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Artificial intelligence as invisible infrastructure: socio-technical impacts and the transition to autonomous agents in everyday life (2024-2026)

Artificial Intelligence as Invisible Infrastructure: Sociotechnical Impacts and the Transition to Autonomous Agents in Daily Life (2024-2026)

Artificial intelligence as invisible infrastructure: socio-technical impacts and transition to autonomous agents in daily life (2024-2026)

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SUMMARY

This article analyzes the deep integration of Artificial Intelligence (AI) into contemporary daily life, investigating the paradigmatic transition from instrumental generative tools to autonomous agents that operate as an invisible infrastructure. Through a systematic literature review and analysis of consolidated technological trends between 2024 and 2026, the
This study discusses how AI is reshaping productivity, education, and data governance. The results indicate that, while operational efficiency has increased across various layers of society, critical challenges are emerging regarding algorithmic opacity, data bias, and the crisis of digital authenticity. The article concludes that AI literacy and ethical human oversight are indispensable requirements for the sustainability of the human-machine symbiosis in the modern digital environment and suggests pathways for regulation that protects human agency.

Keywords: Artificial Intelligence. Autonomous Agents. Digital Everyday Life. Algorithmic Ethics. IT Governance.

1. INTRODUCTION

The evolution of computing technologies in recent decades has followed a trajectory of Miniaturization and integration, culminating in what is known today as the age of intelligence. omnipresent. The rapid rise of Artificial Intelligence (AI) in recent years has transformed it from A technological promise within an infrastructural reality. If in 2023 the debate centered on emerging capability for generating text and images through large language models scale (LLMs), the 2024-2026 biennium consolidated AI as a basic infrastructure, operating silently and ubiquitously across management systems, mobile devices, and processes. decision-making.

The central problem of this research lies in understanding technological "invisibility." When As a technology becomes infrastructure, it tends to move out of the realm of the user's critical awareness. becoming as natural as electricity or the drinking water network. However, unlike Of passive infrastructures, AI possesses predictive agency. How does this invisible automation affect the Human autonomy? The aim of this article is to map the impacts of the transition to systems. autonomous and discuss the ethical and technical risks associated with increasing technological dependence in daily professional and personal life.

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2. THEORETICAL FRAMEWORK

2.1. The Evolution of Artificial Intelligence: From Reactivity to Proactivity

The trajectory of AI can be segmented into waves of complexity. The first wave, purely
Reactive and based on rigid rules, it gave way to the second wave, deep learning .
Learning). The fundamental turning point occurred with the popularization of transformative neural networks.
(Transformers), which enabled natural language processing at levels of complexity.
human, including context and semantics (VASWANI et al., 2017).
In 2026, academic literature focuses on "Third Wave AI," which seeks to integrate logical reasoning.
and contextual. According to Russell and Norvig (2021), the evolution towards intelligent agents that perceive
They are aware of the environment and act proactively to achieve complex goals without constant intervention.
This marks the definitive transition of AI from a tool to an agent.

2.2. Autonomous Agents and Ubiquitous Computing

The concept of Autonomous AI Agents (AAIA) refers to systems capable of...
self-management. Unlike a chatbot that waits for a *prompt,* an autonomous agent in
2026 is capable of decomposing a generic order (e.g., "plan my study week") into
Operational subtasks (checking the schedule, retrieving materials, booking appointments, sending emails).
This complete integration revives Mark Weiser's (1991) vision of ubiquitous computing. For
Weiser argues that the most successful technologies are those that "disappear" into everyday life.
In the current context, AI has ceased to be a destination (a specific website or app) and has become the fabric of the system.
a combination of operating systems and web browsers, performing *backend* operations that the
The user doesn't even notice.

2.3. Ethical Challenges: The Bias and Opacity of the "Black Box"

The reliance on invisible infrastructure exposes the problem of algorithmic opacity. Many of the
Systems that decide on bank credit, resume screening, or health diagnoses operate
as "black boxes". Cathy O'Neil (2016) warns about "Weapons of Mathematical Destruction", in
that opaque models reproduce historical biases present in the training data under the
The facade of technological objectivity. In 2026, with the increasing complexity of the models, the
Traceability of decisions becomes the main challenge of contemporary software engineering.

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3. METHODOLOGY

The methodology adopted is an exploratory literature review of a qualitative nature. The research
It was structured based on the analysis of indexed scientific journals and conference proceedings.
Technology and digital governance reports (such as the *AI Index Report* and ISO/IEC guidelines).
Works published between 2020 and 2026 that address the intersection between AI and were selected.
social behavior. The analysis was divided into three pillars: technical functionality, impact
Psychosocial and regulatory frameworks.

4. RESULTS AND DISCUSSION

4.1. AI as a Catalyst for Productivity and the Risk of Cognitive Atrophy

The results demonstrate that the use of AI in daily academic and professional life has increased the...
Average productivity in repetitive tasks increases by up to 40% (data estimated based on trends for 2025). However,
academic discussion points to the risk of "cognitive atrophy." As
that we delegate the writing, information synthesis, and logical planning to AI agents,
The human capacity to perform these operations independently may be compromised.

4.2. The Crisis of Authenticity and Synthetic Content

By 2026, the distinction between what is generated by humans and what is generated by algorithms has become...
almost impossible in digital environments. This puts pressure on trust in institutions.
Current technical discussion revolves around the implementation of "digital watermarks" and cryptography.
data provenance as a way to mitigate the spread of deepfakes and misinformation.
Automated processes that affect the day-to-day functioning of democracy and interpersonal relationships.

4.3. Regulation and Governance: The Role of the Developer

As a Bachelor of Science in Computer Science, it is observed that the responsibility no longer rests solely with...
functional code, but also ethical code. The implementation of responsible AI guidelines.
(REI) has become the standard for publication in high-Qualis journals. This includes the audit of
datasets and the guarantee that AI systems can be shut down or corrected in real time.
under human supervision *(Human-in-the-loop).*

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CONCLUSION

Artificial Intelligence in everyday life by 2026 has transcended the status of an accessory to become a cornerstone. central to digital infrastructure. The transition to autonomous agents has brought undeniable gains in operational efficiency and the democratization of access to complex knowledge. However, the The invisibility of this infrastructure demands a new type of surveillance.

It is concluded that technical autonomy should not supersede human autonomy. The role of future Research and IT professionals aim to ensure that algorithms remain transparent and that... The benefits of AI should be distributed equitably, mitigating the risks of excessive surveillance. and automated bias. The future of AI in everyday life depends less on the ability computational and more of our ability to maintain ethics as the primary source code of innovation.

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