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TRANSHUMANISM, EMERGING TECHNOLOGIES AND THE SECURITY ENVIRONMENT OF THE FUTURE

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Abstract: *Half a century ago, the idea of biological perfection of the human race through genetic manipulation or the creation of human-machine hybrids was automatically labelled as a dangerous fable, reminiscent of the Nazi ideology of Super - Man. Today, after several decades of research into transhumanism, the question is no longer 'if' the supermen will become a reality, but 'when' and 'how' hybrid humans will look like. It is therefore only a matter of time before the supremacy of man born of the random play of genes will be overthrown by "hybrid man", "improved man", "superman". A "superman" in symbiosis with artificial intelligence. What might the world look like, then? Will it still be structured according to the same criteria of power? What could be the security impact of the emergence of cyborgs capable of processing information in billionths of a second? This article aims to bring research into transhumanism and emerging technologies to the fore and to examine the potential impact of their materialization on the international security environment.*

Keywords: *transhumanism, security, emerging technologies, superman, cryonics, virtual reality, artificial intelligence, gene therapy, brain-machine interface.*

Motto: "I have come to announce the Superman. Man is something to be overcome."

Friedrich Nietzsche,
"Thus Said Zarathustra"

Whether in the public domain in the news, in debates among medical ethicists or in science-fiction essays, research into transhumanism has a decades-long history. It was born out of a series of very human needs for growth and survival. Ever since man realized that his life is nothing more than a period of time between two implacable events, birth and death, he has sought to extend this period of his earthly existence. On the other hand, selfishness and greed for power, born of the need for survival and growth, dominated his behavior and transferred it to human society, more or less structured in state formations, which predisposed it to anarchy. Under these conditions, the need for hierarchy came naturally, because it brought with it stability and relative prosperity. Hierarchy imposed discipline and rules, created the state and power structures, and later state ambitions, expansionism, imperialism and the need for military supremacy, humanity's most important instrument of power. If it took millennia to discover gunpowder and another few hundred years to build the first steam engine, in today's technological age, it has taken man only a few decades to move from the processor to the microprocessor, from technologies to nanotechnologies, from being an observer of weather phenomena to a creator of such phenomena.

The basic sciences respond to these needs. Biology can act on the human genome and remove or amplify those gene sequences that program its cell apoptosis. Biochemistry can identify the biochemical mechanisms responsible for homeostasis. Pharmaceutical chemistry studies new and novel categories of active substances designed to improve the health of the human subject. Medicine corroborates information from all these sciences and uses them to prolong the life of the human individual. And mathematics, physics and engineering sciences bring technological progress and put it at the service of man and his desires. In the

technological age of artificial intelligence and emerging strategic technologies such as biotechnology, genomics, nanotechnology, materials science, computational logic, cognitive neuroscience, transhumanism research is the synthesis of all these concerns. Or, in other words, transhumanism research is about to generate that "superman" in symbiosis with artificial intelligence. *The question therefore arises, what might the world look like when the 'new man' emerges? Will it still be structured according to the same criteria of power? What could be the security impact of the emergence of brain-machine interfaces and related emerging technologies?*

What is transhumanism?

The idea of the "superman" is not a recent one. It was a constant of the Romantic, Enlightenment Era. Philosophically, it was theorized by great thinkers such as the German Friedrich Nietzsche (1844-1900), who announced that "*God is dead*" and that the world would belong to "Superman" and his will to power. In literature, the British Mary Shelley (1797-1851) wrote of "*Frankenstein or the Modern Prometheus*", the doctor with the idea of creating life from dead matter, resulting in a giant monster with exceptional powers. Transhumanism is therefore not an isolated school of thought, a niche phenomenon destined to become extinct as soon as the world loses interest in it, but it is already a constant of human concern which, in the current technological age, has a chance of materializing.

Encyclopedia Britannica defines transhumanism as a "*social and philosophical movement devoted to promoting the research and development of robust human-enhancement technologies. Such technologies would augment or increase human sensory reception, emotive ability, or cognitive capacity as well as radically improve human health and extend human life spans. Such modifications resulting from the addition of biological or physical technologies would be more or less permanent and integrated into the human body*" (Hays n.d.).

