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MAN AND MACHINE IN THE PERSPECTIVE OF CONVERGENCE AND ARTIFICIAL INTELLIGENCE

ABSTRACT

The subject of consideration is the relationship between man and machine in developing new technologies. It concerns communication, language, acting and performing appropriate social roles. Man in the mediatized world plays the role of: sender, user, prosumer and customer. Equipped with knowledge, competences and action skills, he has to face a multitude of cybernetic assistants, avatars, bots, robots, androids. Digital transformation and development of nanotechnology, biotechnology, cognitive and information technology have resulted in a prominent place for artificial intelligence in the relationship between man and machine. This paper presents a report on artificial intelligence research, identifying areas of opportunity for humans as well as those that pose a threat.

Keywords: digital transformation, technological convergence, artificial intelligence

INTRODUCTION

In the technology-rich, modern world, full of dynamics and changes, man is constantly functioning accompanied by machines. Nowadays we cannot imagine life without them. However, we should ask the question - where is the collaboration of man and machine leading us? In the mediatized world, man plays the role of: sender, user, prosumer and customer. Equipped with knowledge, competences and action skills, he has to face a multitude of cybernetic assistants, avatars, bots, robots and androids. In communication, in the real world, the sender was equipped with specific knowledge about the world, linguistic and non-linguistic

competence, ideological and cultural competence, and above all, intention. He was able to encode and decode signs, that is, to use language¹. His relationship with the receiver was about interaction - the process of exchanging meanings, symbols that had to be deciphered and interpreted during communication. With the development of technology, communication changes from analogue in the real world, to digital in the world of machines. Here we do not have a simple system: sender - receiver and statement. Robots and avatars adopt all the features of human communication, speed it up and improve it.

In the first place, the relationship of exchange changes, from interaction to interactivity, that is, the mutual interaction of communicating parties, but occurring in a media environment. "Interactivity includes both the possibility of direct personal contact of personal communication elements and human-machine communication through appropriate interfaces. The basis for this type of activity is software"². The communication changes in a fundamental way. Thus, machines adopt all the features of human communication, but at the same time they change it. Communicating with a machine whose program has limited and predefined capabilities thus requires the user to either adapt their list of needs to the machine's capabilities or use a program with capabilities close to the need.

TECHNOLOGICAL CONVERGENCE

This relationship between man and machine has led to convergence, understood as gathering, alignment. The Latin *vergere* means to incline, to bend and *kon* means together, jointly, mutually³. This root - convergence has also been used in media and machines. In media studies the term was popularized by Ithiel de Sola Pool and Nicholas Negroponte⁴. Media studies introduces this term in many meanings. Convergence is understood as:

- the ability for media to interpenetrate as communication techniques evolve,
- combining the traditional features of devices such as the computer, telephone and fax machine, and the Internet with its informative and entertaining nature,

¹Żydek-Bednarczuk, U., *Wprowadzenie do lingwistycznej analizy tekstu*, Universitas, Kraków 2005, p. 21.

² Słownik wiedzy o mediach. Ed. E. Chudziński. Park-Edukacja, Edition 2, Warszawa-Bielsko Biała 2009, p. 51.

³ Kopalinski, W., *Konwergencja* [hasło]. in: Słownik wyrazów obcych i zwrotów obcojęzycznych. Warszawa 1971, p. 406.

⁴ *Studia Medioznawcze / Media Studies*, 2011, 3(46), Warszawa 2011, p.12.

-interpenetration and combination of individual features and elements characteristic of traditional media centres and their mutual interaction,
- process⁵.

At this point it is necessary to recall Henry Jenkins' book, *Convergence Culture: Where Old and New Media Collide*. The author "by convergence means the flow of content across multiple media platforms, the cooperation between multiple media industries, and the migratory behavior of media audiences who would go almost anywhere in search of the kinds of entertainment experiences they wanted. [...]. Instead, convergence represents a cultural shift as consumers are encouraged to seek out new information and make connections among dispersed media content"⁶. The relationships that accompany convergence are related to interactivity, hypertextuality, and virtuality. It is not a simple relationship and not always safe.

