# Uncertain futures of work: The perception of generative AI in knowledge professions

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**Abstract:** The application of generative AI (GenAI) tools has led to widespread speculation about the implications of technological change for the future of cognitive work. This article provides insights on how the use of GenAI affects work practices in the fields of IT programming, science and coaching based on expert interviews and a quantitative survey among users of GenAI. Specifically, we ask about perceptions on skills, creativity, and authenticity, which we regard as key qualities of cognitive work. Contrary to widespread expectations that AI use would hollow out or substitute aspects of cognitive work, we find that there is a strong awareness for the meaning of the professional core in each field. We conclude that the use of AI provokes reflections about the meaning of human work in operating AI tools adequately and taking on responsibility for their results, thereby rather reinforcing its relevance.

**Keywords:** artificial intelligence, cognitive work, digitalization, skills, creativity, authenticity

## *1. Introduction*

Rapid progress in the development of AI systems has – once again – inspired speculations about the future of work. Unlike in prior periods of rapid automation, however, uncertainties and concerns about the impact of technology do not concern repetitive tasks of manual labour but knowledge work (Brynjolfsson et al., 2023; Dell'Acqua et al., 2023). Seemingly, the predictions in the much-acclaimed book *The second machine age* (2014) are becoming real. In this book, Eric Brynjolfsson and Andrew McAfee argue that AI technologies will have an impact on cognitive fields of work comparable to the effect of industrial automation on blue-collar work. As in similar texts, the perspective is one of a 'race against the machine', the title of another work by the same authors (Brynjolfsson & McAfee, 2012; see

also Acemoglu & Restrepo, 2018), to avoid the substitution of human work by technology.

Only ten years ago, such statements very much seemed to address a distant future; now, they appear to become true in the present with the advent of generative AI (genAI), an incarnation of AI that progresses into fields that were thought to be the realm of human action. By writing poems, creating graphics, or composing music, it seems to possess skills that surpass those of many humans; genAI also seems to possess creativity in recombining and readjusting information, and the results appear to be authentic in the sense that it is hard to judge whether they result from human or artificial intelligence.

The presentation of ChatGPT by Open.AI was aptly described as the 'iPhone moment' of AI by the CEO of the chip producer Nvidia due to the degree of public attention it attracted and the extraordinarily high pace by which it was picked up by consumers. A new practical dimension began to enter the hitherto rather speculative discourse about AI, as millions of users began to experiment with ChatGPT and shared their experiences through social media, including ridiculous failures but also astonishing accomplishments of so far unprecedented capabilities.

Yet, even though everyone can now try and experiment with ChatGPT, we still do not have a more empirically grounded debate. On the contrary, it seems that expectations and speculations are rising to new peaks with the public excitement that follows each release of a new genAI application. On the one hand, much of the discussion follows the established patterns of a race between humans and machines. A study by Goldman Sachs projects a 'significant disruption' of labour markets and calculates that up to one-quarter of all jobs might be substituted through genAI-based automation (Hatzius et al., 2023). Another study that looks at the susceptibility of work tasks through genAI estimates that up to 49% of jobs contain tasks that could be taken over by genAI. The authors argue that genAI appears 'to be particularly impactful for highly-educated and highly-paid workers' and make policy suggestions about how to mitigate disruptive effects on the labour market (Felten et al., 2023). Here, genAI once again appears to be a job killer, but this time on steroids, endangering knowledge-intensive professions.

On the other hand, studies also predict job growth and discuss the potential of the 'augmentation' of human work through genAI. A study on the use of ChatGPT in mid-level professional writing tasks finds an increase in work productivity and a decrease in inequality among workers

as ChatGPT benefits 'low-ability workers' more (Noy & Chang, 2023). A similar experimental investigation on the impact of ChatGPT in the field of customer support work similarly concludes that there is a significant improvement for novice and low-skilled workers but a minimal impact on experienced and highly skilled workers (Brynjolfsson et al., 2023).

While such studies help us formulate some hypotheses on the impact of genAI in the workplace, their empirical scope remains limited. Systematic research about the actual impact of genAI on professions is still in its infancy. In this chapter, we set out to explore how genAI is currently perceived and used in knowledge work. Focusing on **professional skills**, **creativity**, and **authenticity** as crucial aspects of knowledge work, we ask how genAI might change its professional core. Based on qualitative expert interviews and a quantitative survey, we investigate the perception and use of genAI in three fields of knowledge work that are likely to be particularly exposed: **academic work** in science, **IT programming** in industry, and the **coaching sector**.

Our results belie the expectation that human expertise and skills lose importance. Our study rather shows the contrary: debates and experiences with genAI help to sharpen and value the **core of the professional identity.** The debate on genAI thus helps people working in the respective sectors to see more clearly what constitutes the core of their profession (1) in terms of the **skills** needed not only to accomplish work tasks but also in designing tasks and the projects behind them, (2) in terms of **creativity** understood as original approaches to task fulfilment, and (3) in terms of **authenticity**, which highlights the need for the explicability of tasks and responsibility for results. Our study thus also highlights that professions consist of more than an addition of single work tasks. They contain experiential and tacit knowledge about how to frame, prepare, and interpret steps that are difficult for machines to replicate. However, there are also concerns among the interview partners that professions could be hollowed out and that the quality of products and services could deteriorate as automated 'good-enough-versions' of the former offers become commonplace.