Transhumanism emerged as a concept in 1957, in an essay of the same name (Huxley 1957) by the English biologist and philosopher Sir Julian Huxley (1887-1975), brother of the writer Aldous Huxley (1894-1963)[1]. An advocate of social Darwinism[2] and representative of scientific and cultural globalism as the first Director-General of the United Nations Educational, Scientific and Cultural Organization (UNESCO) from 1946 to 1948 (Bibby n.d.), Julian Huxley was mainly concerned with improving the human condition through social and cultural change. In his view, social institutions, through specific mechanisms of social engineering, would have the potential to interfere with the evolution of humanity by refining and improving the species. Huxley's essay is considered to be the founding document of the Transhumanist Movement, which believes that humanity could be improved not so much through social engineering as through technology.

Self-described as libertarian[3], the Movement has brought together scientists, researchers and thinkers such as American computer scientist and futurist Ray Kurzweil, Canadian computer scientist and roboticist Hans Moravec, American nanotechnology

[1] Author, among others, of the novel Wonderful New World, published in 1932, in which he talks about a dictatorial dystopian society in which citizens are controlled by genetic manipulation and false information.

[2] Sociological theory, founded by Herbert Spencer (1820-1903), which explains the evolution of society based on Charles Darwin's theory of natural selection. It was very popular at the end of the 19th century and in the first half of the 20th century.

[3] „Philosophical concept according to which actions are not causally determined, but neither do they occur randomly, without any rational, responsible intervention. Integral political and economic liberalism, which involves maximising the right of the individual and minimising the role of the state." – see: Marcel D. Popa si colab, *Dicționar enciclopedic*, Editura Enciclopedică, 1993-2009, https://dexonline.ro/sursa/de, accessed at 09.01.2022.

researcher Eric Drexler, American philosopher James Hughes, Swedish philosopher Nick Bostrom (Hays, Transhumanism: social and philosophical movement, op. cit. n.d.) and many others. The principle that governs the entire discourse of the Movement is "extropianism", a philosophy dedicated to transcending human limits.

Over time, two major views of what they call "post-humanity" have emerged within the Movement. One believes that technological and genetic improvements can create a distinct species of radically improved humans. The other believes that in the future an artificial intelligence superior to human intelligence will be created. Some believe that social and cultural institutions, national and international, such as religion, the family, the system of individual freedoms will be largely irrelevant to the trajectory of technological development - dependent solely on market forces and the nature of technological progress. A trajectory that aims at an end point, where artificial intelligence will merge with human intelligence. An end point where the new man will be born, the perfected man, with enhanced physical and mental attributes, improved general health and a much longer life span. Others believe that social institutions can influence the trajectory of technological development. In 1998, the *World Transhumanist Association* (Transhumanism n.d.) was founded to promote the development of human enhancement technologies and to combat social forces that might oppose technological progress.

A now-classic presentation of the goals and concerns of the transhumanists comes from the British philosopher Max More, one of the Movement's best-known theorists. He describes transhumanism as *"a blanket term given to the school of thought that refuses to accept traditional human limitations such as death, disease and other biological frailties. Transhumans are typically interested in a variety of futurist topics, including space migration, mind uploading and cryonic suspension. Transhumans are also extremely interested in more immediate subjects such as bio- and nanotechnology, computers and neurology. Transhumans deplore the standard paradigms that attempt to render our world comfortable at the sake of human fulfilment"* (McNamee 2005-2006).

Research directions in transhumanism

Sarwant Singh, one of today's leading technocrats, said in a 2017 article in "Forbes" magazine that "*the coming years will usher in a number of body augmentation capabilities that will enable humans to be smarter, stronger, and more capable than we are today*" (Singh 2017).

These augmentation goals are to be achieved through several major directions of scientific research in transhumanism such as:

1. Cryogenic suspension through body or brain freezing;
2. Mind – Uploading to a computer or the cloud;
3. Superintelligence through the rise of artificial intelligence;
4. Creation of Robots and Cyborgs (computerized organisms) no longer dependent on biological bodies;
5. The "hive mind" by connecting human brains into a swarm of brain-machine interfaces (Transhumanism Technology n.d.).