In trying to find answers to only selected questions, I wanted to address technological convergence, the changes it brings to language and communication, and artificial intelligence. This huge range of issues only allows me to hint at the changes and transformations that the relationship between the human world and machines brings about. The question of the future of new technologies has been asked many times. I refer here to the conference and publication *Visionen der Informationsgesellschaft*⁷, to the lectures of Professor Harald Lesch⁸ and to the publication *Converging Technologies for Improving Human Performance. Nanotechnology, Biotechnology, Information Technology and Cognitive Science*⁹.

World domination by new technologies is connected to new perspectives of civilization development. What is needed here is a vision that shows what awaits humans in their relationship with machines in the age of maximum saturation and development of digital media. Technical visions are mental structures that allow us to push the boundaries in the area of what we have not yet seen and which aims to improve or enlighten human life. Visions concern projects that are related to the actions of people and machines that build a new society and a

⁵ Kopecka-Piech, M., *Koncepcje konwergencji mediów*, Studia Medioznawcze, 2011, 3(46), Warszawa 2011, p.13.

⁶ Jenkins, H., *Kultura konwergencji. Zderzenie starych i nowych mediów*, Warszawa 2007, p. 9.

⁷ *Visionen der Informationsgesellschaft*. Ed. Banse, G., Kiepas, A., trafo Berlin, Berlin 2016.

⁸ Lesch, H., *Telewizja ZDF*, info 2019, TV lectures, December.

⁹ *Converging Technologies for Improving Human Performance. Nanotechnology, biotechnology, information technology and cognitive sciencens*. Report. Edited by Mihail C., Roco and William Sims Bainbridge, National Science Foundation. Kluwer Academic Publishers, Dordrecht The Netherlands 2003.

happy world. What might that world be like? I refer here to the National Science Foundation Report entitled: *Converging Technologies for Improving Human Performance*¹⁰.

I define technological convergence as the merging of multiple fields of science and knowledge into a synergistic whole that is related to digital media. "What is implied by the term convergence are various forms of integration of telecommunications, data communications and mass communications"¹¹. This includes the integration of fixed telephony and mobile networks. The medium that currently plays the most important role in the processes of technological convergence is obviously the Internet. The Web is what converges the various forms of media and communication on the web (networks). Networking is one of the most essential features of convergence strategies¹². Technological convergence is the basis for media convergence and convergence in culture.

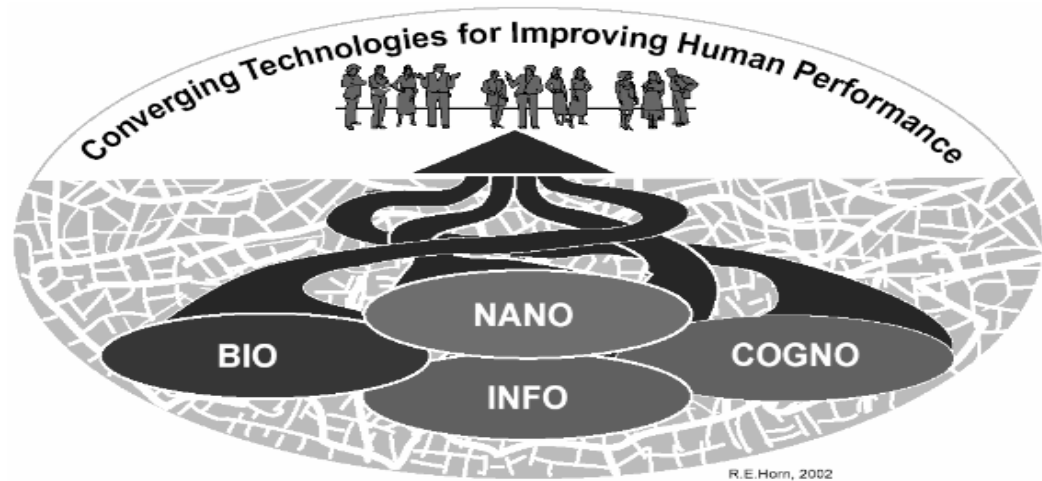
¹⁰ *Converging Technologies for Improving Human Performance, nanotechnology, biotechnology, information technology and cognitive science*. Report. Edited by Mihail C., Roco and William Sims Bainbridge, National Science Foundation, Kluwer Academic Publishers, Dordrecht, The Netherlands 2003.

