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EDITORIAL

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The advancement of digital technologies has seen remarkable progress in recent years, profoundly transforming numerous industries. In the medical field, surgeons now collaborate with advanced robots, like the da Vinci Surgical System, to perform procedures with unprecedented precision and minimal invasiveness. In logistics, order pickers in warehouses are assisted by robots like Amazon's Kiva to retrieve products or by agile robots (e.g., Boston Dynamics' Spot). The management of gig economy workers increasingly relies on sophisticated algorithms for task allocation and performance evaluation, such as in the case of Uber (Zwick, 2018). Similarly, customer service and HR departments are witnessing a grand transformation with the deployment of advanced chatbots and AI assistants (utilizing generative artificial intelligence), capable of handling tasks with a level of sophistication previously unattainable (Grote, 2023). Examples of how emerging technologies are changing work are countless. The evolution of Artificial Intelligence (AI) is generating a revolution reminiscent of the internet's advent, propelled by the synergy of big data availability, the self-learning capabilities of machines, and the exponential growth in computing power (Ferràs-Hernández , 2018).

Driven by the need to meet growing customer demands (e.g., in e-commerce) or to mitigate the (future) shortage of labour (e.g., in the health care or logistics sector), businesses are increasingly adopting advanced technologies (Berkers et al., 2023; Parker & Grote, 2022). While companies pursue these innovations for the competitive advantage they offer through enhanced efficiency, the impact on the workforce is profound and complex (Brougham & Haar, 2018). Employees seem to hold an ambivalent attitude towards these emerging technologies and the changes that they bring: some fear to fall behind, while others embrace the challenges and opportunities offered by technology-related change (Frick et al., 2021). Surprisingly, the focus often remains on the technical advantages rather than how this technological revolution transforms the workplace and the humans working with these systems (Parker & Grote, 2022; Schwab, 2017).

The study of human-technology interaction at work has a long-standing research tradition in psychology, notably in automation (Wall et al., 1990). Yet, to fully explore the impact of advanced system capabilities on organizational and employee dynamics, we need to go beyond prior technology at work literature. Recent research emphasizes the need for a human-centred approach in technology adoption and design, urging the integration of Work and Organizational Psychology (WOP) principles to prioritize employee well-being and performance in the face of technological advancements (Parker & Grote, 2022; Parker et al., 2017; Wang et al., 2020). Shifting the focus from the threat of technology to jobs (Frey & Osborne, 2017) to how AI and similar technologies reshape work (Bankins et al., 2023), calls for more empirical studies on their effects on job quality and employee outcomes. This highlights a critical gap in understanding the real-world impacts of emerging technologies on the workplace, marking an urgent area for further investigation.

With this special issue, we want to stimulate scientific discussion on the effects of introducing emerging technologies in the workplace as well as the role that WOP can play in this process. With the ultimate goal of developing theories as well as sound best practices regarding a human-centred development, implementation, and use of emerging technologies at work. We will continue with a more detailed overview of the contents of this special issue.

Overview of the special issue

This special issue starts off with a position paper by *Ulfert, Le Blanc, González-Romá, Grote, and Langer* that results from a panel discussion on the current and future directions of WOP research in the field of emerging technologies at work, held at the 21st Congress of the European Association of Work and Organizational Psychology. Based on a discussion of three principal themes: (1) emerging technologies as new type of technological change, (2) WOP's role in the design of emerging technologies and (re)design of work, and (3) hindrances for WOP in becoming more involved, they formulate seven central recommendations for involving WOP researchers and practitioners in shaping the future development and implementation of emerging technologies at work.

The next two papers are situated in one of the pioneering application contexts of algorithm-based decision support, i.e., personnel selection. Decisions in HRM are often about people rather than about things and processes, and therefore the use of algorithm-based decision support may raise questions regarding moral issues such as fairness and equal treatment.

By performing an online 2×2 experiment, *Feldkamp, Langer, Wies and König* investigated whether the type of decision-support agent (human vs algorithmic) differentially affects people's perceptions of procedural justice, overall fairness, and trust regarding the outcome of a personnel preselection process that appears either fair (i.e., gender-balanced) or possibly biased (i.e., male dominated). Results indicated that the type of decision-support agent was more important for differences in participants' perceptions than the decision-support outcome itself. Algorithm-based decision-support was generally perceived less positively than human decision-support, and consequently participants tended to reject the algorithm-based preselection more often than the human-based one irrespective of the process outcome. Apparently, people seem to perceive algorithm-based systems as more consistent, but also as less likely to uphold moral standards. The finding that they are less

sensitive to possible biases by algorithms than to human biases, stresses the importance of good training data for algorithms to prevent possible discrimination as much as possible. Moreover, possible limitations in training data that may affect system performance for specific groups should be made transparent for users. This enables them to appropriately assess system quality, particularly if they themselves are not well-trained to use algorithm-based systems.