The remainder of this contribution is structured as follows: in the next section, we briefly introduce a framework by which we approach the relationship between humans and genAI that connects insights from critical informatics with theoretical perspective, emphasising the complementarity between technology and (human work). In section 3, we present the methods for gathering and analysing our data. In section 4, we consecutively present the results from the fields of science, IT programming, and coach-

ing. In the last section, we discuss the results comparatively and draw conclusions to understand the impact of genAI on knowledge work.

## 2. Research framework

In approaching the impact of genAI on knowledge work in the workplace, we connected two theoretical threads that caution against oversimplified expectations about the substitution of work through technology. The first are perspectives of **critical computer science** as pioneered by Joseph Weizenbaum and further developed by academics like Wolfgang Coy, Robert Kling, Katharina Zweig, and Gary Marcus. Weizenbaum was a protagonist of AI research in the 1960s–1980s. As a professor at MIT, he invented ELIZA, one of the first chatbots. At the same time, however, he was an outspoken critic of exaggerated expectations about AI and cautioned that society needed to set goals for and boundaries of technological development, in particular with regard to automated weapon systems. He was especially critical of the anthropomorphisation of technology that resulted in the term 'artificial intelligence'. In his seminal work *Computer power and human reason* (1976), Weizenbaum criticised the term AI because of its inherent analogy to human intelligence. Human intelligence, he argued, was categorically different to automated calculations: AI surpasses human intelligence in many aspects, but it lacks the intuitiveness, context-sensitivity, and reflectivity of human reasoning, among other deficits. While Weizenbaum was fascinated by the progress in AI research and, in fact, was one of its protagonists, he warned that the power of AI systems must not be overestimated and recognised a strong tendency in society to do so.

The work of Weizenbaum and other critical computer scientists (e.g. Coy & Bonsiepen, 1989; Marcus & Davis, 2019) thus intersect with a second stream of literature that we build upon. These contributions highlight the **complementarity** of artificial and human intelligence and the potential that AI can be used to augment human decision-making (Daugherty & Wilson, 2018; Davenport, 2018; Ramge, 2020). Decision-making from this perspective comprises various functions that involve data collection, analysis, and interpretation. Machines can be instrumental in supporting these functions and, indeed, open up unseen possibilities to provide the basis for more informed decisions. It remains the role of humans, however, to dynamically contextualise and interpret the respective material, which

requires domain-specific and experiential knowledge that is often hard to codify.

These insights about the differences between artificial and human intelligence, as well as the possibilities for their interaction and the augmentation of human intelligence, are important cornerstones for the analysis of the use of genAI in knowledge work. From this brief discussion, we summarise the following aspects for our empirical analysis:

1. genAI should not be equated with human intelligence. Even if its results are fascinatingly similar to human communication, there is an epistemological abyss between AI and human reasoning. We, therefore, ask less about what human functions can be replicated and more about differences and possible complementarities.
2. How work changes through the use of genAI depends on the new ways by which human actors learn to use the tools at their disposal. Our research tackles questions of social innovation in the respective occupational fields and is particularly interested in the experimental mode by which actors identify new possibilities to fulfil tasks.

We are convinced that this perspective is particularly well-suited to analyse the specifics of genAI. While the above statements remain valid for many conventional automation technologies, the characteristic of genAI, and especially genAI chatbots, lies in the dialogical way in which their potential unfolds. We are not talking about a static set of machinery or algorithms that can be isolated and measured in its capabilities, but about a technology that evolves in interaction with human activity. For example, questions of skills, creativity, and authenticity are of particularly high relevance for the evolution of genAI, and the quality of its results most importantly lies in the prompts by which human actors operate it and the sensemaking needed to deal with its results.

## *3. Methods*

Our main research question asks about the perception of genAI among employees in the field of knowledge work. In particular, we wanted to find out how they perceive (a) the impact on **skills** in terms of obsolete skills and newly emerging skills, (b) the relationship between genAI and **creativity**, and (c) the role and perception of **authenticity** with regard to the use of genAI. These terms were identified with a view to the theoretical discussion

on the complementarity between human and artificial intelligence referred to above and public debates on the impact of genAI that particularly highlights issues of skills, creativity, and authenticity as particularly relevant.

In the context of this study, we limit our investigation to genAI systems that operate on the basis of large language models and provide the generation of written language. We selected three occupational fields in order to investigate these issues. These were supposed to represent relevant fields of knowledge work in which the application of genAI is imminent and in which we assume that the issues of (re)skilling, creativity, and authenticity matter. Based on the observation of public discourses on these matters in Germany and prior research experiences, we chose the fields of science, IT programming, and coaching for our study and used a mixed methods approach.

