest that highly digitalized work contexts introduce specific conditions that the traditional JD-R framework may not fully capture. In particular, AI appears to blur the boundaries between demands and resources: for some professionals, automated systems reduce repetitive tasks and enable more meaningful work, yet for others, the same systems increase cognitive demands, uncertainty, or fear of skill erosion. This duality indicates that the digital work environment may shape how workers experience and negotiate engagement in ways that extend beyond the general categories of demands and resources as typically defined. This is further exasperated by organizational practices surrounding automation and incorporation of AI in work practices that pushes for higher work loads while making menial work tasks redundant. As such we need to continue on from previous attempts to address direct interactions with

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technology on work engagement as framing what is studied (Li et al., 2024b; Mäkiniemi et al., 2020) towards breaking down how those interactions with technology shape engagement. Studies of the role of AI in work engagement need to begin embracing interactions that are situated and contextual (cf. Abdelnour-Nocera and Clemmensen, 2019; Clemmensen et al., 2016), ubiquitous (cf. Salber et al., 1998), complex and interdependent (cf. van Berkel et al., 2021), or even entangled (cf. Frauenberger, 2019).

Based on these insights, there is a need to further conceptualize Digital Work Engagement as a phenomenon that reflects how engagement is enacted and maintained in settings where work is deeply intertwined with dynamic, intelligent technologies. As such, we define digital work engagement as "a positive and fulfilling state of mind that is characterized by experiencing vigor, dedication, and absorption based on the worker's interactions with and relation to technology in the workplace." This definition puts digital work engagement as a type of user experience at work, as has been emphasized by Simsek Caglar et al. (2022) as a contemporary research gap. Such a concept could refine the JD-R model by accounting for the specific digital affordances, continuous change, and evolving skill requirements that characterize modern IT work. Future theoretical and empirical work could build on this study to develop and validate Digital Work Engagement as a construct, clarifying its unique features and implications for motivation, well-being, and performance.

Through this, digital work engagement is distinct from similar terms such as techno-work engagement, digital employee experience, employee engagement, and user engagement. As previously mentioned, techno-work engagement describes experience of work engagement when working with digital technology (Mäkiniemi et al., 2020). In comparison, digital work engagement is not limited to direct interaction with technology. Therefore, techno-work engagement is a part of digital work engagement. Digital employee experience is the holistic perceptions of workers based on their understanding of direct and indirect digital touchpoints (Gheidar and ShamiZanjani, 2020). While both concepts are based on both direct and indirect connections to technology, the concepts differ in multiple ways. Digital employee experience is another concept based in HR research. It does not limit what type of experiences it contains and does not include cases where the technology might be ubiquitous or embedded which can cause the worker to be unaware of it. In contrast, digital work engagement specifies what type of experience it conceptualizes and does not dismiss cases where the worker might not be fully aware of the existence of technology. User engagement is often defined in the lines of quantifying valuable interactions with technology (Lehmann et al., 2012). Similarly, employee engagement conceptualizes the employees' commitment to the organizational cause (Kosaka and Sato, 2020). Digital work engagement is not intended to be a metric of use or of commitment to companies values.

Implications for designers and organizations

The practical implications of these results highlight various ways that AI can either enhance or hinder work engagement in the IT industry. Developers, Managers, and unions can consider these insights when integrating AI into IT workplaces. The themes on which these insights are grounded are detailed in parentheses. To provide the opportunity for AI to enhance our work engagement, developers, managers, and unions need to ensure that tools are provided to workers that they either know or can learn to use (Foundation for Use of AI, Technology Adoption and Impact on Work Engagement), and that the value added by these tools is visible to those expected to use them (Tools Aligning with Workers' Goals).

Designers of these tools should begin exploring ways to reduce the cognitive effort required to use them securely and reliably (Always on your mind). This does not mean that it is enough to just lower the barriers of entry for these technologies further. Workers whom they empower might overestimate their competence and efficacy, and act carelessly due to not understanding or critically reflecting on the output of generative AI or code completion, which can have severe consequences (Over-belief in your competence). Another significant issue is that the current AI is often perceived as unreliable and lacking transparency. The first forces users to constantly be critical of the outputs of such systems (Unreliability of AI). The second forces users to constantly take care to follow compliance guidelines from their employers (Always on your mind), unless they have a local solution set up that does not put company or customer information at risk (Preventing Fears and Worries). To prevent demands such as these, designers will need to prioritize and develop for example transparency and explainability features and support for critical reflections, while balancing the automation of the tools with worker values.

Furthermore, developers, managers, and unions should all work toward using participatory practices in the introduction of AI in workplaces to prevent demands and increase resources introduced by AI further (Detrimental Leadership). Managers and union representatives can also work to further increase these resources by providing workers with opportunities for professional development (Professional Growth), supporting them while allowing them autonomy in their work (Access to Support), and working towards preventing the triggers of their fears and worries (Preventing Fears and Worries).

Future research and limitations

This paper claims the need for and presents a definition of Digital Work Engagement. The definition given is only an early iteration of the conceptualization of this user experience at work. As previously mentioned, HCI researchers can continue researching how it should be defined and broken down into dimensions to improve our understanding of it. Future studies can also continue to study how this concept of Digital Work Engagement depends on how AI adapts or automates work.

This study has some limitations. First, the sample consisted only of IT professionals in Sweden, which may limit transferability to other contexts and industries. Second, allowing participants to define AI themselves provided valuable insights but also resulted in varied interpretations, which may differ from technical definitions. Third, the study primarily focused on the motivational (gain) aspect of the JD-R model and did not thoroughly examine burnout or long-term effects. Future research could address these aspects by incorporating other sectors, conducting cross-cultural comparisons, and employing longitudinal or mixed-methods designs to capture more effectively how AI influences work engagement over time. Additionally, the study is based on semi-structured interviews, which limits the empirical data to participants' perceptions of their experiences of AI in the workplace. A different study design, such as using contextual observations, would allow going beyond their perceptions into understanding their practices as well. Similarly, a design centric research method could continue on this study to see how to implement the implications of AI

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tools that cater to digital work engagement. As with most interview-based research, the researcher–participant relationship may also have influenced how participants framed their responses.

Conclusion

This study explored how Swedish IT professionals perceive and experience AI in relation to their work engagement. By combining a participant-driven definition of these technologies with the Job Demands–Resources model, the study highlights how AI can act both as resources that support growth and meaningful work and as demands that create worry or uncertainty. The findings contribute qualitative insights to complement the predominantly quantitative research in this area and show the value of considering employees' perspectives when designing and implementing AI in the workplace.

Furthermore, the results suggest a need for a more context-specific understanding of how work engagement unfolds in highly digitalized environments. Building on this, we suggest that future research could define and develop the concept of Digital Work Engagement to capture better how intelligent technologies shape the balance of demands and resources. Understanding this evolving dynamic can help organizations and designers support positive experiences and sustainable motivation in an increasingly automated work environment.

Conflicts of interest

None declared

Data availability

The data underlying this article cannot be shared due to the privacy of individuals that participated in the study and the potentially sensitive nature of the data.

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