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Review Article

Artificial Intelligence (AI) and Future Skills-An Integrative Competency Model

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ABSTRACT

The article, based on a literature review, highlights the diverse competencies and executives and executives need to successfully meet the challenges of digital transformation. The text examines not on the social competencies and future skills but also the impact of Artificial Intelligence (AI) on the working world and the sociated new competency requirements. The findings are then integrated into a generalized competency model for specialists and executives. **Keywords:** Artificial intelligence; Competency requirements; Digital leaders

INTRODUCTION

The ongoing digitalization has significantly changed nearly every aspect of life over the past decades. According to a study by McKinsey, by 2030, around 375 million workers worldwide approximately 14% of the global workforce may need to change occupations to meet the demands of digitalization [1]. transformation affects not only how we communicate a process information but also has significant impacts n the ⁴place, working world and society as a whole. In the modern digital technologies are ubiquitous, transforming business models, work processes and the demands employed For instance, a study by acatech found that a large proportion of companies in Germany view digitalization as a iver for the transformation of their business models. Con anies must pt to a fast-paced, technology-driven enviro ent to re in competitive, while the workforce must acqu ew skill nd competencies to cope with the challenge igital transformation [2,3].

The importance of digitalization g the mere tar 1 adoption of new technologies. It a significant reconfiguration of workplaces, the creation new job profiles f qualific and the continuous development ns. An OECD study shows that about on jobs in VECD countries na could be significantly alt d by n [4]. Knowledge workers face the challen atinuously expanding their digital competencies in a rapidly changing suc environment [2]. In hly technical skills are s context, h required but also the v to navigate a connected, data-driven world, some emplex problems and develop innovative solutions. According to a couply by the World Economic Forum, skills such compare problem-solving, critical thinking, and creativity are essential to the future workforce, as they are difficult to replace through automation [5].

opportunities and challenges. While digital innovations lead to the efficiency and new possibilities, they also raise questions about data protection, security and social justice [6]. Addressing these challenges requires a deep understanding and development of digital competencies at all levels of society.

In this context, the topics of digital competencies, future skills and specific competencies for the application of artificial intelligence are gaining increasing importance. The ability to effectively use digital tools, understand new technologies and integrate them into the working world has become a key competency essential for both individual professional success and the competitiveness of companies and economies [7]. According to a McKinsey study, digital competencies are the most demanded skills in the job market [5,8].

Competency requirements

Digital competencies: Digital competencies refer to the specific skills required to effectively use digital technologies and manage digital transformation processes within organizations. For specialists and executives, digital competencies are particularly important as they not only influence their own working methods but also how teams are led and projects are managed.

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The European Commission describes digital competencies as essential for agency in a digitalized world, particularly for executives who must strategically use digital tools and technologies to optimize business processes and develop innovative solutions. Digital competencies encompass a broad range of skills and knowledge necessary to use digital technologies safely, effectively and responsibly. These competencies go beyond merely operating computers or surfing the internet; they involve a deeper understanding of how digital tools work and their application in various contexts.

Digital competencies can be understood as the ability to critically understand, apply and actively shape information and communication technologies to be capable of action in a digitalized society. This definition emphasizes the need not only to use digital technologies passively but also to actively contribute to the design and further development of digital environments. The authors highlight that digital competencies are multidimensional, encompassing various subfields such as technical skills, informational competencies and communicative abilities [3].

A key feature of digital competencies is their dynamic nature. As digital technologies continuously evolve, the corresponding competencies must also be constantly adapted and expanded. This requires individuals to be willing to engage in continuous education and adapt to new technological developments.

Unlike traditional IT competencies, which primarily focus on technical understanding of hardware and software digital competencies aim to enable people to productively appreciately use digital technologies in various areas of life. This call application of digital tools in professional contexts as well as the use of digital media for information gathering, compunication and participation in society.