The paper by *Wesche, Henning, Kollhed, Quade, Kluge and Sonderegger* provides an even more nuanced picture of people's perceptions on algorithm-based decision support. They performed two randomized online experiments, one with a hypothetical scenario and one with a scenario in which participants were personally affected by the decision-making situation. In both experiments, the type of decision-maker (human vs. algorithm) and the provision of procedural explanation regarding the decision process (yes/no) were manipulated; moreover, in Study 2, the type of decision-making task (requiring human skills vs requiring mechanical skills) was manipulated too. Like Feldkamp et al., their results showed that – in both scenarios – people overall had higher levels of trust in and acceptance of human decision-making. However, providing explanations only affected perceived transparency, trust and acceptance in the hypothetical scenario. Moreover, higher fairness ratings were found for tasks requiring mechanical skills than for tasks requiring human skills, irrespective of the type of decision-maker. These findings again confirm that what people believe that algorithmic decision-making systems are capable of is more important for their trust and acceptance than these systems' de-facto technological capability. Organizations should therefore thoroughly consider the division of decision-making tasks between algorithmic decision-making systems and humans. In addition, trust in algorithmic decision-making could be enhanced by providing explanations that are specifically tailored to the needs of employees working with these systems. Further research on the effects of design- and implementation features of algorithmic decision-making systems is warranted to provide evidence-based recommendations for real-life work settings.

The next four papers focus on the role of technology in teams, and address technology as a collaborative agent, as a medium for interaction (i.e., communication and coordination), and as an assessment tool for team functioning, respectively.

As already mentioned above, AI systems are moving away from being a technology used as a tool towards becoming team members that increasingly take on more complex tasks. This will increase the interdependence between AI and their human team members. However, we still require a better understanding of how human-AI teams function, particularly the main psychological mechanisms that support collaboration within this type of team, e.g., team trust. Due to the inherently complex nature of emergent states like team trust, it is essential to understand all underlying dynamics in detail. Based on an integration of current literature from WOP, human–computer interaction (HCI), and computer sciences, *Ulfert, Georganta, Centeio Jorge, Mehrotra and Tielman* present a multidisciplinary and multilevel framework, built up of eight propositions, that synthesizes existing theories and models and incorporates the different entities and levels that shape team trust. This framework can be considered as a first step to define and conceptualize team trust in human-AI teams.

In recent decades, and particularly during the COVID-19 pandemic, the use of interactive technologies to support teamwork has greatly increased. To gain a more detailed insight into the impact of these technologies on various psychological mechanisms required for effective teamwork, *Georganta, Peus and Niess* performed a systematic review of empirical studies from both WOP and HCI. Results showed that interactive technologies had mainly positive effects on various team effectiveness components, especially when they allowed team members to be physically close to each other or provided the option to interact synchronously. However, relationships with team effectiveness components have not been fully explored yet, as there is still limited evidence on affect-related properties and outputs such as team trust and team commitment. Moreover, many studies suffer from similar methodological limitations, with the majority being experimental studies performed among student teams. Importantly, the results of this systematic review make clear that WOP and HCI research exist mainly independently from one another, treating design and impact of interactive technologies as distinct elements instead of as different aspects of the same phenomenon. The authors therefore plead for more interdisciplinary research and present an exemplary approach to enhance collaboration and move beyond each discipline's boundaries.

In their paper on leadership in virtual work settings, *Höddinghaus, Nohe and Hertel* focus on electronically mediated interaction as the key element of virtuality and consider other characteristics mentioned in the literature (e.g., spatial or temporal dispersion; informational capacity of involved technologies) as qualifying factors. To gain more insight into the effects of leadership in virtual contexts, two related literature reviews were performed. Studies within highly virtual contexts suggest that, on average, active (i.e., task-, relational-, and change-oriented) leadership types are positively related with desired follower outcomes. So, it seems that in highly virtual contexts followers are still able to recognize and interpret supervisory behaviours, regardless of reduced communication cues. When comparing contexts that differ in levels of virtuality (i.e., considering virtuality as a moderator of leadership effects), higher levels of virtuality are shown to strengthen the effects of task-oriented and some relational-oriented leadership styles, while mixed findings were found for change-oriented leadership. However, these initial results should be considered with caution, as many of the reviewed studies suffer from methodological shortcomings like cross-sectional designs and self-reported data. In addition, due to the large variability in settings and type of technologies used, the different studies are hard to compare. The authors provide several conceptual and methodological suggestions to enable research on leadership in virtual work settings evolving to a more mature stage.

