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Introduction to the Monograph on Artificial Intelligence in Digital Society, Volume 1, 2026

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We are on the verge of global changes in existence. In the digital age, we have witnessed the emergence of objects and phenomena that were unimaginable just a few decades ago.

The creation and development of artificial intelligence (AI) attracts particular attention from scientists and the general public. Artificial intelligence, which is created by human intelligence, will inevitably surpass its creators in the near future. This situation has brought a number of fundamental questions (understanding of the nature of reality, consciousness, the meaning of existence, etc.) to the fore at a new level, which require study.

Given these circumstances, I came up with the idea of creating a series of monographs entitled *Artificial Intelligence in Digital Society*, which describe existing AI theories and practices and explore the complex relationship between AI and society.

The monograph is based on the idea of synergy, the increase in the overall efficiency of the "Human-AI System" as a result of their interaction, as well as possible integration and merging.

As the Editor, it was my privilege to oversee the development of the first edition of this monograph. I was particularly interested in chapters that not only highlighted the challenges of digitalisation in society, but also offered specific practical solutions for utilising artificial intelligence capabilities.

This monograph considers issues related to researching both the potential and shortcomings of the digitalisation of society. This issue features a variety of chapters that draw on the expertise of artificial intelligence specialists and reflect a wide range of ideas and perspectives.

Chapter 1 is devoted to the historical development and theoretical foundations of artificial intelligence. The authors review key milestones in the evolution of AI, emphasising that technological progress in this domain has not

followed a strictly linear trajectory. The chapter analyses the interdisciplinary nature of AI, integrating biological, cognitive, philosophical, mathematical, and logical perspectives together with developments in machine learning, neural networks, and natural language processing. Particular attention is given to the transition from classical symbolic approaches to machine learning paradigms. The analysis demonstrates that neither symbolic nor statistical approaches alone are sufficient, highlighting the growing importance of hybrid methods in contemporary intelligent systems.

Chapter 2 examines the regulation of human interaction with artificial intelligence within the emerging "Human–AI System". The authors propose a conceptual model for regulating the use of AI-based chatbots in scientific research and academic publishing. Central to this model is the AIC "AI Chatbots Attribution", which promotes compliance with ethical and legal copyright standards. The chapter also addresses mechanisms for monitoring and managing human–AI interaction in the context of rapidly advancing digital technologies. Particular attention is given to the protection of fundamental human rights, including freedom of choice and the right to work, as well as the proposed "AI Free. Human Created" attribution.

Chapter 3 addresses the growing gap between the rapid advancement of artificial intelligence technologies and society's capacity to govern and benefit from them equitably. The chapter examines the relationship between digital transformation, artificial intelligence, and societal change, highlighting how technological development reshapes institutions, governance structures, and human relationships. Drawing on qualitative documentary research and comparative case studies across healthcare, finance, education, and public services, the authors analyse both the opportunities and risks of AI-driven transformation. Using Vial's Building Blocks of Digital Transformation framework, the study emphasises infrastructure integration, equitable value distribution, trustworthy organisational practices, and a human-centred approach to sustainable transformation.

Chapter 4 investigates the factors influencing artificial intelligence adoption among small and medium enterprises and its implications for organisational performance. The study develops an integrated analytical model that combines the technology–organisation–environment framework, diffusion of innovation theory, and ethical principles to explain AI adoption within SMEs. Using quantitative methods and structural equation modelling, the authors analyse survey data collected from South African enterprises. The findings indicate that compatibility, organisational readiness, employee capability, top management support, customer pressure, vendor support, and ethical considerations such as fairness, accountability, and transparency significantly influence AI adoption, thereby contributing to improved firm performance.

Chapter 5 provides a comprehensive review of artificial intelligence–driven chatbots and intelligent agents applied to monitoring, evaluation, and

organisational learning. The chapter examines recent advances in conversational AI, including large language models, retrieval-augmented generation, and multi-agent architectures. Through a systematic literature review and bibliometric analysis of peer-reviewed publications from 2021 to 2025, the authors identify key research trends, core techniques, and emerging application domains. The findings highlight the growing role of AI-based conversational systems in organisational evaluation and knowledge management. The chapter synthesises current evidence, identifies research gaps, and outlines directions for future studies and evidence-based adoption.