The **qualitative survey** consists of 14 expert interviews that we initiated in March of 2023, from which we derived insights that provided the basis for a broader investigation through a quantitative study that was conducted in December 2023. The qualitative study used inductive sampling following the snowball principle and aimed to provide detailed insights into the reasoning of employees in the surveyed professions about genAI. We also were able to reconstruct the manner and the current state of implementation in each field through qualitative data collection.

For the qualitative part of the analysis, we selected a sample of representatives of professional associations and other experts who possess insights about the general reception of genAI applications in their occupational field. We also contacted employees who used genAI in their work routine and thus were able to report about their experiences in working with genAI. We selected the interview partners according to the degree to which an organisation could be regarded as representing the perspectives of employees of a professional group and the ability of representatives to comment on the use of genAI in their field. In total, we conducted 14 semi-structured interviews that lasted between 60 and 90 minutes between May 2023 and March 2024. Questions were asked about their usage of genAI tools and perceived uptake of such tools in their occupational field, how such tool use changes work experiences and work outputs, and related queries.

The audio recordings of these conversations were transcribed and analysed using qualitative content analysis. As two coders, we worked iteratively and chose a deductive-inductive method of coding that departed from the three main categories 'skills', 'creativity', and 'authenticity' to which we added subcategories that were derived from the interview material.

The results were summarised and condensed to summaries for each main category in each sector and analysed comparatively.

The **quantitative online survey** (with different people) provides a broader perspective on the usage and perceptions of a greater number of employees and solidifies some of the assumptions that were developed in the qualitative analysis. The study also contained an **experiment** in a methods seminar at Humboldt University in Berlin that will constitute a third source of data. However, this data is currently being evaluated and has not been incorporated into this study.

To explore the perceptions of ChatGPT's impact across three distinct domains – coaching, IT, and science – we conducted three parallel yet separate studies. Participants were recruited through Prolific, specifically targeting individuals from the United States and Europe who regularly (and weekly) use AI technologies. To ensure relevance and expertise in each domain, we employed prescreeners tailored to each field: for IT, we required experience in computer programming, familiarity with various programming languages, and knowledge of software development techniques; for coaching, we sought individuals in roles such as consultant, coach, therapist, personal trainer, or well-being counsellor; and for science, we focused on those with a research function in their employment.

Across all studies, participants were compensated at a rate of £12 per hour. Initially, 385 individuals were recruited. However, participants who reported non-active use of ChatGPT were excluded from further analysis to maintain a focus on individuals with current and relevant experiences with it. This criterion led to a final participant pool distributed across the three domains as follows: 105 in IT, with 25.7% female, a mean age of 31.32 (SD = 10.35), and notable usage patterns of ChatGPT 3.5 (60%), and version 4 (40%); 120 in coaching, with 46.7% female, a mean age of 34.26 (SD = 10.22), and a preference for ChatGPT 3.5 (70%) over version 4 (30%); and 106 in science, with 54.7% female, a mean age of 30.15 (SD = 5.79), with 73% using ChatGPT 3.5 and 27% using version 4.

Participants came from diverse educational backgrounds, spanning all levels of education, which added a wide variety of perspectives to our analysis. The study aimed to assess their perceptions of the impact of ChatGPT on creativity, skills, and authenticity within their respective fields (compare Figures 1–3 for the precise items). This assessment was created for the purpose of this study and carried out using items rated on a 5-point Likert scale, the results of which are detailed in Figures 1–3, provided in the results section.

## *4. Findings: Skills, creativity, and authenticity*

### a) The case of science

The advent of ChatGPT and other genAI tools has generated much debate among researchers and research managers, editors and publishers, and funders. They discuss how the use of genAI might affect the quality of research and its evaluation, the publication and grant application system, and how it might introduce potential biases and inequalities in terms of research content, but also in terms of which research organisations are willing and able to pay for genAI tools. While people recognise the opportunities and possibilities for improving and speeding up the research process, the communication of results, and applications for further funding, people also fear a 'vicious circle' of genAI producing publications and grant proposals, which are then evaluated by genAI with fundamental effects on scientific knowledge production.

In the following, we discuss the results of our expert interviews focusing on (1) the (un)learning of old and new skills and expertise, (2) creativity as a central prerequisite of originality and innovation in scientific knowledge production, and (3) authenticity as the critical aspect for authorship in terms of taking responsibility for results, granting originality, and questions of intellectual property rights. These three topics present critical aspects of the ongoing technological developments and the debate on genAI in science.

#### aa) Skills

The debate on how genAI changes the social practices of doing science in terms of the (un)learning of skills and the gain or loss of expertise centres on two crucial topics: First, our interviewees discuss what skills are needed to properly use genAI as a tool to support research work. They address skills such as prompt engineering, the critical assessment of genAI results, and the need to understand how genAI works to know about its limitations (such as hallucinations). In the interviews, people also address the question of how to cope with the rapid development of new genAI tools. They highlight the need for constant adaptation to this development – either for using genAI or for regulating it – and indicate speed and permanent flexibility as other main aspects in terms of new skills for using genAI (see also Figure 1).