Dimensions of digital competencies f and executives

Technological competencies: Technological competencies form the foundation for confidently having the following to the following technologies in an increasingly digitalized parts

pecialist

On a basic level, technological competencia fer to the ability ous digita levices such as to safely and efficiently operation peripherals, as well as the computers, tablets, smartph s an word use of standard software li , spreadsheets and presentation tools. Another dement is the ability to use avigatin the internet, including browsers, using search engines, sending and eiving emails and participating in social networks.

On an advanced level, technological competencies include the ability to under nd and use more complex digital systems. This includes, for mple___nowledge of programming, data analysis and networ y. The skills are particularly in demand chn in the technical development and invol in profession ems, such as IT specialists, software maintenance of a and data develo scientists. Advanced technological also involve a deep understanding of network com encie

technology and cybersecurity. Consecurity is a particularly critical area as the threat of cyber and poperases. According to the Global Risk Report of the Work popomic Forum, cyberattacks and data breach are among the peatest risks for companies worldwide [5].

An important aspect of t nological npetency development is the ability to adapt to technolog and developments. In the fast-paced digital w it is sential to engage in continuous educatio chnologies. This requires nd lea earn new tools and systems but also not only the willingnes the ability to integrate into existing processes and ncy development is a dynamic structures. Tecl lifelong learning and continuous process that adaptation [7].

Informational competencies: Informational competencies are a central development of digital competencies and are essential for the safe and distribution of the vast amount of information of the digital world. These competencies concerning the ability to search for, evaluate, organize, and use information

to find h mant and reliable information. This begins with the use of second engines and databases to conduct targeted and officient of search. Thordsen et al., emphasize that this of search engines not only knowing how to correctly formulate a search query but also understanding which sources reliable and how to effectively combine various information sources [9].

A key aspect of this competency is the understanding of how to use digital information resources such as scientific databases, ebooks and specialized professional portals.

The ability to critically evaluate information is a central element of informational competencies. In the digital world, it is important to verify information for reliability, accuracy and relevance. This requires an awareness of possible biases and misinformation, as well as the ability to consider the context and origin of the information.

Critical evaluation is particularly important in light of the increasing spread of fake news and manipulative content on the internet. This competency includes understanding how algorithms and filter bubbles can influence the information a user sees online and the ability to recognize and circumvent these effects. Another important element is assessing the scientific quality and methodological rigor of studies and reports, especially in areas such as medicine, science and technology [3].

Informational competencies also involve the ability to efficiently organize, manage, prepare and effectively share information. This competency is becoming increasingly important as the volume of digital information that individuals and companies must manage continues to grow [9].

Additionally, this dimension includes considering copyright and licensing conditions when sharing and publishing information. Understanding the legal frameworks, such as copyright, creative

commons licenses and data protection regulations, is essential for the legally secure use and dissemination of information.

An important component of informational competencies is awareness of data protection and data security. In an era where personal and professional data are increasingly stored and processed digitally, it is important to understand the risks and dangers associated with using digital information. This requires not only technical knowledge but also an understanding of ethical considerations when handling personal data. Data protection competencies include the ability to control access to sensitive information and protect privacy in both professional and personal contexts [9].

Communicative competencies: Communicative competencies concern the ability to effectively use digital technologies for communication and collaboration. In an increasingly connected world, where much communication takes place via digital channels, these competencies are important for professional and personal success. They encompass not only the technical skills needed to handle various communication platforms but also the social and cultural abilities required to communicate effectively and appropriately in different digital environments. This also includes the responsibility to ensure that all team member capable of following secure communication practices an are aware of the risks associated with digital communid n. Regular training on security in digital communication employees build the necessary knowledge [9].

These three dimensions technological, infortational communicative competencies together form the cundation for comprehensive digital competency. They enable the curdation for only to use digital technologies but also to have the there easily and responsibly. These skills are essential for success to a digitalized society and workplace.

