Lernende Systeme

GERMANY'S PLATFORM FOR ARTIFICIAL INTELLIGENCE

Work, Training and Human-Machine Interaction

White Paper by the Working Group Future of Work and Human-Machine Interaction

Executive Summary

Artificial Intelligence (AI) is a catalyst for the processes of digital transformation that are sweeping through society and the world of work. AI technologies not only impact on the requirements that people have to meet and the skills they need to have, but also on the types of activity they undertake, the places they work and the way their work is organised, both within individual companies and across the entire labour market. Furthermore, Artificial Intelligence is changing the relationship between people and technology and making new types of human-machine collaboration possible. Shaping these profound processes of change means identifying ways to achieve a future (working) world that utilises Artificial Intelligence, striking a balance between safe workplaces and trained staff, and creating work that is rewarding and centred on people.

Transformation management is crucial to the development and positive use of AI systems in the world of work and to fully harnessing the potential for innovation and productivity. It is not just about "bringing people along", but also about enabling workers to be confident and competent in dealing with AI systems. They should be able to contribute their experience and knowledge and thus play a proactive role in shaping the introduction of these systems.

The working group Future of Work and Human Machine Interaction of Plattform Lernende Systeme is focusing on three areas of action and believes the following aspects must be addressed:

Shaping human-machine interaction

- **The relationship between people and technology:** The new dynamic that Artificial Intelligence brings to the relationship between people and technology is raising completely new questions regarding ethics, law and how we shape the world of work. At the same time, it is important to have a realistic idea of the capabilities and, most importantly, the limits of AI systems. It is only by first developing a sound, well-informed assessment of what Artificial Intelligence can do that we can then have a practical discussion about the parameters, design criteria and areas of application for AI systems. Fundamentally, interaction on the part of AI systems ought to be tailored to people, their needs and their abilities. The self-determination and autonomy of the user must be at the heart of everything. At the same time, these and other principles for developing and utilising AI technologies must be worked out in greater detail, with all affected parties being involved in the design process as early as possible. This will help to boost confidence in, and acceptance of, the systems among workers.

- **Criteria for shaping human-machine interaction:** The use of AI systems is changing the way that work is divided between people and machines – both at work and in other areas ranging from the care sector and smart homes to mobility. This makes it especially important to develop criteria and benchmarks for orientation to help us design human-machine interaction. Potential starting points include the principles of transparency, traceability, privacy and explainability. There are also the fundamentals of human-centred design to factor in when developing machines, robots and software systems. Additional considerations include how to create (working) environments that are conducive to mutual learning and the questions of safety, usability, responsibility and autonomy. All these design criteria can also serve as a basis for national and international standardisation and the further development of occupational health and safety.

- **Areas where AI systems can be used:** New AI technologies are being used in a range of areas – from office work, administration and production through to services in finance, insurance and commerce and applications in mobility, health and care. All these contexts can involve different types of human-machine collaboration. For instance, AI systems can free up staff from routine office tasks and assist with decision-making during complex processes in manufacturing or medical diagnostics. However, AI applications can also process insurance cases or take care of certain customer communications. All this gives rise to two challenges. The first concerns the modification and displacement of certain activity profiles, and the ways in which work is divided between people and technology. What matters is the role allocated to staff and whether AI systems ease the workload and offer assistance or completely take over activities. The second is the development of design criteria for human-machine interaction, particularly in view of the various areas of activity, different ways of dividing work between people and technology and (potential) new activity profiles. This approach aims to create ergonomic working conditions, safeguard employment, give people the skills they need and afford companies extra potential in a variety of sectors.

Training and skills development

- **Training and skills requirements:** The first step in developing a focused, future-proof education and training culture in schools, universities and companies is to identify what training and skills are required – whether in specific operational terms or more generally speaking. Skills that are important for digitalisation constitute a basic grounding, but specific AI skills are important, too – as appropriate to a person's role in their organisation or the demands of a particular sector or business model. (Consider, for instance, specialists as opposed to general surgeons or development skills as opposed to application know-how.) Following on from this, conclusions can be drawn about basic and further training and proposals developed for programs and curricula, such as an "AI driving licence" or an "AI checklist" comprising separate modules of further training that can be combined as necessary.

- **Continuous development of basic and further training:** Basic and further training concerns content, teaching and learning concepts, qualification instruments and wider parameters and resources, including state funding. Artificial Intelligence – and, certainly, the combination of AI with conventional methods – gives rise to new options in basic and further and training and for lifelong learning, learning networks and flexible and participative learning. The question is how Artificial Intelligence and innovative assistance systems can contribute to learning fitness, self-effectiveness and personalised guidance, speed up relevant skills acquisition, and help establish a working environment that is conducive to learning. Best-practice examples of relevant content and suitable instruments can be generated by testing out new approaches. At the same time, it is also important to take into account the challenges – such as those related to data protection – and suitable parameters and resources for basic and further training and lifelong learning.

- **Skills management and development:** If companies are to use Artificial Intelligence in their operations, for instance to improve processes, develop innovative products and services or ensure staff have exactly the skills they need for a particular strategy, then managing skills and knowledge is a task of strategic importance. It is also a key element in the change processes that accompany the roll-out of AI technologies. One question is whether and under which conditions – e.g. with regard to privacy and data protection – monitoring AI-assisted skills is an option for employees and companies. It could, for instance, help create a better overview of skills and requirements within a business, leverage information for transformation processes, develop focused measures for boosting skills or provide a proficient means of integrating practical knowledge into AI systems.

The processes of shaping work and transformation

- **Transformation and change management:** Accelerated technological change and new AI technologies are giving rise to diverse areas of application for Artificial Intelligence, which generates new requirements for companies as they seek to transform their operations. Key to this process are criteria for designing and introducing AI systems and an AI roll-out culture within companies themselves that facilitates an openness to new AI technologies and can be used to set out parameters for their use. Crucial impe-

tus for the design, roll-out and transformation processes can be derived from experimentation rooms, living labs and pilot phases, which provide considerable support. This approach ensures companies can generate best practice examples and make important findings but, most importantly, it helps establish acceptance for AI technologies among users ahead of any far-reaching roll-out. It is important at this juncture to factor in the differences between large companies, on the one hand, and small and medium-sized enterprises (SMEs), on the other. These differences are relevant, for example, in terms of how (financially) risk-averse a company is, how agile it can be when introducing new technologies and how it can shape transformation processes.

- **Shaping working conditions:** The roll-out of AI technologies is changing the requirements that apply to processes, organisational structures and the way work is arranged within a company. That includes in-house communication, staff management, employee participation in business decisions and interdisciplinary cooperation across departments and divisions. All of this means working conditions are also changing. When developing and introducing AI technologies, it is already important to allow for different tasks, roles and working correlations, to design working environments to ensure they are healthy, safe, personality-enhancing and conducive to learning, and to use AI technologies to support employees and reduce their workload. This in turn fosters commitment among staff, encourages them to identify more strongly with the company, boosts their motivation and enhances their acceptance of AI systems.

- **Acceptance and codetermination:** A key element in the successful design and roll-out of AI technologies in companies is bringing staff on board early on and making sure their interests are represented in the associated transformation processes. The first step is to design work in a way that appeals to staff, earns their trust and facilitates their acceptance of new AI systems. At the centre of this process are questions regarding the transparency of AI systems and how easily they can be explained, how personal (employee) data is to be handled, but also how working processes, activity profiles, qualifications, workload and employment will be affected. It is vital to factor in employees' interests and both safeguard and develop codetermination – particularly given the speed of technological change.

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