

## **DIGITAL TRANSFORMATION OF THE WORKPLACE – RISK OR OPPORTUNITY?**

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The digital transformation of the workplace is creating technological and structural change that is impacting on a variety of professions and occupations. This article aims to describe the status quo of digitalisation in the workplace and to assess the resulting opportunities and risks for companies and their employees, as well as future developments, needs and requirements. Finally, organisational design recommendations for the digital transformation of the workplace will be discussed from a psychological perspective.

### **The spread of digital technology in the workplace**

Digitalisation has already arrived in the workplace. In a survey of organisations with 20 or more employees, all participating organisations declared that they use email often to very often for internal and external communication (bitkom, 2018). About half the companies use mobile and smartphones (51 per cent) as well as online meetings and videoconferencing (48 per cent) for communication. Almost 40 per cent use SMS service providers or messenger apps (38 per cent) as well as client and employee portals (38 per

cent). The use of social networks (25 per cent), chatbots (virtual personal assistants, 13 per cent) or company blogs (5 per cent) is less common. Widespread availability of the internet coupled with capable mobile devices allows many professionals to work flexibly and autonomously, and to be location independent. Their work environments range from home offices to coworking spaces.

### Opportunities and risks in a digitalised workplace

Employees hope to gain a better work-life balance (46.5 per cent), more time flexibility (43.3 per cent), and easier access to necessary information (41.3 per cent) from digital and mobile workplaces. They are, however, concerned about a higher reliance on IT infrastructure and an internet connection (46.2 per cent), the obligation to be reachable for extended hours for work-related purposes (41.3 per cent) and surveillance by new technologies (38.4 per cent). Personal privacy is particularly relevant when talking about surveillance. Companies are once more paying increased attention to data protection, since the EU data protection regulations came into force in May 2018, and since the publication of hacked password databases (e.g., Scherschel, 2019). The use of private devices for work purposes, for example, also known as “bring your own device” (BYOD) not only has the benefit of increasing employee flexibility and reducing company expenses, but also increases security risks for company data (e.g., Gosh et al., 2013).

Schwarz Müller et al. (2018) outline four core areas via which the digital transformation is impacting the workplace:

- Effects on work-life-balance and health: Increased flexibility of time and location means that work and personal life are more compatible, yet there are also dangers in employees being constantly available and in the lack of boundaries between the professional and the personal. Moreover, digitalisation increases the density of information and work pressure employees deal with. Decisions have to be made quickly and when faced with uncertainty. Employees feel overwhelmed and have difficulty getting enough rest (Badura et al., 2018).
- Increased use of information and communication technology: The increased use of technology at work allows for higher standards, the provision of support to and control of work processes. Many aspects of work are becoming more automated and the importance of knowledge-based work will increase. In addition, communication is happening more and more via new media, resulting in new forms of collaboration

(e.g., virtual teams). Managers are leading their teams over increasing distances and are using a variety of communication channels to stay in touch (e.g., messenger apps).

- Changes to performance and talent management: With work becoming increasingly mobile and virtual, competencies in IT and problem-solving, as well as lifelong learning are becoming essential. Working in digital environments and on shared documents increases the transparency of work processes and leads to more results-oriented work.
- Changes in organisational hierarchies: Organisational hierarchies are becoming flatter due to transparency and the improved flow of information (e.g., corporate wikis). Employee participation in decision-making is also improved with the use of digital tools (e.g., feedback apps).

The risk that a digitalised workplace poses is less so the increased use of digital technology and more so the work arrangements and conditions for the technology's use (PsyGA, 2019).

### Future developments in, and needs and requirements for a digitalised workplace

Companies consider the availability of IT infrastructure (50.9 per cent), missing platforms and standards (26 per cent), and the selection of effective applications for collaboration (22.5 per cent) to be the technological challenges of workplace digitalisation (Statista, 2019). They see additional challenges presenting themselves in the areas of data safety and security (48.8 per cent and 45.3 per cent), and in operational safety (35.1 per cent). Technical developments like the increased networking and communication capacities of intelligent devices in the “internet of things” (Mattern and Flörkemeier, 2010) are further accelerating digitalisation. Thus, companies and their employees have the opportunity for even more flexibility concurrent with increased responsibility to shape their own working conditions. Aside from the availability of IT infrastructure, a further need presents itself in how employees and digital technologies can interact while preserving data safety within the company.

### Design recommendations for the digital workplace

If employees are working on increasingly flexible schedules, independently of location and more autonomously, job designs must be needs-based and customised according to the company's and the employees' requirements

(IFAA, 2018).

The following recommendations can be made at the organisational and managerial levels (Schwarz Müller et al., 2018; IFAA, 2016 and 2018):

- Effects on work-life-balance and health: Create healthy working conditions concurrent with sensitising managers.
- Increased use of information and communication technology: Create transparent and binding rules, and clearly formulate expectations.
- Changes to performance and talent management: Offer training and qualification programmes in IT and in the development of problem-solving competencies; Establish a culture in which mistakes are dealt with constructively.
- Changes in organisational hierarchies: Establish a culture of trust and a people-oriented leadership style (cooperation, recognition).

### Recommendations for the design of human-technology interaction

Within a single firm, the interactions between people, technology, processes and external factors get very complex. Increasing digitalisation, networked devices and automation further contribute to the complexity.