Future skills

Int J

Future Skills refers to a group of abilitie cies that comp √ changing, are becoming increasingly important in a n beyond mere technical or digitalized world. These skills a d t digital competencies and inclutof cognitive, ucceed in a complex social and emotional abilities requ kills are crucial for the and dynamic work environment. Ful of individuals and adaptability and innovation capacity ily influe ced by technological organizations in a fut ges [5 progress and global ch

cills is underscored by the rapid The importance of h pace of technolog I change the accompanying shifts in the hile technical kills and digital competencies working world remain impo ability to develop comprehensive and comparing is becoming increasingly central. Tries enable dividuals and organizations to future-orien These al continu y adapt to new conditions, develop innovative solutio and ve complex problems that arise in a highly and g alized world. inter

Studies show the impanies investing in the development of financial kills are have productive and innovative and can better dapt market changes [7].

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ntelligence (AI) use of Artin The increasing automation ar us, as many technical tasks can heighten the need for Futur humans unique such as be automated, while the s , the creativity, ethical thinking and social ction are difficult to replicate by machines. Therefore, future skills are gaining utomated work environment importance in an i it the con because they repretencies that machines and algorithms cannot e ly replicate

er to the ability to effectively Digital competencies use digital technical challenges. In contrast, Future Ski far beyond the technical use of digital tools. Th riety of competencies required to succeed panging work environment, shaped not only by by social, economic, cultural and ecological technology bu. changes. Another difference between digital competencies future skills lies in their breadth of application: Digital an sies are often applied in specific fields of work or COL future skills are relevant across different tasks, w industries [7]. Future skills, especially for islists and executives, include the following competencies.

steps, thinking and innovation capability

For secutives, strategic thinking is a central future skill. Digital transformation forces companies to constantly question and all their business models. Executives must be able to identify long-term trends, anticipate technological developments and develop strategic plans that keep the company competitive in an increasingly digitalized world [7,10].

Innovation capability refers to the ability to develop new ideas and successfully implement them in practice. This competency is particularly important at a time when technological changes and global competition force companies to continuously seek new ways to improve their products, services and processes. Innovation capability requires a combination of creativity, willingness to take risks and the ability to think outside the box [2].

Executives play an important role in fostering innovation capability within their teams. They must create an environment that encourages creativity and experimentation while ensuring that new ideas are effectively evaluated and integrated into the company's strategy. Innovation capability must be promoted throughout the organization to establish a culture of continuous improvement and innovation [10,11].

Critical thinking

Critical thinking refers to the ability to objectively analyze information and situations in order to make informed decisions. Critical thinking involves questioning assumptions, identifying connections, and evaluating arguments and evidence. In a world characterized by information overload and complex problems, the ability to critically assess information is becoming increasingly important. The growing complexity of technical systems and the need to make decisions based on data analysis require a high level of analytical competence and critical thinking [2,7].

Agility

The speed of technological change requires specialists and executives to be able to quickly adapt to new circumstances and implement flexible working methods. Agility enables companies to respond swiftly to market changes, integrate new technologies and continuously optimize their processes. For executives, agility means not only being able to react flexibly to changes but also designing the organization to be prepared for the unexpected. This involves supporting an agile corporate culture based on collaboration, rapid feedback cycles and iterative processes [12].

Interdisciplinary collaboration and digital leadership

Digitalization increases the need for interdisciplinary collaboration. Specialists and executives must be able to lead teams composed of experts from various disciplines and integrate their diverse perspectives and skills. This requires a high level of social competence and the ability to develop effective communication and collaboration strategies. For executives, this means not only being experts in their own field but also developing an understanding of other disciplines to successfully lead their teams. They must be capable of steering interdisciplinary projects that often involve complex technical and organizational challenges. It is important to develop shared vision and synthesize the diverse contributions of team members into a systematic whole.

Digital leadership also includes the ability to manage irtu teams that often operate across geographical by daries. Executives must be able to effectively use digital com ration and collaboration tools to coordinate teamwork, productive working environment. This requires building true and enhancing team motivation. Executives mu d new ways to inspire, coach and support their teams y e ensuring that es a high h performance goals are met. This ability requ of emotional intelligence, communication s and flex ity [13,14].