The next paper, by *Zeyda, Stracke, Knipfer and Gloor*, demonstrates the value of emerging technologies as

measurement tools for research on organizational behaviour. Physiological signals have been argued to change or explain affect, cognition, and motivation in organizational settings, and can also resemble different work-related behaviours and emotions. Wearables, e.g., smartwatches, can be used to collect unobtrusive measurements of body signals that are not affected by self-report biases, such as neurophysiological signals and motor expressions. Results of a preliminary field study on the relationship between physiological arousal and perceived productivity of (team) work meetings, showed a significant relationship between the variance in arm acceleration and team members' perceived meeting productivity. Moreover, perceived meeting productivity could be accurately predicted from participants' body signals in roughly 60% of the cases. So, wearables seem to present a powerful tool to understand important determinants of workplace productivity and organizational behaviour.

In the final paper of this special issue, the focus shifts to the technology development process. Extant research has shown that prospective work design, i.e., the systematic creation of well-designed jobs as part of the changes introduced by new technologies, is rarely considered in the development of (emerging) technologies. Once implemented, this may result in poor job quality and sub-optimal individual and organizational performance. By performing an in-depth, longitudinal interview study, *Kahlert and Grote* explored technology developers' design mindsets. i.e., their conception of their own work as designers, in relation to their concern for prospective work design and how this might be fostered. Based on their results, they propose a framework of holistic and impact-aware design mindsets consisting of four dimensions, ranging from a purely technical understanding of technology development to a reflection and concern for social factors involved in developing, implementing, and using technology. Design mindsets and developers' professional identity turned out to be related, as holistic and impact-aware mindsets were more often expressed by those who considered multiple disciplines to be part of their professional identity. Supplemented by an easy-to-use tool for technology developers to explore their own professional identity, the theoretical framework for design mindsets provided in this paper facilitates taking prospective work design into account early in the technology development process, which in turn may benefit the work design of future technology users.

Insights from the special issue

Based on the overview of the included papers, we will now discuss several emerging insights that may offer guidance for future research in this domain.

Reconnect and reach out

The first two insights emerging from the papers included in this special issue relate to the *theoretical grounding of WOP research* on emerging technologies at work. As mentioned before, the WOP literature already contains several well-substantiated theoretical models on, among others, motivation, well-being, or job (re)design that form a strong monodisciplinary basis for research in this domain (e.g., work design, socio-technical systems, or action regulation theory literature). We need to *reconnect with our "WOP-roots"* to look for existing theoretical knowledge that we can apply, and if needed adapt, to current work contexts wherein emerging technologies play an increasingly important role.

At the same time, several papers in this special issue point out that different disciplines, i.e., WOP, organization science, computer sciences and human-computer interaction research and many others, are concurrently doing research on different aspects of the same technology-related phenomena. To advance theory, these disciplines should collaborate (more) in *multidisciplinary research* that enables complementing each other's theoretical knowledge and stimulates mutual learning.

For example, technology acceptance theories (e.g., Technology Acceptance Model; Venkatesh & Bala, 2008), aim to predict how individuals adopt technology. However, these models are less effective for newer technologies, especially when technology takes on new roles within organizations (e.g., as teammates; Larson & DeChurch, 2020). Although updates to these models include contextual factors, such as in the Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2016), they often still fall short of capturing the full complexity and dynamics of modern workplaces. Research on human-technology interaction is often focused on micro-level user–system interaction, overlooking broader social contexts, with few exceptions (Díaz-Boladeras et al., 2015). Conversely, literature on organizational change (Hayes, 2022) and workplace innovation (Rus et al., 2019) highlights the importance of human and social factors, including effective communication, participation opportunities, and support, for successful technology transitions. While broader organizational science literature has explored technology-related changes (Orlikowski & Gash, 1992), it often lacks detail on the day-to-day operational adjustments required by employees. An integration of the described literature streams is thus urgently needed.

To conclude, to obtain a holistic view and a deeper understanding of emerging technologies' impact on employee and organizational outcomes, WOP's theoretical perspectives need to be integrated with those of adjacent disciplines such as organization science, computer sciences and human-computer interaction research that are currently also involved in research on emerging technologies at work. To do so, we need to reach out to researchers across disciplinary boundaries.