Within these research directions, a number of applied research projects are emerging as outlined in a special report by the *Lifeboat Foundation Safeguarding Humanity* (Anissimov n.d.), one of the Movement's flagship organizations:

- **Cryonics,** described as "*high-fidelity preservation of the human body, and particularly the brain, after what we would call death, in anticipation of possible future revival. [...] In vitrification, the brain is not frozen in the conventional manner but with a cryoprotectant (antifreeze) mixture, which effectively prevents the formation of crystals,*

causing the water to freeze smoothly, like glass" (Anissimov n.d.). Research in the field dates back to the 1970s, when the Michigan Cryonics Institute (Cryonics Institute n.d.), for example, was founded. The field is gaining support after previously frozen frogs were shown to come back to life. But, say transhumanists, a success of the technology can only be reported after the development of molecular nanotechnology (MNT) techniques, when intracellular ice crystals can slowly melt and metabolism can be restarted by triggering the appropriate chemical reactions inside cells.

- **Virtual reality (VR)**, which will gradually replace reality. Thus, say proponents of this technology, "*simulations will become the preferred environments for work and play. Pretty soon the main obstacle to truly immersive VR will not be the visuals but the haptics — our sense of touch. To fool our senses into believing haptic technologies* (Lindeman n.d.) *are conveying the real thing, the "frame rate" needs to be significantly higher than for visual technologies, a few hundred updates per second rather than a few dozen — which is why development could take another decade or two. But many millions of dollars are currently going into efforts to develop advanced VR*" (Anissimov n.d.). Virtual reality became a very real topic during the SARS-COV II pandemic, when major cultural institutions offered virtual tours of art collections and museums, or computer game platforms like *World of Warcraft* or *Second Life* surpassed 13 million subscribers.

- **Gene therapy with adenoviral vector**, whereby 'bad' genes are replaced by 'good' genes, or with messenger RNA vector that can selectively change protein production in mitochondria. In this respect there is already the SENS (SENS Research Foundation n.d.) (Strategies for Engineered Negligible Senescence) anti-ageing research program, which aims to achieve the so-called "*longevity escape velocity*", which could lead to indefinite lifespans and, of course, messenger RNA-based anti-COVID vaccine production technologies. But the spectrum of this technology could be much broader, from cancer therapies to the treatment of morbid obesity, autoimmune or congenital diseases.

- **Outer space colonization** by building space colonies in the asteroid belt area of the Earth-Moon system, especially near stable *Lagrange Points*[4], designed to host billions of individuals to be born in the future. These space colonies would be created in habitats like those described in 1977 by American physicist Gerard K. O'Neill in his book, *The High Frontier: Human Colonies in Space* (O'Neill 1977). O'Neill proposed three rotating habitat models to generate artificial gravity: "*Island one*" – a modified Bernal sphere[5], "*Island two*" – a Stanford torus[6], and "*Island 3*" – two counter-rotating O'Neill cylinders[7]. The building materials for these habitats would be extracted from the Moon and asteroids. The habitats would be lit by the Sun and powered by solar panels. The theories of O'Neill and his

[4] „The Lagrange points, named after the Italian mathematician and astronomer Joseph-Louis Lagrange (1736-1813), are places of gravitational equilibrium in the solar system. Objects that are placed at these locations tend to stay there because the forces are in equilibrium. In other words, Lagrange points are locations in the solar system where objects can orbit the Sun at the same speed as a planet, standing in the same place relative to both celestial bodies (Sun and planet)." – See: Iosif A., *Ce sunt punctele Lagrange?*, SCIENTIA, https://www.scientia.ro/blogurile-scientia/blogul-scientia/8481-ce-sunt-punctele-lagrange.html, accessed at 09.01.2022.