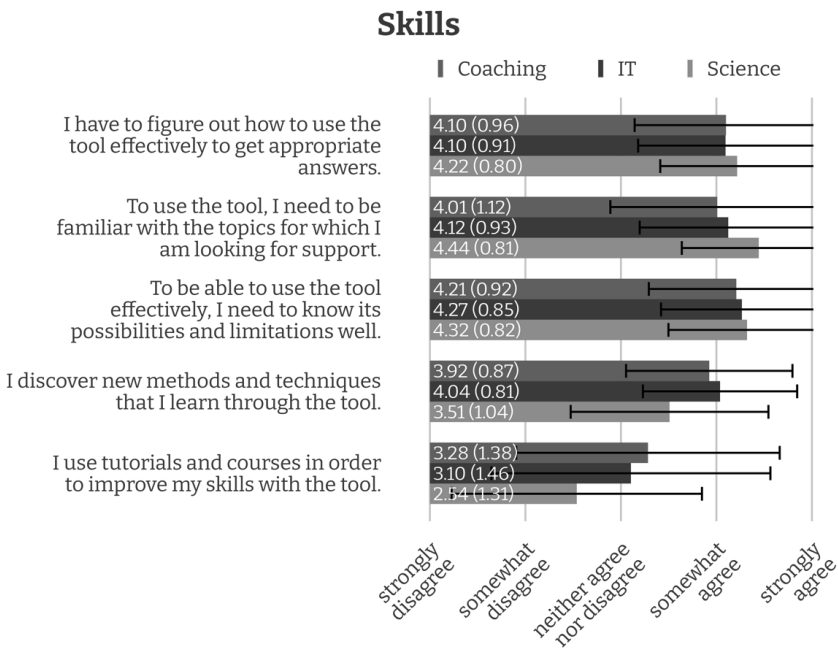


*Figure 1. Comparative assessment of the perceived impact of ChatGPT on skill enhancement across coaching, information technology, and science domains*

Taking all of this into account, they agree that genAI can help with analysing data in the research process and writing text. Nonetheless, the role of genAI in science is also regarded as differing between disciplines. While putting results into text might be considered a task which can be easily standardised and therefore automatised in the natural sciences, in the humanities and social sciences, the production of text is understood as an integral part of the research process and the produced text is considered to be the actual result. Some interviewees fear that the use of genAI as a tool to speed up the writing process could even lead to a dominance of disciplines more adaptive to integrating genAI over other disciplines, which then might fall behind, in particular, in producing grant proposals but also publications as the dominant currency in science to attain positive evaluations and funding.

Second, however, our interviewees also address the question of the limits of genAI and the limits of the *use* of genAI beyond the mere question

of its capabilities. They ask what kind of scientific work can actually be automatised and which work should still be done by human experts. Some interviewees differentiate between standard tasks in text production and data analysis and tasks that require human sensemaking. The latter are regarded to be the sensemaking processes that guide the production of text and the analysis of data but also comprise the checking, weighing, and evaluation of results. Most of all, they argue that only humans can take responsibility for scientific results. They also highlight that it is necessary to grant the reproducibility and transparency of results, which limits the use of genAI to tasks where humans are able to understand on which grounds genAI is actually doing what it does. Yet, some people also question the use of genAI for standard tasks. They highlight instead that even if genAI can do standard tasks such as writing an abstract or doing a literature review, it is still necessary that scientists have the skills to do it in order to be able to judge the results of genAI.

This process leads to a new skill, which one interviewee addressed as being most urgently needed. It is described as the competence to 'manage' the use of genAI. This does not only include the question of who decides upon which software is bought and worked with at a research organisation but also who manages the possibilities for using genAI. As the capabilities of genAI and the possibilities of tasks for which to use genAI are rapidly increasing, this relates to questions of who decides upon rules for good scientific practice when working with genAI.

bb) Creativity

The interviews and the survey also address the question of how the notion of creativity in science might change through the use of genAI (see Figure 2). Understanding creativity as innovative and original and thus at the core of scientific practice, people discuss how far genAI can contribute to this creative process, particularly as genAI can already be used to develop research questions and review papers and proposals. A central insight from our interviews is that people recognise the capacity of genAI to discuss new ideas. However, they still regard the production of new research questions combined with its methodological operationalisation as unique to humans because of their capacity to meaningfully explain why something is innovative and original beyond statistical probabilities.

For the humanities and social sciences, the writing process is also considered a crucial element of the creative process that cannot be substituted

by genAI. In the social and natural sciences, which apply quantitative methods, this is also discussed for the analysis of data. Beyond statistical calculations, which are done by using genAI – for instance, in pattern recognition software, data analysis is recognised as a creative process that needs original thought to raise innovative research questions, to operationalise them, and to discuss the results in an innovative way.