Artificial intelligence and com

requirements

most defining Artificial Intelligence (AI) is one th the potential to the encompasses a technologies of the 21st century and transform nearly every area of modern lik range of technologies that e chines to develop humanm-solving, perception and like abilities such as learn , pro , ap decision-making. AI car automating simple tasks to ng complex problems that require human judg it and c 🙀. AI is used in many offering a valiety of opportunities to industries and area costs, and develop new business optimize processe models, including through mation and optimization of s and personalization and recommendation business proce systems.

AI-specie eten requirements

Int I Sw

Data science and the learning: Data science and machine learning the foundation for numerous AI applications.

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Companies must develop a deep upperstanding in w data is collected, processed and analyzed a gain meaningful insights and integrate them into AI model, upperding to Teuber et al., the ability to understand and unage of the most important technical competencies in an upper driven work environment [15].

In addition to the fundementals of the science and machine learning, professionals in it master the specific platforms and tools used to develop a mimplement AI applications. The ability to effectively the most of the science ools is one of the critical competencies for the science of the implementation of AI initiatives in companies [14].

Security and p

Along with the increasing use of AI technologies, the need to consider recurity and privacy aspects also grows. Professionals must ensure on the AI systems they develop and implement are secure and consider with data protection regulations. However, the AI systems that cybersecurity competencies and a deep constanding of data protection regulations are among the most import technical requirements in an AI-driven work ment p. 1.

Integra n of AI systems

pother important technical requirement is the ability to searcessly integrate AI systems into existing business processes. Professionals must be able to design and implement AI cations so that they interact effectively with existing IT systems and processes [14,15].

Adaptability

Adaptive skills refer to the ability to quickly adjust to new technologies, work methods, and organizational changes. In a work environment increasingly shaped by AI and digital technologies, these skills are important. Specialists and executives must be able to continuously learn and adapt to changing demands.

This adaptability is one of the core competencies in a future shaped by AI. The rapid development of AI technologies and their integration into ever-new application areas require employees to be willing and able to continually educate themselves and acquire new skills. This pertains not only to technical aspects but also to adapting to new work processes and structures necessitated by the introduction of AI [5].

Adaptability is closely linked to the concept of lifelong learning. In a world where technological innovations are advancing at an ever-faster pace, it is not enough to maintain skills and knowledge acquired once. Instead, specialists and executives must be ready to continuously evolve and expand their competencies to stay up- to-date with the latest technologies.

According to André et al., promoting a culture of continuous learning, flexibility and adaptability within organizations is important to successfully meet the challenges of digital transformation. Companies should provide programs and resources that enable employees to regularly update their skills and adjust to new requirements [14].

Ethics and responsibility

With the increasing spread of technologies such as artificial intelligence and big data, the importance of ethical considerations and responsibility grows. Technological innovations must align with ethical standards and legal regulations. This includes protecting privacy, avoiding discrimination through algorithms and considering the social and environmental impacts of technological decisions [7].

According to Binns, one of the greatest challenges lies in socalled algorithmic bias. This bias can arise when the data on which AI systems are trained reflects existing societal inequalities or when the algorithms themselves exhibit systematic biases. This can lead to AI-supported decisions appearing discriminatory, particularly in areas such as credit granting, human resources, or criminal justice [17].

Another central ethical issue is the transparency and explainability of AI decisions. Miller argues that the acceptance and trust in AI systems depend on the ability to understand and explain the decisions made by these systems. This is particularly important in sensitive areas such as medicine or finance, where erroneous decisions can have serious consequences [18].

A key aspect of ethical responsibility in dealing with AI is a question of accountability and liability for decisions made and AI systems. According to Goodman et al., there are often uncertainties in the implementation of AI systems above as responsible for faulty decisions or harmful our mes developer of the system, the optimizer, or the user. These uncertainties can cause legal and the problems, especially when AI systems are used in critical areas such healthcare or criminal justice [19].

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The General Data Prote ion (GDPR) in the European Union is an mple of A lation ensuring the protection of personal dat the digita ge. These regulations compel companies to caref onside ow they collect, store The . comply with these legal and process personal requirements is become a important competency for companies using AI technolos

Floridi suggests and organizations should develop specific ethical guidelines for a true of AI technologies, which establish clear standards and principles for the responsible use of AI. These guidelines should include issues of fairness, transparency, security and protection [20,21].