In order to ensure data and operational safety within the context of digital transformation, companies must be seen as a whole, so that all available resources are considered. There are limits to the attempt to entirely replace human occupations with automation. These limits present themselves, for example, in cases of decision making under uncertainty and in the ability to improvise. Automation can also lead to misunderstandings and problems in the interactions between people and the technology (Sarter et al., 1997). As “team players”, technologies should be created so that it is clear who is responsible for what aspect of the task at hand, what condition the team partner is in, and what their intentions are (Klein et al., 2004). This can lead to increased organisational resilience, enabling an organisation to recover more quickly from unexpected events such as an attack on its data (Hollnagel et al., 2006).

The interface of an IT-operated external infusion pump serves as an example from the health sector (Nemeth et al., 2008): As a “team player”, the device shows medical staff the current course under current settings, and the future course at any given setting. A graphic display supports pattern recognition and quick treatment in case of any unexpected developments.

Underlying design recommendations can be drawn from the use of digital technology in a variety of fields such as security, communication or production technologies. When combined with the recommendations for organisational structure and leadership, human beings with their strengths and their needs could take centre stage in the design of the digital workplace.

## References

Badura, B.; Ducki, A.; Schröder, H.; Klose, J.; Meyer, M. (eds.) (2018). *Fehlzeiten-Report 2018: Sinn erleben - Arbeit und Gesundheit*. Springer-Verlag.

Bitkom (2018). *Tschüss Fax? Unternehmen setzen auf digitale Kommunikation*. Online available at: <https://www.bitkom.org/Presse/Presseinformation/Tschuess-Fax-Unternehmen-setzen-auf-digitale-Kommunikation.html>.

European Union (2016). *Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)*. Online available at: <https://eur-lex.europa.eu/eli/reg/2016/679/2016-05-0>.

Ghosh, A.; Gajar, P. K.; Rai, S. (2013). Bring your own device (BYOD): Security risks and mitigating strategies. *Journal of Global Research in Computer Science*, 4(4), pp. 62-70.

Hollnagel, E.; Woods, D. D.; Leveson, N. (2006). *Resilience engineering: Concepts and precepts*. Ashgate Publishing, Ltd..

IFAA – Institut für angewandte Arbeitswissenschaft e. V. (2018). Checkliste zur Gestaltung mobiler Arbeit. Online available at: [https://www.arbeitswissenschaft.net/fileadmin/Downloads/Angebote\\_und\\_Produkte/Checklisten\\_Handlungshilfen/Checkliste\\_Mobile\\_Arbeit\\_Formular\\_AnP\\_TV\\_final.pdf](https://www.arbeitswissenschaft.net/fileadmin/Downloads/Angebote_und_Produkte/Checklisten_Handlungshilfen/Checkliste_Mobile_Arbeit_Formular_AnP_TV_final.pdf).

IFAA – Institut für angewandte Arbeitswissenschaft e. V. (2016). *Checkliste zur Gestaltung digitaler arbeitsbezogener Erreichbarkeit*. Online available at: [https://www.arbeitswissenschaft.net/fileadmin/Downloads/Angebote\\_und\\_Produkte/Checklisten\\_Handlungshilfen/Checkliste\\_Erreichbarkeit\\_Formular\\_zum\\_Ausfuellen.pdf](https://www.arbeitswissenschaft.net/fileadmin/Downloads/Angebote_und_Produkte/Checklisten_Handlungshilfen/Checkliste_Erreichbarkeit_Formular_zum_Ausfuellen.pdf).

Klein, G.; Woods, D. D.; Bradshaw, J. M.; Hoffman, R. R.; Feltovich, P. J.

(2004). Ten challenges for making automation a “team player” in joint human-agent activity. *IEEE Intelligent Systems*, 19(6), pp. 91-95.

Mattern, F.; Flörkemeier, C. (2010). Vom Internet der Computer zum Internet der Dinge. *Informatik-Spektrum*, 33(2), pp. 107-121.

Nemeth, C.; Wears, R.; Woods, D.; Hollnagel, E.; Cook, R. (2008). Minding the gaps: creating resilience in health care. In In: Henriksen, K.; Battles, J. B.; Keyes, M. A.; Grady, M. L. (eds.). *Advances in Patient Safety: New Directions and Alternative Approaches* (Vol. 3: Performance and Tools). Agency for Healthcare Research and Quality (US).

PSYGA - Portal für psychische Gesundheit am Arbeitsplatz (2019). *Technologie ist nicht die einzige Stressursache*. Online available at: <https://www.psyga.info/psychische-gesundheit/wissen/technologie-ist-nicht-die-einzige-stressursache>

Sarter, N. B.; Woods, D. D.; Billings, C. E. (1997). Automation surprises. *Handbook of human factors and ergonomics*, 2, pp. 1926-1943.

Scherschel, F.A. (2019, 17. Januar). *Passwort-Sammlung mit 773 Millionen Online-Konten im Netz aufgetaucht*. Heise Online. Online available at: <https://www.heise.de/security/meldung/Passwort-Sammlung-mit-773-Millionen-Online-Konten-im-Netz-aufgetaucht-4279375.html>.

Schwarz Müller, T.; Brosi, P.; Duman, D.; Welp, I. M. (2018). How Does the Digital Transformation Affect Organizations? Key Themes of Change in Work Design and Leadership. *management revue*, 29(2), pp. 114–138. Online available at: <https://doi.org/10.5771/0935-9915-2018-2-114>.

Statista (2019). *Statista-Dossier zur Digitalisierung der Arbeit*. Online available at: <https://de.statista.com/statistik/studie/id/52757/dokument/digitalisierung-der-arbeit/>.