

## Editorial

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# Future of work in Germany: Socially sustainable value creation in digitalized and artificial intelligence-supported work systems

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The future of work concerns us all. From a scientific perspective, the future of work is considered a research field that seeks to gain insights into perspectives on how the nature of work is changing and what effects that may have on humans, organizations and society [1]. Research and innovation on the future of work should advocate working conditions in which employees are productive, healthy and satisfied. There is no doubt that this requires validated and reliable findings from work science and suitable measures for knowledge transfer that enable rapid implementation in companies. The discipline of work science is inherently multidisciplinary and encompasses research fields as diverse as Occupational Safety and Health, Human Factors and Ergonomics, Industrial Engineering, Organizational Psychology, Sociology and Economics. The international perception is that research on the future of work in Germany is often conducted in the field of industrial production, especially Industry 4.0, and its related areas [2]. However, research on the future of work is funded independently of the economic sector by

a variety of sources, including the German federal and state governments, social partners, employers' and employees' associations, non-profit organizations and companies. With both the predecessor research program "Future of Work" and the current program "Future of Value Creation", the German Federal Ministry of Research and Education (BMBF) provides funding for the field of application-oriented work science, thus giving the subject appropriate visibility in society. This visibility is particularly important because it promotes the dialog between companies, society, science and social partners that is so essential to finding and implementing science-based solutions that foster productive as well as humane working conditions.

In terms of social impact, it is interesting to note that the wording of the aforementioned research programs has changed. Shifting the focus from "work" to "value creation" implies that work is simply a means to an end, not the goal itself. In connection with this, debates are already emerging, for example, on the various dimensions of "value" (e.g. economic vs. social values) and the necessity of work that does not contribute to value creation. Increasingly, consensus emerges in the German work science community that the process of value creation in companies should not only aim towards financial profitability but also –

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and increasingly- social sustainability. Socially sustainable value creation could, for example, aim to resolve socioeconomic inequalities in occupational health [3]. Although similar debates have been held in the past and a variety of possible sustainability goals have long been addressed through research on ergonomic work design and occupational safety and health, a general definition of sustainable work and the associated objectives is still lacking [4]. This reinvigoration of the social sustainability movement will certainly bring together a range of existing research areas within work science and give rise to new ones.

With this movement, topics such as the prevention of illness, injury, and disability as well as treatment and rehabilitation become even more relevant than ever before. Available literature reviews and meta-studies suggest that current research efforts on occupational safety and health focus largely on mental and musculoskeletal health/diseases, in particular with regard to the development of preventive measures, and the investigation of basic cause-effect relationships, workloads and treatments [5–23]. A total of eight articles in this special section of *WORK* can be assigned to this area and address different topics in this field. The contributions by Scheepers et al. and Mehler et al. deal with the perception of digital stress. Opportunities for mobile and time-flexible work in production are addressed by Peschl et al., whereas a conceptual contribution to information assistance systems as mediators in the area of mental workload of assembly workers is provided by Bläsing et al. Auweiler et al. and Goppold et al. then present approaches for primary prevention through digital training for psychosocial risk assessment and occupational safety in vocational trainings by means of augmented reality. For prevention, Mayer et al. investigate an active hand exoskeleton. Finally, Schäfer et al. examine whether or not digital platform companies perceive occupational safety and health as a success factor.

The COVID-19 pandemic has also affected work science research and its implications. Today, work and human-oriented work design face challenging conditions often described as volatility, uncertainty, complexity, and ambiguity (VUCA), which have been exacerbated by the pandemic. Accordingly, research on highly reliable/resilient organizations becomes increasingly relevant [24]. Examples of approaches to organizational design (Rimbeck et al.) and participatory redesigning of digital work (Schumacher et al.) in such organizations are presented in the special section. During the COVID-19 pandemic,

employers in Germany were faced with the challenge of quickly enacting and enforcing home office work regulations. As a result, work redesign and regulations had to be implemented in most cases without prior negotiations between employers and labor representatives in order to ensure the “survival” of the company. The research approach that was typical of the past, with many iterations between theory development, method validation, field studies as well as practical piloting and implementation, could not be carried out in the short time available. Accordingly, there is a lack of analysis and assessment of work design measures that are often presented as best practice, without their present and future effects having been studied scientifically and on a broader scale. A special issue with the latest research about working from home was recently published in *WORK* [25].

However, there is likely much more research on the effects of the pandemic on the working world to come in the next years. At the beginning of the COVID-19 pandemic, for example, shortly after the introduction of widespread infrastructure for video conferencing, many expected that this would enable more efficient ways of working and communicating, and consequently reduce workload for employees. In our own scientific work and other work areas, we observe that while the time spent traveling has been reduced, the time spent in video conferences has increased significantly and that people are often performing additional tasks, such as answering e-mails. This has led to a great deal of work being compressed while the range of work has increased. Without specific ergonomic work design recommendations, which are not yet available in this area, companies can only act to the best of their knowledge and belief and no legal regulations can be made based on scientific evidence. It can currently be observed that the first companies are introducing video conference-free days so that work with an increased need for concentration can be carried out undisturbed. This is not fundamentally a new problem, as many lessons have been learned, e.g. from research on open-plan offices and telework research, but available technologies and the societal context have changed; therefore, best practice recommendations require further research in these current circumstances.

Against the backdrop of the COVID-19 pandemic, research on communication, competencies and knowledge management seems to have gained relevance in this area. While there is no denying that for work activities such as manufacturing a product, there is usually a wide range of methods available

for work analysis (encompassing the full range of data collection from surveys over observation to measurement for varying levels of detail from rough screening to operational measurements) and work design (including a wide variety of process models, design catalogs, target times, digital workplace planning tools, and digital human models) as well as extensive operational resources. Communication, competencies and knowledge management, on the other hand, are often considered secondary work activities, even though they can also have a major impact on occupational safety and health. Accordingly, a total of six contributions deal with effects and design approaches to informal communication (Stöckl and Struck, and Roth), competencies (Karwehl et al., Karwehl and Kauffeld, and Weigel et al.) and knowledge management (Tietz and Werner).

For a sustainable transfer of scientific findings into application and to companies, suitable methods are needed. In Germany, there are a large number of public and private agencies for advising companies on ergonomic work design and occupational safety and health. Emerging topics in work design such as artificial intelligence (AI) are currently being piloted at an early stage with the establishment of funded large-scale work science competence centers to test a wide variety of AI applications, analyze their effects on employees and work organization, and derive evidence-based work design recommendations. In this context, AI-based approaches can also be used as a tool for research in work science, as the article on virtual reality in designing of work processes (Straatmann et al.) implies.

The contributions in this special section can, of course, only hint at the current range of future of work trends and issues. Viewing the current and future challenges that we are facing at work as an opportunity for human-oriented work design while weighing up the risks appears to us to be a promising approach that should be pursued further in the interest of achieving socially sustainable value creation [26].

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Guest Editors

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