De

integrated competency model

The descept competency requirements for specialists and particles rescaling from digital transformation and, in carticle from AI can be summarized in an integrated competence model. This model represents a generalized competence framework in which digital competencies, AIcific on petencies and future skills are integrated.

The model encompasses technological skills as well as parching competencies such as ethical thinking, strategic plating and interdisciplinary collaboration and it can be extended according to organization-specific or role-specific requirements.

Competency area	Sub-competer	Description	Relevant sources
Technological competence	 Basic technic understandi Advanced technic and the s Technological innovation 	Encompasses the ability to understand and strategically apply digital technologies and AI.	[15,22]
Information competence	 Information quation Data-driver-cision-making owledge numbers 	Ability to evaluate digital and Al- generated data and incorporate it into decision-making processes.	[22]
Communication and collaboration competence	 Grand Annication Grand Barteria Construction 	Use of digital tools for leadership and collaboration, especially in virtual and interdisciplinary teams.	[10,23]
Strategic competence	Digital strategy development Annovation management • Change management	Development and implementation of digital and AI-based strategies to promote innovation and change.	[10,11,24]
Critical thinkn, problem-solving	Analytical thinkingCreativityDecision-making	Ability to analyze complex problems and develop creative solutions, particularly in the context of AI.	[4,7]

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Adaptability and continuous learning	 Willingness to learn Flexibility Resilience Agility 	Continuous education and adaptation to technological and AI-driven changes.	[2,5,1]
Ethical and sustainable thinking	 Ethical decision-making Sustainability orientation Social responsibility 	Consideration of ethic and social aspects in the use of A and digital technologies.	[7,25,26]
Innovation capability	Creative thinkingEntrepreneurial thinkingProcess innovation	Promotion of innovatio, a sugh digital technology	[14,23]
Leadership competence in the AI context	 Virtual leadership with AI tools Adaptability to AI- driven changes Innovation-friendly culture 	Leadership of teams and projects sign and y influenced by AI technolo _s	[10,14,23]
Collaboration and interdisciplinary work	 Collaboration in interdisciplinary teams for AI solutions Promoting cooperation between the solution of the	Participant of collaboration between various and lines and departments a context of AI and digital technologies.	[7,22,27]
Cross-cutting competencies	Interdisciplinary competenceDigital competence	Over thing skills that support and plement all other areas.	[2,15]

Table 1: Integrated competency model.

DISCUSSION

that specialists The article highlights the diverse compete and executives need to successfully meet t challenges digital transformation. The focus is on digita ompetencie uture skills and the specific requirements aris from th ase of Artificial Intelligence (AI).

Digital competencies encompass of skills necessary nsibly. These to use digital technologies effect y and competencies range from technica to informational aboration. abilities and digital communication and

chnical abilities and include Future skills go beyond social, cognitive and otior that are increasingly nplex work environment. important in a digitalized

As the use of art ial inteln continues to spread, the sific competencies in dealing with AI also requirements for increase. These wledge in data science and machine <u>Ch</u> learning, as were as an un anding of the ethical and legal aspects asso ed with the use of AI.

integrated competency model that The art ps dey ar encies, AI-specific skills and future combin com skills. This rali model serves as a guide for the alists and executives in a dynamic, quali tion of driven work environment.

CONCLUSION

The digital transformation, accelerated by technological advancements and the integration of artificial intelligence, has redefined the competencies required for professionals and executives in the modern workplace. The development of digital competencies, future skills and AI-specific abilities is critical to ensuring individuals and organizations can thrive in a rapidly evolving environment. As technology continues to advance, the ability to adapt, engage in lifelong learning and address ethical and legal concerns will become even more essential. The integrated competency model proposed in this article offers a comprehensive framework that combines these various skill sets, providing a roadmap for professionals to navigate the complexities of digitalization. This model not only addresses technical expertise but also emphasizes the importance of critical thinking, ethical responsibility and strategic leadership in a future shaped by continuous technological innovation.

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