[5] Permanent space habitat concept proposed in 1929 by John Desmond Bernal (1901-1971), consisting of a hollow, non-rotating spherical shell 16 km in diameter, filled with air. See: John Desmond Bernal, *The World, the Flesh and the Devil: An Enquiry into the Future of the Three Enemies of the Rational Soul*, 1929.

[6] The Stanford Torus is a proposed NASA project for a permanent space habitat. The project aims to build a ring-shaped rotating space station, a concept originally theorised by German engineer Wernher von Braun (1916-1977) and Slovenian engineer Herman Potočnik (1892-1929). See: Richard D. Johnson, Charles Holbrow, *Space Settlements: A Design Study*, National Aeronautics and Space Administration, 1977.

[7] An O'Neill cylinder would consist of two counter-rotating cylinders, each 8.0 km in diameter and 32 km long, connected at each end by a rod mobilised by a bearing system. See: Gerard K. O'Neill, *op.cit*. p. 148.

predecessors were later developed by Marshall T. Savage, author of *The Millennial Project: Colonizing the Galaxy in Eight Easy Steps* (Savage 1993), published in 1993.

- **Cybernetic systems** designed to make up for deficiencies in human organs. Take the wireless implantable device of Neuralink, a company run by US tycoon Elon Musk. "Wires" smaller than human hair are implanted into the brain by robots and can then detect the activity of neurons. In the immediate term, this holds great medical promise for treating serious neurological conditions such as Parkinson's disease and other forms of neuronal degeneration (A brief exploration into Transhuman Tech 2019). 'Mind-reading' is also an increasingly visible concern for big companies. In 2019, US tycoon Mark Zuckerberg announced Facebook's plans to build a "non-invasive wearable device is meant to one day allow users to type by simply imagining themselves talking" (Tangermann 2019) and acquired a start-up that aims to develop a brain-machine interface (Tangermann 2019). The project will help people with tetraplegia to "express" their thoughts, and in the long term everyone will be able to control their electronic devices using brain signals. In China, a study has been published of students wearing "*Focus headbands*" produced by BrainCo, which are devices that measure their brain activity and light up in different colors to show their concentration levels (Tangermann 2019). And, the American company Microsoft announced the launch of Microsoft Surface, a desktop computer without a mouse and keyboard that takes information from fingerprints and hand gestures (Anissimov n.d.). And the list goes on.

- **Autonomous self-replicating robotics,** considered the "**Holy Grail of robotics**". A discovery dating back to the 1980s, when NASA's landmark study *Advanced Automation for Space Missions* (Freitas și Gilbreath 1982) was published, found that robotic self-replicating is just a matter of engineering and no fundamental theoretical breakthroughs are needed. Thus, the study cited by the Lifeboat Foundation report recalled, "*the design was based on electric carts running on rails within the factory, 'paving machines' that direct sunlight to melt lunar regolith, robotic strip miners for obtaining raw materials, and a solar cell 'canopy' for powering it all. After 10 years, over 100,000 tons of lunar factory could be produced autonomously. The factory's functions could then be hijacked for the benefit of human colonists, used to produce housing, products, and provide large quantities of solar power*" (Anissimov n.d.). This project could be applied on Earth, building self-replicating factories that could turn arid and unlivable spaces in Australia, the Arctic or abiotic regions of the planetary ocean floor into giant platforms for human colonization.

- **Molecular manufacturing through molecular nanotechnology** (MNT), considered to be the "**Holy Grail of manufacturing**". Produced in atomically precise nano-factories, molecular devices are expected to develop medical applications in non-surgical organ repair, targeted cell therapy or the creation of so-called *'utility fogs*' – a hypothetical collection of tiny nanobots that can replicate a structure, useful in restoring biological structures permanently compromised by necrosis. These devices could also be used outside medicine, including for criminal purposes, if such products, hardly visible to the naked eye, were loaded with poison and introduced into enclosed spaces or used as military vectors to destroy the environment.