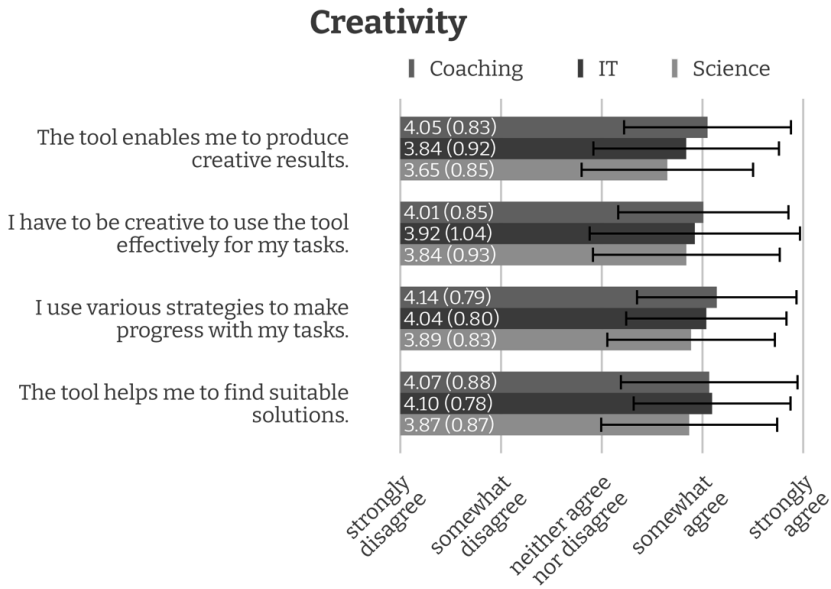


*Figure 2. Comparative assessment of the perceived impact of ChatGPT on creativity across the coaching, information technology, and science domains*

Creativity, however, is seen as crucial not only to the research process but also to reviewing and evaluating papers and grant proposals. Some of the interviewees argue that only humans are capable of judging scientific originality and novelty because this kind of judgement also draws on original thinking and the ability to critically reflect on what constitutes an original innovation beyond a mere recombination of existing ideas. Yet, creativity is also understood in terms of being creative when using genAI. Looking for the best prompts to achieve the best results is becoming recognised as part of the creativity needed to do good science.

cc) Authenticity

Authenticity, understood as a question of authorship, is a topic of central concern to all interviewees and was also part of the survey (see Figure 3). It is, on the one hand, discussed as a legal question in terms of good scientific practice in producing scientific results and evaluating research. Furthermore, people discuss whether genAI is a tool to assist people or if it can be regarded as a 'collaborator' with its own ideas. Central to this dilemma is the question of what happens to the reliability of scientific results as the crucial source for the legitimacy of science when genAI is used in an increasing number of ways during the research process. In any case, people agree that genAI cannot take responsibility for the results it produces, meaning it cannot attain the status of an author. Nonetheless, people also agree that the use of genAI should always be mentioned while being aware of the different degrees of involvement of genAI in the research process, from summarising existing literature to coming up with new research questions.

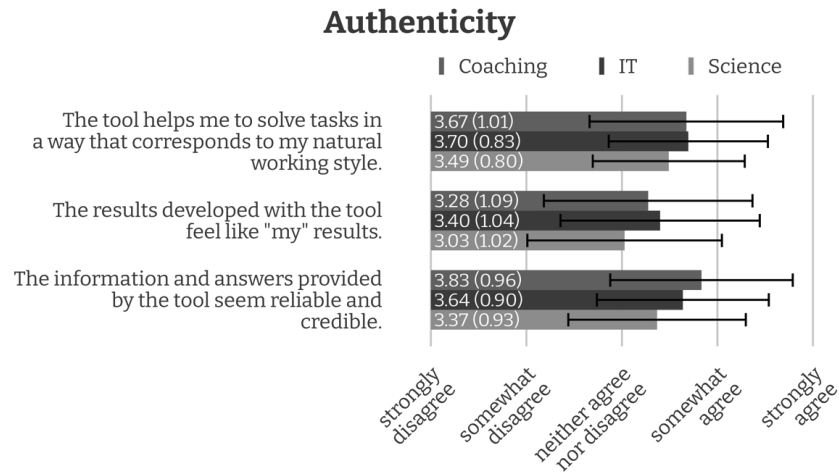


*Figure 3. Comparative assessment of the perceived impact of ChatGPT on authenticity across the coaching, information technology, and science domains*

Drawing on the aforementioned understanding of sensemaking and creativity as explicitly human capacities, the need for authenticity is understood as

core to novelty and originality and thus to the reliability and legitimacy of scientific results, which must not be challenged by using genAI.