Chapter 6 explores the use of artificial intelligence-based chatbots to enhance the sustainability and competitiveness of small and medium enterprises in the digital era. The study investigates factors influencing chatbot utilisation among South African SMEs by integrating the technology–organisation–environment framework, the technology acceptance model, and diffusion of innovation theory. A quantitative research design was employed, with survey data collected from 300 enterprises and analysed using structural equation modelling. The findings reveal that relative advantage, compatibility, organisational readiness, perceived usefulness, ease of use, ethical AI regulation, and top management support significantly influence chatbot adoption among SMEs, whilst security is less significant.

Chapter 7 analyses the transformative role of artificial intelligence as a driver of innovation in production systems, managerial decision-making, and consumer value creation. The chapter examines the application of AI technologies in smart manufacturing, including predictive maintenance, intelligent supply chains, and human–robot collaboration. It also explores the use of cognitive automation, predictive analytics, and scenario modelling to support augmented decision-making processes. In the consumer domain, the authors discuss hyper-personalised services enabled by recommendation systems, behavioural analytics, and conversational interfaces. The chapter emphasises that effective AI implementation requires high-quality data, workforce reskilling, robust governance frameworks, and responsible innovation

Chapter 8 focuses on governance, ethical challenges, and data security risks associated with the adoption of Generative Artificial Intelligence in contemporary organisations. The authors analyse emerging security threats related to large foundation models, including model poisoning, prompt injection, and risks of data leakage and intellectual property exposure. The chapter also examines ethical concerns such as inexplicable bias, limited transparency, and generate shadow vulnerability in AI systems. To address these challenges, the authors propose a socio-technical governance framework that integrates human oversight, explainable artificial intelligence, and continuous security monitoring within the generative AI deployment process.

Chapter 9 investigates the role of Smart Artificial Intelligence in advancing Industry 4.0 within the South African manufacturing sector. The chapter examines how cyber-physical systems, the Internet of Things, and intelligent automation contribute to improving productivity, efficiency, and competitiveness in industrial production. Based on a systematic literature review of studies published between 2022 and 2025, the authors analyse the opportunities and constraints associated with Smart AI adoption. The findings indicate that, despite its significant potential for digitalising production processes, implementation is hindered by financial limitations, inadequate technological infrastructure, and insufficient organisational capabilities within the manufacturing sector.

Chapter 10 examines the prospects for human–machine collaboration in Sub-Saharan Africa in the context of labour market transformation and technological development. Using a systematic literature review of studies published between 2020 and 2025, the chapter analyses how artificial intelligence may influence employment, poverty reduction, and social inequality within the framework of the Sustainable Development Goals and the capability approach. The findings reveal that limited infrastructure, low levels of digital and AI literacy, and insufficient technological resources constrain the effective adoption of advanced technologies. At the same time, the region's young population creates opportunities for universities to expand AI education and industry partnerships.

Chapter 11 explores the development of a higher education ecosystem based on the implementation of artificial intelligence technologies. The study analyses the benefits and challenges associated with the integration of AI into university teaching and learning processes. On this basis, the authors develop and substantiate a model for the optimal implementation of artificial intelligence within the higher education ecosystem using a systems approach. The proposed model includes structural (universities, faculties, departments, institutes, etc.) and functional (content of education, forms and methods of teaching, diagnosing of learning outcomes, administering of educational service, and eternal – include academic achievement: levels of knowledge, skills, and competences) components. The results are essential for developing university strategies for developing educational ecosystem.

Chapter 12 analyses the readiness of South African universities to adopt Generative Artificial Intelligence within the higher education sector. The chapter examines both the opportunities and challenges associated with the use of generative AI tools in academic environments, particularly in the absence of comprehensive institutional policies and guidelines. Using a systematic literature review and content analysis of academic publications, institutional reports, and policy documents, the authors assess levels of adoption according to the Generative AI maturity framework. The chapter proposes an analytical framework enabling universities to evaluate readiness, identify adoption gaps, and develop policies for responsible integration of generative AI technologies.

The monographs in this series represent an attempt to integrate the experience accumulated in recent years and propose new solutions to the challenges of AI using.

This series of monographs is an invaluable resource for researchers, teachers, postgraduate students, and practitioners in the field of AI.

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