¹¹ Dijk van J., *The Network Society: Social Aspects of New Media*, London 1999, p. 42.

¹² Kopecka-Piech, M., *Koncepcje konwergencji mediów*, Studia Medioznawcze, 3(46), Warszawa 2011, p. 15.

Diagram 1. Technological Convergence Source: *Converging Technologies for Improving Human Performance*. Nanotechnology, biotechnology, information technology and cognitive science

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Source: *Converging Technologies for Improving Human Performance*. Nanotechnology, biotechnology, information technology and cognitive science, 2003, p. VII.

Through technological convergence and synergy, we can provide a vision of the future, designating the following areas: nanotechnology, biotechnology, technological information and cognitive science. These areas are closely related to digital media. The report highlights the benefits of technological convergence. "Examples of benefits may include improved productivity and earnings, improved individual sensory and cognitive abilities, evolutionary changes in healthcare, improved work efficiency and communication effectiveness, highly effective communication techniques including brain-to-brain interaction, improved human-machine interfaces including neuromorphic engineering, sustainable and 'smart' environment, neuro-ergonomics, enhancing human capabilities or increasing efficiency"¹³.

¹³ *Converging Technologies for Improving Human Performance*. Nanotechnology, biotechnology, information technology and cognitive science. Report. Edited by Mihail C., Roco and William Sims Bainbridge, National Science Foundation, Kluwer Academic Publishers, Dordrecht The Netherlands 2003, p. 9.

The concepts defining the future of digital media are: nanotechnology, biotechnology, technological information and cognitive functions. If we use abbreviations of these terms or only meaningful prefixes: *nano* - , *bio* - , *info* - then relationships occur between them that determine the architecture of the vision of the future.

Diagram 2. Relationships between scientific disciplines in the context of technological convergence

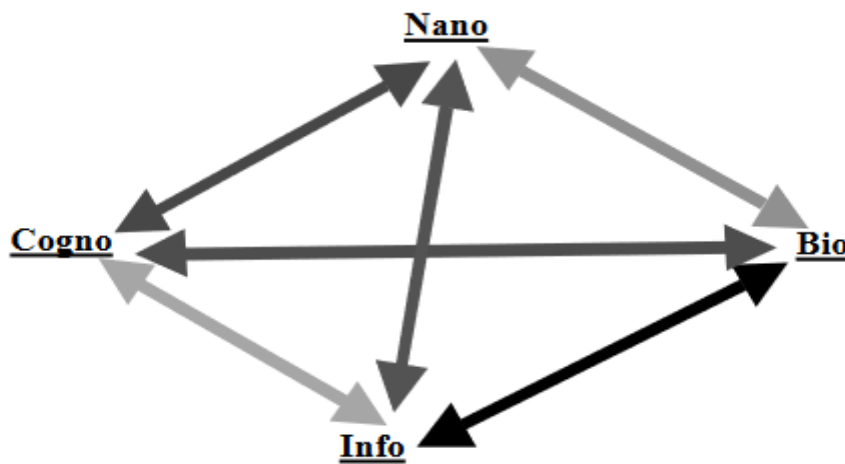


Figure 1. NBIC tetrahedron.

Source: Converging Technologies for Improving Human Performance. Nanotechnology, biotechnology, information technology and cognitive science, 2003, p. 2).