Recognize the diversity in technology's roles and functions

Third, the papers in this special issue clearly show that emerging technologies can take on a *diversity of roles and functions* in our workplaces, for instance, by providing decision support, enabling interaction between team members, and even collecting unobtrusive measures (e.g., physiological signals) that are related to employee affect, cognition, and motivation in organizational settings. Nevertheless, most of current WOP research still treats technology as a monolithic thing, thereby not taking the above-mentioned diversity in technology's (potential) roles and functions into account. So, a rethink on the conceptualization of technology in WOP research seems warranted.

In their recent paper, Anthony et al. (2023) give a detailed explanation why the currently (still) dominant perspectives on the role of technology at work are less suitable for research on emerging technologies, such as AI. The technology as *tool* perspective focuses on employee's use of technology in their everyday taskwork, thereby particularly emphasizing task performance as a key criterium. Other scholars have conceptualized technology as a *medium* that can facilitate communication across boundaries, highlighting its role in collaborative processes (e.g., joint task completion). Yet, AI technologies present unique challenges not seen in prior technologies, such as their invisibility, complexity, or even adaptability, making such more traditional perspectives too restrictive if considered in isolation. Consequently, in recent years, novel perspectives have been suggested, arguing that AI can act as a *team member* (Larson & DeChurch, 2020) or as a *counterpart* (Anthony et al., 2023). In these perspectives, AI is treated as an active participant within a broader work ecosystem. This perspective allows for going beyond the mere interaction between an employee, a technology, and a task, by considering the complexity and dynamics of such collaborations. This systemic perspective enables a more comprehensive consideration of the various stakeholders and elements involved in the development, implementation, and utilization of AI within organizations (Anthony et al., 2023).

In conclusion, when investigating emerging technology in the workplace, WOP researchers must thoughtfully consider their perspective on technology. They must assess whether a re-evaluation of how they conceptualize technology is needed, by critically reflecting on the conceptual framework that most appropriately aligns with the technology being studied.

Take a multilevel approach

Fourth, some papers in this special issue point out that gaining more in-depth insight into the effects of (working with) emerging technologies may require taking a *multilevel approach*. This particularly applies to studying human-technology collaboration that goes beyond dyadic interactions, such as in human-AI teams (Ulfert et al., 2023). In these teams, a collection of human individuals and one or more autonomous AI agents interdependently work together on a shared task and common goals (McNeese et al., 2019; O'Neill et al., 2022; Van den Bosch et al., 2019). As suggested by Ulfert and colleagues in this special issue, human-AI teams can be considered as systems incorporating both human and technological entities, whose shared perceptions are shaped by beliefs about their interrelationships at different levels (i.e., individual, dyad, and team level). A multilevel perspective may also be relevant for studying remote as well as co-located teams that collaborate, i.e., communicate and coordinate, through using interactive technologies. Depending on their specific features (see for an overview: Penichet et al., 2007), different types of interactive technologies may affect both team- and individual-level work-related outcomes via various psychological mechanisms.

Related to this, most studies included in this special issue exclusively focus on either the individual employee level or the team level. Future research could explore how the interplay between variables from different levels shapes the (nature of the) collaboration between human workers and emerging technologies as well as its outcomes.

To conclude, WOP research on emerging technologies could benefit from taking a multilevel perspective in studying the complex and dynamic mechanisms through which collaboration between humans and emerging technologies takes shape and, in turn, results in various work-related outcomes.

Study the complete 'life cycle' of technology (from development to use)

Finally, all papers but one of those included in this special issue relate to the "phase" of *using* emerging technologies. This reflects the current state of the art in WOP literature, where the majority of – experimental and field – studies focuses on employee perceptions of and reactions to emerging technologies in hypothetical or real-life work scenarios. Whereas some papers on the *implementation* of (emerging) technologies can be found in organization sciences (e.g., Journal of Change Management) and interdisciplinary (e.g., Technology in Society) journals, in WOP literature this topic is, at best, only touched upon. Furthermore, by examining critical decisions made during the *development phase of technology*, particularly those affecting job quality, we can promote both effective performance and human well-being (Clegg, 2000; Leonardi, 2012; Parker & Grote, 2022).

To conclude, it is about time for WOP to enter uncharted territory and study the full "life cycle" of emerging technologies at work by not only focusing on the use "phase" but also on the development, design, and implementation "phases" of these technologies from a human-centred perspective.

Closing remark

We hope you will enjoy reading the above papers and that they contribute to moving research and practice related to emerging technologies in the workplace forwards. To conclude this editorial, we would like to say a heartfelt "thank you" to the reviewers of the different papers for their invaluable support in putting together this special issue.

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