b) The case of coaching

In the evolving coaching landscape, the introduction of genAI (genAI) tools has sparked considerable discussion regarding their applicability and utility within the field. While there is an acknowledgement of the potential benefits that genAI can offer, the overall sentiment among coaching professionals reveals a cautious perspective. This apprehension stems from a clear recognition of the inherent limitations of current genAI technologies when applied to the core processes of coaching, which are deeply rooted in human interaction, empathy, and understanding. Coaching is a structured process to enhance an individual's personal or professional development through tailored guidance, support, and empowerment. It involves a collaborative relationship between the coach and coachee, wherein the coach employs various techniques to facilitate self-discovery, goal setting, and the achievement of desired outcomes. Rooted in principles of psychology, education, and human behaviour, coaching emphasises the coachee's active role in their growth journey, leveraging their strengths and potential to foster significant, sustainable change. The primarily informative nature of genAI, as exemplified by text-generation tools, contrasts with coaching's explorative approach, which focuses on eliciting personal insights through questioning. Thus, current genAI tools like ChatGPT are not suited for a direct coaching process. However, other potential areas are evident in which genAI tools can support the coaching practice, such as enhanced accessibility and efficiency in certain operational aspects of coaching.

aa) Skills

In the perception of the interviewed professionals, the integration of genAI in coaching is creating a divide between traditional coaching methods and technologically enhanced practices. Coaches recognise genAI's role in streamlining specific tasks, such as scheduling, initial assessments, and gathering basic information and common methods. Highly common and standardised coaching issues like time management are already outsourced into online courses enhanced by genAI. However, this seems only applicable to topics that are concise in scope and follow a somewhat structured

approach. Furthermore, the exploration of genAI's potential in coaching has brought to light its utility in supplementary roles, such as collecting and analysing data during sessions. This application suggests a modest yet significant opportunity for genAI to contribute to the coaching process by offering additional information.

However, the interviews revealed a consensus on the irreplaceable nature of human qualities in coaching, highlighting that while genAI can augment certain aspects of coaching, emotional intelligence, empathy, and the capacity for deep human connection remain central to effective coaching practices. The capacity for emotional attunement, the development of trust, and the understanding of subtle contextual cues remain distinctly human attributes that genAI cannot replicate. Further, the survey results suggest that knowledge about specific topics is still necessary when working with ChatGPT, while the actual tool use is intuitive as it does not require any specific skills to use (Figure 1).

The skills associated with deploying genAI effectively in coaching – knowledge of the tools, understanding how they work, and efficiently leveraging them – are tempered by a critical awareness of the technology's boundaries. As the coaching profession continues to grapple with the implications of genAI, the prevailing view is one of cautious integration, where genAI's role is confined to augmentative and supportive functions, always secondary to the irreplaceable value of human insight and connection in the coaching process.

bb) Creativity

GenAI's capability to generate diverse ideas and perspectives can, at a superficial level, contribute to the creative toolkit available to coaches. For instance, AI-driven prompts can inspire novel approaches to standard coaching challenges or provide a range of options for tackling common issues like goal setting or motivation. Coaches appreciate genAI's ability to generate diverse ideas, aiding in brainstorming and problem-solving. The survey results enforce this notion, as coaches reported coming to creative and suitable solutions with ChatGPT (Figure 2) –whereby the bias of tool use should be taken into account here. Coaches who find the tool useful and meaningful continue to use it and thus could participate in our study. However, in the interviews, the depth and usefulness of these AI-generated contributions are often questioned. The nuanced understanding of a coachee's personal experiences, emotions, and the subtleties of human

behaviour remain distinctly human facets that genAI cannot adequately capture or replicate. As such, the true essence of creativity in coaching, rooted in deep empathy and genuine human connection, appears beyond the reach of current genAI technologies. In fact, the survey results show that coaches need creativity to use ChatGPT effectively (Figure 2).

Moreover, the potential for genAI to support creativity in coaching raises significant considerations regarding the balance between technology and human intuition. While genAI can offer new insights, the critical judgement to discern which of these are truly valuable and applicable in a specific coaching context remains a distinctly human skill. The creative application of genAI in coaching, therefore, involves a discerning use of technology, where coaches must navigate between the benefits of AI-generated content and the irreplaceable value of human-driven creative insight.

### cc) Authenticity

Authenticity in coaching is paramount, constituting the bedrock of the coach–coachee relationship. It involves genuine interactions, sincere emotional engagement, and mutual trust that enables profound personal growth. The use of genAI tools in coaching, while offering operational efficiencies and perceived viable answers (Figure 3), prompts a significant concern among the interview partners regarding the preservation of authenticity. It is held that these tools, by their very nature, operate on algorithms and patterns devoid of the capacity for genuine emotional intelligence or the nuanced understanding of human complexities. As such, while genAI can process and produce content at remarkable speeds, the depth of understanding and the empathetic connection that form the essence of an authentic coaching relationship cannot be algorithmically replicated. This limitation highlights the indispensable value of human presence in coaching, underscoring that the core of coaching – the authentic connection and understanding between coach and coachee – remains irreplaceably human.