In the diagram we see a holographic connection between biotechnologies and nanotechnologies, as well as cognitive approach to science and information. This will only be achieved through the convergence and application of transdisciplinarity, both in science and technology. Cognitive thinking is linked to nanotechnology and information to biotechnology. These connections correspond to projects - visions related to robots, prostheses that allow us to live better and longer, mobile applications that make our daily lives easier, and projects related to the vision of artificial intelligence to replace and surpass our thinking. Based on four key principles: unity of material at the nanoscale, tools for the interdisciplinarity of different fields

of science and technology, hierarchical systems and improving the flow of information, mastering *big data* and noise we can talk about transformation and vision, the future in digital media. Technological convergence is always accompanied by machines and artificial intelligence. Researchers are writing about a new architecture in digital media.

Diagram 3. New architecture in the vision of new media

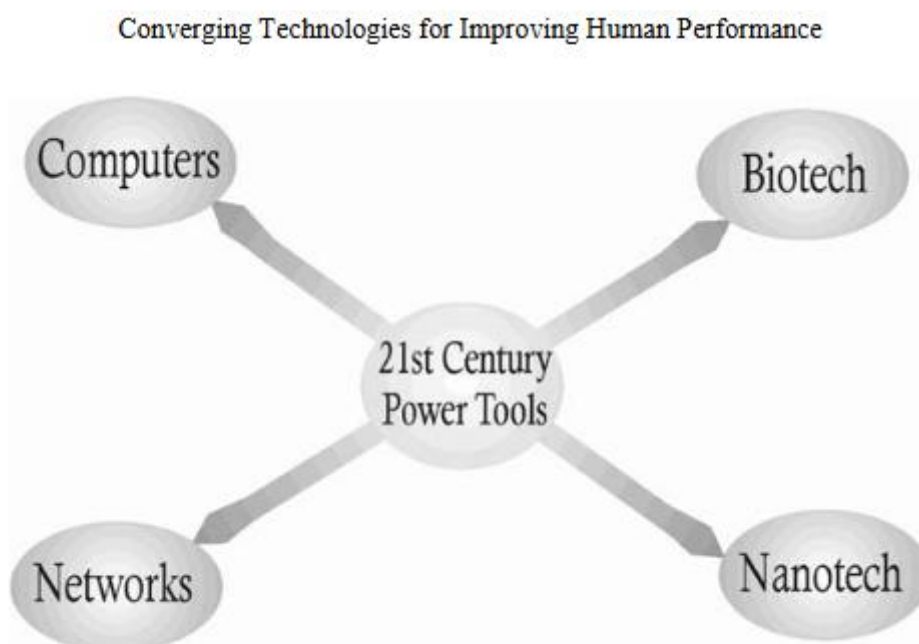


Figure A.14. 21st century power tools.

Source: Converging Technologies for Improving Human Performance. Nanotechnology, biotechnology, information technology and cognitive science, 2003, p. 71).

The convergence of technologies will therefore lead to a new architecture in new media. Nanotechnologies are related to the nanostructure and nanoparticles. They concern new materials used in devices such as electronics. Tools and machines have to be as small as possible and hold huge amounts of information - big data. Nano is also important in medicine - all kinds of electronically controlled prostheses improve our health. They should be as small as possible and functional. The vision of nano is the development of machines, including computers, smartphones, tablets, prostheses and robotics. Modern machines are included in the concept of the Internet of Things. The Internet of Things “is the concept that uniquely identifiable objects can directly or indirectly collect, process or exchange data via an electrical

system, smart KNX or a computer network"¹⁴. Creating connections between devices, services and people, exchanging and analysing data and making life more comfortable - this is the idea behind one of the most important concepts of our time. Machines are becoming an integral part of our lives. Smart homes, smart cities, protection of our health, mobility are areas where machines - things improve the quality of everyday life.

Biotechnology is related to man and medicine. The Wikipedia defines it as "an interdisciplinary field of science that uses biological processes on an industrial scale. /.../.Biotechnology is the use of biological systems, living organisms or their components to produce or modify products or processes for a specific application"¹⁵. It is associated with industry, agriculture, medicine, new media.