- **Megascale engineering**, i.e. building structures at least 1,000 km long in one dimension, such as a space elevator as a planet-to-space transport system, the *Globus Cassus*[8] or the *Dyson sphere*[9]. With the help of self-replicating robotic systems, the Lifeboat Foundation report states, "*the production of such large structures could be done largely by*

[8] Globus Cassus is an art project and book designed by a group of architects and artists led by Christian Waldvogel. It presents a conceptual transformation of planet Earth into a much larger artificial world with an ecosphere on its inner surface. See: Christian Waldvogel si colab., *Globus Cassus*, Lars Müller Publishers, 03.09.2004.

[9] Hypothetical megastructure that completely surrounds a star and captures much of its energy.

autonomous drones, with intelligent agents only managing the highest top-level functions and architecture"[10].

- **Mind uploading**, also called **non-biological intelligence**, is based on the idea that cognitive processing can be implemented on substrates other than neurons. Neurophysiology research and the recent construction of the world's first brain prosthesis - an artificial copy of the hippocampal gyrus (Gonzales n.d.) – argue in favor of this. According to this research, it seems that our minds are defined more by the pattern of information they embody than by the type of 'hardware' they are implemented on. Of course, this line of research is aimed at a complete synthetic 'prosthetic' human brain. A synthetic brain will no longer be affected by degenerative diseases, although it will face other types of dysfunctions, and, very importantly, the carriers of such brain devices will be able to join together in computer networks, in global clouds. Moreover, clones of such individuals will be given a biological body and a brain loaded with networked memories.

- **General Artificial Intelligence** (GA), an extended super-intelligence capable of running the world. Currently, the world's fastest supercomputer, the *Fugaku*, produced in Japan, reaches a speed of 415.5 petaFLOPS, a petaflop representing one million billion operations per second. It is followed by the American-made *Summit* and *Sierra* with 148.6 petaFLOPS and 94.6 petaFLOPS respectively, and the Chinese-made supercomputer *Sunway TaihuLight* with 93.01 petaFLOPS (Top 500: The List 2021). And the research continues.

As Michael Anissimov, author of the Lifeboat Foundation's special report concludes, "*if raw materials such as sand can be converted into computer chips and then into intelligent minds, eventually the majority of material in the solar system could be made intelligent and conscious. The result would be a 'noetic Renaissance': the expansion of intelligence and experience beyond our wildest dreams*" (Anissimov n.d.).

The potential security impact of transhumanism

American geopolitologist Francis Fukuyama has labelled transhumanism "*the most dangerous idea in the world*" (Fukuyama 2004). A statement that has sparked controversy between supporters and critics of these research directions.

We are in a period of convergence, of interdisciplinary, revolutionizing fields such as information technology and electronics, energy and the environment, medicine and health care, biotechnology and agriculture, global and national security. On the one hand, technological convergence has the potential to meet basic human needs and improve the quality of human life and, on the other hand, it raises serious security concerns. Of course, we all want incurable, oncological and debilitating diseases, whether congenital or acquired, to be eradicated. Of course, we all want to live longer and better, to be more beautiful, healthier, more energetic, more intelligent. And, all these technologies that are revolutionizing medicine are bringing much-desired life-saving solutions to people in distress or meeting the aspirations of those dissatisfied with their biological appearance and performance to achieve perfection. And that's not all. 'Perfected' people will be more intellectually and economically productive. The human-artificial intelligence symbiosis will reshape the macro-economic picture, something already visible during the current pandemic, when online activities flourished and the informal economy led to a reshaping of the way we do business, for example.

The question is whether and how can we maintain control of this research process in the long term? What will happen when research moves to the other level, of improving the biological functions of healthy humans? When will neuroscience, neuropharmacology, cognitive prosthetics and brain-machine interfaces move beyond the current early stages of

[10] *Ibidem.*

development and offer the possibility of uploading brain cognition, memory, affect, volition and other neurological processes onto a computer, generating the post-human cloud computing? What will happen when an outside force will virus this cyborg-like system or when the technology provider intervenes on the human biotech product, erasing its affect or other components of its personality? Where is the free will of the post-human individual? What 'rights' of the human and the post-human will be next? And what might be the outcome of such "programming"?