Moreover, the challenge of maintaining authenticity extends to the ethical use of genAI in coaching. All interviewed coaches agree that transparency regarding the role and extent of genAI's involvement in the coaching process becomes crucial. Coaches are tasked with the responsibility of clearly communicating to coachees when and how genAI tools are used, ensuring that the coachees understand the nature of these tools and their limitations. This transparency is essential in maintaining the trust and integrity of the coaching relationship, allowing coachees to discern the

origin of insights and advice – whether they are derived from their coach's expertise or augmented by genAI.

Amid the exploration of authenticity in the integration of genAI into coaching, an intriguing counterpoint emerges regarding the accessibility and comfort level some individuals may experience when using genAI tools. Specifically, anthropomorphised chatbots and AI systems present a unique potential for those who find it challenging to engage in the deeply personal and vulnerable process of coaching another human. For certain individuals, especially those grappling with issues surrounded by stigma or shame, initiating conversations and expressing their innermost thoughts and feelings can be significantly less daunting when interacting with an AI (see Waytz et al., 2014). The perceived lack of judgement and anonymity provided by genAI tools can lower barriers to entry for these individuals, offering them a preliminary step toward seeking help. In these instances, genAI does not detract from the authenticity of the coaching process but rather enables a form of engagement that might not have been possible otherwise.

Incorporating the various aspects into the broader discussion, it becomes evident that the role of genAI in coaching is multifaceted, offering both challenges and opportunities to preserve and enhance the coaching experience. The key lies in the mindful application of these technologies, recognising their potential to reach individuals who might otherwise remain outside the sphere of coaching support. As such, the integration of genAI into the coaching domain calls for a balanced approach, one that embraces the potential of technology to complement human-driven coaching processes while maintaining a steadfast commitment to the principles of authenticity and ethical practice. Nonetheless, the effective integration of these tools requires a deep understanding of their functions, limitations, and the ethical considerations involved. Coaches must discern the use of genAI and ensure that these technologies serve to support rather than overshadow the indispensable human elements of coaching.

### c) The case of programming

The introduction of ChatGPT and other genAI tools raised great interest among programmers to test and utilise their potential and limitations for various tasks in a timely manner. The broad discussion about the work efficiency of the tools and the programmers' initial experience also quickly

led to an increase in interest from some companies in financing the corresponding genAI tools for their IT departments. Data protection debates tended to take a back seat, or the topic was downplayed, and responsibility for its use was passed on to the individual programmer.

After all, the field of programming is constantly changing: Not only technical devices but also technical services and possibilities are constantly expanding. As a result, the demand for programmers is also increasing, and new jobs, such as data analyst and ML engineer, are becoming more and more in demand. At the same time, the requirements for every developer are constantly and gradually adapting in order to keep up with the latest trends and fulfil the quest for simplicity and efficiency. The most prominent example is programming languages, which themselves are constantly changing – not only in which context and by which type of developer they are used, but also to which further development they are subject. If they are used a lot, more and more functions and possibilities are added, while other languages lose their functionality. As one aspect of a programmer's job is to work with these languages in the programming process for about half of the workweek, this also raises the question of how the apparently necessary retraining and further training of skills in order to keep up is changing due to new tools such as ChatGPT.

aa) Skills

The discussion about the change in skills in the context of the use of genAI in programming encompasses a variety of aspects that were examined in the expert interviews. These include the identification of suitable areas of applicability of genAI, the skills required for its use, and the importance of human expertise in various contexts. In addition to the main coding, the tasks of programmers also include customer meetings, team meetings, code reviews, and the documentation of code and programs.

The potential use cases for genAI are primarily in the coding and creation of texts and documentation for code snippets and programs. In coding, genAI can support routine tasks and provide suggestions. However, it remains crucial that programmers have a sound understanding of the underlying processes in order to avoid potential errors and bugs, some of which only appear later (see also Figure 1). GenAI offers clear advantages, particularly in the area of text creation and documentation, which was previously neglected due to time constraints. The integration of genAI can,

therefore, not only save time but also lead to better quality and traceability in, for example, code reviews.

However, the question of how the use of genAI changes forms of learning and knowledge is also raised. There is some concern that the experiential knowledge that is currently being acquired as a junior, for example, will be replaced by the use of genAI and that self-learning will fall by the wayside. Therefore, it seems essential that programmers continue to have the skills to recognise and identify problems and give instructions independently, as well as to acquire and test the knowledge required to use genAI tools effectively (see Figure 1).

bb) Creativity

The effective use of genAI in programming requires an in-depth analysis of the available tools. Programmers inform themselves in advance about the functions and possible uses of genAI tools through research and practical testing. This process of testing new tools is usually done through learning by doing, using simple tasks to evaluate the output and understand the potential of the tool. In addition, there is often a self-organised exchange between programmers to share experiences and best practices in dealing with genAI.

The discussion about creativity in programming is about finding innovative and original ways in the development process. The actual coding is only one part of the overall work, with the focus on the knowledge gained from experience and the ability to solve problems, also with the support of genAI. An interview partner points out: 'Just that one doesn't only Google but also uses AI. So, the results are the same. The question is, just how quickly do you get to the result? Or how precise are the results?'