ARTIFICIAL INTELLIGENCE

The scientists' comments also relate to language and artificial intelligence that can work with the 'ageing human mind. Linguists have concluded that the key to understanding and creating artificial intelligence is to recognise the mysteries of language and human speech, which are the material manifestations of our consciousness and intelligence. Fundamental research into understanding, problem-solving, learning, planning and creativity is now crucial¹⁶.

Possibilities of application of artificial intelligence:

- digital assistants in phones or computers,
- intelligent air conditioning,
- the Internet of Things: plugged-in refrigerators, vacuum cleaners, watches ...,
- autonomous vehicles,
- search engines,
- machine translations,

¹⁴ Wikipedia - Internet of Things, <http://pl.wikipedia.org/wiki/>

¹⁵ Wikipedia – biotechnology, <http://pl.wikipedia.org/wiki/>

¹⁶ Aktualności. Parlament Europejski. 2020:

https://www.europarl.europa.eu/resources/library/images/20201019PHT89625/20201019PHT89625_o_riginal.jpg

- cybersecurity,
- fighting disinformation,
- optimisation of products and sales channels,
- online shopping and advertising,
- intelligent agriculture: irrigation, animal feeding, weed removal robots¹⁷.

This research responds to emerging new words related to prefixes:

nano - "SI prefix - a prefix expressing multiples and submultiples of units of measurement based on the metric system"¹⁸,

info – Internet top-level domain for companies and individuals providing general information; the domain was announced on 16 November 2000, fully operational since June 2001. Info is also the abbreviation for the word information¹⁹,

bio - *bio(s)*, Greek prefix βίος 'Life. It forms a whole series of words often composed of successive prefixes or words, e.g.: *bioagro* - seed and plant protection products for organic farming; organic agricultural inputs, *biofertilisers* - organic plant protection products, *biolife*, *biotextiles*, organic toys, household appliances, white goods and organic pet products, ecotech, - organic, biodegradable, reusable packaging and serving dishes; packaging, sorting and processing machinery, logistics, bioexpo - conference, training²⁰.

The next stage of transformation and development in the human-machine relationship is research into artificial intelligence. "In its simplest terms, artificial intelligence (AI) is systems or machines that mimic human intelligence when performing tasks and can iteratively improve themselves based on the information they collect. AI assumes different forms. Here are some examples:

- Chatbots use artificial intelligence to classify customer problems faster and provide more accurate answers.

¹⁷https://www.europarl.europa.eu/resources/library/images/20201019PHT89625/20201019PHT89625_original.jpg [access 1.03.20]

¹⁸ Wikipedia - nano- , <http://pl.wikipedia.org/wiki/> [access 21.02.2021]

¹⁹ Wikipedia - info- , <http://pl.wikipedia.org/wiki/> [access 21.02.2021]

²⁰https://bioexpo.pl/?gclid=Cj0KCQjwho7rBRDxARIsAJ5nhFkorLR02tuHgjZwnHNUPBetLhr2rgC2cX7JECuKldO_ONIZNuUm-GzowaAuccEALwwcB

- Intelligent assistants use AI to analyse critical information from large text data sets to improve planning.
- Recommendation engines provide automatic suggestions for TV programmes based on viewers' viewing habits.

Artificial intelligence is more about the process and capabilities of super assisted thinking and data analysis than a specific format or function. Artificial intelligence is associated with functional, humanoid robots conquering the world, but artificial intelligence is not intended to replace humans. It is meant to significantly enhance human capabilities and performance. This qualifies it as a company's most valuable asset."²¹(<https://www.oracle.com/pl/artificial-intelligence/what-is-artificial-intelligence.html>).