But until we will find the answers for all these questions, a few things are certain. Today, the Transhumanist Movement is more active than ever, and a few countries hold supremacy in its fields of research. It is no coincidence that these countries are also the biggest technological powers. Japan, the US, China, Germany and Italy have distinguished themselves in the development of artificial intelligence. The US and China have developed research programs in human-machine interface, cybernetic systems and molecular manufacturing. The US and Russia already have decades of cryonics research. Israel stands out in gene therapies. Russia, the US and China are developing research in space, space colonization and space weapon systems. It is becoming increasingly clear that we are moving towards a global race of 'human enhancement' and emerging strategic technologies. But, a 'race' of 'good intentions' that needs extremely rigorously controlled internationally, through very strict rules and cross-checking mechanisms. A 'last' global competition that will make the difference between the future winners and losers.

What might be the security impact of the 'human enhancement' and emerging strategic technologies race?

First, the world might be reconfigured along technological lines. State power might no longer be able to relate only to the classic dimensions theorized by political scientists but, above all, might be expressed by technological capacity and the degree of participation in global technological research. In this case, research that will have a massive impact on the military, both in terms of weapons systems and the way in which warfare will be conducted. A modern war of space platforms, unmanned vehicles, cyber and electronic warfare, android robots, nanobots and quite possibly cyborgs. The future poles of hegemonic power might therefore belong to the technological powers, which might form military and technological alliances with states of interest in terms of sectoral research, geostrategic position and the raw materials of the future – strategic minerals (including silicon in the sand). As a result, there might be an intensification of geopolitical competition for control of sea coasts and continental shelves (rich in sand), as well as subsoils rich in strategic minerals. States with no technological ambitions and less to offer in terms of resources and geostrategic position might make up the underdeveloped, colonizable marginality, subject to the geopolitical game. The technological split might be deeper and more radical than any other division of the world. Emerging technology' hegemons might accumulate more power than ever before. The alignment and structuring of the international system might be more rigorous. States dependent on the security "umbrella" of the technological hegemon might be even more aligned. The more technological hegemons will be, the lower the major risk of a technological unipolarity.

The technology race might bring with it a new security dilemma and a new arms spiral. The new security dilemma might raise the question of '*what kind of technological research can be developed by a state so as not to arouse suspicion about its intentions?' How can a state without technological ambitions ensure its security, how can it build alliances? Or, in other words, who might allocate resources to protect a technological ballast?*

Last but not least, there is the risk of a global economic 'overheating' in the context of the technological sprint, especially in the military field. An overheating that could generate a massive economic crisis of a structural nature that could throw the poorer and underdeveloped

regions of the world into chaos. A crisis that could result in the restructuring of the global economic system.

So how will it be possible to strike a balance between cutting-edge technological research, which comes up with new developments every year, and the economic capacity of countries to renew their defense capabilities? How much security can state with technologically outdated weapons systems still have? How should they reconfigure their defense and security strategies? How should they design their defenses? Is a medium-term projection still valid? Or should five-year adjustments be made?

Obviously, the answers to these questions depend on many factors (state power, scientific research strategy, grand strategy of transformation into technological power, etc.). But they also have a point of convergence - the need for system restructuring. The technological future requires major adjustments, starting with educational curricula, the development of technical education, strategic and critical thinking, investment in basic and applied research, research platforms and ending with re-industrialization, in line with the targeted research areas. On the military side, the technological sprint is the most worrying, as alignment with the latest weapon system designs will make the difference between survival and annihilation. Such an alignment is only possible within military and technological alliances, the only formats that can ease the economic strain of such an alignment.

The future will belong to those alliances in which the technological sprint will be provided in a 'Pooling and Sharing' format, in which the research sectors will be distributed among the allies and the technological endowment of the member states will be seen as a common defensive objective and not just an individual, national one. Consequently, the future will belong to those states that will design a Grand Strategy of transformation into technological power, because only this future will ensure their place in technological alliances and maximize their security.

All these questions and possible answers must, however, be seen in the broader context of transhumanism research. Emerging technologies and transhumanism are transforming the world. It depends on each people how aware they will be of these transformations and how prepared they will be for them.

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