The use of genAI, such as ChatGPT, is only seen as an extension of the existing toolset. What is new is the wide range of possibilities that such tools now offer. For example, ChatGPT can be used as a research tool in specific cases or to simplify and visualise different solution approaches. This function provides effective added value if you have the relevant experiential knowledge to a) prompt in a targeted manner and b) be able to continue working with the output conscientiously. Our study results also underline the importance of human creativity and experiential knowledge, which are essential for critically evaluating the output of genAI and using it sensibly. It can be seen that human creativity plays a central role in the ef-

fective use of genAI in programming by enabling a meaningful integration of the tool into the development process (see Figure 2).

cc) Authenticity

Accordingly, the authenticity debates in the programming field remain rather quiet. Despite the fact that the latest tools and trends are usually tested in terms of their potential and possible use cases, questions about the origin of ideas are rarely discussed, even with the advent of freely accessible genAI. This lack of discussion may be due to the fact that genAI is not seen as more than just another tool, i.e. 'just the new Google' and seems to correspond more or less with their own natural working style (see Figure 3). However, when it comes to the question of the correct use of the tools and the responsibility for the product presented to the customer, one encounters recurring threads of debate.

While the occurrence of errors and bugs in code is nothing new, the use of genAI also leads to new sources of errors that the developers are not familiar with from their 'own code'. In particular, genAI-generated code that exceeds the developer's own experiential knowledge leads to an increased number of subsequent bugs, similar to untested genAI code. A comprehensive understanding of typical sources of errors, which often are more profound and only occur in a few cases, is often only the domain of senior developers. Junior developers would not even recognise them. Consequently, some senior programmers offer junior developers the opportunity to work together a) through their concepts, b) their prompting, and c) through the code created with genAI in order to increase junior developers' experiential knowledge. They hope that by sharing their experiences, their juniors will avoid future errors and subsequently reduce their own time-consuming rework. Otherwise, there is always a risk that sources of error will not be recognised due to a lack of knowledge at the junior level and a lack of time at the senior level, meaning the product will be delivered to customers with bugs. Nevertheless, this is also part of the business: it is always possible to optimise and expand a code, so before genAI, the products often had to be revised and adapted after a certain time anyway.

Overall, genAI tools are primarily described as support tools that may be able to take over a large part of the tasks of junior developers in the future. Nevertheless, even experienced developers find them to be a supportive tool rather than a collaborative partner with their own ideas. More central seems to be the question of how the qualification, learning, and knowledge

processes of developers will evolve if the genAI is already a junior developer at their side.

## *5. Conclusion*

Our study provides evidence for new requirements in terms of **skills**, **creativity**, and the ability to verify the **authenticity** and reliability of automatically generated inputs in a dialogical relationship between workers and genAI tools. This view is clearly expressed in the numerous statements by interview partners in all three professions on requirements for **learning** how to operate and master genAI tools, and it is also reflected in our quantitative study. Figure 1 displays a particularly high awareness of the need to acquire skills to do so, which so far is only partially backed up by education and learning opportunities in formalised courses. Acquiring skills on genAI to date mostly seems to be a matter of trial and error.

The awareness of participants in our study about requirements for creativity is equally high and present in all surveyed professions. Clearly, the use of genAI is not a zero-sum game in which human actors lose capabilities when genAI systems grow stronger and more sophisticated. Accordingly, the attitude of most interview partners could be described as a concerned embrace of the new technical options. There are some concerns about a hollowing out of professions and especially about a deterioration of quality, e.g. in peer review processes in science and in services provided by semi-automated coaching platforms. However, there is clearly an acknowledgement of the new possibilities and benefits that could be derived from them.

A fascinating result of the qualitative study that we did not expect is the amount of reflection about the **professional core** of the occupations that we encountered in each field. Rather than weakening the professions, genAI triggered an intensive process of reflection and self-assurance about what it means to be a scientist, coach, or programmer. The participants of this study, by and large, agree that the meaning of these professions transcends providing single tasks that could be replicated or substituted by AI. There is a growing awareness of the skills to combine, contextualise, and dynamically adjust work tasks that clearly lie beyond the boundaries of the punctual responses and calculations of large language models. There are also indications that the professions **dynamically adjust** to new technological (and societal) realities by enlarging and updating the skills and com-

petencies in each profession. This is most clearly expressed in the case of programming, where dynamic adjustment to new programming languages and software developments has constituted a fundamental characteristic of the profession for many years.

Among the confident statements in favour of the complementarity of humans and genAI, we could also detect **uncertainties** about the boundaries of what AI could and should do in the future. When interview partners expressed convictions about what AI would never be able to do, we also detected underlying fears behind such strong statements that sometimes also remained contradictory. The self-assurance about the core content and values in each profession is accompanied by a desire to delimit the reach of AI. This self-clarification process is characterised by tensions that revolve around questions of 'authenticity' – questions that not only concern what AI could do but also how society should effectively control and regulate the usage of constantly evolving AI.

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