In a vision of the future, humans will be replaced by machines. "Computers that perceive the reality around them, understand it better and, based on advanced analysis, draw groundbreaking conclusions, have until recently only existed in science fiction films. Meanwhile, intelligent machines right before our eyes cease to be the domain of cinema or literature, and their presence in homes and workplaces will become more noticeable with each passing year. We already have electronic assistants like Alexa or Sonia. Are cognitive solutions different from other new technologies? /../. Their unique feature is that they perform tasks that so far only humans could perform. Thanks to machine learning, computers have gained, among others, the ability to recognise images and interpret speech. Although at this stage their efficiency leaves a lot to be desired, if we take into account the speed at which artificial intelligence has been developing in recent years, we can expect that the gap between man and machine will soon shrink dramatically"²². With the emergence of intelligent systems, intelligent machines, the world will change beyond recognition, reducing the role of man to accepting the plans proposed by a constantly learning computer. Their constant improvement will translate into better management of the economy and society.

We can only ask the question - will humans still be needed? However, we must not forget that machines work only in a specific algorithm and in a 0-1 system. They are functional, but they cannot prove their decisions and change them instantly. They are just very intelligent machines. Artificial intelligence is a co-factor with technological convergence. It is worth considering how society treats artificial intelligence. Such data is presented in the NASK

²¹ <https://www.oracle.com/pl/artificial-intelligence/what-is-artificial-intelligence.html>)

²² (<https://polskiprzemysl.com.pl/wiadomosci/technologie-kognitywne>

Report. The aim of the research was to gain knowledge and information about artificial intelligence functioning in modern society. "The study was conducted using the CAWI (computer assisted web interview) method on the Opinion Reactor research panel in July 2019. The research sample included a Poland-wide sample of respondents n=1000, selected in a random-quota manner, and its structure reflects a representative population of Polish internet users aged 15+"²³.

When asked to define AI, respondents considered it a technology that works without human intervention - 55.8 per cent. It accompanies us in everyday life: education, transport and entertainment. Respondents would like AI to be used primarily for professional purposes: to replace the hardest and most dangerous jobs performed by humans (63.1 percent) and as a form of assistance in tasks performed (59.1 percent). Internet users would also like to see AI used for more rational management of energy and natural resources (39.7%).

Internet users expect the biggest benefits of AI to be primarily improved quality of life (34.0%), better cybersecurity (33.0%), reduced work accidents (32.7%), and a higher level of personalisation of products and services (30.3%). (NASK Report 2019, p. 4) Respondents' concerns are related to their privacy and constant monitoring of citizen activities (60.5%), and increased unemployment (40.1%), as well as cybercrime (37.7%). They expect legal regulations related to AI. They are most afraid of data security, (57.4%), privacy (47.8%) and user security (46.3%). When asked about AI-related education, they consider that the school does not have properly prepared teachers, the core curriculum does not address these issues, and the school's infrastructure does not address this issue.

Respondents also believed that the financial responsibility for damage caused by AI lies with the software developer (65.5%), the device manufacturer (60.3%), and the operator (human) of the device and/or software (31.6%).

²³ NASK Report. Sztuczna inteligencja w oczach Polaków – raport z badań społecznych. Badania świadomości, oczekiwań i lęków polskich internautów związanych z rozwojem technologii sztucznej. Państwowy Instytut Badawczy NASK, Warszawa 2019, p.2. The article quotes all the data that appeared in the NASK Report 2019.

CONCLUSIONS

Publications on artificial intelligence often focus on opportunities and threats. These questions are inadequate to the problem. One should rather answer the question what is the task, the problem to be solved by AI and what are the potential consequences of such an action. When describing the relationship between man and machine, one should ask about the condition of modern man, and above all about ethical and even theological issues. We will not escape artificial intelligence, but will we therefore become an artificial human, a technicised human, an augmented human, a 3D human²⁴ or maybe just a cyborg. Convergence and artificial intelligence are changing our lives, and the interaction between man and machine is becoming a reality these days. And it is this relationship that underpins changes in technology, digital media, society and culture.

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²⁴ Miczka, T., *Człowiek techniczny, „człowiek rozszerzony”*. „człowiek z 3D”. *Próba definicji*, „Filo-Sofija” . Z problemów współczesnej filozofii, Volume VI Bydgoszcz, 2017, pp. 37- 48.

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